Sunshine Coast Regional District Community Wildfire Protection Plan

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Report by Diamond Head Consulting April 2021

Community Wildfire Protection Plan for Sunshine Coast Regional District

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Executive Summary

The Sunshine Coast Regional District has prepared this Community Wildfire Protection Plan in partnership with the Sechelt Indian Government District, Town of Gibsons, and District of Sechelt. This plan examines wildfire risk in the shared wildland-urban interface of the partnering governments and offers recommendations to improve community preparedness and resilience to wildfire.

The type of development and extensive forested areas that characterize the Sunshine Coast also contribute to its vulnerability to wildfire. Many communities are intimately intermixed within and among the region's forest. A complex geography of inlets, mountains, and islands restrict most locations to only one or two points of access to the wider region in the event of a local emergency. The region is isolated from the rest of British Columbia and relies on marine transportation to service daily needs and, if necessary, evacuation. Much of the infrastructure critical to the functioning of these communities, including water and electrical utilities, fire stations, communications, and community buildings, is located within the wildland-urban interface. Sections 1 through 3 of this CWPP place the study area in context of these factors and identify key values at risk.

The wildland urban interface is the zone where homes and businesses meet the forested landscape. In British Columbia, this has historically been defined by area that have over six structures per hectare that are adjacent to greater than two kilometres of forest. Within this CWPP, the recognized wildland urban interface is 441 km² and has been adjusted to account for local geography and important values at risk. In the wildland urban interface, consultants conducted wildfire risk assessments on public land, examining structures and the characteristics of forest vegetation. These assessments were used to map the wildfire risk in relation to known values throughout the wildland urban interface. The analysis shows that much of the study area is characterized by a high wildfire risk, including the areas around communities such as Egmont, Pender Harbor, Halfmoon Bay, West Sechelt, Sechelt Inlet, Roberts Creek, Port Mellon, and Gambier Island. Development in these areas has placed buildings and infrastructure near forests that can sustain fires with moderate to high wildfire behavior. Centrally located areas in the District of Sechelt, the Sechelt Indian Government District, and the Town of Gibsons face moderate or low risk because they are more widely separated from adjacent forests by agricultural land, industrial quarries (SIGD), or intervening residential development. Section 4 of this CWPP describes the results of risk analysis.

There are proactive measures that can be taken to reduce wildfire risk through operational treatments of interface fuels, community planning, and preparedness as well as education to increase public awareness. Twenty four interface areas that pose a substantial risk to urban development and critical infrastructure have been identified. These include public lands that qualify for funding to develop and carry out treatment prescriptions. The management of interface areas that are on private land are generally beyond the jurisdiction of local government. Public education and awareness of wildfire risk and options for mitigation and preparedness is a critical component of this CWPP. The Firesmart program and its resources should be distributed to residents as the foundation for raising public awareness.

Local governments have some ability to mitigate wildfire risk through planning and policies. Creating development permit areas is recommended to reshape interface areas over time. These influence the design of buildings and landscaping and improve the resilience of new structures to wildland fire. Other



actions include review of land use regulations, updating of building and subdivision codes, encouraging neighbourhood FireSmart programs, and providing additional resources for a regional wildfire coordinator. Recommendations to treat interface fuels, improve community planning, and increase public awareness are summarised in Section 5.

Early detection and response are critical to prevent large scale wildfire events. Firefighting resources available to the project partner governments have been inventoried as well as training systems. Water availability is reviewed both for wildland and structural fires. Emergency planning and evacuation is reviewed, and recommendations are made to develop both local and regional evaluation plans. Section 6 provides a summary of recommended suppression response protocol and resources available to these communities.

This Community Wildfire Protection Plan has been developed by the project partners to acknowledge existing and future wildfire risk in our communities. It provides a roadmap for improving the resilience of this area to this natural hazard. Prioritised recommendations are made and framed to access further funding opportunities. The project partners recognize this Plan as a fundamental first step towards improving the resilience of the communities to the impacts of wildfires.



Summary of CWPP Recommendations

This report includes information about the current wildfire threat and risk within the study area and provides many recommendations on what can be done by both local government and private individuals. Some of these recommendations can be implemented with relatively low cost. Others, such as fuel treatments, require more substantial resources and support from the Provincial government and inter-agency cooperation. Recommendations have been prioritized based on how quickly they can be implemented and their relative impact on reducing wildfire risk.

There are funding sources available to help implement many of these recommendations. UBCM manages the Community Resilience Investment (CRI) Program which offers up to 100% funding for a range of wildfire mitigation initiatives. Many of the recommendations made in this report are eligible for CRI funding. Estimated costs for implementing these recommendations are in addition to existing operating budgets.

Number	Action Item	Section in document	Priority	Timeline years	Estimated cost or effort
1	Continuously review the CWPP as a living document and complete an update every 5 years.	1.2	Low	5+	CRI funding eligible
2	Develop a fuel management working group with representatives from the provincial government, regional district, partnering governments, and local First Nations to establish and review prioritization for fuel management.	5.1	High	1-2	80 hours
3	Develop fuel management plans for treating priority interface treatment areas. Target top 3-6 priority areas under local government jurisdiction for prescription development, with a phased approach for next areas. All planning will require consultation and partnerships with local First Nations.	5.1	High	1-2	CRI funding eligible
4	Implement prescriptions developed from the fuel management plan.	5.1	High	2-3	CRI funding eligible
5	Develop a parks forest management plan for SCRD parks that includes objectives for fuel management and strategies for achieving those objectives.	5.1	Medium	3-5	CRI funding eligible
6	Conduct FireSmart assessments for First Nation owned buildings, publicly owned buildings or publicly, provincially and First Nations owned critical infrastructure in the AOI.	5.1	High	1-2	CRI funding eligible



Number	Action Item	Section in document	Priority	Timeline years	Estimated cost or effort
7	Use FireSmart assessments to prioritize retrofitting and fuel management for critical infrastructure in the SCRD in the AOI.	5.1	High	2-3	CRI funding eligible
8	Create a FireSmart Demonstration project for SCRD owned critical infrastructure.	5.1	Medium	2-3	CRI funding eligible
9	Create a FireSmart Demonstration project for District of Sechelt owned critical infrastructure.	5.1	Medium	2-3	CRI funding eligible
10	Create a FireSmart Demonstration project for SIGD owned critical infrastructure.	5.1	Medium	2-3	CRI funding eligible
11	Create a FireSmart Demonstration project for Town of Gibsons owned critical infrastructure.	5.1	Medium	2-3	CRI funding eligible
12	Develop a Regional Fire Smart Coordinator position through the SCRD. Responsibilities of this coordinator are described in Table 21. Include an array of metrics to assess the success of this new role, and reassess effectiveness after one year.	5.2.2	Medium	1-2	CRI funding eligible
13	Develop FireSmart plan for identified high wildfire risk FireSmart priority areas.	5.2.2	High	2-3	CRI funding eligible
14	Develop FireSmart plan for identified moderate wildfire risk FireSmart priority areas.	5.2.2	Medium	3-5	CRI funding eligible
15	Support homeowners to reduce fuel loading on private land by reducing barriers to debris disposal. This could include providing bins for waste, chipping and disposing of waste, or waiving tipping fees for fuel management debris.	5.2.2	Medium	2-3	CRI funding eligible
16	Conduct a regional study to determine areas for a Wildfire Development Permit Area to apply. This should examine the feasibility and impact on property of applying different buffer distances from areas of high risk fuels or native forest vegetation to determine the DPA extent. Individual OCP amendments will be required for each jurisdictional area.	5.2.3	High	1-2	CRI funding eligible
17	Revise the Egmont/Pender Harbour Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible



Number	Action Item	Section in document	Priority	Timeline years	Estimated cost or effort
18	Revise the Elphinstone Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
19	Revise the Halfmoon Bay Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
20	Revise the Hillside/Port Mellon Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
21	Revise the Roberts Creek Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
22	Revise the Twin Creeks Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
23	Revise the West How Official Community Plan to include wildfire as a Development Permit Area.	5.2.3	High	2-3	CRI funding eligible
24	Revise the District of Sechelt Official Community Plan to include wildfire as a Development Permit Area for the District of Sechelt.	5.2.3	High	2-3	CRI funding eligible
25	Develop a community communication and engagement strategy.	5.3	High	1-2	80 hours
26	Establish neighbourhood specific interest groups. Including a local government representative and/or Fire Rescue liaison in these groups will facilitate engagement and education on FireSmart initiatives and keep the focus of the groups on wildfire issues.	5.3	Medium	2-3	CRI funding eligible
27	Representatives from each government should receive training for Local FireSmart Representatives, Home Partners, FireSmart 101, and Community Champions	5.3	Medium	2-3	CRI funding eligible
28	Develop a FireSmart brochure that focuses on the local context of wildfire in the AOI. Include material on reducing human caused fires.	5.3	High	1-2	CRI funding eligible
29	Provide educational material and promote wildfire awareness during large public events or festivals, as through brochures and pamphlets, scheduled presentations, or information booths.	5.3	Medium	2-3	CRI funding eligible
30	Organize an open house to accompany any FireSmart fuel treatments undertaken by the project partners.	5.3	Medium	2-3	CRI funding eligible



Number	Action Item	Section in document	Priority	Timeline years	Estimated cost or effort
31	Distribute a summary of this CWPP through local government communications channels. Include summary maps for easy reference for community members.	5.3	High	1-2	CRI funding eligible
32	Update the local government websites to contain direct links to important FireSmart resources, such as this CWPP and the FireSmart Begins at Home Manual. If possible, include local FireSmart buildings and landscaping as examples.	5.3	High	1-2	CRI funding eligible
33	Integrate wildfire layers from this report into the GIS open data tools that exist on partnering government websites.	5.3	High	1-2	CRI funding eligible
34	FireSmart projects, including any building changes or vegetation and fuel management, should be showcased on local government websites and potentially with interpretive signage in the field.	5.3	High	1-2	CRI funding eligible
35	Conduct annual spring media campaign to promote reducing human wildfire ignitions.	5.3	High	1-2	CRI funding eligible
36	Consult and coordinate with utility providers to create defensible spaces and reduce risk around all substations.	5.4	Medium	1-2	CRI funding eligible
37	Post wildfire awareness signs at high use camp sites, recreation areas, and high use trail heads during the summer.	5.4	Moderate	1-2	\$5,000
38	Create a water availability map for the study area, integrating information from all partnering fire departments.	6.1.2	High	1-2	CRI funding eligible
39	Identify critical water resources on the water availability map. Identify the specific critical resources that should not be used for drafting.	6.1.2	High	1-2	CRI funding eligible
40	Complete evacuation plans for each partnering government.	6.1.3	High	3-5	Non CRI Funding streams available
41	Ensure that all firefighters in all departments receive basic wildfire training, including S100, S185, and ICS100.	6.1.4	High	3-5	CRI funding eligible
42	Ensure that all fire departments are trained in use of Structure Protection Unit deployment.	6.2	High	1-2	Integrate into current training program



Number	Action Item	Section in document	Priority	Timeline years	Estimated cost or effort
43	Conduct cross-jurisdictional meetings and tabletop exercises annually before fire season. Include emergency managers from partnering governments, representatives from local fire departments, and representatives from the BCWS.	6.2	High	1-2	CRI funding eligible



Table of Contents

1	SECTION	1: INTRODUCTION	15
	1.1	Purpose	15
	1.2	CWPP Planning Process	19
2	SECTION	2: LOCAL AREA DESCRIPTION	22
	21	CWPP Area of Interest	22
	2.2	Community Description	
	2.3	Past Wildfires. Evacuations. and Impacts	
	2.4	Current Community Engagement	
	2.5	Linkages to Other Plans and Policies	
		2.5.1 Affiliated CWPPs	
		2.5.2 Local Authority Emergency Plan	
		2.5.3 Local Government and First Nation Plans and Policies	
		2.5.4 Higher Level Plans and relevant Legislation	
		2.5.5 Ministry or Industry Plans	34
3	SECTION	3: VALUES AT RISK	37
	3.1	Human Life and Safety	37
	3.2	Critical Infrastructure	40
		3.2.1 Electrical Power	40
		3.2.2 Communications, Pipelines, and Publicly Owned Buildings	41
		3.2.3 Water and Sewage Infrastructure	43
	3.3	High Environmental and Cultural Values	46
		3.3.1 Drinking water supply areas and community watersheds	46
		3.3.2 Cultural Values	47
		3.3.3 High Environmental Values	48
		3.3.4 Other Resources Values	54
		3.3.5 Hazardous Values	54
4	SECTION	4: WILDFIRE THREAT AND RISK	55
	4.1	Fire Regime, Fire Weather, and Climate Change	55
		4.1.1 Fire Regime and Fire Weather	55
		4.1.2 Climate Change	59
	4.2	Provincial Strategic Threat Analysis (PSTA)	61
		4.2.1 Fire History	64
	4.3	Local Wildfire Threat Assessment	65
5	SECTION	5: RISK MANAGEMENT AND MITIGATION FACTORS	73
	5.1	Fuel Management	73
	5.2	FireSmart Planning and Activities	83
		5.2.1 FireSmart Goals and Objectives	86
		5.2.2 Key Aspects of FireSmart for Local Governments and First Nations	86
		5.2.3 Identify Priority Areas within the Area of Interest for FireSmart	90
	5.3	Community Communication and Education	94
	5.4	Other Prevention Measures	97
	5.5	Summary of Recommendations	98
6	SECTION	6: WILDFIRE RESPONSE RESOURCES	100
	6.1	Local Government and First Nation Firefighting Resources	101
		6.1.1 Fire Departments and Equipment	101



	6.1.2 Water Availability for Wildfire Suppression	
	6.1.3 Access and Evacuation	
	6.1.4 Training	
6.2	Structure Protection	
6.3	Summary of Recommendations	
APPENDIX 1	LOCAL WILDFIRE THREAT PROCESS	106
A 1.1	Fuel Type Attribute Assessment	
A 1.2	Proximity of Fuel to the Community	
A 1.3	Fire Spread Patterns	
A 1.4	Topography	
A 1.5	Local Wildfire Threat Classification	
A 1.6	Local Wildfire Risk Classification	
A 1.7	Summary of Fire Risk Classes	
APPENDIX 2	WILDFIRE THREAT ASSESSMENT WORKSHEETS AND PHOTOS	119
APPENDIX 3	DESCRIPTION OF TERMINOLOGY	120
APPENDIX 4	REFERENCES	



List of Figures

Figure 1. Total area (ha) burned by wildfires in BC by year	17
Figure 2. CWPP Planning Process Model	21
Figure 3. This CWPP AOI showing land ownership.	23
Figure 4. Land tenures in the AOI	25
Figure 5. Location of previous wildfire events in the AOI	28
Figure 6. Density of structures	39
Figure 7. Critical Infrastructure	45
Figure 8. Location of provincially Red- and Blue-listed species	50
Figure 9. Location of provincially Red- and Blue-listed species	51
Figure 10. Critical habitat for federally listed wildlife	52
Figure 11. Critical habitat for federally listed wildlife	53
Figure 12. Climate change impacts on wildfire risk.	60
Figure 13. Input factors and contributing weights to the final PSTA score	61
Figure 14. Provincial Strategic Threat Analysis threat rating for public owned lands	63
Figure 15. Wildfire behaviour threat map	67
Figure 16. Future wildfire risk projection.	72
Figure 17. Fuel treatment area map	76
Figure 18. Wildfire risk to homes	84
Figure 19. FireSmart Management Zones	85
Figure 20. Characteristics of the seven conifer fuel types	107
Figure 21. Updated fuel type map for the AOI	110
Figure 22. Initial Spread Index (ISI) Rose from TS Elphinstone	114



List of Tables

Table 1 Broad land ownership within the AOI	22
Table 2 Land ownership with Crown land breakdowns within the AOI	24
Table 3 Employees by key sectors in Sunshine Coast Regional District	26
Table 4 Summary of wildfires in the AOI since 1950	27
Table 5. Wildfire management in provincial parks	35
Table 6. Wildfire management in marine parks	35
Table 7 Wildfire management in ecological reserves	35
Table 8 Summary of density	38
Table 9 List of publicly owned critical infrastructure	41
Table 10 List of critical infrastructure (water and sewage) provided by the project partners	44
Table 11 Community watersheds overlapping the AOI.	46
Table 12 Recorded known occurrences of Red and Blue listed species that inhabit the AOI	48
Table 13 Recorded known occurrences of Red and Blue listed ecological communities found in the AOI	49
Table 14 Climatic characteristics of the biogeoclimatic zones within the project area	55
Table 15. Summary of the biogeoclimatic zones within the AOI by Natural Disturbance Type	56
Table 16 Weather statistics for the months of May to Sept (1980-2010)	58
Table 17. Average number of moderate, high, and extreme rated fire danger days	58
Table 18. Summary of wildfire threat on public owned lands	62
Table 19 Fuel treatment summary table	77
Table 20 FireSmart practices and activities	87
Table 21. Primary responsibilities of the Regional FireSmart Coordinator	89
Table 22 Summary of FireSmart	90
Table 23. Existing development policies related to wildfire in the SCRD and District of Sechelt	91
Table 24. Regulatory considerations	93
Table 25. Potential key messages for a wildfire communications strategy	95
Table 26. Potential methods of public outreach for wildfire communications	96
Table 27 Summary of recommendations discussed in Section 5	98
Table 28. Local fire training standards and recommended courses	104
Table 29 Summary of recommendations discussed in Section 6	105
Table 30 Fuel Type Categories and Crown Fire Spot Potential	111
Table 31 Proximity to the Interface	112
Table 32 Slope percentage and fire behaviour implications.	115
Table 33 Slope position of value and fire behaviour implications	115
Table 34 Wildfire behavior category based on fire intensity	116
Table 35. Wildland Urban Interface Threat Class	117



Section 1: Introduction

1.1 Purpose

The Sunshine Coast Regional District (SCRD), Town of Gibsons, District of Sechelt, and the Sechelt Indian Government District (SIGD) recognize wildfire planning and mitigation as a critical component of emergency preparedness for their communities. The varied geography and forest character of the communities present unique challenges and opportunities for managing wildfire risk in this region. Communities are generally set within the forest and have areas of *intermix* development – where buildings are closely placed within and among trees – and areas of *interface* – where contiguous urban development directly abuts forests. This region where homes and structures are threatened directly by forest fire is the *wildland urban interface*, and generally considered to extend up to two kilometres around urban developments. In recognition of the vulnerability to wildfire, the aforementioned local governments have created a partnership to proactively manage wildfire risk. This partnership has commissioned this Community Wildfire Protection Plan (CWPP) to improve the resilience and protection measures of the partnering communities.

Wildfire risk is a product of the probability of a wildfire occurring combined with the consequences if it did occur.

Wildland urban interface is the area around communities where development is among or abuts forest, and consequently where development faces greater wildfire risk.

The purpose of this CWPP is to define the risk from wildfire to human life, property, critical infrastructure, and identified values, and to provide a framework to proactively reduce this risk. This document identifies necessary measures and actions that will result in:

- 1. Reduced likelihood of a wildfire entering the community.
- 2. Reduced impacts and losses to property, critical infrastructure, and other values.
- 3. Reduced negative economic and social impacts to the community.
- 4. Future development that is resilient to wildfires.



The mitigation of wildfire risk is an ongoing effort which is achieved through adoption of municipal policy, vegetation management, and community education. Several themes are defined and provide a framework for this CWPP document :

Theme 1: Much of the understanding of the nature of wildfire risk is from other regions, which adds uncertainty to predicting fire behavior and likelihood on the Sunshine Coast.

Theme 2: Climate change is expected to result in higher levels of wildfire risk in the near future.

Theme 3: The project partners can proactively mitigate wildfire risk through the management of interface vegetation and community policy and planning.

Theme 4: Inter agency cooperation between the project partners and provincial agencies is critical to manage wildfire risk.

Wildfire Trends

Wildfires have historically been the most significant natural disturbance in British Columbia. The impacts from wildfires have been increasing throughout the province. Over the past decade there has been an average of 1,692 fires per year in British Columbia, burning an average of 151,000 ha each year (BC Wildlife Service, 2020). Almost half of these fires were a result of human-caused ignitions. Wildfires have cost the province almost 2.6 billion dollars in the last decade in direct costs for suppression and emergency response (BC Wildfire Service, 2020). This does not include the impacts of evacuations and business closures, uninsured losses, public health expenditure for treating smoke inhalation and burns, as well as anxiety and trauma resulting from wildfire events. The 2017 and 2018 wildfire seasons were the worst on record in British Columbia, damaging over 2.5 million hectares; an area equal to 80% of Vancouver Island, or 6.5 times the size of the SCRD's total area. In 2017, several large interface fires resulted in the displacement of 65,000 people under evacuation orders, while many hundreds of thousands suffered from heavy smoke in BC's major urban areas (BC Wildlife Service, 2020).



The trend of increased area burned and fire suppression costs has been documented across North America (Marlon, et al., 2012). This can be in part attributed to climate change, which is contributing to hotter and drier weather in the spring and summer. This is causing vegetation to grow earlier, dry out faster, and remain dry for a longer period (Hope, McKenney, Pedlar, Stocks, & Gauthier, 2016). Since 1985, it is estimated that 50% of the increase in the area burned by wildfire in the western United States has been due to human caused climate change (Abatzoglou & Williams, 2016). Worldwide, the length of the fire season increased by 19% from 1979 to 2013. Research in British Columbia has estimated that the record-setting 2017 fire season was made 2-4 times more likely by climate change (Kirchmeier-Young, Gillett, Zwiers, Cannon, & Anslow, 2019).



Figure 1 Total area (ha) burned by wildfires in BC by year from 2007 to 2019 (BC Wildlife Service).



Historically, the temperate coast of BC has experienced smaller wildfires, often contained by unfavourable fuel conditions and weather (Lertzmann, et al., 2002; Daniels & Gray, 2006). However, the risk of large wildfires to coastal communities is predicted to increase with longer and more extreme wildfire seasons. *Fuels* are those elements of the forest that can burn, including the forest floor, logs, dead branches and needles, and live foliage of trees. Owing to the coast's optimal growing conditions, fuel loading is often high (Morgan, Bagley, McGill, & Raymond, 2019). Consequently, when wildfire threat is elevated there is potential for extreme fire behavior. While the wet, maritime climate of the region limits wildfire potential for much of the year, the increasingly prevalent dry summer conditions present a window during which the threat of a wildfire is considerable (Halofsky, Conklin, Donato, Halofsky, & Kim, 2018; Agee, Wright, Williamson, & Huff, 2002). This vulnerability has been proven south of the border, with coastal ecosystems in Oregon and Washington experiencing extreme wildfires that are outside the historical coastal fire regime.

Climate change models are predicting that the mean annual temperature will increase by 1.6°C by the 2050s, led by similar summer temperature increases. Precipitation during the summer is expected to decline by 16%, while much more of the winter precipitation in watershed headwaters will fall as rain instead of snow (Pacific Climate Impacts Consortium, 2013). Warmer temperatures and reduced summer precipitation can be expected to increase the length of the wildfire season and the incidence of wildfire in coastal forests (Haughian, Burton, Taylor, & Curry, 2012). Feasible strategies to protect communities from wildfire must focus on the factors that can be changed now. This includes managing fuel in forested areas adjacent to development, enhancing building and neighbourhood design, improving suppression response and capability, reducing human-caused ignitions, and increasing public awareness of wildfire risk through education.



1.2 CWPP Planning Process

CWPP Guiding Principles

The following guiding principles have been developed to help guide and support decision making and prioritize actions to manage wildfire risk. See Figure 2 for an illustration of the CWPP development process.

Guiding Principles				
Public Health and Safety	Public safety is the foremost priority for all wildfire management activities.			
Protection of infrastructure	Community infrastructure, including private property, public structures, and facilities, is protected from wildfire.			
Sustainable Planning	Growth and development improve quality of life, maintain a healthy environment, and ensure a prosperous future.			
Environmental Protection and Enhancement	Ecosystems that support biodiversity and environmentally sensitive features are protected and enhanced.			
Interagency Co- operation and Policy	Wildfire management planning, preparedness, prevention, suppression, ecosystem rehabilitation, and education occurs in co-operation with all relevant agencies and neighbouring local governments.			
Public Awareness, Education and Advocacy	Public understanding, support and awareness of wildfire risk management is increased through effective education, advocacy, and communication.			
Adaptive Management	The effectiveness of wildfire management initiatives is monitored and continuously improved by reviewing actions and decision-making processes.			
Financial Responsibility	Wildfire management initiatives are prioritized and implemented adequately within reasonable, sustainable budgets and through innovative partnerships.			

CWPP Implementation History and Planning Process

In 1999, the Sunshine Coast Regional Fire Centre mapped the fire hazard for populated areas within the Regional District. This effort was a prelude to greater wildfire management by local government resulting from the 2003 Filmon Report, which called for more provincial investment in community wildfire planning (Filmon, 2003). This project examined fuel loading, topography, weather, fire suppression capacity, land use, and fire history to assign areas of the Regional District a numerical score representing fire hazard. This analysis determined that the risk of wildfire to some areas of the Regional District was high or extreme. This assessment spurred local government to pursue FireSmart initiatives throughout the region's communities.



In recognition of changed conditions over twenty years, the SCRD has worked with the Town of Gibsons, District of Sechelt, and Sechelt Indian Government District to secure a grant through the Community Resiliency Investment (CRI) program which has allowed the development of this Community Wildfire Protection Plan. The project partners selected Diamond Head Consulting to prepare the Community Wildfire Protection Plan in July of 2020.

A Living Document

Recommendations in this CWPP are designed to be implemented over both short and long timeframes while also acknowledging that wildfire risk will continue to change due to development, climate change and ecosystem dynamics. This plan is intended to be a living document that will be updated every five years.

Recommendation Number	Action Item	
1	Continuously review the CWPP as a living document and complete an update every 5 years.	

CWPP Consultation Process

This CWPP update was developed in consultation with First Nations and local stakeholders. Stakeholders were engaged and asked to provide feedback at the start of this project. High public interest in the plan has been met with dedicated public engagement in addition to direct stakeholder outreach. This took the form of mostly digital engagement; public open houses were planned, but were not possible due to the COVID-19 public health emergency. The CWPP will be presented at public council meetings and includes recommendations for ongoing engagement at community events.







Figure 2. CWPP Planning Process Model



Section 2: Local Area Description

2.1 CWPP Area of Interest

The study area for this CWPP is the *wildland-urban interface* (WUI) within the Sunshine Coast Regional District. This area overlaps the administrative boundaries of the District of Sechelt, Town of Gibsons, and the Sechelt Indian Government District. These are the lands within several kilometers of where urban development reaches a minimum density of six structures per hectare, with adjustments made to account for local geography. The total project study area (Area of Interest or AOI) is 441.1km² or 11.7% of the land area of the Sunshine Coast Regional District.

The Regional District is located on the southern mainland coast of British Columbia, between the regional districts of Metro Vancouver and Powell River. The AOI is separated from adjacent communities by the inshore waterways of the Salish Sea. The largest communities are Gibsons, located on the shore of Howe Sound, and Sechelt, located on the isthmus between the Strait of Georgia and the head of Sechelt Inlet. Smaller communities occupy the bays, coves, and islands adjacent to the coast, with little development in mountainous inland areas. The Regional District has a land area of approximately 3,774 km² and a population of approximately 30 000 (2016 census).

The Sunshine Coast Regional District is located within the traditional territories of the shishalh Nation and Skwxwú7mesh Nation. The shishalh territory encompasses most of the regional district west of Roberts Creek, including the lands and waters around the Sechelt and Jervis Inlets. The Skwxwú7mesh territory encompasses the watershed around Howe Sound, including the area around Gibsons and Port Mellon. Four First Nation Reserves of the Skwxwú7mesh and 17 areas of shishalh Nation Land are within the project area. These total approximately 442 hectares and are located throughout the project area.

Within the project area there is a mix of land ownership. A total of 21% of the AOI is privately owned and 62% is Crown Land (Table 1, Figures 3 and 4).

Jurisdiction	Area within the AOI (ha)	% of area within the AOI
Private land	18,656	21%
Provincial Crown Land (includes municipal parcels and parks)	54,109	62%

 Table 1 Broad land ownership within the AOI

*Note: All tables included in the report and accompanying maps have used UTM area calculations for the highest degree of accuracy. The geospatial data supplementing this report also include area calculations, however these are based on BC Albers. The minor differences between data contained in the tables in this report and the geospatial data is due to these different map projections.





Figure 3. This CWPP AOI showing land ownership.



Table 2 Land ownership with Crown land breakdowns within the AOI.

Jurisdiction	Area within the AOI (ha)	% of area within the AOI
Crown - Community Watershed	7,049	8
Crown - Conservancy Area, Ecological Reserve, Protected Area, Provincial Park	5,921	7
Crown - Forest Management Unit	22,747	26
Crown – Forest Recreation Reserves	113	0
Crown - Local/Regional Park	1,529	2
Crown - Misc. Reserves	1,186	1
Crown - Municipal Parcels	382	0
Crown - UREP (Use, Recreation and Enjoyment of the Public Reserve)	1	0
Crown - Watershed Reserve	3,569	4
Crown Lease - Misc. lease	54	0
Crown Tenure – Community Forest Agreement, Schedule B	9,525	11
Crown Tenure – Woodlot Licence, Schedule A	172	0
Crown Tenure – Woodlot Licence, Schedule B	1,857	2
Federal - Dominion government Block/Federal Parcels	3	0
Federal - First Nation Reserve*	440	1
Private	18,656	21
Unknown Ownership/Exceptions	14,154	16

*Shíshálh Nation Lands are designated as "Federal Indian Reserve" in the spatial data layer referred to for these tables.





Figure 4. Land tenures in the AOI.



2.2 Community Description

The Sunshine Coast Regional District contains two incorporated municipalities, the Sechelt Indian Government District, and five electoral areas which are directly administered. The Regional District is 3,774 km² in area, of which 441 km² is within the AOI. The study area is heavily forested, with urban development outside of a few main town centres occurring within a matrix of continuous forest cover. Small areas around Sechelt and Gibsons are used for agriculture. The Provincial Strategic Threat Analysis identifies a relatively small area of 234 hectares as non-vegetated ("non-fuel") land cover within the project area.

While the forest industry has historically been central to the economy of the AOI and remains an economic driver, the region is well-known as a destination for tourism and recreation. Retail trade and government services are the largest employers.

Sector	Employees
Agriculture, forestry, fishing, and hunting	565
Mining	150
Utilities	50
Construction	1,420
Manufacturing	915
Wholesale trade	295
Retail trade	1,840
Transportation and warehousing	765
Information and cultural industries	360
Finance and insurance	380
Real estate and rental and leasing	280
Professional, scientific, and technical services	1,175
Management of companies	10
Administrative and support functions	800
Educational services	995
Health care and social assistance	1,440
Arts, entertainment and recreation	420
Accommodation and food services	1,145
Other services	635
Public administration	565

 Table 3 Employees by key sectors in Sunshine Coast Regional District (Statistics Canada, 2017)



2.3 Past Wildfires, Evacuations, and Impacts

There have been 182 wildfires in the AOI since 1920, burning a total area of approximately 11,637 ha. (Table 4). In the past 10 years there have been 49 fires that have burned approximately 152 hectares.

Table 4 Summary of wildfires in the AOI since 1950.

AOI Fires Summary	# of Fires	Area Burned (ha)
Total 1920 – 2019	182	11,637
Average #/year	1.8	116.4
Total 2010-2019	49	152
2010-2019 Average #/year	4.9	15.2

There has been one major wildfire in the last ten years in the study area. The Old Sechelt Mine Wildfire occurred in July of 2015, during a period of extreme summer drought and high temperatures. This wildfire was approximately 1 km northwest of homes in Sechelt and required evacuations and the declaration of a state of local emergency. The British Columbia Wildfire Service (BCWS) and the Sechelt Fire Department responded, with BCWS coordinating most of the suppression operations. Although no homes were damaged or destroyed by this wildfire, one contract tree faller tragically lost his life during the wildfire suppression operation. Photo 1 is an aerial photo that illustrates how close this fire came to homes in Sechelt.



Photo 1. Aerial photo showing portion of the 2015 Sechelt fire (grey forest area in upper left of the photo).





Figure 5. Location of previous wildfire events in the AOI. Polygons represent larger wildfires while points represent smaller fires (<1 ha). Color codes represent fires within different decades. No wildfires in this data set overlap with SIGD or Gibsons.



A recent wildfire occurred in 2019 near Port Mellon. Although this fire was smaller than the 2015 Sechelt fire, it came very close to industrial facilities in Port Mellon which include large fuel accumulations from timber processing. BCWS aggressively actioned this fire with airtankers and ground crews to prevent the spread and limited the fire to 3 hectares. A five hectare wildfire occurred at Cecil Hill in 2019. This fir occurred downslope of a communications tower and adjacent homes, with some residents placed on evacuation order. Aggressive action by the BCWS contained this wildfire before any structures were involved.

Wildfires in coastal ecosystems are infrequent. They are typically small and with a low intensity. These trends are consistent with the wildfire history in the AOI. There does however appear to be a shift wildfire trends occurring in coastal ecosystems in the broader Pacific Northwest. In 2020, temperate forests in western Oregon experienced catastrophic wildfires that were unprecedented in modern times, leading to 11 deaths and thousands of burned homes (Oregon Department of Forestry, 2020).

Coastal forests have an abundance of fuel, as typical growing conditions are optimal for vegetation growth. When conditions are dry and hot, which is occurring more frequently due to climate change, there greater potential for fires to exhibit extreme wildfire behaviour. The understanding of wildfire behaviour and risk has largely been informed by experiences in areas with frequent wildfires, typically drier interior forests with lower fuel accumulations. There is less experience with managing risk in the heavy fuel loading found in coastal ecosystems because fire is less familiar here. The uncertainty inherent in coastal wildfire risk management must be recognized and carefully considered.



Photo 2. Dense coastal forest intermixed with homes near Sandy Hook Park.



2.4 Current Community Engagement

Wildfire and fire preparedness support and engagement resources are available on the websites for the SCRD, Town of Gibsons, and District of Sechelt. However, formal engagement for this CWPP and other accompanying wildfire initiatives have been complicated by the ongoing COVID-19 pandemic. In response, consultation initiatives have shifted to digital media until live events can be safely hosted.

2.5 Linkages to Other Plans and Policies

The intent of this sub-section is to identify the sources and linkages to other relevant documents, plans, or legal requirements that are relevant to the CWPP planning process. The relevance of objectives, strategies, and polices in these documents are discussed,

2.5.1 Affiliated CWPPs

The AOI is separated from other communities by inlets and uninhabited mountainous terrain. No other CWPP study areas border the study area for this CWPP.

2.5.2 Local Authority Emergency Plan

The SCRD runs the Sunshine Coast Emergency Program and acts as the lead agency for emergency management in the AOI. This program acts as an integrated emergency platform for the SCRD, the Town of Gibsons, the District of Sechelt, and the Sechelt Indian Government District.

A comprehensive emergency response and recovery plan has been developed for the four governments. It guides the operations, organization, responsibilities, and coordination for response and recovery from an emergency or disaster within the AOI. It describes the Incident Command (IC) and Emergency Operations Centre (EOC) functions, locations, and activation. The plan also includes hazard specific roles and procedures. Wildfire is one of the specific hazards within the plan. A series of checklists for the EOC director, operations, planning, logistics, and administration are included to ensure the EOC can provide direction and support to the Incident Command during a wildfire event.

2.5.3 Local Government and First Nation Plans and Policies

A variety of local government plans and policies refer to wildfire risk management.

Hazard Risk and Vulnerability Analysis (HRVA)

Hazard Risk and Vulnerability Analyses (HRVA) assess the hazards which threaten a community. Hazards can be natural such as wildfires, landslides, and severe storms, or human-caused such as industrial accidents and engineering failures. Risk is described as a function of the probability of an event occurring and consequences of that event. Risk has been analyzed for a variety of hazards using a table-based scoring system. HRVAs have been completed for the four governments in the study area. An additional HRVA has also been completed for Gambier and Keats Island. The HRVAs found each study area to have a High or Very High risk associated with wildfire.

Sunshine Coast Regional District Official Community Plans

Official Community Plans (OCPs) guide the intensity of land use and economic activity within a municipality or electoral area. Once in effect, other bylaws adopted by the local government must be



consistent with the OCP. OCPs can contain provisions regulating development within certain areas or other policies regarding the wildland-urban interface, including controls on development in areas of wildfire risk. Several OCPs in the SCRD are in force within the project area. Policies from each relevant to wildfire are summarized below. None of the policies from these OCPs that describe wildfire impacts or hazards have been implemented through further bylaws. Therefore, none of these plans have a means of enforcing any policy concerning wildfire within their applicable areas.

Egmont/Pender Harbour Official Community Plan

Section 2.1 of the Egmont/Pender Harbour OCP includes an objective related to residential land use to reduce the risk of wildfire hazard in residential areas. Homeowners are encouraged to practice vegetation management and consider using non-combustible building materials.

Elphinstone Official Community Plan

Part B-1 of the Elphinstone OCP outlines local environment and development permit areas. One of the objectives is "to protect development from hazardous conditions in the forms of land slip, erosion, marine processes, flooding and wildfires." However, wildfire is not identified as a specific development permit area in this OCP.

Halfmoon Bay Official Community Plan

The Halfmoon Bay OCP does not include specific objectives and policies for managing wildfire hazard in Area B. The OCP is focused on the community of Halfmoon Bay but does make some recommendations for the remaining portions of Area B that are outside Halfmoon Bay. Most of this land is crown owned with little residential use and is also covered by the shíshálh Nation Strategic Land Use Plan (discussed separately below). A key policy for development applications in this portion of Area B is a requirement to complete fire hazard assessments.

Hillside/Port Mellon Official Community Plan

The Hillside/Port Mellon OCP covers an area of mostly industrial use. There are no specific wildfire related guidelines within this OCP.

Roberts Creek Official Community Plan

Several sections of the Roberts Creek OCP pertain to wildfire. Section 5.25 describes a goal of the SCRD to reduce the potential for fires in interface areas. This section recommends the review of development proposals in the context of this goal. There is also an objective to ensure "the interface of RESOURCE and those areas which are rural or residential should be considered within the context of interface fire potential, emergency planning as well as potential impacts on residential uses." There are also several sections in this OCP that specify the importance of maintaining adequate water supply for fire suppression.



Twin Creeks Official Community Plan

The Twin Creeks OCP notes that this area is not within the SCRD fire protection area. An objective of this OCP is to promote the expansion of utilities and services, which includes fire protection. This plan also includes the objective to reduce the threat of property damage from wildfires by encouraging property owners to manage vegetation and coordinate volunteer fire protection.

West Howe Official Community Plan

This OCP notes that certain areas (designated Rural Designation B and Williamsons Landing Residential) lack fire protection. No policies are included that relate to wildfire management.

Towns of Gibsons Official Community Plan

The Gibsons OCP was revised in 2015. This plan emphasizes sustainable growth within the natural environment that surrounds and interfaces with the Town. There is a specific section for policies regarding the natural environment, which includes an objective of reducing risk from natural hazards. However, this does not explicitly identify wildfire as a natural hazard.

The Town of Gibsons bylaw no. 971 restrict open burning in the Town. No backyard burning or beach fires are permitted at any time.

District of Sechelt Official Community Plan

The Sechelt OCP was revised in 2011. Part of the vision identified in this plan is that Sechelt is developed in harmony with its unique natural environment. This OCP also identifies natural hazards that must be addressed during development. However, this does not explicitly identify wildfire as a natural hazard.

The District of Sechelt bylaw No. 486 restricts open burning within the District. Open burning for waste disposal is prohibited.

Sechelt Indian Government District Official Community Plan

The SIGD does not have an OCP. Rather, all land use planning has been amalgamated into the Sechelt Nation Land Use Plan, which is discussed below in 2.5.4.



2.5.4 Higher Level Plans and relevant Legislation

Sunshine Coast Landscape Unit Plans

The Sunshine Coast Natural Resource District contains three Landscape Units that overlap with the AOI: the Sechelt, Chapman, and Howe Landscape Units. These plans provide direction for resource management on crown land and include legal objectives for each area. A fundamental goal in these plans is to maintain landscape level biodiversity values. These plans identify and create Old Growth Management Areas (OGMAs), which are used to ensure critical wildlife habitat is preserved. Few industrial activities are permitted inside OGMAs. Most of the OGMAs identified in these plans are located outside of the wildland urban interface. One exception is in the interface area between Gibsons and the forests of Mount Elphinstone, where OGMAs have been identified within 500m of structures.

Strategic Land Use Plan for the shishálh Nation (Sechelt Nation Land Use Plan)

The Strategic Land Use Plan (SLUP) for the shishálh Nation reviews values found across the shishálh Nation territory or *swiya* and discusses how these values should be managed within a long-term management plan. The AOI and the SIGD land overlaps with the territory included in the SLUP. This plan outlines the strategic goals, priorities, and land use zones which will then influence site specific planning in areas of the *swiya* under direct shishálh administration. As a strategic document, the SLUP does not specifically address wildfire as a forest management or community planning topic, but rather speaks more broadly of forestry in strategic planning. Several goals and priority actions are included that are complementary with those of wildfire management. As a forestry activity, fuel management within the *swiya* must be conducted in collaboration with the shishálh Nation. This CWPP, conducted in partnership with the SIGD, provides the groundwork for further collaboration.



2.5.5 Ministry or Industry Plans

South Coast Response Fire Management Plan

The South Coast Response Fire Management Plan completed in 2020 integrates wildfire response into larger resource and land management objectives. The focus of this plan is on wildfire suppression response, rather than prevention. The Fire Management Plan identifies and prioritizes values at risk by "themes." These themes identify the response priority and suppression objectives. The 5km WUI zone in this plan, which most of the CWPP study area overlaps, is identified as Very High response priority and is given a corresponding objective of quick detection, full response, and extinguishment.

Forest Development Units and Forest Stewardship Plans

The crown land in the AOI is in the Sunshine Coast Timber Supply Area (TSA), which was last reviewed in 2011 (BC MFLNRO, 2011). A discussion of forest health management for this area is included in the 2017 Coast Timber Supply Areas Forest Health Overview. Forest health issues can increase tree mortality and therefore fuel loading. This paper notes that the highest concern for forest health in the area is root disease (BC MFLNRO, 2015). There are five active Forest Development Units (FDU) in the AOI. These FDUs indicate where a forest licensee is operating. These units are accompanied by individual Forest Stewardship Plans (FSPs) which specify the forest practices obligations. Fuel management and treatments that overlap with these areas may require a review of the relevant FSPs.

The Sunshine Coast Community Forest Agreement (CFA) tenure partially overlaps with the study area. The total area of the CFA is 11,000 hectares, 2,600 of which overlap with the CWPP study area. Portions of this tenure, particularly near Sechelt Inlet Road, are in the wildland urban interface and border private land. Fuel management activities that overlap the CFA tenure will require engagement with the CFA land manager(s) and will benefit from partnerships in planning these activities.

Fuel management: reducing wildfire risk by modifying the structure of the fuel. Typically requires a *fuel management prescription*, which identifies the strategies that will reduce wildfire risk, and to ensure that other values are protected. *Fuel treatment* is the implementation of the prescription, where the fuel is physically modified using heavy machinery or ground workers.



Parks and Protected Area Management Plans

The AOI contains a wide variety of parks and protected areas, including provincial parks, regional parks, and ecological reserves. There are 10 provincial parks and 6 provincial marine parks. These plans have management plans or mission statements to guide development and management. The only plan that includes a discussion of wildfire is the Garden Bay Marine Park Management Plan, which recommends the creation of a Fire Management Plan to aid in resource conservation. The shíshálh Nation has worked with the province in managing marine parks and sustain fish stocks. Future wildfire management in these parks will require Nation involvement.

There are two ecological reserves in the AOI: Ambrose Lake and Frances Point. Ambrose Lake Ecological Reserve Purpose Statement does not discuss wildfire. The Frances Point Ecological Reserve recommends the creation of a Fire Management Plan. The following three tables provide summaries of wildfire management within provincially protected areas within the AOI.

Park	Management Plan?	Notes
Buccaneer Bay	None found	
Mount Richardson	Purpose statement	No mention of wildfire/fuel/fire
Mount Elphinstone	Purpose statement	No mention of wildfire/fuel/fire
Porpoise Bay	1981 master plan	No mention of wildfire/fuel/fire
Roberts Creek	1981 master plan	No mention of wildfire/fuel/fire
Sargeant Bay	1991 master plan	No mention of wildfire/fuel/fire
Simson	1987 master plan	Trails were created with the secondary purpose
		of facilitating firefighting access. Also notes to
		post fire closure signs during high hazard periods.
Skookumchuck Narrows	Purpose statement	No mention of wildfire/fuel/fire
Spipiyus	Purpose statement	No mention of wildfire/fuel/fire

Table 5. Wildfire management in provincial parks management plans for BC Parks located in the AOI.

Table 6. Wildfire management in marine parks management plans for marine Parks located in the AOI.

Marine Park	Management Plan	Notes
Garden Bay	1992	Recommends creating fire management plan
Smuggler Cove	1985	No mention of wildfire/fuel/fire
Sechelt Inlets (Piper Point)	None found	
Plumper Cove	1980	No mention of wildfire/fuel/fire
Halkett Bay	1989	Limits campfires

Table 7. Wildfire management in ecological reserves management plans for ecological reserves located in the AOI.

Ecological Reserve	Management Plan	Notes
Ambrose Lake	Purpose statement 2003	No mention of wildfire/fuel/fire
Francis Point (Park and	2008	Recommends creating fire management plan
Ecological Reserve)		



Regional Parks and Natural Areas

The SCRD owns and manages over 100 regional parks, recreation sites, cemeteries, and community halls. Many of these parks are tenured and licensed out to other entities for operational management, however park planning is conducted by the SCRD Parks department. Parks management is guided by the 2014 Master Plan, which is supplemented by a Wildfire Hazard and Risk Assessment completed in 2007. Wildfire risk mitigation has occurred in these parks in collaboration with the BC Wildfire Service, FLNRO, and local community groups to reduce fuel loading. This work has been focused on small scale fuel reduction alongside trails and trailheads, typically focusing on one site per year depending on resources and capacity. SCRD staff have noted the success of community and agency partnerships, and a desire to expand these activities to other SCRD sites. Recent work has occurred at Baker Beach Park and Beaver Island, and future work is planned for Sprockids Park. Parks staff have identified various forest health concerns have strained resources and led to increased fuel loading in forested portions of SCRD parks.


Section 3: Values at Risk

Wildfires can impact communities in numerous ways. They damage homes, businesses, facilities, and infrastructure and can in the worst cases result in the loss of life. Smoke from nearby wildfires impacts human health and disproportionately affects vulnerable populations of the elderly, people with preexisting medical conditions, and people with low incomes. In addition to property damage and loss, economic impacts can include reduced tourism activity and compromised health, safety, and success of agricultural production. Wildfires can also disrupt economic activity through evacuations of residents, who often must take leave of their employment. Evacuations and area closures disrupt the movement of goods and services via roads, railways, and utility corridors which are critical to the wider regional economy. Cultural values, including archaeological and modern-day uses of forests by indigenous peoples, may also be impacted.

Wildfires are ecological disturbances with environmental impacts on non-human systems. While many ecosystems are adapted to fire and may require it as part of their life cycle, coastal temperate forests are not. Large wildfires on the coast result in the losses of significant stocks of carbon, valuable habitat, and water retention capacity.

These direct and indirect impacts can be difficult to quantify but cause large cumulative impacts, not all of which can be insured. This section of the report provides an overview of the types of values that can be impacted from wildfire within the AOI.

3.1 Human Life and Safety

Protection of human life is the top priority in the event of wildfire in the urban interface. Provincial practice uses the density of homes and buildings as a proxy for density of population for wildfire planning exercises. Areas with an average density of more than 6 structures per square kilometre are defined as the wildland urban interface (Figure 6).

Table 8 provides a summary of the total area within the AOI by structure density class. The AOI contains urbanized areas of high structure density. It also contains large rural areas where structure density is below the wildland-urban interface threshold. The eastern half of the AOI is more densely urbanized than the western half, with most structures located in the Gibsons to Sechelt corridor. Communities like Sechelt, the Sechelt Indian Government District, and Gibsons are characterized by more discrete transitions between urbanized areas and adjacent forested areas. *Interface* conditions are found where urban areas largely lacking forest vegetation directly abut native forests. However, much of the AOI is characterized by *intermix* development, where houses and buildings have been constructed within and among native forest vegetation. Smaller communities such as Egmont and Port Mellon are typical of this condition.

Development conditions and structure density affect all aspects of fire management response and can strongly influence fire behavior. The connection between communities are built and fire risk is discussed in greater detail in Section 5.





Interface development is where the boundary of urbanized and forested areas is visible at the scale of whole neighbourhoods.



Intermix development is where the boundary of urbanized and forested areas is visible at the scale of single houses or groups of houses.

Density Structures/ km ²	Area (km²)	% of total area
0-6	15,560	20.9 %
6-24	10,846	14.5%
25-100	9,799	13.2%
100-250	4,970	6.7%
250+	1,873	2.5%
No buildings	31,356	42.1 %

Table 8 Summary of density





Figure 6. Density of structures.



3.2 Critical Infrastructure

The features and utilities that are considered "critical infrastructure" were identified through consultation with stakeholders. These are features that, if disrupted or destroyed, would cause serious impacts on the functioning of the government and important facilities that the public relies on. These include transmission lines and substations, municipal water supply, waste treatment, hospitals, schools, airports, municipal buildings, and police and fire stations (Figure 7)

3.2.1 Electrical Power

Electricity for the communities within the AOI is provided by BC Hydro. The distribution network is comprised mostly of wooden utility poles with some underground distribution. Wooden poles are vulnerable to wildfire, and in many locations these poles are within 2m of forests.

There are four substations located in the AOI at Gibsons, Sechelt, Pender Harbour, and Port Mellon. These substations connect various transmission lines from the broader mainland network. The transmission line network within the AOI is critical to the functioning of the broader regions outside of the AOI. One transmission line is one of the two critical connections between Vancouver Island to the mainland. One other transmission line provides the only connection between the Powell River area and the provincial network. BC Hydro conducts its own extensive vegetation management program to ensure protection of its network and has practices in place to ensure smooth incident management in collaboration with other stakeholders in the event of an emergency or natural disaster.

Electrical networks can be compromised in the event of a large wildfire. Not only can wildfire involve electrical facilities, but burned trees can also fall on lines and disrupt service. Emergency operations facilities must exist to ensure backup power is available for the continued functioning of this network in an emergency.



Photo 3. Transmission line in the SCRD.



3.2.2 Communications, Pipelines, and Publicly Owned Buildings

There are a variety of municipal buildings that are owned and operated by the four governments in the AOI. Table 9 provides summary of building type, owner, and location. There are several pieces of critical infrastructure that are not owned by local government, but rather provincial or other government agencies. This includes the Sechelt Hospital, which is the only hospital in the AOI. The Sechelt-Gibsons airport is located on the outskirts of Sechelt and is the only airport in the AOI.

The AOI is ferry accessible, via terminals at Earl's Cove in the north and Langdale in the south, both of which are operated by BC Ferries and are considered part of the provincial transportation network. The north terminal provides access to Powell River, itself another ferry access only community. Powell River is also linked to Vancouver Island via an additional ferry at a separate terminal. The south terminal at Langdale connects the AOI with West Vancouver and forms a critical transportation link with the rest of the mainland. The south terminal at Langdale is larger and is serviced by larger and more frequent ferries than the north terminal. This south ferry terminal is critical to the economic functioning and wellbeing of all communities in the AOI and is the primary evacuation route for residents in case of an emergency.

There are several physical limitations to transportation within the AOI. The Sunshine Coast Highway is the only transportation route. This forms the only regional connection with most communities in the AOI. In some locations there are bypasses and alternative routes, however there is one major chokepoint at Chapman Creek. The sole vehicle crossing of this creek is near Davis Bay Beach on the Sunshine Coast Highway. This bridge is surrounded by forest. If this bridge were compromised, all areas north would be isolated and require servicing or evacuation via the small Earl's Cove ferry.

Several communities within the AOI are served by small secondary highways with no alternate access. This includes Port Mellon, Egmont, Garden Bay, portions of the SIGD, and communities in the Sechelt Inlet. The islands of Gambier, Thormanby, and Keats are also isolated and accessed by boat only. These islands, as small communities, also have limited fire protection resources.

Fortis BC provides gas to the AOI. The service map for Fortis indicates a pipeline that runs through the AOI, however Fortis does not provide detailed maps to external companies. Fortis BC has its own management practices and emergency procedures for managing emergencies. Underground pipelines are rarely directly involved in wildfire events.

Туре	Name	Х*	Υ*
BC Ambulance	Station 235	445354	5480162
BC Ambulance	Station 265	425836	5496990
BC Ambulance	Station 268	462771	5473195
BC Hydro	Gibsons Substation	462705	5473065
BC Hydro	Pender Harbour Substation	430288	5499059
BC Hydro	Port Mellon Substation	464524	5485775
BC Hydro	Sechelt Substation	445509	5480720

Table 9. List of publicly owned critical infrastructure (non-water) and their UTM coordinates. These have been provided by the project partners.



Туре	Name	X* Y*	
BCWS	Sechelt Fire Base	448285	5478462
Communications	Roberts Creek Cell Tower	452914	5475434
Communications	Cell Tower – Cecil Hill (Madeira Park)	427210	5496386
Cultural	shíshálh Nation Longhouse	446229	5480236
Fire Hall	Egmont and District	428384	5511215
Fire Hall	Garden Bay (Pender Harbour Dept)	425684	5498618
Fire Hall	Gibsons #2	461002	5471201
Fire Hall	Glbsons	462773	5473363
Fire Hall	Halfmoon Bay	434515	5484792
Fire Hall	Halfmoon Bay #2	436871	5480845
Fire Hall	Madeira (Pender Harbour Dept)	425805	5496983
Fire Hall	Roberts Creek	452903	5475423
Fire Hall	Sechelt	444974	5480329
Hospital	Sechelt Hospital	445723	5480603
Local Government	Gibsons Public Works	460742	5473840
Local Government	Gibsons Municipal Hall	463065	5472118
Local Government	Pender Harbour Community Hall	426049	5496977
Local Government	SCRD Madeira Park Office	425899	5496689
Local Government	SCRD Admin	448486	5478086
Local Government	Sechelt Indian Government District	445748	5481225
	public works		
Local Government	Sechelt Municipal Hall	444710	5480224
Local Government	shíshálh Nation Admin	445740	5480377
Local Government	shíshálh Nation Admin	445681	5480347
Local Government	shíshálh Nation Admin	445695	5480394
Medical	Gibsons Medical Clinic	461564	5473080
Medical	Pender Harbour Doctors	426115	5495577
Medical	Sumac Place Mental Health Clinic	462629	5473100
RCMP	Gibsons Detachment	462212	5473075
RCMP	Sunshine Coast	444671	5480103
School	Cedar Grove	461103	5471241
School	Davis Bay Elementary	447579	5477028
School	École Chatelach	444293	5480385
School	Elphinstone Secondary	462480	5472897
School	Gibson Elementary	462723	5472697
School	Halfmoon Bay Elementary	435897	5481437
School	Kinnikinnick Elementary	443834	5482361
School	Langdale Elementary	465271	5476394
School	Madeira Park Elementary	425907	5496991
School	Pender Harbour	430170	5499213
Cabaal	Elementary/Secondary	450007	
SCHOOL	RODERTS CREEK Elementary	453297	54/4/16



Name	X*	Υ*
SCRD Alternative	444638	5480344
SD 46 Admin	453253	5474655
SD 46 Admin	463122	5472184
West Sechelt Elementary	441871	5480625
BC Ferries Earls Cove Terminal	427274	5511640
BC Ferries Langdale Terminal	465321	5475781
Chapman Creek Bridge	447637	5476690
Hospital Bay Wharf	425471	5498148
Madeira Wharf	425955	5497185
Sechelt-Gibsons Airport	448155	5478699
Whiskey Slough Wharf	424611	5496417
CapU Sunshine Coast	445176	5480635
	NameSCRD AlternativeSD 46 AdminSD 46 AdminWest Sechelt ElementaryBC Ferries Earls Cove TerminalBC Ferries Langdale TerminalChapman Creek BridgeHospital Bay WharfMadeira WharfSechelt-Gibsons AirportWhiskey Slough WharfCapU Sunshine Coast	NameX*SCRD Alternative444638SD 46 Admin453253SD 46 Admin463122West Sechelt Elementary441871BC Ferries Earls Cove Terminal427274BC Ferries Langdale Terminal465321Chapman Creek Bridge447637Hospital Bay Wharf425955Sechelt-Gibsons Airport448155Whiskey Slough Wharf424611CapU Sunshine Coast445176

*Coordinates are provided in metres, referenced to NAD 1983, UTM Zone 10N.

3.2.3 Water and Sewage Infrastructure

The water supply in the AOI is complex, and relies on lakes, streams, and ground water to form the bulk of its supply. The SCRD supplies water to most of the residents in the AOI through three different systems: the North Pender Harbour Water Service Area, the South Pender Water Service Area, and the Regional Water Service Area (RWSA). The Chapman Water System comprises the bulk of the RWSA, and the primary source is the Chapman Creek watershed. South and North Pender areas rely on local lakes, and service a much smaller population. The Chapman Water System is comprised of 11 water storage reservoirs located throughout the AOI, as well as one water treatment plant. The water is withdrawn from Chapman Creek, which itself is supplied by the Chapman Creek watershed (discussed below). Water restrictions are common during periods of extreme summer drought, such as 2015, and to a lesser extent 2017 and 2018. Water supply for the Chapman Water System is insufficient during prolonged summer droughts, which overlaps with the wildfire season. This supply deficit is being addressed through various initiatives to ensure that supply remains adequate for the community. The water demand analysis however, does not account for the significant water demand to manage wildfire and structural fires beyond normal demand.

There are several smaller water improvement districts within the AOI outside the SCRD water service. Additionally, the Town of Gibsons administers its own water system, which provides water to most of its residents from the Gibsons Aquifer via a system of wells. Water is pumped from the aquifer using wells, which is then stored in reservoirs. A 2017 report identified the water supply as sufficient to meet current and forecasted community needs. However, the Town currently relies on the SCRD for emergency storage, specifically to meet fire flow standards. Current work is ongoing to upgrade water delivery to ensure the system remains adequate in the future. The Upper Gibsons area is included in the Town of Gibson water system, however backup fire flow is provided from the SCRD for this system.

The SCRD manages sewage for properties in electoral areas A, B, D, E, and F. The District of Sechelt and the SIGD are on the same sewage system which is run by the District of Sechelt. The Town of Gibsons owns and operates its own sewage system.



Туре	Name	Х*	Υ*
Wastewater	Currant Rd Waste Treatment	433276	5484931
Wastewater	Gibsons Waste Treatment	462742	5471688
Wastewater	Langdale Waste Treatment	465745	5477214
Wastewater	Pender Landing Waste Treatment	423931	5498802
Wastewater	Prowse Road Pump Station	463203	5471855
Wastewater	Sakinaw Ridge Waste Treatment	423130	5500336
Wastewater	Sechelt Water Resource Centre	444985	5481022
Wastewater	Square Bay Waste Treatment	432412	5484654
Wastewater	Woodcreek Waste Treatment	459594	5472340
Water	Chapman Water Treatment Plant	447745	5480957
Water	Cove Cay Reservoir	427457	5511040
Water	Daniel Point Reservoir	423135	5499623
Water	Dogwood Reservoir	426445	5497065
Water	Francis Peninsula Reservoir	424285	5497271
Water	Garden Bay Reservoir	425300	5498798
Water	Gulfview Reservoir	426498	5496400
Water	Hopkins Landing Waterworks	464911	5474932
Water	Hotel Lake Reservoir	423936	5498831
Water	Lily Lake Treatment Plant	425860	5496197

Table 10. List of critical infrastructure (water and sewage) provided by the project partners.

*Coordinates are provided in metres, referenced to NAD 1983, UTM Zone 10N.





Figure 7. Critical Infrastructure.



3.3 High Environmental and Cultural Values

The intent of this sub-section is to clearly identify and understand where high environmental and cultural values are located within the AOI to effectively determine wildfire risk and identify mitigation activities.

3.3.1 Drinking water supply areas and community watersheds

There are 10 provincially designated community watersheds that overlap the AOI. The Dysart, Milne, Waugh, Laurena, and Fircom Community Watersheds are mostly contained within the AOI, while the remaining watersheds have small overlaps with the AOI. The largest number of homes and businesses rely on the Chapman Watershed, most of which is outside the AOI for this CWPP. Wildfires can cause shifts in landscape processes that can decrease water quality by increasing sedimentation and nutrients downstream and increasing erosion adjacent to watersheds (Emelko & Sham, 2014). There have also been cases where homes and infrastructure have been destroyed or damaged during debris flows that can be attributed to wildfires (Jordan, Turner, Nicol, & Boyer, 2006). The likelihood of debris flow is increased after wildfire to communities downstream, particularly areas of development on alluvial fans.

Community Watersheds	Service Area
Waugh Lake	Egmont
McNeill Lake	Madeira Park-Pender Harbor
Milne	Halfmoon Bay
Dysart	Dysart
Chapman	Sechelt-Davis Bay
Dakota	Port Mellon
McNair	Port Mellon
Fircom (Gambier)	Halkett Bay
Laurena (Gambier)	Brigade Bay
Gambier (Gambier)	Douglas Bay

Table 11. Community watersheds overlapping the AOI.



3.3.2 Cultural Values

Indigenous goals for land management

shíshálh Nation

The shíshálh Nation has a long and rich history of managing its traditional territory, the *swiya*. Colonization disrupted indigenous land management and de-emphasized or ignored traditional cultural values during development and resource extraction. As one of the few nations in British Columbia to re-establish self government over part of the *swiya*, the shíshálh have outlined several goals for land management respecting cultural resources within their traditional territory (A Strategic Land Use Plan for the shíshálh Nation, 2007):

- Ensure that the shishalh Nation has authority over planning and management of cultural resources in the territory.
- Preserve, protect, and restore sacred, historical, archaeological, and cultural sites and other features and values with significance to the shishalh Nation.
- Ensure that shishalh language, concepts, ideas, and values are used in land and resource management.
- Reaffirm and encourage shishalh cultural use of the land, cultural practices, and learning.

Wildfire planning must integrate these goals into the strategies used to reduce wildfire risk. In addition to the provincial archaeliogical layers, the shishalh Nation maintains are more up to date internal database with cultural sites. This dataset should be reviewed prior to any fuels management planning. Partnerships with the shishalh Nation will be critical to ensure protection of cultural resources.

Skwxwú7mesh Nation

The Skwxwú7mesh have presented a vision for their traditional territory in the *xay temixw* (Sacred Land) Land Use Plan. Like their neighbours, the shíshálh, the Squamish history of land management was disrupted by colonization and is today being reasserted. While the Skwxwú7mesh do not have an area of self government within the AOI, their land use plan sets expectations for how cultural resources will be managed during activities within the forests of their traditional territory. The plan designates a Forest Stewardship Zone, including most of the traditional territory, divided into sensitive areas where special care is needed to protect wildlife and cultural values, restoration areas where natural or cultural values have been compromised by development, and *Kwa kwayx welh-aynexws* (wild spirit places) which should be maintained for their cultural and spiritual use and off-limits to other activities. Wildfire planning within the traditional territory of the Skwxwú7mesh Nation (Howe Sound communities) must occur in collaboration with the Skwxwú7mesh Nation to ensure cultural resources are conserved and protected.

Archaeological values

The Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development maintains a spatial database of archaeological and historical sites. These include locations where there is evidence of past human activity. Within the AOI there are 354 recorded sites of which 350 are archeological sites related to aboriginal life during the 14,000 years prior to European contact. They include cache pits, house pits, trails, fishing sites, cooking features, lithics, grave sites and human



remains. Due to the sensitive nature of these sites their exact locations cannot be published. Direct activities such as fuel management must ensure that these sites are not disturbed.

3.3.3 High Environmental Values

The BC Conservation Data Centre (CDC) records BC's most vulnerable vertebrate animals and vascular plants, each of which is assigned to a provincial Red or Blue list according to their provincial conservation status rank. Species or populations at high risk of extinction are placed on the Red list and are candidates for formal endangered species status. Blue-listed species are considered vulnerable to human activity and natural events. A total of 12 occurrences of blue-listed species and 8 occurrences red-listed species were identified within the AOI. An additional 3 blue-listed ecological communities and 40 red-listed ecological communities were identified within the AOI. See Table 12 and Table 13 for a summary and details of these species and communities, and Figure 8 and Figure 9 for maps depicting publicly available locations.

Scientific Name B.C. Status **Common Name** Category Accipiter gentilis laingi Northern Goshawk, Laingi Vertebrate Animal Red Subspecies Allium amplectens Slimleaf Onion Vascular Plant Blue Ardea herodias fannini Great Blue Heron, Fannini Vertebrate Animal Blue Subspecies Callophrys johnsoni Johnson's Hairstreak Invertebrate Animal Red Cercyonis pegala Common Woodnymph, Incana Invertebrate Animal Red incana Subspecies Chrysemys picta pop. 1 Painted Turtle - Pacific Coast Vertebrate Animal Red Population Eumetopias jubatus Steller Sea Lion Vertebrate Animal Blue Threaded Vertigo Invertebrate Animal Blue Nearctula sp. 1 Double-crested Cormorant Vertebrate Animal Phalacrocorax auritus Blue

Vertebrate Animal

Blue

Northern Red-legged Frog

Table 12 Recorded known occurrences of Red and Blue listed species that inhabit the AOI (Conservation Data Centre).



Rana aurora

Table 13 Recorded known occurrences of Red and Blue listed ecological communities found in the AOI(Conservation Data Centre).

Scientific Name	Common Name	B.C. Status
Abies grandis / Berberis nervosa	Grand Fir / Dull Oregon-grape	Red
Abies grandis / Tiarella trifoliata	Grand Fir / Three-leaved Foamflower	Red
Carex macrocephala Herbaceous Vegetation	Large-headed Sedge Herbaceous Vegetation	Red
Leymus mollis ssp. mollis - Lathyrus japonicus	Dune Wildrye - Beach Pea	Red
Picea sitchensis / Rubus spectabilis Dry	Sitka Spruce / Salmonberry Dry	Red
Picea sitchensis / Rubus spectabilis Very Dry	Sitka Spruce / Salmonberry Very Dry	Red
Maritime	Maritime	
Picea sitchensis / Rubus spectabilis Very Wet	Sitka Spruce / Salmonberry Very Wet	Red
Maritime	Maritime	
Pinus contorta / Sphagnum spp. CDFmm	Lodgepole Pine / Peat-mosses CDFmm	Red
Pseudotsuga menziesii / Berberis nervosa	Douglas-fir / Dull Oregon-grape	Red
Rhododendron groenlandicum / Kalmia	Labrador-Tea / Western Bog-laurel / Peat-	Blue
microphylla / Sphagnum spp.	mosses	
Thuja plicata / Rubus spectabilis	Western Redcedar / Salmonberry	Red
Thuja plicata / Symphoricarpos albus	Western Redcedar / Common Snowberry	Red





Figure 8. Location of provincially Red- and Blue-listed species in the west project area. (BC Conservation Data Centre)





Figure 9. Location of provincially Red- and Blue-listed species in the east project area. (BC Conservation Data Centre)

In addition to provincial designations, two species listed under federal wildlife legislation have designated critical habitat within the project area. One, the Western Painted Turtle, is also red-listed provincially. The other is the Marbled Murrelet (*Brachyramphus marmoratus*), a tree-nesting seabird that favours old forest habitats. Other federally listed species may be found in the project area based on habitat requirements but have no designated critical habitat within the AOI.

The impacts of fuel treatments to these plants, animals and ecosystems should be taken into consideration when prescribing fuel treatments across the study area. Details regarding the management requirements of these species can be found on the Conservation Data Centre Website (https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre).





Figure 10. Critical habitat for federally listed wildlife in the west project area. Designated habitat is pink and proposed is green stripe. (BC Conservation Data Centre)





Figure 11. Critical habitat for federally listed wildlife in the east project area. Designated habitat is pink and proposed is green stripe. (BC Conservation Data Centre)



3.3.4 Other Resources Values

The AOI is in the Sunshine Coast Timber Supply Area (TSA), and the crown land within the AOI overlaps with this TSA. Most of the timber harvesting land base occurs in more remote locations of the Sunshine Coast outside the AOI. The Howe Sound Pulp and Paper corporation in Port Mellon is a large pulp mill inside the AOI. Forestry operations do occur within the AOI and many forests in the interface have regrown after harvesting.

A large open-pit gravel mine is within the Sechelt Indian Government District. This 250 hectare pit supplies construction aggregate to the Lower Mainland, Vancouver Island, and Washington state. An open conveyor belt transports material from the pit to the load out facility on the shoreline, crossing patches of forest, residential areas, and the Sunshine Coast Highway.

3.3.5 Hazardous Values

The intent of this sub-section is to identify hazardous values that pose a safety hazard to emergency responders.

The Sechelt Landfill is operated by the SCRD and is the main waste disposal facility in the AOI. The landfill has procedures in place to prevent accidental ignition during waste disposal. This facility receives municipal, residential, and industrial waste of various types. There is also a transfer station in Pender Harbour and a recycling depot in the Town of Gibsons.

There are large-scale industrial operators in Port Mellon with high concentrations of woody debris on site. The Howe Sound Pulp and Paper Mill and a nearby log sort require outdoor storage of combustible material as part of their operations. These facilities typically have procedures and response plans in place to prevent and mitigate these hazards. The Howe Sound Pulp and Paper Mill has a private fire department capable of responding to hazardous materials incidents and industrial fires within the mill property.

Gas stations can be found throughout the AOI, and all are potentially hazardous due to the storage of large quantities of fuel on site. Many are located within a few hundred metres of forest vegetation.



Section 4: Wildfire Threat and Risk

Wildfire threat is a term that reflects the potential fire behaviour that a natural area could produce. The factors that contribute to this include fuel loading and distribution, slope, aspect, and weather conditions. The term wildfire risk is a measure of the likelihood of a wildfire occurring, its potential behavior and the consequences of it impacting human lives, structures, and infrastructure.

4.1 Fire Regime, Fire Weather, and Climate Change

4.1.1 Fire Regime and Fire Weather

The Biogeoclimatic Ecosystem Classification (BEC) is used to describe ecosystems by vegetation, soil, and climate.

Wildfire threat is a ranking of potential fire behavior based on fuel conditions, weather conditions, slope, aspect, and other biophysical factors.

Wildfire risk is a measure of the probability of a wildfire occurring combined with the consequences or impacts it would cause.

Ecosystems are classified at the largest scale into BEC zones. Most of the AOI is in the Coastal Western Hemlock (CWH) BEC zone, with a small area of Coastal Douglas-fir (CDF). The CWH zone is generally wet but can have short hot and dry summer seasons. The CDF is one of the mildest climates in Canada characterised by longer fire seasons with warm and dry summers. In the AOI, it is limited to outermost portions of the coast between Garden Bay and Sechelt, where the rainshadow effect of Vancouver Island is strongest.

The BEC zones within the study area are further broken down into subzones, which reflect more specific climates (Table 14). These subzones are associated with different natural disturbance regimes. In the AOI, the climate is drier and warmer closest to sea level, with increased moisture further north/east and up slope. Most of the study area is in the CWHdm (dry maritime) and CWHxm (very dry maritime) subzones, which are ecosystems with warm, dry summers and mild winters with little snow. These are the dominant subzones in the study area. These forests transition at higher elevations to the wetter climate of the CWHvm2 (very wet maritime, montane variant) which are cooler and receive substantial amounts of precipitation as snow in the winter.

Biogeoclimatic Zone	Range	Annual Precipitation (mm)	Summer Precipitation (mm)	Annual Snowfall (cm)	Avg. Annual Temperature (°C)
CDF	Max	1263	272	92	10.5
	Min	636	105	17	8.8
CW/Hym	Max	2721	565	234	10.7
CWHXIII	Min	1100	160	26	7.8
CW/Hdm	Max	2412	525	177	10.3
Cwhuin	Min	1367	280	45	8.7
CWHvm2	Max	2850	681	605	No Data
	Min	2760	550	552	NO Dala

Table 14. Climatic characteristics of the biogeoclimatic zones within the project area (Green & Klinka, 1994)



All ecosystems are influenced by periodic disturbances that vary in size, severity, and frequency. Examples of common disturbances include wildfire, windthrow, ice and freeze damage, water, landslides, insect, and disease outbreaks as well as human caused events such as logging. Historically, agents of disturbance were viewed as unhealthy and a threat to the integrity of the forest as a timber resource. Today, forest professionals recognize the role of periodic disturbance in maintaining healthy and diverse forests and ecosystems.

All biogeoclimatic subzones have been separated into natural disturbance types (NDT) according to the Forest Practices Code Biodiversity Guidebook. These NDTs are classified based on the size and frequency of natural disturbances that occur in those ecosystems as per the following:

- NDT 1 Ecosystems with rare stand-initiating events
- NDT 2 Ecosystems with infrequent stand-initiating events
- NDT 3 Ecosystems with frequent stand-initiating events
- NDT 4 Ecosystems with frequent stand-maintaining fires
- NDT 5 Alpine Tundra and Sub-alpine Parkland ecosystems

Biogeoclimatic Zone	Natural Disturbance type	Area (ha)	Percent of total area (%)
Costal Douglas-Fir	NDT 2 - infrequent stand-initiating events	10,179	14
Coastal Western Hemlock – Very Dry Maritime (CWHxm)	NDT 2 - infrequent stand-initiating events	43,379	58
Coastal Western Hemlock – Dry Maritime (CWHdm)	NDT 2 - infrequent stand-initiating events	18,430	25
Coastal Western Hemlock – Very Wet Maritime, montane variant (CWHvm2)	NDT 1 - rare stand- initiating events	2,416	3

Table 15. Summary of the biogeoclimatic zones within the AOI by Natural Disturbance Type

The subzones in the study area are mostly classified as NDT 2 - Ecosystems with infrequent standinitiating events. These forests generally experienced infrequent wildfires (the mean fire return interval is 200 years) of moderate size (20 to 1000 hectares). Researchers using charcoal dating and other techniques have suggested historic fire return interval throughout the wetter forests of the coast was substantially longer than 200 years, and may have been longer than 600 or 700 years, implying that fire was not the dominant natural disturbance across large areas within and adjacent to the study area (Daniels & Gray, 2006; Lertzmann, et al., 2002). While fire was rare in coastal forests, occasional large fires could occur during periods of extreme drought. In general, fires were patchy or limited in area with unburnt islands throughout. This would result in forests of relatively even age and size trees, with mature trees growing singly or in small patches that had survived previous fires. Veteran survivors of large fires are typically found scattered throughout the forest.





Photo 4. Air photos of burned area NW of Sechelt. This illustrates the uneven and patchy impact of wildfire in ecosystems in the AOI.

Wildfire can substantially alter the physical and biological characteristics of an ecosystem. It can change the structure and species composition of a forest, remove some or all the forest floor organic layer, and alter the chemical properties of the soil (Agee, 1993). In ecosystems where natural wildfires are frequent, they help to prepare seed beds, recycle nutrients, alter plant succession, maintain a diversity of age classes (seral stages) across the landscape, control insect and disease outbreaks as well as reduce fuel accumulations (United States Forest Service, 2006). On the coast, large fires in recent history have been caused by human activities. Forest stands in many areas of coastal British Columbia originate after several hot, dry years between the 1880s and 1920s, during which land clearing, lumbering, railways, camping, and mining activities provided many sources of ignition (Parminter, 1978).

Human intervention in the forest, both deliberate and unintentional, has impacted the fire regime in this area. Improved timber utilization, growing opposition to slash-burning in expanding urban areas, and effective fire suppression have supported subdued fire behavior since the major fires of the early 20th century. While there are still many ignitions in the interface owing to campfires, recreation, and other human causes, most are extinguished by local Fire Departments or unsuitable weather conditions before they can become wildfires.

Urban development in the forest interface has impacted forest stands by altering soils and groundwater, and opening stands to new wind and sun exposure (Zipperer & Pouyat, 1995). Historic logging has created more homogeneous forests with less size and age diversity, which may be more susceptible to severe fire (Spies, et al., 2014). Warmer, drier conditions caused by climate change in combination with higher fuel loads is increasing the risk associated with the interface of these temperate rainforests.



Fire Weather Rating

Fire Weather Rating is the use of weather measurements to assess likely fire behavior for a defined forecast period. The BC Wildfire Service monitors Fire Weather Ratings throughout the province. Fire Weather Ratings are an essential component in most fire prediction models and are used to help determine a community's landscape level wildfire threat.

Table 16 summarizes summer temperature and rainfall statistics from the nearest Environment Canada station with 30-year weather, which is located at the Powell River Airport. This data represents the average temperature and precipitation during wildfire season. For reference, also provided is weather data from the 2018 wildfire season from the Sechelt Airport. 2018 was one of the busiest fire seasons throughout BC, and this reference weather data shows the temperatures and drought associated with a busy fire season.

Weather Attribute	May	Jun	Jul	Aug	Sep
30-year Daily Average High (°C)	16.5	19.4	22.1	22.3	18.7
2018 Daily Average High (°C)	19.7	18.9	24.9	24.2	17.3
30-year Average Rainfall (mm)	76.6	67.6	37.5	45.3	54.7
Rainfall in 2018 (mm)	9.8	52.1	2.8	2.4	118.1

Table 16. Weather statistics for the months of May to Sept (1980-2010)

Table 17 provides a summary of the average number of days rated as moderate, high, and extreme in the fire season (May to Sept) at fire weather stations inside or adjacent to the study area. This has been calculated from data over the past ten years.

Table 17. Average number of moderate, high, and extreme rated fire danger days over the past ten years (May to Sept)

Weather Station	Average # of Days as Moderate	Average # of Days as High	Average # of days as Extreme
Sechelt (EC)	41	36	10
Elphinstone	33	17	1
McNabb	34	20	3



4.1.2 Climate Change

Climate change will result in changes to temperature and precipitation, with impacts to both forest health and wildfire risk. The Pacific Climate Impacts Consortium predicts warmer temperatures yearround, with the greatest increase occurring in the summer. The estimated summer increase is predicted to be 2.0 °C by the 2050s, and 3.1 °C by the 2080s (Pacific Climate Impacts Consortium, 2013). Precipitation is expected to increase by 10% annually, although summer seasonal precipitation will *decrease* by 10%. The summer weather conditions are therefore expected to be slightly warmer and slightly drier on the Sunshine Coast, consistent with predictions for a longer wildfire season. Patterns observed in other parts of BC and North America suggest that hotter, drier conditions are likely to result in an overall increase in wildfire frequency in the study area (Kirchmeier-Young, Gillett, Zwiers, Cannon, & Anslow, 2019; Taylor, Régnière, St-Amant, Spears, & Thandi, 2010). Warmer temperatures in spring and fall will extend the duration of the fire season, placing values at risk throughout more of the year (Abatzoglou & Williams, 2016).

Climate change will continue to have negative impacts for forest health (Spittlehouse, 2008). Climate change affects forest health by creating maladaptation between trees and sites, which can create conditions for outbreaks of insects and diseases. More frequent or prolonged droughts are likely to reduce tree health and vigor, also increasing susceptibility to pathogens and pests (Woods, Heppner, Kope, Burleigh, & Maclauchlan, 2010; Sturrock, et al., 2011). Declining forest health tends to increase forest fuel loading by increasing the amount of fuel in the stand. Health impacts were directly observed by the project team during field inspections of interface forests. Trees located on drier sites were showing signs of drought stress and mortality, and fuel build-up from tree morbidity (i.e. decline or dieback, but not death) was observed in many areas.

The impacts that climate change is having on wildfire in the study area are uncertain. The predicted weather trend is for longer, hotter, drier summers, which would result in higher potential wildfire for activity within the study area. There is a poor understanding of wildfire behaviour in coastal fuel types, and fire return intervals have been long. Traditionally, wildfire has been uncommon in coastal fuels due to the moist climate. However, this moist climate creates high volumes of foliage and woody material which are potential fuels. Climate change and its impacts on forest health and weather patterns is expected to result in an increase in wildfire size, intensity, and frequency in the AOI.



CLIMATE IMPACTS TO TREES AND FORESTS

BY THE 2080s EXPECTED CHANGES TO ...

TEMPERATURES Warmer summers, milder winters.

PRECIPITATION Less snow. Longer dry periods during



MELTWATER Earlier snowmelt. Lower late-summer flows.



EVAPOTRANSPIRATION Increased rates of evaporation and transpiration from waterbodies, soil and plants.

GROWING SEASONS Longer, warmer growing seasons.

VARIABILITY

More frequent and unseasonal extreme weather {high

...WILL LIKELY CAUSE:



MORE FUEL BUILD-UP

Heat, extreme precipitation, freezing rain, heavy wet snow, flooding, landslides, and windstorms may happen more often, leading to more tree damage and fuel build-up.



MORE STANDING DEAD FUEL Tree pests may reproduce more rapidly and more often, leading to more standing dead fuel.



DRIER FUELS

Evapotranspiration rates will increase relative to precipitation, resulting in drier soils and vegetation and supporting ignition potential earlier in the year.



MORE LIVE FUEL

Longer growing seasons may support more growth, meaning more crown fuels.



LONGER FIRE SEASONS AND LARGER FIRES

Fires may occur more often and burn larger areas. Fire risk is expected to increase in most places and ecosystems not adapted to fire will be most vulnerable.

Figure 12. Climate change impacts on wildfire risk.



4.2 Provincial Strategic Threat Analysis (PSTA)

The PSTA is a high-level analysis conducted at the Provincial level and is intended to be used as a starting point for an assessment of local wildfire threat. It includes several spatial layers, including wildfire threat and fuel typing. The CWPP involves updating this at a local scale, by integrating local weather and updating the fuel typing for the public land in the AOI. The original PSTA spatial data is provided below. This is an interpretation of fuel type mapping, historical fire data and weather, and topography. The PSTA includes information and maps that describe fuel types, historical fire density, and the potential for embers to land in an area (spotting impact), head fire intensity, and a final calculated wildfire threat score (Figure 13).



WILDFIRE THREAT SCORE

Figure 13. Input factors and contributing weights to the final PSTA score.

The 10 Fire Threat Classes represent increasing levels of overall fire threat (i.e. the higher the number, the higher the threat). PSTA Threat Class 7 is a threshold and the most severe overall threat classes are Class 7 and higher. Areas of the province that fall into these higher classes are most in need of mitigation. Areas rated as Class 7 or higher are locations where the fire intensity, frequency and spotting can be severe enough to potentially cause catastrophic losses in any given wildfire season, where those ratings overlap with significant values at risk. Areas rated as Class 6 are also considered to be particularly prone to wildfires, are susceptible to crown fires (head fire intensity greater than 10,000 kW/m), and are most likely to be affected by spotting impacts.

The PSTA mapping for the AOI appears fragmented because the analysis cannot be published for private land. This analysis was completed at a coarse scale with poor input data. The PSTA identified the majority of the public land area assessed as a moderate threat (Table 18).



Table 18. Summary	of wildfire	threat on	public owned	lands
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PSTA Threat Rating (class)	Area (ha)	% of area
Extreme (9-10)	428	0.5%
High (7-8)	2,048	2.7%
Moderate (4-6)	19,712	26.6%
Low (1-3)	4,870	6.5%
No Data (Private Land)*	16,799	22.6%
Water	30,550	41.1%

*There is a minor discrepancy between private land area likely due to different provincial layers being updated at different times.





Figure 14. Provincial Strategic Threat Analysis threat rating for public owned lands



Provincial Wildfire Threat Analysis - Limitations

The PSTA is a generalized and coarse analysis completed at a province wide layer with a 50m pixel size. This tool is useful for higher level wildfire analysis however lacks detail that is required for a localized analysis of wildfire risk. A key component of this CWPP is refining this PSTA data into a refined wildfire risk map which incorporates locally derived data and ground truthing for verification. This map has a higher detail and combines wildfire threat with the proximity to values. This process is detailed in Appendix 1.

4.2.1 Fire History

The BCWS wildfire data include wildfire polygon data for 1920-2020, and wildfire ignition data for 2000-2020. The wildfire history in the study area is characterized by mostly small wildfires that are easily suppressed, with the occasional large wildfire (>1000 ha). Larger wildfires appear to be relatively frequent prior to the 1950s, with large fires occurring several times per decade. However, since 1950 there has only been one notable large fire, the previously (2.3) discussed Sechelt fire in 2015. This is likely due to a combination of factors. After 1950, the wildfire service effectively suppressed most wildfires due to technological advances in wildland firefighting techniques. Furthermore, broadcast burning was a frequent technique in the forest harvesting industry to dispose of post-harvest debris, which led to more frequent human caused fires.

Since 1920, the most common type of wildfires in the AOI have been lower-intensity surface fires. These wildfires tend to consume mostly ground and surface fuels and reduce fuel loads in the forest without causing major mortality to the overstory trees. However, these fires are relatively infrequent and small on the coast and have not resulted in any significant reduction in landscape fuels. Wildfires have been lower in severity, frequency, and size than is typical of most Natural Disturbance Type 2 ecosystems. There is no apparent reason for this decrease, although it may be partially attributed to human intervention in the natural disturbance regime due to forest harvesting as well as effective wildfire suppression.



4.3 Local Wildfire Threat Assessment

Field crews completed assessment of fuel conditions and wildfire threat assessments in January and February of 2021. These site visits were focused on areas in the wildland urban interface. The goal of these site visits was to assess the wildfire threat, ground truth the PSTA fuels data, and identify feasible potential fuel treatment areas. Sites were identified to be assessed in advance using desktop analysis which considered the following:

- 1. PSTA Wildfire Threat Areas of High and Extreme wildfire threat
- 2. Structure Density Areas near higher structure densities
- 3. Critical Infrastructure All critical infrastructure was visited.
- 4. Crown and Municipal Land Only publicly owned land was visited.
- 5. Locally identified areas Areas specifically highlighted by local government staff and stakeholders were visited.

A total of 89 wildfire threat plots and 207 walkthrough assessments were conducted for the study area. Figure 14 is a map that illustrates wildfire threat and provides a summary of the threat scores. Appendix 1 provides a detailed summary of the technical process for determining this local wildfire threat score.



Local Wildfire Risk Summary

Wildfire Risk is a measure of the probability of a wildfire occurring, combined with the consequences of that wildfire. The probability of wildfire is measured by the wildfire threat, which is a combination of fuel conditions, weather, and terrain. The consequence of a wildfire is determined by the location and value that could be impacted. The measure of wildfire risk is fundamentally spatial and contextual. The highest risk areas are those with a high wildfire behaviour potential and which are adjacent to communities and critical infrastructure. Field assessments for the CWPP focused on areas of high to extreme wildfire behaviour potential within 500m of identified values. A detailed description of the technical process to determine wildfire risk is summarized in Appendix 1, including the final wildfire risk map.

The overall wildfire risk in the AOI is high. The potential wildfire behaviour within the study area is generally moderate or high, with scattered forests posing an extreme threat. There is an extensive interface area that is widely distributed throughout the study area. There is a high likelihood that wildfire could occur within this wildland-urban interface posing a high risk to property and life. The following subsections describe wildfire risk conditions on lands within each of the project partners' jurisdiction.



Photo 5. The study area is dominated by conifer fuel types and variable topography. Wildfire risk is driven by the proximity of values to forests with high wildfire behaviour potential, which are often conifer forests on steep slopes.





Figure 15. Wildfire behaviour threat map



Wildfire Risk in the Sunshine Coast Regional District

Most of the identified high wildfire risk areas are within the administrative boundaries of SCRD Electoral Areas. The wildfire risk is higher in the areas northwest of Sechelt, with the highest wildfire risk in Pender Harbour. Overall wildfire risk is high in Egmont and Halfmoon Bay. Roberts Creek similarly has a high wildfire risk, albeit it is the lowest relative to other SCRD portions of the study area. Port Mellon has high to extreme wildfire behaviour potential, however this is largely driven by the steep slopes rather than dense fuel accumulations.

Due to their isolation and lack of formal fire protection, the three inhabited islands in the study area are vulnerable to the impacts of wildfire. South Thormanby island has a moderate to high wildfire risk, most of which is found in Simson Provincial Park. The remainder of the island, which is private land, is heavily forested, and the entire populated portion of the island can be considered intermix with no discrete wildland urban interface.

The wildfire risk on Keats Island is similar, as most of the island is private with intermix fuels and development. Gambier is the largest and most populated island and is mostly publicly owned. The wildfire risk on Gambier is high due to the density of values and intermix fuels, as well as high risk fuels found adjacent to private lands.



Photo 6. Air photo of area adjacent the Port Mellon Highway which has areas characterized by high wildfire risk due to the prevalence of coniferous fuels and intermix-type development.



Wildfire Risk in the Sechelt Indian Government District

The overall wildfire risk to the SIGD is moderate. This area is mostly developed, with small amounts of natural forest inside the SIGD jurisdictional boundaries. The south of the district has important values in the interface, including residences and important cultural values. Development in the SIGD is more typical of interface than intermix conditions.



Photo 7. Communication towers and power lines considered critical infrastructure that are intermixed with fuels adjacent SIGD land.



Wildfire Risk in the Town of Gibsons

The overall wildfire risk in the Town of Gibsons is low. There is little wildland urban interface or intermix areas in the Town boundaries as it is surrounded by developed or agricultural land. The publicly owned natural areas within the Town pose a moderate wildfire risk, but these areas are discontinuous with the larger landscape forests of the adjacent SCRD electoral areas.

Wildfire Risk in the District of Sechelt

The wildfire risk in the District of Sechelt is high. The District has extensive interfaces with the landscape forests to the west, east, and north. There are areas of high and extreme wildfire threat within 500m of structures in all these areas. There is critical infrastructure located in the interface in the eastern portion of Sechelt, adjacent to the airport. Neighbourhoods that are high risk are Wilson Creek, Selma Park, East Porpoise Bay (including Sandy Hook and Tuwanek), and West Sechelt.



Photo 8. Interface values and forest near Wilson Creek.



Wildfire Risk Projections

The wildfire risk assessment conducted for the AOI is a summary of the current conditions, however predicted climate change impacts should be considered. Climate change is expected to result in hotter, drier summers, which is expected to increase wildfire risk. A prediction of the future wildfire risk conditions has been completed using weather data from the years 2017-2019. This includes two fire seasons, 2017 and 2018, which were extremely hot and dry. The result of this analysis shows the wildfire behaviour potential throughout the AOI is significantly greater. This analysis is depicted in Figure 16.

This climate change wildfire risk projection is a simplified analysis that assumes that the 2017 and 2018 values represent the future weather patterns. The accuracy of this projection is uncertain, however this projection is illustrative of the potential changes in wildfire risk that may result from climate change in the AOI.





Figure 16. Future wildfire risk projection.


Section 5: Risk Management and Mitigation Factors

This section identifies strategies that can be implemented to reduce the risk of wildfire to communities and critical infrastructure. These strategies have been identified through the analysis of wildfire threat and risk, stakeholder consultation, and a review of best management practices. The recommendations vary in scope, implementation cost, timeline, and the party(s) responsible. These recommendations are organized into the following categories:

- 1. Fuel Management (5.1)
- 2. Planning and Preparedness (5.2 and 6)
- 3. Communication and Education (5.3)
- 5.1 Fuel Management

For fire to occur, there are three factors required: fuel, oxygen, and heat. The behavior of wildfire is determined by fuel condition, terrain slope and aspect. Of these factors, the only one that can be modified is fuel.

The determination of wildfire threat and risk has identified areas of high wildfire threat adjacent values. These highest risk areas on public land were visited in the field. The areas that were confirmed to pose a high risk have been identified as priority areas where fuel prescriptions should be considered. For all prioritized treatment areas, options have been explored to partner and cooperate with other interest groups for the operational treatment, maintenance, and improving access.



Fuel treatments are completed through three phases:

- 1. Identify areas for fuel treatment within a Community Wildfire Protection Plan or other high level strategic plan.
- 2. Develop a detailed Fuel Management Prescription which identifies objectives and strategies to reduce wildfire risk.
- 3. Operational implementation of the Fuel Management Prescription.

This CWPP is a critical first step to identify and prioritise candidate areas for fuel treatment in the interface. The process from initial identification of a treatment area to implementation on the ground is typically a multiyear process.



Interface Fuel Treatment Areas

Areas on public lands that were identified as high risk and are located within 100m of moderately dense interface communities were visited in the field. Fuel plots were established in representative areas to determine wildfire threat. Assessments of the fuel condition were completed following the provincial assessment system using the 2012 Wildfire Threat Assessment Guide. This is the provincial standard for field assessments of fuel hazard in the WUI and is used to plan fuel hazard mitigation works. Fuel types are scored under this system which is used to help prioritise the areas for fuel hazard mitigation funding under the Community Resilience Investment Program (CRI). A total of 99 field assessments and worksheets were completed.

The fuel component of wildfire threat is driven by the density and continuity of fuel on the forest floor, in the canopy, and the ladder fuels that connect the two. The highest threat fuel types are composed of dense coniferous trees with high vertical and horizontal continuity, with high fuel loading on the forest floor in the form of dead logs and branches.

Interface fuel treatments change the composition of a forest to reduce the wildfire threat, and thereby the wildfire risk. This involves reducing the overall fuel load and disrupting both the vertical and horizontal continuity to create fuel strata gaps. The overall objective of the fuel treatment prescriptions is to change the fire behavior potential of these stands from a crown fire to a surface fire under the most dangerous weather conditions (the 90th percentile weather conditions). This allows suppression resources to be able to act on the wildfire and defend the adjacent values. The detailed strategies for reducing fire behavior potential are detailed in a fuel management prescription, which is developed by a Registered Professional Forester with wildfire management experience. Potential strategies include tree thinning, spacing, pruning, surface debris removal, or creating fuel gaps. Treatment areas should be linear adjacent to the values at risk, a target of at least 100m wide and located up against man made and natural fuel breaks when possible.



Surface fire is where only fuels in contact with ground are involved in a wildfire.



Crown fire is where tree crowns, including foliage and branches, are involved in a wildfire. Crown fire can be passive, meaning only single tree crowns or groups of trees are involved, or active, meaning fire is readily spreading between tree crowns.



Many of the interface treatment areas are located partially on SCRD managed parks. Maintenance of these fuel treatments will therefore ultimately become part of SCRD regular parks management. SCRD has completed fuel management activities before, however not at the scale proposed in this CWPP. Completion of these treatments will require consultation with SCRD parks staff, and maintenance of these treatments may impact parks planning and capacity. Furthermore, in areas not designated for fuel treatment the goals of parks maintenance may dovetail with the goals of fuel reduction. For example, removing dead and downed trees near facilities for hazard reduction also reduces fuel loading. It is recommended that SCRD Parks develop a new parks management plan that integrates wildfire management objectives outlined in this CWPP. Integrating fuel management goals explicitly into the management of SCRD parks presents an opportunity to reduce wildfire risk during daily operations of the local government. Some examples of wildfire hazard reduction strategies that may integrate with parks management are:

- Remove dead and dying trees proactively to reduce public safety hazard and wildfire hazard.
- Create an assessment program for Parks facilities that integrates tree hazard and wildfire hazard assessments.
- Replace trees that require removal with non-flammable trees. Explore the use of novel species that are more fire resistant (for example, Larch, Sequoia, and non-native deciduous trees).



Photo 9. Forests with tree mortality in Cliff Gilker Park.





Figure 17. Fuel treatment area map.



Table 19 Fuel treatment summary table

Treatment	General	lurisdiction*	Wildfire Be	haviour I	Potential	Priority	Fuel	Area	Area	Area	Treatment Pationale
Polygon ID	Location	Junsuiction	Moderate	High	Extreme	FILOIILY	Туре	(ha)			
1	Sechelt	Crown	14.6			High	C5	18.41	Adjacent Airport, BCWS office, SCRD office. PSTA based on inaccurate fuels, which have been corrected. Treatment can make use of the adjacent low fuel BC Hydro ROW to increase mitigation. Overlaps Sunshine Coast Community Forest tenure.		
2	SCRD- Gibsons	Unknown- Crown	23.3	1.5		High	C5	26.77	Homes directly adjacent conifer fuel types. Treatment to increase protection by integrating with BC Hydro ROW.		
3	SCRD- Gibsons	SCRD	54.3	13.0	1.1	Medium	C5	70.87	Soames Hill Park, steep conifer fuels. Homes within 100m of portions of park in all directions.		
4	SCRD- Pender	Unknown- Crown	189.3	42.8	0.1	Medium	C5	231.5 2	Treatment to protect homes and highway within 100 m of treatment area. Conifer fuels on steep terrain. Portions of extreme PSTA threat to east. Treatment area also contains a communications tower with very limited access. Options to further net down treatment area to just include critical infrastructure.		
5	SCRD	Unknown- Crown	12.8			Low	C5	12.97	Treatment to protect homes and highway within 100m. Conifer leading stand with good access through adjacent cutblock.		
6	SCRD- Secret Cove	Unknown- Crown	33.8			High	C5	32.89	Three polygons have been broken up as they are fragmented by private land. May be lumped together in prescription. Treatment of conifer fuels to protect adjacent homes within 100m.		
7	SCRD- Secret Cove	Unknown- Crown	118.3			High	C5	122.5 9	Three polygons have been broken up as they are fragmented by private land. May be lumped together in prescription. Treatment of conifer fuels to protect adjacent homes within 100m.		
8	SCRD- Secret Cove	Crown-SCRD	53.0	0.5		High	C5	42.93	Three polygons have been broken up as they are fragmented by private land. May be lumped together in prescription. Treatment of conifer fuels to protect adjacent homes within 100m.		



Treatment	General	to at all at a sk	Wildfire Behaviour Potential		Duiouit	Fuel	Area		
Polygon ID	Location	Jurisdiction*	Moderate	High	Extreme	Priority	Туре	(ha)	
9	SCRD- Halfmoon Bay	SCRD-Crown- BC Parks	205.8	17.3		High	C5	235.4 3	Homes within 100m along entire treatment area. Boundaries delineated using structure density layer. Mix of jurisdiction, majority SCRD and Crown. BC Parks land has lower threat and may be netted out, multiple riparian areas in the BC Park portion of TU. C5 leading fuels throughout, field work identified mortality and declining trees throughout. Prescribed burn potential in his area, although might be difficult with overlapping values.
10	SIGD	SIGD	28.9	3.4		High	C5	44.92	Mostly C5, interfaces with private homes and critical infrastructure and high cultural value (longhouse). Could be combined with TU 11 to form one large treatment unit, however this will require partnership with crown.
11	Sechelt	Crown	13.3	14.2		High	C3	24.12	Continuous with TU 10, lots of volatile C3 fuel surrounding critical infrastructure. Relatively flat with mechanized potential.
12	SCRD- Roberts Creek	Crown-BCP arks	31.5	8.3	0.6	High	C5	41.59	PSTA inaccurately identified portions of this as D1/2, but fieldwork corrected this to volatile C3. interfaces with some private homes and highway.
13	SCRD- Roberts Creek	BC Parks	34.5			Low	C5	36.44	Adjacent highway, could build off adjacent golf courses to create a larger fuel break from landscape forests.
14	SCRD- Roberts Creek	Unknown- Crown	27.1			Low	C5	28.57	Interfaces with private land, C5 leading fuels. Build off BC Hydro ROW to increase area of mitigation.
15	SCRD- Sechelt Inlet	Crown-BC Parks	29.5	14.4		Medium	C5/M 1	43.55	Surrounds relatively isolated private homes up Sechelt Inlet. Mostly conifer leading fuels. Overlaps Sunshine Coast Community Forest tenure.
16	Sechelt	Crown	14.7			Medium	C5	13.24	Interfaces with private land, conifer leading fuels. Overlaps Sunshine Coast Community Forest tenure.
17	Sechelt	Crown-BC Parks	66.2	0.8		Medium	C5	70.71	BC Parks Porpoise Bay. Flat with conifers throughout. Treatment to protect adjacent private land and campsites. Overlaps Sunshine Coast Community Forest tenure.
18	SCRD- Garden Bay	SCRD	23.9	2.4	0.2	High	C5	37.96	Katherine Lake Park, conifer stands throughout. Interfaces with private lands. PSTA inaccurately typed portions as D1/2, corrected to C5. Potential as demonstration forest.
19	SCRD- Sakinaw Lake	SCRD	44.1	9.3	0.5	High	C5	56.00	Dan Bosch Park. Surrounds Sunshine Coast Hwy, borders two proposed WRR treatments north and south. Treatment here will greatly improve protection of critical route in AOI



Treatment	General	luric diction*	Wildfire Be	haviour I	Potential	Driority	Fuel	Area	Treatment Pationala	
Polygon ID	Location	Jurisdiction	Moderate	High	Extreme	Phoney	Туре	(ha)		
20	SCRD- Egmont	Crown-BC Parks-SCRD	95.3	1.3		High	C5	97.10	Builds off treatment area that is currently in implementation stage around Egmont Road. Egmont identified as a High risk community on WUI Risk Class Maps. Difficult terrain with gullies and steep slopes.	
21	Sechelt	Crown-First Nation	131.4	38.1	0.2	High	C3/C5 /M1	172.70	Fuel break between west sechelt and landscape forest. Recent fire in 2015 was in this area. Protects homes along boundary and community. Mix of fuels, with portions of volatile C3. Excellent access.	
22	SCRD- Elphinsto ne	SCRD	7.5	0.3		Low	C5	7.70	Interfaces with private land, homes directly back onto treament area. C5 fuel, good access.	
23	SCRD- Port Mellon	Crown-SCRD	29.5	3.7	3.9	Low	C3/C5 /D1	43.43	C3 and C5, overlaps with BC Hydro ROW. Portions of D1/2 will be netted out. Good access.	
24	SCRD- Pender	SCRD	10.0	5.6		Medium	C5	15.64	Interfaces with private land, conifer leading fuel. Field work noted significant fuel loading due to tree failure, hazard not captured in PSTA. Good candidate for prescribed burn.	

*Note that treatment areas overlap with the traditional territory of the shishalh nation, and consultation will be required for all treatment areas.





Photo 10: Example of stand condition before fuel mitigation treatment



Photo 11: Example of stand condition post fuel mitigation treatment



Fuel Management near Critical Infrastructure

Several of the identified critical infrastructure values are vulnerable to wildfire. There are several facilities that are critical for supplying clean water that are located within forested areas with reservoirs that are often in high-risk areas such as at the top of slopes. Many of these are within natural forested areas and do not have a suitable defensible space between them and the adjacent forest areas. It is recommended that a detailed assessment be completed of these facilities and fuel treatment prescriptions be developed. These should ensure that there is at minimum a 30-metre fuel-free space around each of them.



Photo 12. Critical Infrastructure surrounded by conifers with no fuel free zone.



Fuel Treatment Implementation and Funding Opportunities

Fuel treatments on local government land are eligible for funding to develop prescriptions for fuel treatment and operational implementation through the Community Resiliency Investment Program. Treatments on crown land are managed through the Wildfire Risk Reduction program, coordinated through the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. Most proposed treatment areas identified in this report are on a mix of land ownership, overlapping both local government and crown land. Projects that include a mix of local and crown land are eligible for funding from CRI, as long as they are adjacent to community structures and they extend no further than one kilometer from the structure density class of greater than six.

Community Resilience Investment Program (CRI)

This CWPP was funded through the UBCM Community Resiliency Investment (CRI) program. This program includes a variety of funding categories, including Education, Planning, Training, and Fuel Management activities. The available funding ranges from \$50,000 annually for low-risk communities, to \$150,000 annually for higher-risk communities. The amounts can be increased based on the number of partners involved. It is estimated that the SCRD CWPP partnership could be eligible for \$600,000 annually through CRI grants. The SCRD, composed of electoral areas, may be eligible for further funding per electoral area for larger collaborative projects. The project partners can apply for funding through this program for several of the initiatives and recommendations within this CWPP, including interface fuel treatment. Applications for 2022 funding grants will be due in late 2021.

First Nations Emergency Services Society of BC

The First Nations Emergency Services Society of BC (FNESS) is a program that helps First Nations to develop and sustain safer communities. Most of the FNESS program funding is conducted in partnership with CRI. Regional applications to CRI which include the SIGD will likely involve FNESS coordination. SIGD is also eligible to apply for FNESS funding independently of the municipal project partners. Most recommendations in this report that are specific to SIGD are eligible for FNESS funding, including interface fuel treatment.

Wildfire Risk Reduction Program

As of 2019, the provincial government is taking leadership for fuel mitigation on provincial crown lands through the Wildfire Risk Reduction (WRR) program. This program operates at the scale of BC's natural resource districts and focuses on vulnerabilities to critical infrastructure and high-risk communities. Subsequently, treatment units identified in this CWPP may differ from those identified strategically at the WRR level. Treatments that are exclusively on crown land are administered by the WRR program, however treatments that are on a mix of local government and crown land are eligible for CRI funding and can be managed by local government. WRR representatives have been consulted on several treatment areas identified in this CWPP to support future partnerships and efficiencies in treatment.



5.2 FireSmart Planning and Activities

This section provides recommendations to mitigate the risk of wildfire to existing and planned developments. These are consistent with the guidance of the FireSmart Begins at Home Manual (BC Wildfire Service, 2019). Private landowners have a large responsibility to play in managing the risk to life and property from wildfire. Recent changes to the CRI program recognize the importance of actions on private lands to mitigate community risk. Private landowners can increase community safety by choosing FireSmart building materials and landscaping as well as through general emergency preparedness.

During a wildfire, homes are ignited as a result of:

- Sparks or embers landing and accumulating on vulnerable surfaces such as roofs, verandas, eaves, and openings. Embers can also land on or in nearby flammable materials such as bushes, trees or woodpiles causing a fire close to a structure.
- Extreme radiant heat from flames within 30 m of a structure that melts or ignites siding or breaks windows.



• Direct flame from nearby flammable materials such as bushes, trees, or woodpiles.





Figure 18. Wildfire risk to homes. During a wildfire, homes are at risk from radiant heat as well as embers carried by winds.

FireSmart assessments divide the area around the home into three "priority zones", which radiate out from the structure. The fire resistance of homes in the interface can be improved by achieving FireSmart standards for building materials, ignition sources and combustible fuels within each of these zones. If a wildfire does threaten the area, suppression capability is improved with good access to the interface area, defensible spaces around values, and a good water supply.





Figure 19. FireSmart Management Zones

Zone 1 is the area within 10 m of the home or building. In this area people and structures are at risk from radiant heat from a wildfire. It has been shown through analysis of recent large-scale wildfires that the most important factors in protecting structures are the exterior construction materials and immediate landscaping next to homes (Westhaver, 2017). The structure itself is sometimes considered on its own as the Home Ignition Zone (1A), or area where wildland fire exposes the home to direct flame. The use of non-combustible or fire-resistant building materials is emphasized, along with landscaping plans that reduce the potential for direct exposure of the home to radiant heat or flame.

Zone 2 includes the area from 10 m to 30 m from a structure. Wildfire taking hold in this area may still subject the building to radiant heat and may produce an ember shower onto the building. Fuels are generally treated aggressively in this area to prevent a crown fire from establishing and reduce the intensity of radiant heat and ember production. Treatments may include removal of ground fuel, thinning of trees, and lift pruning of those retained.

Zone 3 includes the area from 30 m out to around 100 m. People and structures are at risk from ember transport associated with a wildfire in this area. Treatment of fuels in this area generally includes stand thinning and aims to prevent a crown fire but is generally not as aggressive as treatments in Zone 2.



5.2.1 FireSmart Goals and Objectives

The overall goal of FireSmart is to encourage private land holders to adopt and conduct FireSmart practices to reduce the fuel hazard and minimize possible damages to their property from wildfire. Specific objectives include:

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

5.2.2 Key Aspects of FireSmart for Local Governments and First Nations

FireSmart is an easy-to-understand communications and technical resource for local governments seeking to mitigate wildfire risk on private lands. FireSmart is presented as a set of best practices for landholders in the wildland-urban interface, showing how building surfaces and design intersect with neighbouring vegetation and fuel loads to create wildfire risk. FireSmart programming is typically voluntary, unless aspects of FireSmart design or assessment are enforced by local governments through the development permitting process. As most structures at risk and much of the potential fuels for a wildfire are located on private lands, FireSmart emphasizes community engagement, citizen initiative, and the importance of regular property maintenance. Education and engagement lead by local governments is critical in the successful adoption of FireSmart practices by private landowners. Public support for wildfire risk reduction on private land encourages residents to cooperate with each other for the mutual benefit to the neighbourhood.

There are a variety of ways to support FireSmart activities on private land, although private landholders will generally only access these if they have an awareness of the wildfire risk on and adjacent to their property. Education and outreach are key first steps to enabling private landowners to reduce wildfire risk. The project partners should distribute wildfire awareness and FireSmart information through their communications channels. These should include:

- This CWPP document
- http://www.bcwildfire.ca/Prevention/FireSmart.htm
- <u>https://www.FireSmartCanada.ca/</u>
- <u>https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/prevention-home-community/bcws_homeowner_FireSmart_manual.pdf</u>

Other FireSmart resources are focused on local governments themselves, to build support and understanding of wildfire risk among public administrators. These are available for local governments to:

- Update or develop a CWPP.
- Develop policies and practices for FireSmart design in public projects.
- Conduct FireSmart risk assessments on public buildings and critical infrastructure.



- Amend high-level strategic community plans to accommodate wildfire risk analysis.
- Train employees in fire management and emergency response.
- Collaborate across jurisdictions on wildfire matters.

Funding can often be supplied through CRI for these activities. Table 20 provides a summary of FireSmart activities that are eligible for CRI funding.

Table 20. FireSmart practices and activities

Category	CRI-Eligible Activity
1. Education	 Develop and/or promote local FireSmart educational activities and tools. Refer to BC FireSmart Resources for FireSmart materials that are currently available. Develop and/or promote education for the reduction of human-caused fires
	 Encourage active participation in Wildfire Community Preparedness Day Organize and host a community FireSmart day, FireSmart events and workshops, and wildfire season open houses
	Apply for FireSmart Canada Community Recognition
2. Planning	 Develop or update a CWPP Develop policies and practices for design and maintenance of FireSmart publicly owned land and First Nations land, such as parks and open spaces Develop policies and practices for design and maintenance of FireSmart publicly owned buildings
	• Conduct site visits and FireSmart and/or risk assessments for publicly owned lands, First Nation lands and publicly owned buildings
3. Development considerations	 Amend Official Community Plans, Comprehensive Community Plans and/or land use, engineering and public works bylaws to incorporate FireSmart policies Revise landscaping requirements in zoning and development permit documents to require fire resistant landscaping Establish Development Permit Areas for Wildfire Hazard in order to establish requirements for the exterior design and finish of buildings1 Include wildfire prevention and suppression considerations in the design of subdivisions (e.g. road widths, turning radius for emergency vehicles, and access and egress points) Amend referral processes for new developments to ensure multiple departments, including the fire department and/or emergency management staff, are included
4. Interagency co-operation	 Develop and/or participate in regional or local FireSmart planning tables Participate in multi-agency fire and/or fuel management tables
5. Emergency planning	 Develop and/or participate in cross-jurisdictional meetings and tabletop exercises, including seasonal readiness meetings Review structural protection capacity (i.e. Fire safety assessments)
6. Cross training	 Cross-train fire departments to include structural fire and interface wildfire training (e.g. S-100) Provide or attend training for Local FireSmart Representatives and community champions Support professional development to increase capacity for FireSmart activities

¹ Local governments should refer to <u>Changes for Local Governments Under Section 5 of the Building Act: Appendix</u> to <u>Section B1 of the Building Act Guide (Revised February 2017)</u> for information on the use of development permits for wildfire hazard.



Category	CRI-Eligible Activity
7. FireSmart	 Undertake FireSmart Demonstration Projects for publicly owned buildings or publicly and provincially owned critical infrastructure. This may include:
Projects	\sim Replacing building materials (i.e. siding or roofing) with fire-resistant materials
	 Replacing building materials (i.e. stung or rooming) with meeresistant materials Replacing landscaping with fire-resistant plants as outlined in the FireSmart Guide to Landscaping
8. FireSmart	Planning for private land (only with private property owners' consent)
Activities for	 Develop FireSmart Community Plans for specific areas
Private Land	 Conduct <u>FireSmart home and property assessments</u>
	 Offer local rebate programs to home owners on private land and First Nations land that complete eligible FireSmart activities on their own properties
	 Provide off-site debris disposal for private land owners who have undertaken their own vegetation management, including:
	 Provide a dumpster, chipper or other collection method
	 Waive tipping fees
	Provide curbside debris pick-up

Personnel is Policy – The Role of a FireSmart Coordinator

Navigating all the aspects of FireSmart can be challenging for local government and private landowners. Local governments often lack the capacity and expertise to support private landowners in reducing the wildfire risk on their property. There are funding options available to private landowners through government grants, however accessing these grants requires local government support. In an area the size of the AOI, with multiple constituent governments and multiple electoral areas, supporting FireSmart initiatives will be challenging. A Regional FireSmart Coordinator position is recommended to be created to manage FireSmart initiatives on behalf of the partnering governments. This position would create new capacity for FireSmart programs and support private landowners that need assistance accessing resources. The primary responsibilities of this coordinator are summarised in Table 21.

The FireSmart Coordinator role is particularly important in translating the broad, non-region specific objectives and strategies of FireSmart into the context of the Sunshine Coast. Most of the literature surrounding FireSmart has been developed in the more historically wildfire prone regions of BC. As discussed, the understanding of wildfire and climate effects on wildfire on the temperate forests of the coast is constantly evolving. Therefore, recommendations of FireSmart and best management practices will also be evolving. A key role of the FireSmart coordinator will be integrating the developing understanding of FireSmart to create specific recommendations for the values on the Sunshine Coast.

The creation of a new role should also involve metrics for success of this position. Measuring success in wildfire hazard mitigation is challenging: success is rarely clear, and wildfires are powerful forces that can overwhelm the most resilient communities. Some possible metrics include:

- Grant dollars accessed and distributed
- Homes that receive FireSmart assessments
- FireSmart specific recommendations from CWPP implemented



FireSmart Activity Category	Role of FireSmart Coordinator
1. Education	 Develop and conduct a public education program, including meetings or information sessions, public signage, and social media. Distribute FireSmart materials (such as pamphlets and brochures, building design guidelines and wildfire awareness and prevention) through community partners and online.
2. Planning	 Support neighbourhoods to apply for FireSmart Canada Neighbourhood Recognition, including by supporting facilitation and FireSmart events and demonstration projects. Complete FireSmart assessments for critical infrastructure.
3. Development considerations	 Provide in-house capacity to comment on wildfire issues within a development permit process.
4. Interagency co-operation	• Coordinate FireSmart initiatives between electoral areas, local governments, and the SIGD.
5. Emergency planning	 Provide comment on wildfire issues during emergency plan and response preparation.
6. Cross training	• Attend Local FireSmart representative training, with an aim to qualify as a facilitator for this program.
7. FireSmart Demonstration Projects	Coordinate retrofits and vegetation management for critical infrastructure.
8. FireSmart Activities for Private Land	 With homeowners' consent: Conduct Home Ignition Zone Assessments for residential properties or homes. Develop FireSmart Neighbourhood Wildfire Risk Assessment for neighbourhoods. Coordinate local rebate programs for residential properties or homes. Coordinate vegetative debris disposal.
9. FireSmart in the Sunshine Coast	• Develop a strategy for FireSmart specific to the Sunshine Coast, integrating the evolving understanding of FireSmart and wildfire in coastal temperature forests.

Table 21. Primary responsibilities of the Regional FireSmart Coordinator

FireSmart Activities for Residential Areas

There are limited opportunities for government to reduce wildfire risk on private land. These include assessment and planning, with no physical actions eligible for grant funding. Property owner consent is required for any assessments or plans conducted by local government.

Grants are available for rebates for homeowners that adopt and conduct FireSmart practices to mitigate wildfire risk. The requirements for these grants are strict and are limited to 50% of the total cost to a limit of \$500 per property. Details of these requirements can be found in Appendix 2 of the <u>Community</u> <u>Resiliency Investment Program 2020 program guide</u>. This rebate also requires local government support, as assessments are required for a home to be considered eligible.

One challenge that has been noted during field work and during stakeholder consultation is the limited options for debris disposal available to homeowners. Some communities, such as Egmont, have limited access to transfer stations. Similarly, the District of Sechelt bylaw no. 486 limits backyard burning for waste disposal. Local government can support fuel management on private land by providing support



for debris management. This could include dumpsters available for green waste in high risk neighbourhoods, or waiving tipping fees on certain days at disposal facilities.

5.2.3 Identify Priority Areas within the Area of Interest for FireSmart

FireSmart planning and outreach to communities should focus on neighborhoods at greatest risk. A number of these neighborhoods that have been identified are built adjacent to large tracts of forests that have moderate to high fire behavior potential. Table 22 provides a summary of the neighborhoods at highest risk. These should be a priority for Firesmart initiatives and educational outreach .

Area ID	Wildfire Risk Rating (E/H/M/L)	FireSmart Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities
Egmont	Н	N	N	
Madeira Park	Н	N	N	
Secret Cove	Н	N	N	
Halfmoon Bay	М	N	N	
West Sechelt	Н	N	N	A comprehensive FireSmart plan is
East Porpoise	Н	N	N	recommended for all areas. This should
Bay (including				acals advectional outroach, coordination with
Sandy Hook and				the PC/MS and EiroSmart assossments A
Tuwanek)				committee made up of representatives from
Selma Park	М	N	N	the local government. Fire Department. PCW/S
Wilson Creek	М	N	N	First Nations, and homoowners should guide
Roberts Creek	М	N	N	the development of this plan
Gambier Island	Н	N	N	
Keats Island	М	N	N	
Thormanby	М	N	N	
Island				

Table 22 Summary of FireSmart priority areas.



Wildfire Development Permit Area

The *Local Government Act* of British Columbia empowers local governments to designate Development Permit Areas (DPA) where special regulations apply to the design and construction of buildings and communities. The Regional District, Town of Sechelt, and Town of Gibsons each use multiple DPAs to protect against various hazards and environmental impacts. Creating a DPA to address wildfire hazard is an effective way to reshape a community in favor of FireSmart principles. Over time, new construction and subdivision under the DPA will improve the resilience of structures to wildland fire and reduce the likelihood of interface fire occurring. Properties within a DPA will face additional regulatory burden when they redevelop, but this oversight is justified by the public interest in preparing homes in the interface for wildfire. As a major policy initiative requiring an amendment to the Official Community Plan, the introduction of a Wildfire Hazard DPA should be the subject of genuine and sustained public engagement.

This Community Wildfire Protection Plan identifies significant areas of high wildfire risk within the jurisdictional boundaries of the Sunshine Coast Regional District and District of Sechelt. These two governments should investigate implementing a Wildfire Hazard DPA under the "protection from natural hazards" provision in the *Local Government Act*. The Sechelt Indian Government District and Town of Gibsons contain fewer areas of high wildfire risk and may not receive the same level of benefit from introducing such policy at this time. However, the following information is of interest to all partner governments, as future wildfire risk may increase or administrative boundaries may be altered. While some of the governments in the AOI have policies related to wildfire in the Official Community Plans, no policies have been made enforceable through further bylaws.

Administrative Area	Existing Development Policy for Wildfire					
Sunshine Coast	None of the existing building, subdivision, or zoning bylaws have provisions specific to					
Regional District	wildfire hazard or wildfire planning.					
	Egmont/Pender Harbor Official Community Plan					
	Homeowners are encouraged to practice vegetation management and consider using					
	non-combustible building materials.					
	Elphinstone Official Community Plan					
	Wildfire is identified as a hazardous condition, but no DPA has been implemented to					
	address it.					
	Halfmoon Bay Official Community Plan					
	Within the Portion of Area B outside the core community of Halfmoon Bay,					
	development applications may be required to submit fire hazard assessments.					
	Hillside/Port Mellon Official Community Plan					
	No specific policies or guidelines.					
	Roberts Creek Official Community Plan					
	Several sections reference wildfire hazard or risk. Development proposals may be					
	reviewed with respect to "interface fire potential".					
	Twin Creeks Official Community Plan					
	Policy focuses on future expansion of the SCRD fire protection area to include Twin					
	Creeks. Homeowners are encouraged to manage vegetation and coordinate volunteer					
	fire protection.					

Table 23. Existing development policies related to wildfire in the SCRD and District of Sechelt.



	West Howe Official Community Plan
	The plan observes that some areas lack formal fire protection. No policies concern
	wildfire management.
District of Sechelt	None of the existing building, subdivision, or zoning bylaws have provisions specific to wildfire hazard or wildfire planning.
	District of Sechelt Official Community Plan
	Wildfire is not identified as a natural hazard within the OCP.

Development Permit Areas have two core components: a map, indicating the properties to which the DPA applies, and design guidelines, which describe the requirements that must be met during development. A third component, professional reliance, can be required to quantify the risk and help guide appropriate design measures.

The DPA map will be adopted by amendment to the Official Community Plan and must show the properties within the DPA. Many communities with existing wildfire hazard DPAs distinguish their mapping between areas of high and extreme risk, and provide guidance tailored to this risk. This approach is supported by Community Wildfire Protection Plans, which provide high-level maps of wildfire risk using provincial classifications. Often, wildfire threat mapping is used to identify the DPA extent, as CWPP risk mapping reflects the current distribution of structures in the interface and may not account for future land use or density under an Official Community Plan. Another approach to mapping the DPA is to identify all properties within a buffer distance of the forest interface. Buffer distances of 100 or 200 metres are commonly used to help address the risk of ember spotting from a nearby wildfire into a neighbourhood.

Development design guidelines must be developed that will ensure that new buildings and landscapes are planned as per FireSmart principals. The guidelines should address:

- Landscaping design.
- Building materials and testing standards.
- Development layout and subdivision servicing, including building setbacks and location, and requirements for accessory structures.
- Management of on-site vegetation and fuels.
- Standards for assessing the wildfire risk to the proposed development.
- Recommendations for ongoing maintenance by the property owner.
- Reporting requirements, including risk assessment by a qualified professional and postconstruction implementation reporting.

Typically, municipalities adopt in whole or part, existing guidelines and standards from the fire protection engineering discipline (see National Fire Protection Association, 2017; National Fire Protection Association, 2018) or FireSmart (see BC Wildfire Service, 2019) to ensure DPA requirements reflect best practices.

The DPA must provide clear instruction as to when and where requirements apply, and under which conditions variances are allowed. Additional resources are required for local planning departments to administer and evaluate DPA applications. For these reasons, many other BC municipalities rely on professionals, typically a qualified Registered Professional Forester, to evaluate wildfire risk and to



determine appropriate mitigation measures for a proposed development. Some municipalities also require a post-construction assessment to be completed by a qualified professional to verify that mitigation measures have been implemented prior to the issuance of an occupancy permit.

Preparing to introduce a wildfire DPA is a significant undertaking and requires community support. Despite the challenges, regulating development is one of the only ways local governments can increase wildfire resilience on private lands. Over time, such a program will reduce the social cost burden or uninsured losses of unprotected development in the interface, reduce structural fuel involvement in interface fires, and improve the success of fire suppression response.

Administrative Area	Wildfire DPA (OCP Approach)	Amendments to other bylaws
Sunshine Coast Regional District	Amendments required to each Official Community Plan (7). Applies to all development applications (building, rezoning, subdivision) within the DPA area.	Amendments to the Zoning Bylaws (2)_could enable consideration of wildfire risk during rezoning or new construction, but application may be inefficient or unfair.
		Amendments to the Building Bylaw would not enable increased oversight for landscape design.
		Amendments to Subdivision Servicing Bylaw could enable consideration of wildfire risk during land subdivision, but will not enable regulation of exterior renovations or single-lot redevelopment.
District of Sechelt	Amendments required to the Official Community Plan. Applies to all development applications (building, rezoning, subdivision) within the DPA area.	Amendments to the Zoning Bylaw could enable consideration of wildfire risk during rezoning or new construction, but application may be inefficient or unfair. Amendments to the Building Bylaw would not enable increased
		oversight for landscape design. Amendments to Subdivision and Development Control Bylaw c ould enable consideration of wildfire risk during land subdivision, but will not enable regulation of exterior renovations or single-lot redevelopment.

Table 24. Regulatory considerationsfor implementing a Wildfire Hazard Development Permit Area in theSunshine Coast Regional District and District of Sechelt.



5.3 Community Communication and Education

Approximately 20% of the study area is privately owned. This CWPP does not assess wildfire risk on private land which can be high due to fuel accumulations and structures built under outdated building codes. It is critical that private landowners are aware of the wildfire risk associated with living in interface or intermix communities. Increasing awareness of the wildfire risk is the first step towards encouraging homeowners to implement FireSmart principles (as discussed in Section 5.2) on their properties.

Public engagement is one of the most challenging aspects of community wildfire planning. Wildfires are typically understood as low probability events and are often disregarded despite their potentially catastrophic consequences. To be effective, an engagement strategy is required that makes use of multiple resources and opportunities. The overall objectives of this strategy are to:

- 1. Improve knowledge of the wildfire risk in the AOI.
- 2. Encourage the public to consider themselves as partners in wildfire risk mitigation.
- 3. Provide knowledge of the tools and resources available to the public to reduce wildfire risk.

A communications strategy can be implemented as a phased process. The first phase is to provide a summary of wildfire risk (such as the figures and content in this CWPP) that can be distributed to the public. This provides groundwork for a communications program tailored to the communities at highest risk. Once priority areas for FireSmart or fuel mitigation are identified, individual communication initiatives can be rolled out based on need and capacity. An effective communications program requires varying levels of effort. Over time, our understanding of wildfire risk may change and new areas may be developed. Developing a suite of communications for wildfire awareness and ensuring effective distribution is a complex and involved process. It may be best achieved as a specific staff role. It may also cross over and share responsibilities with the Regional FireSmart Coordinator position proposed in Section 5.2.2.

Supporting Wildfire Risk Awareness

The cornerstone of an effective communication strategy will be publicly available resources describing the extent and nature of wildfire risk across the AOI. Public communications must refer to wildfire resources, be widely accessible to the general public, and be actively maintained. This CWPP contains an analysis and summary of wildfire risk for the communities of the AOI and should be made publicly available. However, this document is unlikely to be read in full by the public. Messages of importance wildfire risk can be gleaned and provided in more accessible summary formats such as slide presentations, brochures, or informational videos by the project partners.

One of the most important components of this CWPP to make available to the public is the wildfire risk map. This map can be reproduced at a larger scale, presented at public spaces, printed in brochures, or displayed online. Homeowners can refer to the wildfire risk maps to understand the risk associated with their communities. The Regional District currently offers a customizable geographic information system for viewing property, environmental, and planning information at *maps.scrd.ca*. Adding wildfire risk



information from this CWPP to this existing resource would be an effective way to distribute this information to the public.

Other GIS tools may be appropriate for sharing this information with the public, industry, and developers for more targeted engagement. Web mapping applications that combine multimedia and geospatial information, such as ArcGIS StoryMaps, are becoming more common and easy to use. These digital tools combine text, interactive maps, videos, and other multimedia content, making it easy to highlight important content from this plan and present in an accessible, intuitive format.

Developing a Communications Strategy

A communications strategy may be one or multiple documents. It should lay out a step-by-step strategy for increasing public awareness of wildfire risk and of available resources to the public for risk mitigation. A communications strategy will identify several key messages for increasing public awareness of wildfire and FireSmart initiatives. These messages should be used to focus and correctly scope all government communications on wildfire within the AOI, including printed and digital media and during in-person or online events.

Table 25. Potential key messages for a wildfire communications strategy

Potential Key	/ Messages	for Public	Communications

- The communities of the AOI are set intimately within and among the forest, making them vulnerable to wildfires.
- The wildfire risk in coastal forests during the fire season is real and considerable, particularly during hot, dry years (such as 2017 and 2018).
- Climate change and urban development are increasing the wildfire hazard associated with interface development.
- Private landholders have a large role to play in protecting life and property by adopting FireSmart practices for building and landscape maintenance and by being knowledgeable about local emergency plans.
- There are resources to support private landholders and neighbourhoods in becoming more FireSmart.
- Government can help reduce wildfire risk by strategically managing forest fuels on public land within and adjacent to communities.

A key message to emphasize is that the public plays a critical role in wildfire risk mitigation. Local and provincial government will lead wildfire risk mitigation for public land and assets, but private landowners must play their role in mitigating the wildfire risk on privately held land. There are resources available to landowners in reducing the risk on private land, and it is the role of local government to direct and coordinate private access to these resources.

With key messages developed, the project partners should identify whether public outreach will be general or whether it will focus on specific high risk communities. While all residents of the AOI have an interest in wildfire management and response, it may be cost effective to focus these efforts in communities that are at the highest risk of a wildfire.

The final phase of engagement is to prepare an outreach program to spread information about wildfire to their communities. Identification of target audiences for outreach can assist in deciding *when* and *how* to conduct public engagement.



Table 26. Potenti	al methods of p	blic outreach	for wildfire	communications
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	Potential Methods of Public Outreach for Wildfire Communications
•	Establish neighbourhood specific interest groups as discussed in section 5.2.3. Including a local government representative and/or Fire Department liaison in these groups will facilitate engagement and education on FireSmart initiatives and keep the focus of the groups on wildfire issues. Develop a public wildfire information brochure tailored to the AOI. Provide information from this CWPP to provide local context
•	Provide educational material and promote wildfire awareness during large public events or festivals, as through brochures and pamphlets, scheduled presentations, or information booths.
•	Organize an open house to accompany any FireSmart fuel treatments undertaken by the project partners.
•	Update the local government websites to contain direct links to important FireSmart resources, such as this CWPP and the FireSmart Begins at Home Manual. If possible, include local FireSmart buildings and landscaping as examples.
•	Explore online means of presenting the information contained in this CWPP in an engaging format, such as ESRI's StoryMaps or <i>maps.scrd.ca</i> .
•	FireSmart projects, including any building changes or vegetation and fuel management, should be showcased on local government websites and potentially with interpretive signage in the field.



5.4 Preventing Wildfire Ignition

Sources of wildfire ignition can be human- or lightning-caused. Lightning ignitions are difficult to predict or manage. Human caused ignitions, however, can be prevented and are the source of about one half of all wildfires in BC. The most common sources of human caused fires include:

- Campfires
- Industrial activity
- Discarded cigarettes and matches
- Vehicles
- Railways
- House-related fires
- Power lines
- Vandalism.

Predicting and preventing human caused ignitions is a high priority for wildfire mitigation. Road-side ditches and medians that contain grasses should be mowed periodically throughout the fire season. This will reduce fuel loading (standing cured grass) and reduce the ignition potential associated with vehicles, heavy machinery, and cigarettes during the fire season. Signs should be posted at camp sites, recreation areas, and high use trail heads during the summer showing the fire danger rating and emphasizing the need to fully extinguish campfires and not discard cigarettes.

There is also ignition potential from the numerous residences that back up against the interface. Private residents adjacent to wildland (grass or forested) should be reminded (e.g. through public bulletins or media notices) of common risks of ignition in these forested landscapes. A social media campaign in the late spring and early summer should be considered to encourage awareness of wildfire risk and the public's role in preventing ignitions.

Trees can potentially fall on power lines, which can pose a fire risk. Risk is managed primarily by utility companies with regular assessments and tree hazard mitigation programs. The project partners should continue dialogue with BC Hydro to ensure they are removing hazardous trees from forested natural areas that could strike the power lines.



5.5 Summary of Recommendations

Table 27 Summary of recommendations discussed in Section 5.

Number	Recommendation	Section
2	Develop a fuel management working group with representatives from the provincial government, regional district, partnering governments, and local First Nations to establish and review prioritization for fuel management.	5.1
3	Develop fuel management plans for treating priority interface treatment areas. Target top 3-6 priority areas under local government jurisdiction for prescription development, with a phased approach for next areas. All planning will require consultation and partnerships with local First Nations.	5.1
4	Implement prescriptions developed from the fuel management plan.	5.1
5	Develop a parks forest management plan for SCRD parks that includes objectives for fuel management and strategies for achieving those objectives.	5.1
6	Conduct FireSmart assessments for First Nation owned buildings, publicly owned buildings or publicly, provincially and First Nations owned critical infrastructure in the AOI.	5.1
7	Use FireSmart assessments to prioritize retrofitting and fuel management for critical infrastructure in the SCRD in the AOI.	5.1
8	Create a FireSmart Demonstration project for SCRD owned critical infrastructure.	5.1
9	Create a FireSmart Demonstration project for District of Sechelt owned critical infrastructure.	5.1
10	Create a FireSmart Demonstration project for SIGD owned critical infrastructure.	5.1
11	Create a FireSmart Demonstration project for Town of Gibsons owned critical infrastructure.	5.1
12	Develop a Regional Fire Smart Coordinator position through the SCRD. Responsibilities of this coordinator are described in Table 21. Include an array of metrics to assess the success of this new role, and reassess effectiveness after one year.	5.2.2
13	Develop FireSmart plan for identified high wildfire risk FireSmart priority areas.	5.2.2
14	Develop FireSmart plan for identified moderate wildfire risk FireSmart priority areas.	5.2.2
15	Support homeowners to reduce fuel loading on private land by reducing barriers to debris disposal. This could include providing bins for waste, chipping and disposing of waste, or waiving tipping fees for fuel management debris.	5.2.2
16	Conduct a regional study to determine areas for a Wildfire Development Permit Area to apply. This should examine the feasibility and impact on property of applying different buffer distances from areas of high-risk fuels or native forest vegetation to determine the DPA extent. Individual OCP amendments will be required for each jurisdictional area.	5.2.3
17	Revise the Egmont/Pender Harbour Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
18	Revise the Elphinstone Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
19	Revise the Halfmoon Bay Official Community Plan to include wildfire as a Development Permit Area.	5.2.3



20	Revise the Hillside/Port Mellon Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
21	Revise the Roberts Creek Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
22	Revise the Twin Creeks Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
23	Revise the West How Official Community Plan to include wildfire as a Development Permit Area.	5.2.3
24	Revise the District of Sechelt Official Community Plan to include wildfire as a Development Permit Area for the District of Sechelt.	5.2.3
25	Develop a community communication and engagement strategy.	5.3
26	Establish neighbourhood specific interest groups. Including a local government representative and/or Fire Rescue liaison in these groups will facilitate engagement and education on FireSmart initiatives and keep the focus of the groups on wildfire issues.	5.3
27	Representatives from each government should receive training for Local FireSmart Representatives, Home Partners, FireSmart 101, and Community Champions	5.3
28	Develop a FireSmart brochure that focuses on the local context of wildfire within the AOI. Include material on reducing human caused fires.	5.3
29	Provide educational material and promote wildfire awareness during large public events or festivals, as through brochures and pamphlets, scheduled presentations, or information booths.	5.3
30	Organize an open house to accompany any FireSmart fuel treatments undertaken by the project partners.	5.3
31	Distribute a summary of this CWPP through local government communications channels. Include summary maps for easy reference for community members.	5.3
32	Update the local government websites to contain direct links to important FireSmart resources, such as this CWPP and the FireSmart Begins at Home Manual. If possible, include local FireSmart buildings and landscaping as examples.	5.3
33	Integrate wildfire layers from this report into the GIS open data tools that exist on partnering government websites.	5.3
34	FireSmart projects, including any building changes or vegetation and fuel management, should be showcased on local government websites and potentially with interpretive signage in the field.	5.3
35	Conduct annual spring media campaign to promote reducing human wildfire ignitions.	5.3
36	Post wildfire awareness signs at high use camp sites, recreation areas, and high use trail heads during the summer.	5.4
36	Consult and coordinate with utility providers to create defensible spaces and reduce risk around all substations.	5.4



Section 6: Wildfire Response Resources

This section provides a summary of the suppression response protocol to be adopted and resources available to the communities as well as recommendations for improvement.

Wildfire Detection and Reporting

The BC Wildfire Service is responsible for wildfire detection. Fires are located using a lightning locator system, aerial patrols, and public observation. In urban centers, a wildfire is most likely to be detected and reported quickly by the public. Wildfire awareness signs should be posted at strategic locations (major transportation corridors, recreation areas and high use trail heads) that specify how to report a wildfire.

All wildfires should be reported to the Provincial Forest Fire Reporting Center in Victoria through their toll-free phone number 1-800-663-5555 or *5555 on a cellular phone. The agent will then collect as much information as possible regarding the fire including:

- The exact location of the fire
- The estimated size
- The type of fuel burning
- The speed and direction of spread
- The colour of the smoke
- The location of any structures or lives at risk from the fire

Contact details as well as the requirement for this information should be included in any public education campaigns. 911 can also be used to report wildfires, however this will require an operator redirect to the reporting centre in Victoria.



6.1 Local Government and First Nation Firefighting Resources

6.1.1 Fire Departments and Equipment

The two types of firefighting scenarios that are commonly described include structural and wildland. The BCWS is responsible for actioning and managing wildland fires. Local fire departments are responsible for structure or vehicle fires in their response area. Wildland interface fires involve both structural and wildland fuels, adding complexity to fire behavior and the suppression response. Interface fires require a coordinated and unified incident command between the BCWS and the responsible local fire department. It is critical that there be strong relationships between local fire departments and the BCWS. This requires training and inter-agency exercises, as well as formal mutual aid agreements. The existing resources for fire suppression in the AOI are described in the following sections.

Local Fire Departments

There are several fire departments that provide fire protection in the study area. These fire departments have their own unique histories and their response areas do not directly correlate to the legal boundaries of the local governments.

The Sechelt Fire Department provides fire protection to the District of Sechelt and the Sechelt Indian Government District. This department is comprised of 4 full time staff and a large volunteer auxiliary. This fire department responded to the 2015 Old Sechelt Mine fire and supported the BCWS in their operations. The Sechelt Fire Department is operated independently of the SCRD.

The Gibsons and District Volunteer Fire Department (GDVFD) have a similar structure to the Sechelt Fire Department, comprised of 4 full time staff with a large pool of volunteer firefighters. However, the GDVFD falls under the umbrella organization of the SCRD. The response area is comprised of the Town of Gibsons, as well as portions of Electoral Areas E and F of the SCRD.

The remainder of the SCRD is serviced by 4 other fire departments. Most of these fire departments are staffed by one full time chief and supported by a pool of volunteer firefighters. The Egmont and District Fire Department is staffed solely by volunteers. The Roberts Creek, Halfmoon Bay, and Egmont and District fire departments fall under the governance of the SCRD, while the Pender Harbour Volunteer Fire Department is operated independently.

There are several areas within the SCRD that are not covered by local fire protection. Port Mellon is the largest and most populous area on the mainland that does not have fire protection. The large industrial pulp and paper operation in Port Mellon has its own fire protection and firefighters – this department has no public service area but may respond outside the mill precinct under mutual aid agreements or other internal policies. Thormanby, Keats, and Gambier islands all lack formal fire protection. These islands are isolated, with access limited to infrequent water taxis for pedestrians. Residents of these islands have worked to establish communal equipment and training sessions for residents to ensure their communities have some local fire protection capabilities.



British Columbia Wildfire Service

The BCWS maintains a fire zone office at a facility near the Sechelt Airport. There are 3 crews based there in the core wildfire season, with several officers also operating out of this office on a fulltime basis.

6.1.2 Water Availability for Wildfire Suppression

Water is the single most important resource required for suppression activities. Wildfire suppression strategy and tactics revolves around access to water for pumping, helicopter bucketing, and skimming by airtankers. Most often natural water sources are used for wildfire suppression. Local fire departments usually rely on networks of fire hydrants for suppression of structure fires.

Water delivery is complicated in the SCRD. There are a variety of water systems used for drinking water, which also supply the hydrant networks. Many of these systems operate independently, as discussed in section 3.2.3. Overall, the established water infrastructure network is extensive, with only more isolated homes and structures lacking hydrant coverage. The capacity of independent water systems does vary, and not all systems may be able to sustain prolonged use for wildland firefighting. Most local fire departments are aware of deficiencies in hydrant coverage within their local response areas. A map of these areas should be produced for the entire AOI and provided to all fire departments. A copy of this map should also be provided to local planners to ensure that hydrant coverage is included in development applications. Development applications typically include a review of hydrant coverage as part of referral phase. Rural areas are often where new urban development occurs. A water system adequate for use in firefighting should be included as a requirement for new developments. This may require input from the local fire department to review the water system's capabilities.

The ocean provides a close resource for aerial firefighting by helicopters and airtankers. The use of natural fresh water sources for on the ground wildfire suppression can be challenging in the AOI. Typically, many fresh water sources have major variation in levels throughout the year. Summer droughts, such as in 2017 and 2018, can result in critically low water levels. This can cause water shortage for wildfire suppression. It is recommended that a map of critical water such as lakes and perennial streams be produced. This map should identify critical water resources that should not be used for drafting or pumping, as well as sources that are adequate for use in summer drought. This map should be distributed to all local fire departments and the BCWS.

6.1.3 Access and Evacuation

There are two dimensions to access and evacuation for the AOI. The first is connectivity between the AOI and the Lower Mainland and the qathet Regional District. The second is connectivity among the various communities inside the AOI. At both this regional and local level, the AOI and its constituent communities are isolated with limited access for evacuation.

The only public access to the AOI is via two ferry terminals located at the northern and southern ends of the peninsula. The main ferry terminal is located at Langdale in the south of the region, where scheduled service typically runs 8 sailings per day between the Langdale and the Lower Mainland's Horseshoe Bay terminal. The ferry capacity on this route is 1,500 passengers and crew, and 360 standard vehicles. The sailing duration is typically 40 minutes. The secondary route connects Earl's Cove, in the northern limit of the AOI, with the qathet Regional District to its north. The ferry on this route typically



runs 8 sailings per day and has a capacity of 450 passengers and 125 vehicles. The sailing time is typically 50 minutes. Public access to the qathet Regional District is also dependent on ferries, with its primary route linking the region to Vancouver Island.

Although large evacuations from wildfire are rare in BC, they are not unknown. The largest evacuation in recent memory occurred in 2017, when a population of 24,000 from Williams Lake and outlying areas were put under evacuation order. Within the AOI, in the event of a large wildfire which requires a regional evacuation, the primary evacuation route is the Langdale ferry to Metro Vancouver. A coordinated evacuation of several thousand residents would be a major undertaking and would require provincial support from various agencies. Furthermore, the terminal and surrounding road capacity would also require coordination from the SCRD to ensure efficient ferry loading. It is recommended that the SCRD and partnering communities develop a large-scale regional evacuation plan to address these challenges.

The intra-region connectivity within the AOI is also limited. The Sunshine Coast Highway (Hwy. 101) is the only thru route between all communities, and for most of the communities is the only access route. This highway is mostly single lane, and capacity may be limited for a large-scale evacuation of any community. The northern communities are the most reliant on the Sunshine Coast Highway for evacuation, while the communities south of Sechelt do have other secondary route options. It is recommended that evacuation plans be completed for each community, prioritizing the most isolated communities first. These plans should then be integrated into the broader regional evacuation plan. Several treatment areas (Section 5.1) have been recommended adjacent to Hwy 101 to improve its safety in the event of a wildfire.

6.1.4 Training

Early response time to an ignition is critical to controlling its spread. Local fire departments will often be first responders to interface fires to attempt to contain fire spread. Although BCWS is ultimately responsible for wildfire management, the initial response by the local fire departments can be critical for early containment.

Most of the local fire departments in the study area have training programs in place for wildland fire operations (Table 28). However, the basic standard training for firefighters in each department varies. Local fire departments should ensure that all firefighters receive basic wildland fire training. This is provided through the S100 Basic Fire Suppression and Safety course, as well as the S185 Fire Entrapment Avoidance course. Firefighters should also receive basic Incident Command System training through the ICS100 course. The ICS system is used by the BCWS to organize firefighting resources during an incident, and basic ICS100 training will ensure local fire departments will be able to effectively integrate into the BCWS structure. This training will ensure effective and streamlined response to a wildfire, either as an independent fire department or as part of BCWS led wildfire management.



Fire Department	Current Wildfire Training Minimum	Additional Training Recommendation
Pender Harbour	S100, ICS100, ICS200, ICS300	S185
Gibsons & District	S100, ICS100	S185
Roberts Creek	S100, S185, ICS100	None
Sechelt	S100, S185, ICS100	None
Halfmoon Bay	Partial S100 and ICS100	100% S100, ICS100, and S185
Egmont	Partial S100 and ICS100	100% S100, ICS100, and S185

Table 28. Local fire training standards and recommended courses.

In addition to formal training courses, wildfire exercises should be conducted by local fire departments as part of their regular training. The focus of these exercises should be inter-agency cooperation. These exercises should include multiple fire departments and the BCWS. Wildland and structural firefighters have different expertise, and wildland urban interface fires require a background in both. Interagency exercises create opportunities for knowledge sharing and to effectively train all agencies in mutual aid scenarios. Facilitating partnerships between fire agencies through training exercises lays the groundwork for effective suppression in the event of an interface wildfire.

6.2 Structure Protection

This section discusses the SCRD and project partners capacity for protecting structures in the event of an interface fire. Successful structure protection is dependent on the building materials and vegetation immediately around the structure. In many large wildland urban interface fires, firefighters must conduct structure triage, a process where structures are categorized for their resilience to interface wildfire. Firefighters will focus their efforts on the structures that are most likely to survive the fire. This is done to maximize the total number of protected structures. Homes that require too many resources and effort may be sacrificed to ensure successful protection of the more resilient structures. The resilience of a structure is increased by adopting the FireSmart principles as discussed in 5.2.

The fire departments in the study area have most of the training necessary for interface wildfire suppression. These departments are well resourced for their mandate of structure protection, and these resources are also useful for wildland fire suppression. Local fire departments also have a small amount of structure protection equipment, including sprinklers. The District of Sechelt Fire Department owns a Structure Protection Unit (SPU), which can be made available to the other departments for an interface incident. SPUs can protect 30-35 structures and contain a large array of sprinklers and accessory equipment that is used to protect values during an interface wildfire.

The fire departments in the SCRD are overall well equipped to respond to an interface wildfire. The SPU operated by the Sechelt Fire Department is a critical resource for interface wildfire suppression, and its central location in Sechelt is ideal for deployment. It is recommended that all departments in the study area receive training in deployment and operation of this SPU. This could be integrated into the interagency training exercise discussed in 6.1.4.



6.3 Summary of Recommendations

Table 29 Summary of recommendations discussed in Section 6.

Number	Recommendation	Section
37	Create a water availability map for the study area, integrating information from all partnering fire departments.	6.1.2
38	Identify critical water resources on the water availability map. Identify the specific critical resources that should not be used for drafting.	6.1.2
39	Complete evacuation plans for each partnering government.	6.1.3
40	Ensure that all firefighters in all departments receive basic wildfire training, including S100, S185, and ICS100.	6.1.4
41	Ensure that all fire departments are trained in use and deployment of Structure Protection Unit.	6.2
42	Conduct cross-jurisdictional meetings and tabletop exercises annually before fire season. Include emergency managers from partnering governments, representatives from local fire departments, and representatives from the BCWS.	6.2



Appendix 1 Local Wildfire Threat Process

This section provides a summary of the local wildfire threat assessment, including field reviewed fuel characteristics, proximity of fuel to the community, local fire spread patterns, topographical considerations, and local factors. The local wildfire threat assessment process involves:

- 1. Verification of local fuel types to develop a fuel type map
- 2. Assessment of the proximity of fuels to the community
- 3. Assessment of fire spread patterns
- 4. Consideration of topography
- 5. Stratification of the WUI based on relative wildfire threat
- 6. Classification of wildfire risk areas

A 1.1 Fuel Type Attribute Assessment

Fuel typing falls into sixteen national benchmark fuel types that are used by the Canadian Fire Behaviour Prediction System (Canada, Canadian Wildland Fire Information System, 2018). This system divides fuels into 5 major groups and 16 more specific fuel types. These groups are used to describe fuels according to stand structure, species composition, surface, and ladder fuels, and the organic (duff) layer. The current Canadian Forest Fire Behavior Prediction (FBP) System does not include coastal forests in their fuel type descriptions (Perrakis & Eade, 2015), therefore the fuel type that most closely represents forest stand structure was identified.

Different fuel types are associated with different levels of wildfire behaviour potential. Therefore, accurate fuel typing is a critical input to the wildfire behaviour and threat assessment mapping. Conifer fuel types typically have the highest wildfire behaviour potential and are the most likely to support continuous crown fire and spotting potential. Different conifer fuel types have different crown fire and spotting as potential. See Table 30 for a breakdown of area by fuel type and crown fire spot potential.



C3 and C5 - Conifer Fuel Types

There are 7 possible conifer dominated fuel types (Figure 20), only 5 of which are typically encountered in British Columbia. Two of these fuel types, C3 and C5, are commonly found in the AOI. Both characterize second growth mature stands. C3 includes a higher density stand with lower crown heights, while C5 is lower in density and has higher crown heights.



Figure 20. Characteristics of the seven conifer fuel types. C3 and C5 are most prevalent within the AOI.



Fuel type M-1/2 – Mixed stands

This fuel type is found throughout the study area, often around riparian areas or areas historically disturbed. They are characterized by stands comprised of a mix of coniferous and deciduous species. The conifer component in these stands is mostly a mix of Douglas-fir, western redcedar and western hemlock. The deciduous component varies and includes bigleaf maple and red alder. In a few locations, the broad-leaved evergreen tree arbutus contributes to the deciduous component of the stand. Fire behaviour potential in these stands increases with and is highly dependent on the number of coniferous trees present.



Photo 13. Example of a stand classified as M2 fuel type


Fuel type D-1/2 - Deciduous

This fuel type consists of stands that are generally moderately stocked and dominated by deciduous trees. Within the AOI, there is little area classified as this fuel type. These stands occur primarily in areas that have historically been disturbed. They can include a small amount of conifer trees, usually in patches or as single trees. Dead and down round wood fuels are a minor component of this fuel complex. During the summer months, the principal fire-carrying surface fuel consists chiefly of deciduous leaf litter and cured herbaceous material. Areas dominated by shrubs are also included in this type. These are dense plant communities with few trees and a variety of shrub species. These deciduous stand and shrub communities will all have a relatively low fire behavior potential.



Photo 14. Example of deciduous fuels in rear. Isolated conifers can be found in deciduous stands.





Figure 21. Updated fuel type map for the AOI.



Fuel types were provided in the Provincial Strategic Threat Analysis (PSTA) dataset. The PSTA fuels layer is conducted at a landscape level, and typically appears coarse when viewed at a small scale. The PSTA fuels data is derived from existing provincial data and algorithmic interpretation of orthophotos. When examined at a local scale for a CWPP, errors are evident. These are often due to recent disturbance, such as logging or land clearing for development. Another source of error is very fine differences in fuel types that are difficult to capture in a large scale analysis, such as selection cut harvesting, or tree mortality from disturbance.

An updated fuel types layer is required to provide an accurate fire behaviour and wildfire threat map. The following process was used to update the fuel type layer, which has been developed in consultation with the BCWS fuels specialist (Dana Hicks, pers communication):

- 1. DHC reviewed the fuel type layer with latest ortho imagery. Identified obvious errors at this scale. This included areas identified as forest but have recently been cleared. Recent harvesting not captured by VRI was typed as S-3, given the likely levels of slash post-harvest in this region of the South Coast. In some areas the VRI-derived fuel type was classified as grass or slash, but the polygon in the aerial imagery is clearly treed. These were classified using air photo interpretation and referencing the nearest treed polygons.
- 2. Areas were identified for ground truthing. This focuses on areas adjacent values and communities as priorities.
- 3. Field work was conducted to ground truth the fuels layers. Polygons adjacent to values were visited by forester and the accuracy of fuel typing layer confirmed. Where errors were encountered, the fuel layer was updated and representative photos were taken.
- 4. Finalize the spatial fuels layer.

Below is a summary table showing the total area for each fuel type in the AOI.

Fuel Type Classification	Total Area (ha)	% of area	Crown Fire Spot Potential
C2	0	0	High
С3	1080.9	1.5%	Moderate
C4	0	0	High
C5	27015.9	36.3%	Low
C7	0	0	Moderate
D1	9840.5	13.2%	Very Low
M2	4874.3	6.6%	Low
01b	173.1	0.2%	Low
S1	84.7	0.1%	
\$3	774.5	1%	Low
Non-Fuel Areas	30562	41.1%	N/A

Table 30 Fuel Type Categories and Crown Fire Spot Potential.



A 1.2 Proximity of Fuel to the Community

Fuel closest to the community usually represents the highest hazard. 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 Wildland Urban Interface (WUI) into 3 areas (Table 31):

- 1. Areas within 100 meters of the WUI (WUI 100)
- 2. Areas from 101 to 500 meters from the WUI (the WUI 500)
- 3. Areas 501 to 2000 meters from the WUI (the WUI 2000).

Table 31 Proximity to the Interface

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

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

WUI threat classes of High or Extreme are depicted in Figure 15. These are identified through a combination of both wildfire behaviour and proximity to communities or values. High WUI Threat Class areas are those with High or Extreme wildfire behaviour and are within 500 m of a value or community. Extreme WUI Threat Class areas are those with High or Extreme wildfire behaviour and are directly adjacent a value or community.



A 1.3 Fire Spread Patterns

Initial Spread Index (ISI) is a rating of the expected rate of spread of a fire. ISI and wind speed and direction data is recorded at local BCWS weather stations and are used to understand the predominant summer fire spread patterns. This data is illustrated as an ISI Wind Rose (Figure 22). This rose shows the frequency of counts by wind direction with the frequency of the ISI values during that time period.

During fire season, the prevailing winds are westerlies, with strong southeasterly winds common. The highly variable topography has significant influence on predicting winds, as does the adjacent large inlets that are found east of the AOI. Therefore, landscape winds should not be used to guide wildfire management without consideration of local topography. Historical wildfires do not show a consistent pattern in spread, but rather have spread patterns determined by slopes and aspect.





Frequency of counts by wind direction (%)

Figure 22. Initial Spread Index (ISI) Rose from TS Elphinstone Weather Station. (BC Wildfire Service, 2019). The color of each bar signifies the ISI, and the length corresponds the frequency of that ISI with the windspeed direction.



A 1.4 Topography

Steep slopes significantly increase wildfire spread through increasing radiant and convective heat. Aspect on steep slopes will also affect wildfire spread, as south facing slopes will be much warmer and drier than other aspects. Areas with steep, vegetated slopes below them are at higher risk than flat areas with similar fuel loading.

Most of the AOI is moderately to steeply sloped, with few flat areas. Broadly speaking, moderate slopes rise from the adjacent inlets or Strait of Georgia, with steep gullies and peaks found throughout. The slopes in the AOI mostly rise from west to east.

Table 32 Slope percentage and fire behaviour implications.

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

Development is concentrated along the water front and the parallel Sunshine Coast Highway. However, given the varied topography and heavy intermixed development throughout the study area, even communities near the water can have steep vegetated slopes below them increasing wildfire behaviour potential.

Table 33 Slope position of value and fire behaviour implications.

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



A 1.5 Local Wildfire Threat Classification

The areas that have a high wildfire threat include fuel types that are dominated by conifer tree species and on steep slopes. These areas have high fuel loading that with both winds and the effects of slope will burn at a high intensity. Conifer dominated fuel types constitute almost 40% of the study area.

Wildfire Behavior Threat	Total Area (ha)	% of area
Very Low	30,283	40.7 %
Low	2,669	3.6 %
Moderate	18,882	25.4 %
High	3,432	4.6 %
Extreme	1,112	1.5 %
Private	18,028	24.2 %

Table 34 Wildfire behavior category based on fire intensity



A 1.6 Local Wildfire Risk Classification

The 2012 wildfire risk methodology was used to determine wildfire risk. This method intersects the updated wildfire threat with the proximity to values to determine wildland urban interface threat class, which represents wildfire risk. This highlights areas of High or Extreme wildfire threat, and classifies their risk based on stratified distances. Areas of very low, low, or moderate wildfire threat are dropped from this analysis. Area of High wildfire risk are within 500m of a value and pose a high or extreme wildfire threat. Areas of Extreme risk are directly adjacent a value and pose a high or extreme wildfire threat.

Wildland Urban Interface Threat Class	Proximity of High or Extreme Threat to Value	Total Area (ha)
Low	>2,000m	340
Moderate	500 – 2,000m	3,420
High	Within 500m	739
Extreme	Directly adjacent	45

Table 35. Wildland Urban Interface Threat Class

A 1.7 Summary of Fire Risk Classes

The above table summarizes the total area by WUI threat class. This is the total area of high or extreme wildfire threat which is further broken down by the distance from value. This is summarized in Figure 23, which shows the spatial distribution of the areas of highest wildfire risk.





Figure 23. Local wildfire risk map.



Appendix 2 Wildfire Threat Assessment Worksheets and Photos

Worksheets and photos submitted separately.



Appendix 3 Description of Terminology

Area of Interest (AOI) The geographic study area for a Community Wildfire Protection Plan, within which the extent of the boundaries of the *Wildland Urban Interface* are determined.

Community Wildfire Protection Plan A plan adopted by a local government or First Nation to identify wildfire threat and risk throughout the study area, examine policy and planning responses, and assess emergency response capacity while providing action item recommendations for building community resilience, supported by the provincial government through the Community Resiliency Investment Program.

Crown fuels Forest fuels occurring in the above the level of the ground, on tree stems or in tree canopies, including live and dead branches attached to trees, bark, and foliage.

Fire Weather Rating Those elements of a forest that can burn, including organic material on the forest floor, logs, dead branches and

Forest fuels Those elements of a forest that can burn, including organic material on the forest floor, logs, dead branches and needles, shrubs and herbs, and the bark, wood, and foliage of live trees.

Fuel management Coordinated action to reduce wildfire risk by modifying the structure and density of forest fuels. In British Columbia, this work typically requires the preparation of a *fuel management prescription* by a qualified forest professional.

Fuel management prescription A document that identifies fuel management strategies to reduce wildfire risk in a defined area, while also ensuring other values are protected.

Fuel treatment The implementation of a fuel management prescription, which may involve the physical modification of fuels by heavy machinery or ground workers.

Interface A pattern of urban development where contiguous development directly abuts native vegetation.

Intermix A pattern of urban development where buildings are closely placed within and among trees.

Landscape Unit Plan A plan prepared by the provincial government that provides objectives for resource management within a defined area, including policies related to forest biodiversity and wildlife habitat.

Official Community Plan A local government plan for an electoral area(s) or municipality, mandated by provincial legislation, that shows how land use will be planned and how local government will meet other provincial policy objectives. Official Community Plans may also include additional policies based on local needs and interests.



Provincial Strategic Threat Analysis A high level analysis of wildfire threat and risk prepared by the Province of British Columbia for public lands and accompanying classifications of severity.

Suppression Actions taken in response to fire to control the spread of the fire or reduce it in area or severity.

Surface fuels Forest fuels found on top of the organic layer of the soil and below the crowns of trees, typically including understorey vegetation, dead branches, needles, and logs..

swiya The traditional territory of the shíshálh Nation, which includes most of the Area of Interest..

Wildfire A form of natural landscape disturbance involving the combustion of vegetation.

Wildfire risk The probability of a wildfire occurring combined with the consequences or impacts it would cause.

Wildfire season The period of the year during which wildfires generally take place due to weather and fuel conditions.

Wildfire threat A ranking of potential fire behavior based on fuel conditions, weather conditions, slope, aspect, and other biophysical factors.

Wildland Urban Interface (WUI) The geographic area where homes and buildings meet continuous areas of natural vegetation.



Appendix 4 References

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