Village of Zeballos
Community Wildfire Protection Plan
2020 Update

Submitted to:

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June 26, 2020

ACKNOWLEDGMENTS

This plan was prepared by Colin Filliter, RPF and Cynthia Lu, RPF. Colby Day, RFT completed the spatial data analysis and mapping. The authors of this report would like to thank and acknowledge the following people for their assistance and participation in preparing the update to the Village of Zeballos Community Wildfire Protection Plan:

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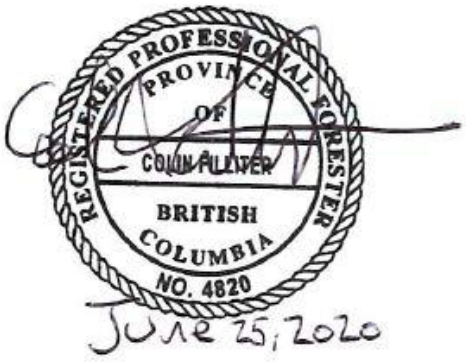
This report is made possible by the Union of BC Municipalities through the Community Resiliency Investment grant.

REGISTERED PROFESSIONAL SIGN & SEAL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EXECUTIVE SUMMARY

The Village of Zeballos 2020 Community Wildfire Protection Plan (CWPP) Update was completed under the framework established by the Community Resilience Investment program, administered by the Union of BC Municipalities. The CWPP addresses the wildland urban interface (WUI) surrounding the Village of Zeballos. The area of interest is within the traditional territories of the Ehattesaht Chinehkint First Nation and Nuchatlaht First Nation, both members of the Nuu-chah-nulth Nations.

The purpose of this report is to update the recommendations made in the initial 2011 Village of Zeballos CWPP. Using the best available spatial data, this CWPP identifies the wildfire risks surrounding the community, potential consequences of a wildfire to the community, and recommends possible ways to reduce the risk. Relevant recommendations from the 2011 plan are carried forward where applicable.

The fuel types in the area are a mosaic of mature conifer forests, recently harvested cut blocks, immature forests, and deciduous patches. Previous fire history in the area indicates low fire density from primarily human-caused fires. The local wildfire threat is Moderate to High. The local wildfire risk ranges from Low to High with higher risk areas associated with fuels in close proximity (within 500m) of the community.

The Village was, and continues to be, severely impacted by the 2018 Gold Valley Fire that occurred on the eastern slopes directly above the Village. The fire and resulting evacuation orders, local state of emergency, road closures, and the physical and mental health effects on Village residents highlight the importance of emergency preparedness, emergency support services, and wildfire protection planning.

Recommendations are summarized in the table below. The recommendations are based on a review of best practices from other jurisdictions, gaps identified through community engagement, the local wildfire risk analysis, prevention of human-caused ignitions, and integration of FireSmart program principles. FireSmart is a national initiative to educate and empower the public on what can be done to protect their families, properties, and communities from wildfire. Fuel management (surface and ladder fuel removal) is recommended for High risk areas within 500m of structures in the Village. Community education and awareness also play a critical role in reducing the wildfire risk. Community education focuses on FireSmart principles, understanding fire use restrictions, emergency preparedness, and regularly sharing fire safety related information with the community.

The Zeballos Volunteer Fire Department provides fire protective services for the Village. On Crown lands, the BC Wildfire Service manages wildfire response. Continued recruitment and training for volunteer firefighters is critically important to maintaining response capacity for WUI fires and any other emergencies. Emergency support services recruitment and training is also identified as a priority for the Village.

This plan makes 26 recommendations to the Village of Zeballos and the Strathcona Regional District. The recommendations should be further prioritized by the Village depending on local strengths, opportunities, and the availability of human, financial, and physical resources. At minimum, the plan should be revisited every five years to assess the progress and relevance of previous recommendations and for the continual improvement of wildfire protection planning as more information becomes available.

SUMMARY OF CWPP RECOMMENDATIONS

Recommendations are assigned priority (Low, Medium, High) based on their relative importance to reducing wildfire risk within the wildland urban interface. Recommendations are also classified based on the estimated timeframe required for their completion (1, 2, or 3). 1 – "quick wins" possible to complete within a year. 2 – requires more planning and integration of multiple elements, may take 2-3 years to complete. 3 – complex recommendations to implement, requires longer term planning, may take up to 5 years to complete. The priority and estimated timeframe are provided to assist local governments in operationalizing the recommendations included in this CWPP.

No.	Priority/ Time-frame	Objective	Recommendation / Next Steps	Responsibility
1.	High / 1	To improve emergency evacuation plan mapping to include all potentially relevant locations.	Include Helicopter Landing area and other evacuation route information on emergency plan maps.	Village with support from SRD GIS
Rationale: Gaps identified in the emergency evacuation plan/map reviewed during the CWPP update process.				
2.	High / 2	To provide the Village and Fire Department with additional tools to reduce the risk of human-caused ignitions and fire hazards within the municipal boundary.	Include in the Fire Bylaw authority for the Fire Chief to restrict open fires and order the removal of materials determined to be a fire hazard from private properties within the municipal boundary. The Village should obtain legal advice prior to adopting any bylaw amendments.	Village, Fire Department
Rationale: Best practice recommended, observed in similar jurisdictions, to address fire hazards on private land.				
3.	High / 2	To mitigate the risk of a WUI fire starting and spreading from the wood waste landfill.	Engage the tenure holder on developing a risk management plan that addresses the potential for spontaneous combustion at the wood waste site. Options may include keeping stand-by water tanker/equipment on site during high fire danger and/or FireSmart planning around the site.	Village, MFLNRORD Collaborate with tenure holder.
Rationale: Concerns with wood waste site identified during CWPP engagement. Wood waste				

debris piles are known hazards for spontaneous combustion.				
4.	Med / 3	To reduce the fuel hazard within high risk areas identified within 500m of the wildland urban interface.	Engage a qualified forest professional in developing and implementing site level prescriptions for each treatment area identified in Table 7. The forest professional may also refer to Priority 1 treatment areas in the 2011 CWPP. Where treatments are identified on crown lands, consult and collaborate with Ehattesaht Chinehkint First Nation, forest tenure holders, and Campbell River Natural Resource District (MFLNRORD).	Village and/or SRD Collaboration with forest tenure holder and MFLNRORD on Crown lands.
Rationale: Recommended treatment areas based on local wildfire risk analysis. High risk areas within 500m of community structures or critical infrastructure are priority for treatment.				
5.	High / 1	To increase community awareness and participation in the FireSmart program.	Contact a Local FireSmart Representative to conduct a Local FireSmart Champion workshop to find a local champion to organize community FireSmart initiatives.	Village and/or SRD
Rationale: The FireSmart program is a nationwide initiative. Several post-wildfire examples across the country show how FireSmart activities reduce the structure losses associated with WUI fires. FireSmart activities are a focus area for all CWPP's developed under the UBCM CRI funding program. FireSmart is implemented through best practices in 7 disciplines: education, emergency planning, vegetation management, legislation, development, interagency cooperation and cross-training.				
6.	High /1	To reduce fuel hazard for identified FireSmart priority areas (high risk fuels within WUI100).	Contact a Local FireSmart Representative to conduct FireSmart Hazard assessments for the priority areas listed in Table 8.	Village and/or SRD
Rationale: As referred to in #5. Priority areas based on the local wildfire risk analysis.				
7.	Low / 2	To improve community FireSmart awareness.	Deliver FireSmart education within the K-12 public school system. Utilize FireSmart Education Kits and the FireSmart BC Education package. Contact the BCWS Coastal Fire Centre Fire Prevention Specialists to	Village and/or SRD

			borrow education kits and for education support.	
Rationale: As referred to in #5. Recommended best practice for public education.				
8.	Med / 2	To improve community FireSmart awareness.	Contact a Local FireSmart Representative to deliver Public education materials at annual community events.	Village and/or SRD
Rationale: As referred to in #5. Recommended best practice for public education.				
9.	High / 2	To reduce fuel hazard on private land and provide alternatives to open burning.	Offer alternative yard waste disposal options including periodic collection and community chipping services.	Village and/or SRD
Rationale: Fuel management requires the removal of fuels which can be costly and a barrier to action. Providing free or subsidized debris disposal is a best practice for encouraging private landowner participation in fuel management activities.				
10.	High / 1	To improve community awareness of the FireSmart program.	Encourage residents to complete the free, online, FireSmart 101 course.	Village and/or SRD
Rationale: As referred to in #5. Recommended best practice for public education.				
11.	Med / 2	To reduce the ignition risk within the FireSmart structural ignition zone.	When new construction or building upgrades to publicly owned buildings occurs, use preferred FireSmart building materials wherever possible.	Village and SRD. Provide information to other public agencies such as School District, Health Authority.
Rationale: As referred to in #5. Recommended best practice for development.				
12.	High / 1	To communicate the content of the CWPP and to improve public awareness of the CWPP and FireSmart recommendations.	Make the CWPP video presentation, report and associated maps available to the public through Village website, SRD website. Share CWPP with forest tenure holders within the AOI	Village and SRD
Rationale: Recommended best practice for community education and awareness regarding wildfire protection planning and FireSmart program implementation.				
13.	High / 1	To improve community	Use SRD social media accounts	SRD

		awareness of wildfire threat and risk, and of the actions that can be taken to mitigate risk.	to regularly share wildfire preparedness, wildfire safety, and FireSmart practices information. Posts can redirect followers to the established resources of FireSmart BC, BC Wildfire Service, and Prepared BC.	
Rationale: Recommended best practice for community education and awareness regarding wildfire protection planning and FireSmart program implementation. Addresses education and emergency planning FireSmart disciplines.				
14.	High / 2	To reduce the risk of human-caused ignitions by improving community awareness of local bylaws, provincial wildfire regulations, and wildfire safety.	Develop a Village of Zeballos specific Wildfire Safety and Preparedness informational factsheet for distribution to residents within the Fire Protective Services Area. Information should include best practices for open burning, where/how to access fire weather information, venting index information, open fire/campfire bans (BCWS), relevant Bylaws and legal information.	Village and/or SRD
Rationale: Recommended best practice for community education and awareness regarding wildfire protection planning and FireSmart program implementation. Addresses education and emergency planning FireSmart disciplines.				
15.	High / 2	To improve community awareness of wildfire threat and risk, and of the actions that can be taken to mitigate risk.	Organize an annual Community Fire Safety or Community Wildfire Preparedness day. Activities may include: checking fire extinguishers and smoke alarms in homes; conducting FireSmart clearing of Priority 1 (up to 10m) zones around critical community infrastructure, FireSmart presentations, fire department demonstrations, etc. The Safety day could be timed with Fire Prevention Week which takes place annually during the 2nd week of October each year. October 4 to 10, 2020 is the next Fire Prevention Week.	Village and/or SRD

Rationale: Recommended best practice for community education and awareness regarding wildfire protection planning and FireSmart program implementation. Addresses education and emergency planning FireSmart disciplines.				
16.	Med / 1	To reduce the risk of human-caused WUI fire events by promoting alternative means of yard waste management and disposal.	Provide residents with information on alternatives to burning yard waste. Link this information on the Village, ZVFD, and SRD websites. Alternatives to burning include community chipping days, composting, or xeriscaping.	Village and/or SRD
Rationale: Recommended practice, observed from other similar jurisdictions. Contributes to public education and development planning; potential to reduce the likelihood of human-caused WUI fire events.				
17.	Low / 3	To mitigate the potential impacts of heavy wildfire smoke and poor air quality on the community.	Improve indoor air quality with the purchase and use of High-Efficiency Portable Air (HEPA) filters. Consider setting up air quality refuge area (i.e.: community hall, or school gymnasium) during heavy smoke events to provide relief. Purchase N95 respirator masks for distribution to community members during heavy smoke conditions to reduce smoke exposure.	Village
Rationale: Based on concerns identified by the Village regarding impacts of poor air quality on community during wildfire events.				
18.	High / 2	To continue to advocate for the maintenance of and improvements to Zeballos FSR.	Continue to work with the road tenure holder stressing the importance of road maintenance and right-of-way maintenance (danger trees, ladder and surface fuels).	Village and SRD with MFLNRORD
Rationale: Inter-agency cooperation within the WUI is necessary to maintain evacuation routes, and protect the community and its critical infrastructure. Recommended best practice for information sharing, awareness, collaboration and cooperation.				
19.	Low / 2	To continue recruitment and retention efforts for volunteer fire	Regularly schedule open houses or recruitment days for the Zeballos Volunteer Fire Department. Connect with the community regularly through	Village, Fire Department

		department members.	social media and consider its use as an advertising tool.	
Rationale: Based on CWPP engagement, recruitment of members is a challenge in small communities. Recommended practice from other jurisdictions is to use social media as a tool to connect with the community.				
20.	High / 1	To continue to ensure all volunteer fire department members are trained to wildland firefighting standards.	Ensure all members of Zeballos Volunteer Fire Department complete Wildland Forest Firefighter Level 1 (SPP-WFF 1) or S-100 training. SPP-115 (structure protection workshop) is also recommended. UBCM-CEPF should be considered for funding, potentially coordinated at the SRD level for all local volunteer fire departments.	Village, Fire Department with SRD support
Rationale: Based on CWPP engagement, not all fire department members have additional training; additional training funding is required.				
21.	Med / 3	To maintain volunteer capacity in emergency support services available to the community.	Apply for funding at the Village or regional level to recruit, train, and purchase equipment for emergency support services.	Village and/or SRD
Rationale: Based on CWPP engagement, 2018 fire season has worn down community capacity. Additional support and funding required.				
22.	Med / 3	To maintain ZVFD's readiness for responding to WUI fires.	Include wildfire-specific training sessions that include: fire line construction, pump operations, sprinkler protection, portable water tank deployment, and wildland hose operations. Interface training should include completion of a wildfire simulation exercise and safety training specific to wildland fire and risks inherent with natural areas. Work with the BCWS North Island Fire Zone, and SRD to conduct annual joint training or mock exercises.	Village, Fire Department
Rationale: Based on CWPP engagement with the Village and BCWS, no such coordination is known to be in place. Interagency cooperation and cross-training are FireSmart disciplines.				

The BCWS North Island Fire Zone has indicated cross-training is an area of interest for future development.				
23.	High / 1	To maintain and improve wildfire emergency communication across agencies and jurisdictions.	The SRD should arrange an annual meeting, prior to fire season, to include BCWS – North Island Fire Zone, EMBC, and local fire department representatives to review incident command structure and emergency support services in the event of a WUI fire.	SRD
Rationale: Key contacts and individuals may change from year to year. Annual meetings recommended as a best practice to build relationships and improve communication in the event of a WUI event. Interagency cooperation and cross-training are FireSmart disciplines.				
24.	High / 3	To improve equipment availability for structure protection.	Engage the City of Campbell River / Campbell River Fire Department in mutual aid/service agreements for assistance and deployment of the City's structural protection unit in the event of the WUI fire impacting the Village/Electoral Area.	Village and/or SRD
Rationale: Recommended as a best practice emergency planning activity, to identify priorities or conditions for deployment of equipment prior to the event of a WUI fire.				
25.	Med / 2	To improve community capacity for structure protection.	Encourage property owners to purchase sprinkler kits and water supply systems for sprinkler kits to deploy on their homes/critical structures	Village and/or SRD
Rationale: Based on current knowledge of the equipment availability for structural protection, local capacity for structural protection could be improved. Sprinkler kits are a relatively low-cost option and highly effective option for the Village and residents.				
26.	Med / 1	To lower the risk of ignition around structures in the community.	SRD Building Department to recommend to Village/Electoral Area A property owners the use of rated roofing materials, lower risk siding materials, 10m setbacks from vegetation, propane tank locations. Develop best practices guidance for building within the electoral area. Link property owners to the BC FireSmart Begin at Home	SRD

			Manual and FireSmart Home Development Guide under the Building Department section of the SRD website.	
Rationale: Best practice recommendation associated with the development planning discipline of the FireSmart program, refer to #5.				

Table 1. Summary of potential resources and funding supports for recommended activities.

Resources	**Land Jurisdiction**	**Types of Projects**
Local government taxation	Municipal Private	• Various projects as directed by local governments including FireSmart assessments and activities, debris disposal, equipment purchases, training, etc.
Forest Enhancement Society BC (FESBC)	Provincial Crown	• Fuel management treatment prescriptions and implementation
UBCM Community Resiliency Investment Program (CRI)	Municipal First Nations Private	• FireSmart hazard assessments, demonstration projects, off-site debris disposal (i.e.: chip trucks) • Community Education • Development planning • Emergency planning and cross training
UBCM Community Emergency Preparedness Fund (CEPF)	n/a	• Emergency support services training • Fire department training or equipment • Emergency evacuation planning • Emergency operations training
First Nations Emergency Support Services – Indigenous Services Canada (FNESS/ISC)	First Nations Reserve lands	• Fuel management prescriptions and treatments On-Reserve
BC Wildfire Service	Provincial Crown	• Fuel management treatments (in coordination with local fire zone officer) • Public education and outreach

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LIST OF ACRONYMS

Acronym	Full Name / Phrase
AOI	Area of Interest
BCWS	BC Wildfire Service
CFFBPS	Canadian Forest Fire Behaviour Prediction System
CRI	Community Resilience Initiative
CWPP	Community Wildfire Protection Plan
ECFN	Ehattesaht Chinehkint First Nation
EMBC	Emergency Management BC
FBP	Fire Behaviour Prediction System
FSR	Forest Service Road
FWI	Fire Weather Index
GIS	Geographical Information System
ISI	Initial Spread Index
LIDAR	Light Detection and Ranging
LFR	Local FireSmart Representative
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
PSTA	Provincial Strategic Threat Analysis
RESULTS	Reporting Silviculture Updates and Land Status Tracking System
SRD	Strathcona Regional District
TFL	Tree Farm Licence
UBCM	Union of BC Municipalities
WFP	Western Forest Products Inc.
WUI	Wildland Urban Interface
ZVFD	Zeballos Volunteer Fire Department

SECTION 1: INTRODUCTION

The Community Resiliency Investment (CRI) program is a new provincial program intended to reduce the risk and impact of wildfire to communities in BC through community funding, supports and priority fuel management activities on provincial Crown land. The Union of BC Municipalities (UBCM), First Nations' Emergency Services Society (FNESS) and the Forest Enhancement Society of BC (FESBC) are working with the Ministry of Forests, Lands, Natural Resource Operations & Rural Development (FLNRORD), represented by the BC Wildfire Service (BCWS), to administer the FireSmart Community Funding & Supports portion of the program for local government and First Nation applicants.

Wildfire is an integral part of British Columbia's ecosystems and landscapes, including areas where citizens settle and communities grow. Due to an increasing population with expanding rural development and the impacts of climate change, more communities in B.C. are located in areas of potentially increased wildfire risk. The Community Wildfire Protection Plan (CWPP) process helps communities develop plans to improve safety, lower the risk of damage to property, and reduce the impacts of wildfires to BC communities.

This CWPP is organized into the following major sections:

SECTION 1: Introduction- Explains the purpose of a CWPP and the CWPP planning process

SECTION 2: Local Area Description- Defines the Area of Interest (AOI) for the CWPP; provides a description of the community within the AOI

SECTION 3: Values at Risk- Introduces the extent to which wildfire has the potential to impact values within the community

SECTION 4: Wildfire Threat and Risk - Describes the process that was undertaken to identify and summarize the fuel hazard and other factors that contribute to the wildfire threat around the community

SECTION 5: Risk Management and Mitigation Factors- Outlines the strategies a community can put into practice to reduce the risk and the impact of a wildfire in four subsections

> 5.1 Fuel Management: identifies and prioritizes fuel management treatments
>
> 5.2 FireSmart Planning and Activities: summarizes the current level of FireSmart implementation and identifies priority areas for future FireSmart activities
>
> 5.3 Community Communication and Education: describes the key steps required to build engagement and support within the community for the CWPP. This includes education and outreach and local community prevention programs.
>
> 5.4 Other Preventative Measures: identifies local actions and strategies that reduce the threat of wildfires

SECTION 6: Wildfire Response Resources- provides a high-level overview of the resources that are available to local governments in the case of a wildfire.

1.1 Purpose

The purpose of this CWPP is to identify the wildfire risks within and surrounding the AOI, to describe the potential consequences if a wildfire were to impact the community, and to examine possible ways to reduce wildfire risk. This CWPP provides an updated assessment of the wildfire risk to the area. The goal is to define the threat to human life, property, and critical

infrastructure from wildfires within the AOI; identify measures necessary to mitigate those threats; and outline an action plan to implement those measures. The CWPP is intended to provide the community with a framework to address the implementation of specific actions that will result in

- reduced likelihood of wildfire entering the community,
- reduced impacts and losses to property and critical infrastructure and
- reduced negative economic and social impacts to the community.

1.2 CWPP Planning Process

The CRI program helps fund costs associated with writing CWPPs and is the main funding source for the development of this CWPP. Since the CRI program was founded in 2018, over 120 First Nations and local governments have received funding for CWPP development.[1] The Strathcona Regional District (SRD) obtained a CRI grant to develop community wildfire protection plans for Electoral Area A including participating communities of the Village of Sayward, Village of Gold River, Village of Tahsis, Village of Zeballos, Nuchatlaht First Nation, Ka:'yu:'k't'h'/Che:k:tles7et'h First Nations; and for Read Island within Electoral Area C. In Fall 2019, SuavAir Aerial Imaging Inc. was contracted by the SRD to carry out the project in collaboration with municipal governments, First Nations, regional stakeholders, provincial government agencies, and residents.

The CWPP planning process consists of the following phases:

1. Background research – general community characteristics, economic profiles, demographics, community plans, emergency planning, critical infrastructure, fire history, fire weather, property values, environmental values, cultural values, land jurisdiction, and relevant legislation.
2. Consultation with local governments, First Nations, regional district, provincial agencies – to identify values at risk, existing fire suppression capacity, and understand current community engagement with respect to wildfire risk mitigation
3. GIS Analyses – review Provincial Strategic Threat Analysis (PSTA) data, using best available information including LiDAR data, updated forest cover and ortho imagery adjust data for fuel typing errors, modify threat and risk classification where necessary
4. Field Work – verification of critical infrastructure, fuel types, identification of community specific values at risk
5. Draft report and mapping development – identification of measures to mitigate risks, make recommendations for action
6. Report review – professional peer review, regional district and community review
7. Community engagement and education – community presentations, follow-up

Understanding the relationship of the community to its surrounding environment, and what that means in terms of the wildfire hazard, threat and risk of loss, is critical to help the community

[1] Union of BC Municipalities. Community Resiliency Investment. (https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html)

plan for mitigation activities and respond to wildfire events. To support this understanding, the BC Wildfire Service (BCWS) has conducted a Provincial Strategic Threat Analysis (PSTA) for the identification of wildfire threat and potential fire behaviour. The outputs of the PSTA were used to assist in this planning process. Other relevant data was gathered through field visits to the community, stakeholder engagement, proprietary LiDAR data shared for exclusive use on this project by Western Forest Products Inc., and publicly accessible data from the BC government Data Catalogue.

SECTION 2: LOCAL AREA DESCRIPTION

2.1 CWPP Area of Interest

The Village of Zeballos (referred to as the Village, or Zeballos, in this report) is located on the west coast of Vancouver Island at the head of the Zeballos Inlet. The Village is about 113km west of the City of Campbell River. The Village is accessed by the Zeballos Road, a 42 km gravel Forest Service Road (FSR) that connects to Highway 19. Other access is by float plane or boat. The AOI of this CWPP is the Village of Zeballos and its surrounding wildland urban interface (WUI). The WUI is defined as a 2km buffer around areas with structure density greater than 6 to 25 structures per km^2 – see Map 1. The AOI is located within the traditional territories of the Ehattesaht Chinehkint First Nation and Nuchatlaht First Nation, both members of the Nuu-chah-nulth Nations.

This plan is an update to the existing 2011 Village of Zeballos CWPP. The 2011 CWPP AOI was all area within a 2km buffer of the Village Municipal boundary. Th 2020 CWPP update AOI is slightly different than in 2011, as per the CRI program guidelines. Structure density was provided by the BCWS as part of the provincial strategic threat analysis dataset.

2.2 Community Description

The Village of Zeballos is primarily a residential community with a population of approximately 107 residents in 2016, down from 125 in 2011.[2] The population also fluctuates seasonally based on tourism, forestry, fishing, and industrial projects. According to the 2016 census data, there are 58 occupied dwellings and 113 total dwellings. Ehattesaht Chinehkint First Nation's (ECFN) community of Ehatis is located on the west side of Zeballos Inlet and is also within the AOI. The ECFN has 442 registered members and approximately 90 members live in Ehatis.[3] Land ownership classes within the AOI are summarized in the table below.

The surrounding area is mountainous, forested terrain that led to the establishment of the Village in the 1930's by gold miners. As the mining began to slow in the 1940's and 1950's, logging replaced mining as the main economic driver in the 1950's, driven by the area's high-

[2] Statistics Canada. 2016 Census Profile. Zeballos (Village). https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=5924029&Geo2=CD&Code2=5924&SearchText=zeballos&SearchType=Begins&SearchPR=01&B1=All&TABID=1&type=0

[3] Ehattesaht First Nation Website (https://ehattesaht.com/about-the-ehattesaht-first-nation/)

value red cedar and douglas fir timber.[4] Currently, the main economic driver for the community continues to be forestry, as well as commercial fishing, aquaculture, and tourism.

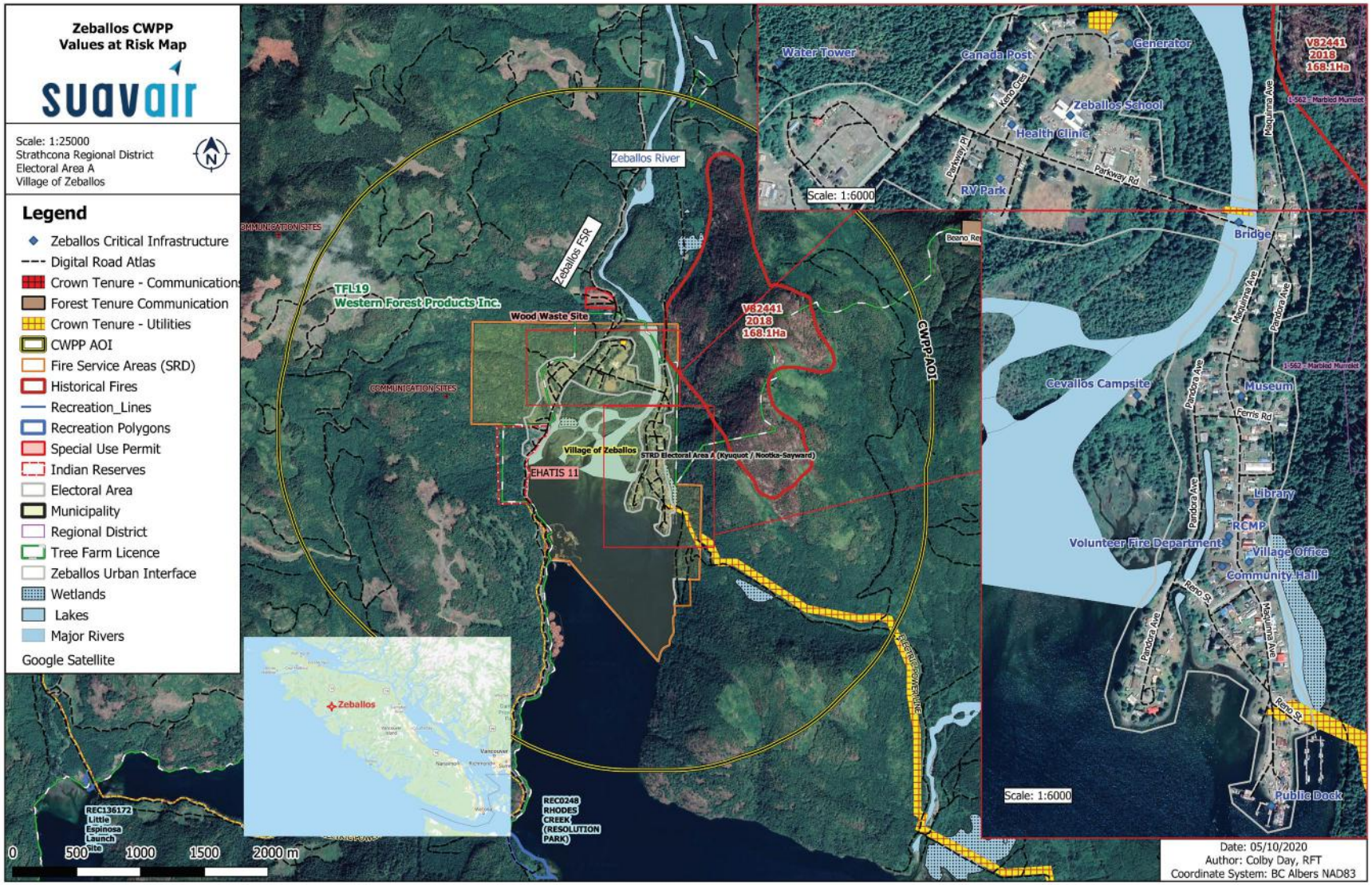
Infrastructure within the Village includes the Zeballos Elementary Secondary School, Zeballos community hall, post office, fire hall, RCMP station, ambulance service, municipal office, library, museum, and health clinic. The Village offers water, sewer, and solid waste disposal services. There is also a public dock for water transportation. Fire protection within the Village boundary is the responsibility of the Zeballos Volunteer Fire Department (ZVFD). The ZVFD also offers fire coverage to the ECFN through the Ehattesaht/Chinehkint First Nation Fire Protection Agreement Bylaw #468-2014.[5]

Table 2. Land ownership classes within the Village of Zeballos AOI.

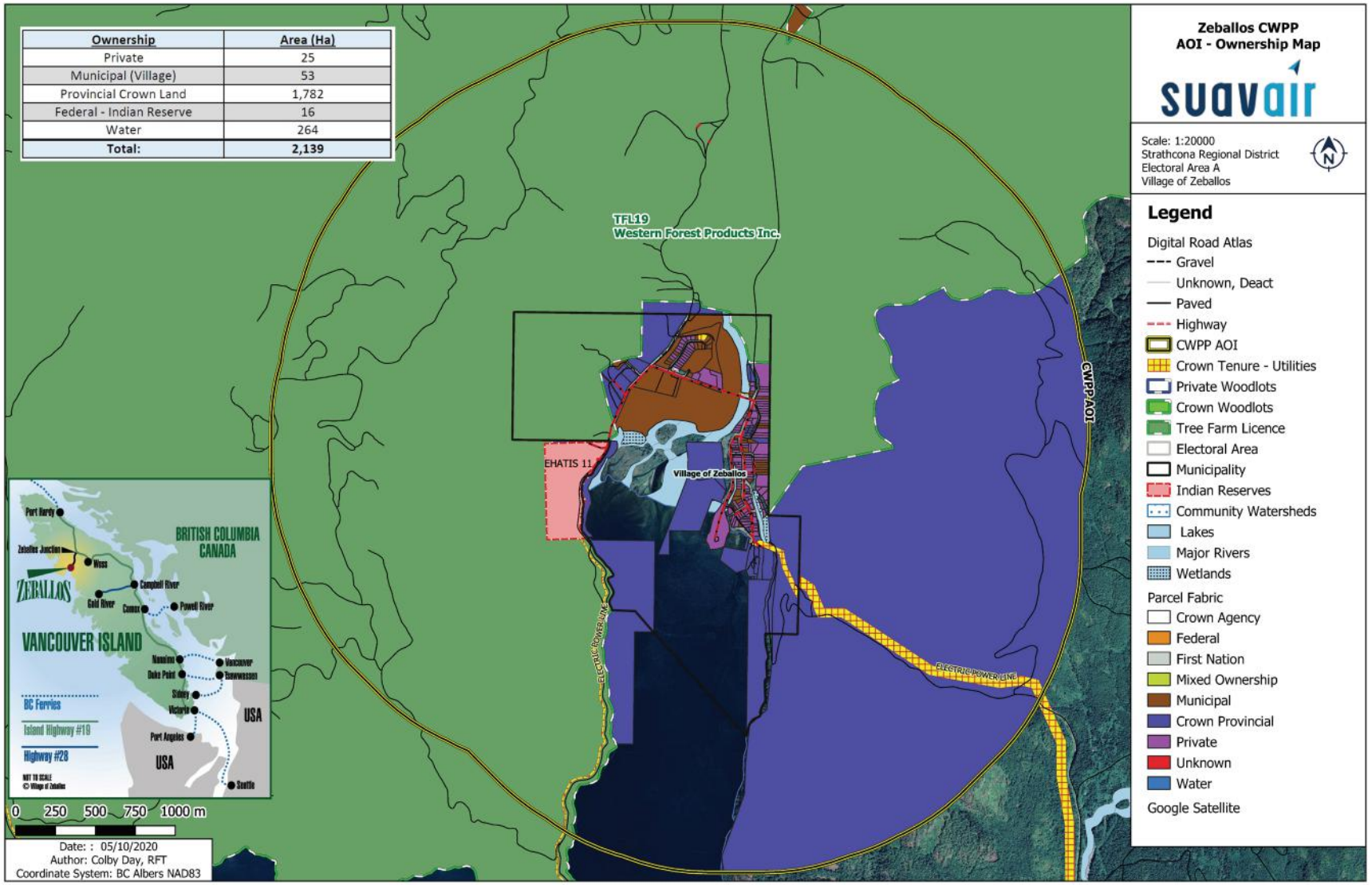
Land Ownership	Area (ha)	Comments
Private	25	
Municipal (Village)	53	
Provincial crown land	1782	
Indian Reserve	16	Ehattesaht Chinehkint First Nation
Water	264	
Total	2139	

[4] Village of Zeballos Website (https://www.zeballos.com/home/history/)

[5] Village of Zeballos. Ehattesaht/Chinehkint First Nation Fire Protection Agreement Bylaw #468-2014 (http://www.zeballos.com/Zeballos2016/wp-content/uploads/2019/05/Bylaw-468-2014-EhattesahtChinehkint-First-Nation-Fire-Protection-Agreement.pdf)



Map 1. Village of Zeballos area of interest.



Map 2. Land ownership classes within the Zeballos AOI.

2.3 Past Wildfires, Evacuations and Impacts

2018 was an extreme fire season in BC, with a record 1.3 million hectares of land burned throughout the province. On Vancouver Island the months of July and August experienced record breaking hot temperatures with minimal precipitation, resulting in forest fuels around Zeballos being unusually dry.[6] The Gold Valley Main Fire (BCWS Fire #V82441) started on August 11, 2018 on the eastern slopes above the Village. The fire had a significant immediate and lasting impact on the community. The fire was initiated by a lightning storm that moved through northern Vancouver Island and started approximately 75 other wildfires within a few hours.

Photo 1. The Gold Valley Main Fire from August 2018, image taken in 2020.

BCWS assessed the fire via helicopter and decided to monitor but not immediately action the fire. The terrain where the fire was burning was extremely steep, and at the time, there was a shortage of physical resources due to the large number of fires burning throughout BC and Vancouver Island.[7] The fire continued to grow over the next few days and an evacuation alert was issued by the Village on August 15th to property owners along the eastern portion of the Village. These properties were situated at the base of the steep slopes with the fire spreading downhill (westerly) through falling rocks and logs sending embers down the hill. The Village issued a statement urging the residents and visitors to be prepared to evacuate within 30 minutes if ordered by emergency officials.[8]

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[6] BC Wildfire Service (https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary)

[7] Morgan Boghean, BC Wildfire. Personal Communication on January 14, 2020.

[8] Campbell River Mirror (https://www.campbellrivermirror.com/news/authorities-call-for-calm-as-fires-burn-near-zeballos/)

By August 16th, BCWS was actively fighting the fire with ground crews and helicopter support. A state of local emergency was declared on the same day. The Comox Fire Rescue Structural Protection Unit arrived on August 17th with a sprinkler system to wet-down houses along the fire line. Additionally, the Port McNeill Fire Department was called into support BCWS crews. The fire was actively fought over the next two weeks with ground crews, helicopter buckets, and an air-tanker making two drops of fire retardant. On August 18th, an evacuation order was issued for six properties that were at risk of falling debris and landslides. On September 8th the evacuation order was expanded to include houses North of Sugarloaf Bridge; All houses on East side of Maquinna Avenue and North of Pandora Cres-cent; All houses on Pandora Cres-cent that are East of Maquinna Avenue; and house numbers 402-B, 404 and 406 Ferris Road, due to potential debris flow and slides.[9]

On October 16th, the Ministry of Transportation and Infrastructure closed the north end of Maquinna Avenue due to debris fall hazards, thereby closing one of two access routes in/out of the Village. During several large rainfall events in December 2018, debris came down the hillside onto the closed section of Maquinna Avenue, completely blocking the road. Maquinna Avenue was re-opened on April 25, 2019 and on June 1, 2019 the evacuation order was rescinded for all properties.

The evacuation orders had a profound impact on the citizens of the Village, as many were displaced from their homes and had to stay elsewhere.[10] As Zeballos is a small community with limited accommodation options, some residents had to leave the community. The emergency support services within the Village were thinly stretched for several months. Additionally, during the wildfire, smoke was very thick and made breathing difficult. Many residents voluntarily evacuated due to health concerns related to poor air quality and did not return until early September 2018.

Another fire of note was the Pinder Creek fire (V92443) which also occurred in August 2018. Although not within the AOI, the fire burned adjacent to Zeballos FSR and resulted in temporary road closures (every 15 to 60 minutes) while fire-fighting activities occurred. As the Zeballos FSR is the only land-based route to the Village, fires near the road right-of-way can significantly impact the Village.

[9] Village of Zeballos, Wildfire Recovery Timeline (http://www.zeballos.com/Zeballos2016/wp-content/uploads/2019/04/Wildfire-Recovery-Timeline.pdf)

[10] Meredith Starkey, Personal Communication on November 4, 2019.

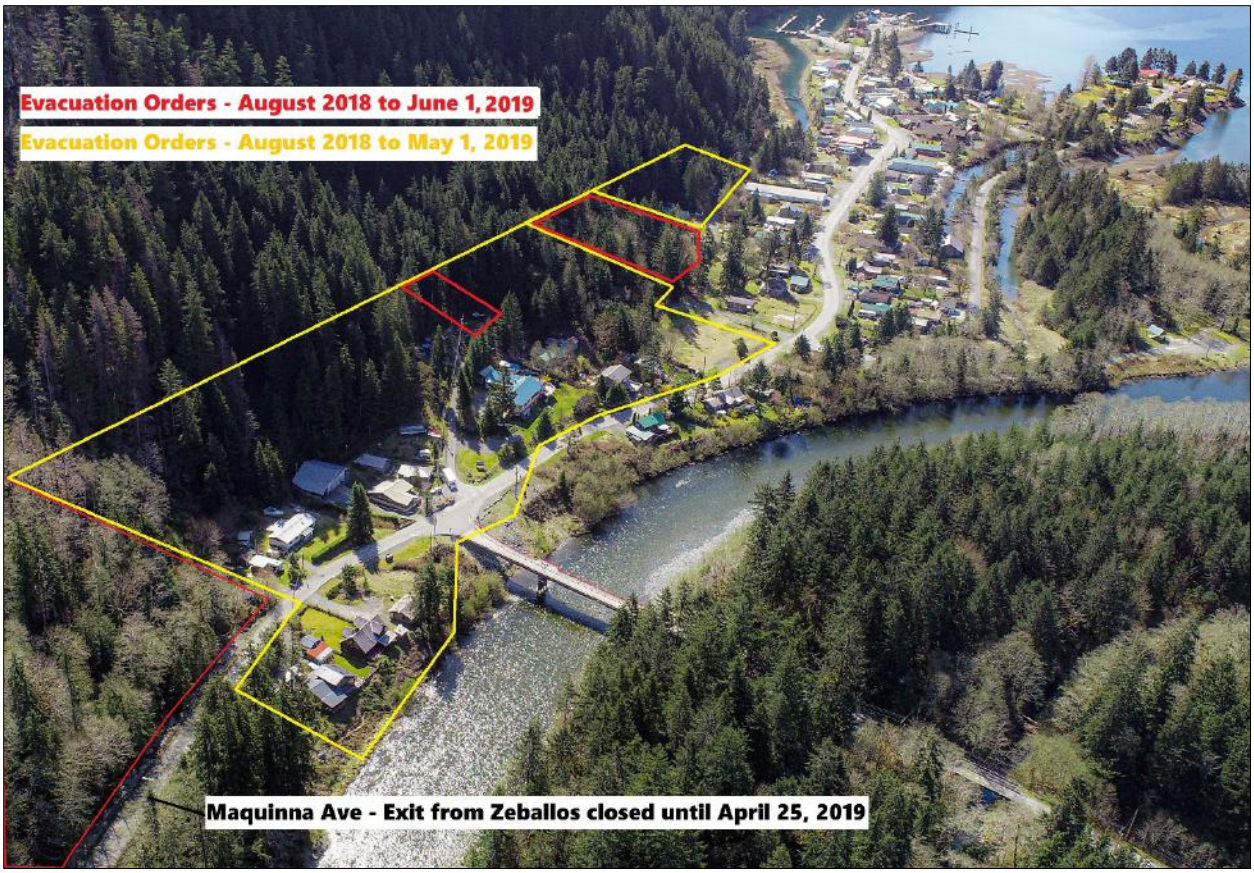
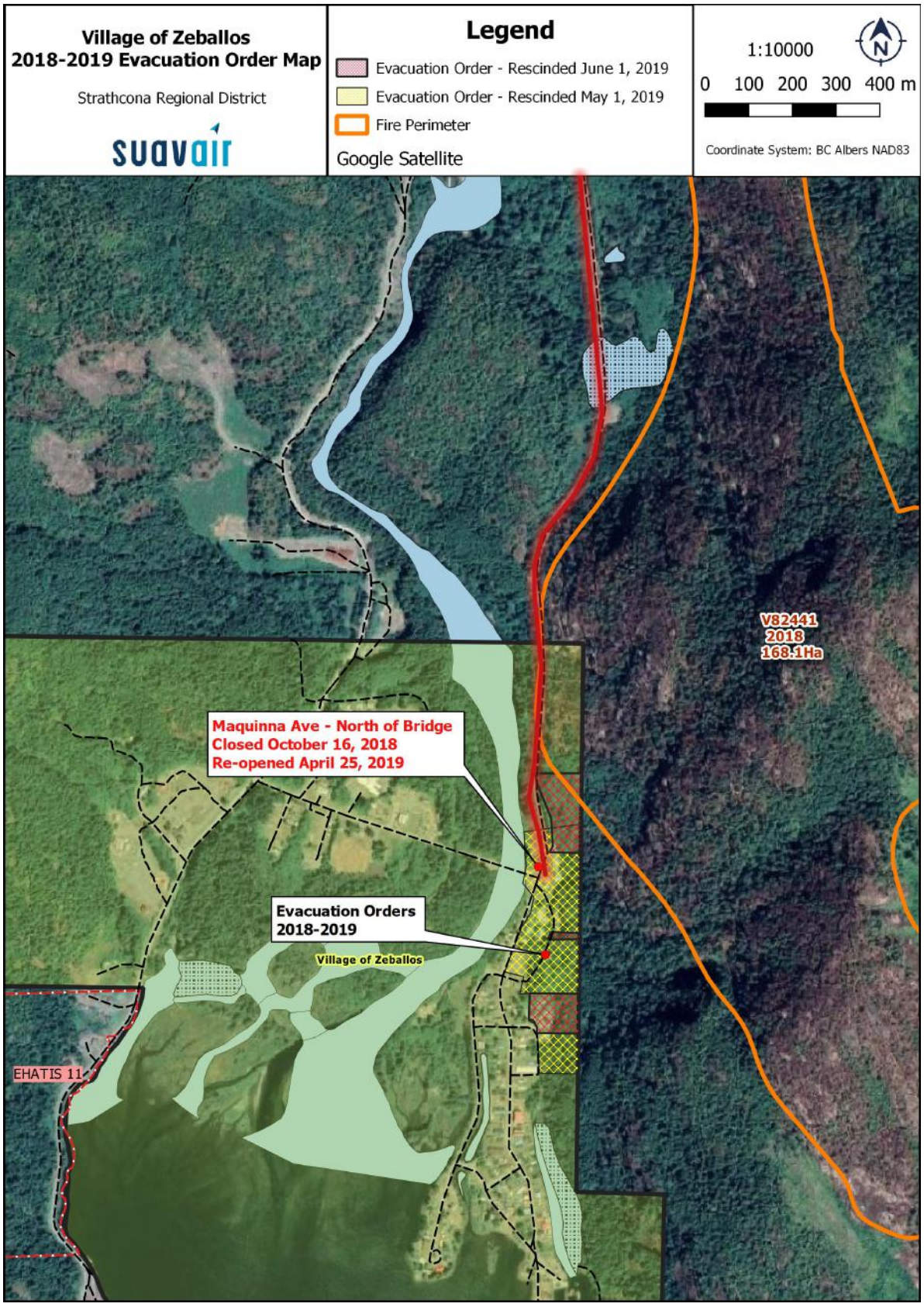


Photo 2. Aerial image of evacuation order areas resulting from the 2018 wildfire.



Map 3. The 2018 Gold Valley Main Fire (V82441) and resulting evacuation orders.

2.4 Current Community Engagement

B.A. Blackwell & Associates completed the 2011 CWPP. No fuel treatments have been conducted within the AOI. The Village has not engaged in community level FireSmart planning or related activities. The Village Administration participated in this 2020 CWPP update process and their identified areas of priority and concern were integrated into this plan as much as possible. The recommendations were reviewed with the Village Administration prior to finalizing the plan.

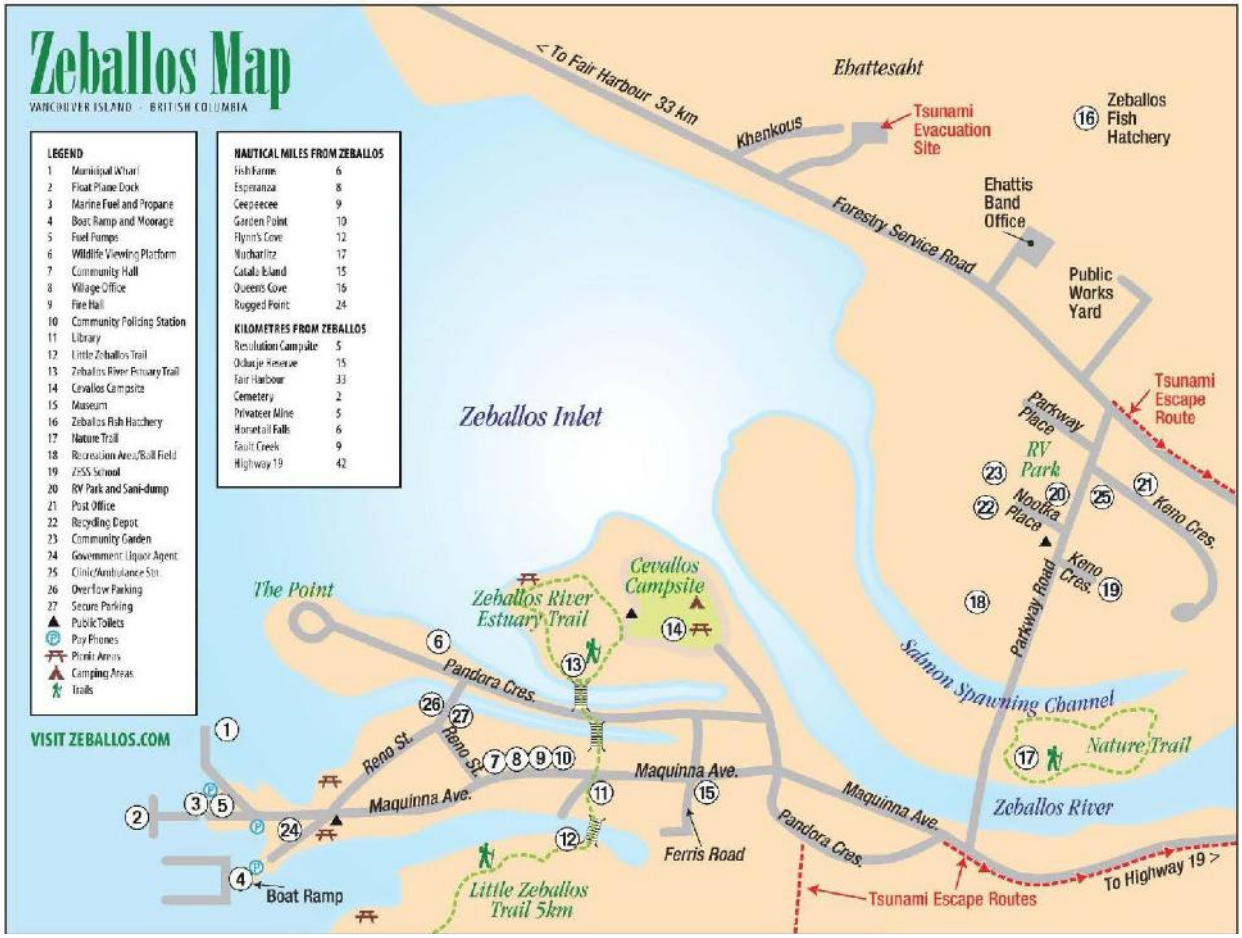
2.5 Linkages to Other Plans and Polices

The intent of this sub-section is to identify the sources and linkages to other documents in order to minimize duplication while identifying other plans or legal requirements that are relevant to the CWPP planning process. It also discusses the relevance of objectives, strategies and polices that will influence the development of the CWPP.

2.5.1 Local Authority Emergency Plan

Under the Emergency Program Act, local governments must prepare local emergency plans that include preparation for, response to, and recovery from, emergencies and disasters. The plan must cover all potential emergencies and disasters that could affect all or any part of the local government, including wildfire.

The Village of Zeballos Emergency Plan (EP) was last updated January 4, 2020. The EP outlines emergency management organization, emergency operations, evacuation procedures, provides a hazard risk vulnerability analysis, and a fire specific hazard action plan. Map 4 is from the EP. The map should include additional locations relevant to emergency planning.



Map 4. Zeballos critical infrastructure and tsunami evacuation map, from the 2020 Emergency Plan.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
1.	High	To improve emergency evacuation plan mapping to include all potentially relevant locations.	Include Emergency Operations Centre, Helicopter Landing area, muster points, and other evacuation route information on emergency plan maps.	Village with support from SRD GIS

2.5.2 Affiliated CWPPs

The 2011 Village CWPP prepared by B.A.Blackwell & Associates included 35 recommendations in the areas of Communication and Education, Structural Protection, Emergency Response, Training and Equipment, and Vegetation (Fuel) Management.[11] A status update on the 2011 Recommendations is provided in Appendix 2: Status of 2011 CWPP Recommendations.

[11] B.A. Blackwell and Associates. Zeballos Community Wildfire Protection Plan. 2011.

Incomplete recommendations that are still relevant to the Village are carried forward in this plan. Other affiliated CWPPs include the 2020 CWPP for Strathcona Regional District Electoral A, completed concurrently with this update.

2.5.3 Local Government and First Nation Plans and Policies

Currently, there is no specific bylaw or building permitting process that specifies the type of construction and roofing materials used. Siding, roofing and other materials can have a large impact on fire ignition potential of homes.[12] Implementing a bylaw that requires the use of fire-resistant building materials on new construction would improve the inherent fire resistance within the community over the long-term as new buildings are constructed. Bylaws may regulate behaviour and reduce the potential for human-caused ignitions within the AOI. At minimum, the Village and SRD should recommend preferred construction materials to builders and make FireSmart information readily available. Recommendations related to FireSmart and structure protection are addressed in Section 5.2 below.

Official Community Plan – Bylaw #330[13]

The Official Community Plan (OCP) was developed in 1996 (Bylaw #330) and updated in 1998 (Bylaw #345). The initial OCP Bylaw #330 covers growth management, housing and regulation, commercial areas, industrial areas, public and institutional use, community character, heritage conservation, parks and environment, environmentally sensitive areas, hazardous lands, servicing and infrastructure, intergovernmental, and land use designations.

Official Community Plan Update –Bylaw #345

Bylaw #345 was introduced in 1998 as an amendment of OCP Bylaw #330, specifically covering section 2.10 of Bylaw #330 "hazardous lands." Updated in the Bylaw was the creation of Development Permit Area (DPA) No. 1, associated with rockfall hazard on the slopes above and to the east of the Village. The DPA recognized the importance of existing forest cover in this area. Properties within this DPA were impacted by the 2018 WUI fire and subsequent evacuation orders due to rock fall hazard.

Zoning Setback Bylaw #466

The setback bylaw requires structures to be set back at least 1.5m from the property lines. There are no setback considerations for vegetation.

Fire Protection Agreement Bylaw #468

Under this Bylaw the Village provides fire protection service to the Ehattesaht/Chinehkint First Nation.

Fireworks, Firearms, and Hunting Bylaw #295

Under this Bylaw, a person shall not, except between October 24 - November 1 in any year, sell, give, fire or set off fireworks.

Zeballos Fire Bylaw #278

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[12] BC FireSmart Begins at Home Manual. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/prevention-home-community/bcws_homeowner_firesmart_manual.pdf

[13] Village of Zeballos. Bylaws. https://www.zeballos.com/document-category/bylaws/

This Bylaw established the Zeballos Volunteer Fire Department and defines the role and authority of the Fire Chief. Human-caused ignitions and debris accumulation on private property are general concerns within all wildland urban interface areas. Expanded authority to the Fire Chief is an asset when addressing fire hazards on private lands.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
2.	High	To provide the Village and Fire Department with additional tools to reduce the risk of human-caused ignitions and fire hazards within the municipal boundary.	Include in the Fire Bylaw authority for the Fire Chief to restrict open fires and order the removal of materials determined to be a fire hazard from private properties within the municipal boundary. The Village should obtain legal advice prior to adopting any bylaw amendments.	Village, Fire Department

2.5.4 Higher Level Plans and Relevant Legislation

The AOI is within the Vancouver Island Land Use Plan as General Management Zone 16 – Zeballos. The Zeballos Landscape Unit does not have an approved landscape unit plan or landscape unit level objectives. Provincial forest management legislation – *Forest and Range Practices Act* and its associated regulations; and provincial wildfire legislation – *Wildfire Act* and its associated regulations apply to provincial Crown land. Other relevant legislation includes the *Heritage Conservation Act, Land Act,* and *Environmental Management Act.*

Wildfire Act and Regulation

Under the *Wildfire Act*, the government may order open fire bans, create restricted areas, restrict certain activities, and recover fire control costs amongst other activities and actions laid out in the *Act.* The *Wildfire Act* pertains to all “forest land” and “grass land” and lands within 1km of “forest land” and “grass land” regardless of public or private ownership.

The *Wildfire Act* and *Wildfire Regulation* require those carrying out industrial activities to conduct fire hazard assessments and to abate hazards that are identified. “Industrial activity” is defined in the *Act* to include land clearing.

For industrial activities inside or within 2km of a fire protection district: fire hazard assessments are required to be conducted at 3 month intervals during which industrial activities are taking place (*Wildfire Regulation,* Section 11(2)(a)). For non-forest tenure holders conducting industrial activities: hazard abatement is required within 6 months of the hazard assessment (*Wildfire Regulation,* Section 12 (1)). Forest tenure holders are required to abate hazards within 24 months of the beginning date of the industrial activity (i.e.: forest harvesting) (*Wildfire Regulation,* Section 12.1(2)(a)).

For utility transmission operations, the *Wildfire Regulation* Section 10, requires that utility transmission equipment operating on or within 300m of forest land or grass land must be maintained in a manner that reduces the likelihood of producing an ignition source, and the site maintained in a manner that prevents fire spreading from the site.

Within the AOI, the *Wildfire Regulation* requires that forest tenure holders must conduct fire hazard assessments every 3 months following the start of their industrial activities. Forest harvesting activities that create fuel hazards within the AOI are legally required to be abated within 24 months of the activity start date.

2.5.5 Ministry or Industry Plans

Directly surrounding the municipal boundary is Crown land under tenure of Tree Farm License (TFL) 19 by Western Forest Products Inc. TFL 19 Management Plan #11, and the WFP Central Island Forest Operations 2017 Forest Stewardship Plan apply to TFL 19.[14] The AOI is within High and Severe polygons according to the BCWS Fuel Hazard Assessment and Abatement Fire Risk Map.[15] The risk class determines the threshold for fuel abatement, for industrial and prescribed activities, as recommended in the Guide to Fuel Hazard Assessment and Abatement in British Columbia.[16]

The AOI is within the Campbell River Natural Resource District, Discovery Coast Recreation District, and BCWS' North Island Fire Zone. The MFLRNORD Vancouver Island Central Coast Response Fire Management Plan, a framework for wildfire suppression and response, applies to the area. BCWS/FLNRORD guidance on wildfire management and fuel management is updated periodically and posted online.[17] MFLRNORD guidance includes the 2019 Fuel Management Prescription Guidance[18] and 2019 Tactical Fuel Management Planning Standard.[19]

There are no provincial or national parks within the AOI. No fuel treatment plans, forest health plans, ecological restoration plans, parks/protected area plans are known to apply within the AOI at this time.

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[14] Western Forest Products, Management Plan Overview (https://www.westernforest.com/sustainability/environment/plans/management/management-plan-10-tfl-19/)

[15] BCWS Post Harvest Hazard Abatement Map. https://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=9bb5372c65464f0bab178907a5c39947

[16] Wildfire Management Branch. A Guide to Fuel Hazard Assessment and Abatement in British Columbia. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/hazard-assessment-abatement/bcws_hazard_assessment_abatement_guide.pdf

[17] BCWS. Wildfire Prevention. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

[18] https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2019_fuel_management_prescription_guidance.pdf

[19] https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2019_tactical_fuel_management_planning_standard.pdf

SECTION 3: VALUES AT RISK

The intent of this section is to introduce the extent to which wildfire has the potential to impact values within a community and should be primarily driven by the Critical Infrastructure Assessment competed under the Local Emergency Planning process. Values at risk (VAR) are the human or natural resources that may be impacted by wildfire (Map 5). This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

3.1 Human Life and Safety

In the event of a wildfire approaching a community, the priority is human life and safety, including the evacuation of at-risk areas. Wildfires can move quickly and unpredictably. It takes time for people to evacuate an area and safe egress can be blocked by the fire itself or by vehicle congestion or accidents.

Zeballos is primarily a residential community with a population of approximately 107 residents (2016 Census data)[20]. According to the 2016 Census, there were 58 occupied dwellings, and 113 dwellings in total.[21] The majority of the homes and structures are located to the southwest of the Zeballos River, on Maquinna Avenue or Pandora Avenue. There is also a cluster of residential homes to the of the Zeballos River on Keno Crescent.

Tourism and industrial projects impact the temporary seasonal population. The Village operates two campgrounds/RV parks that contribute to a seasonal influx in the local population: Zeballos RV Park – 20 RV sites for self-contained units with electricity, sewage, and water hook-ups; and Cevallos Campsite – 10 campsites for tenting, including a large covered picnic area.

West of Zeballos, accessed by the Fair Harbour FSR, are the following communities: Ehatis (Ehattesaht/Chinehkint First Nation), Oclucje (Nuchatlaht First Nation), and Kyuquot First Nation. The access and evacuation routes for each of these communities passes through Zeballos. Fair Harbour FSR and Zeballos FSR are critical infrastructure for the safety and movement of residents and emergency supplies.

3.2 Critical Infrastructure

The intent of this sub-section is to clearly identify and understand where critical infrastructure is located in order to effectively determine the wildfire risk and identify mitigation activities. Protection of the critical infrastructure ensures the emergency can be properly managed in the short-term to minimize the impact to the community as the emergency is occurring. Long-term, the protection of this infrastructure impacts how well the community recovers after the emergency has ended and the community can return to normal.

- **Publicly and provincially owned critical infrastructure (CI)** are assets owned by the Provincial government, local government, public institution (such as health authority or school district), First Nation or Treaty First Nation that are essential to the health, safety, security or economic wellbeing of the community and the effective functioning of

[20] Statistics Canada. 2016 Census. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=5924029&Geo2=CD&Code2=5924&SearchText=zeballos&SearchType=Begins&SearchPR=01&B1=All&TABID=1&type=0

[21] It should be noted that this number has likely decreased slightly from evacuation orders resulting from the 2018 Gold Valley wildfire and aftermath with terrain stability issues

government, or assets identified in a Local Authority Emergency Plan Hazard, Risk & Vulnerability and Critical Infrastructure assessment.

3.2.1 Electrical Power

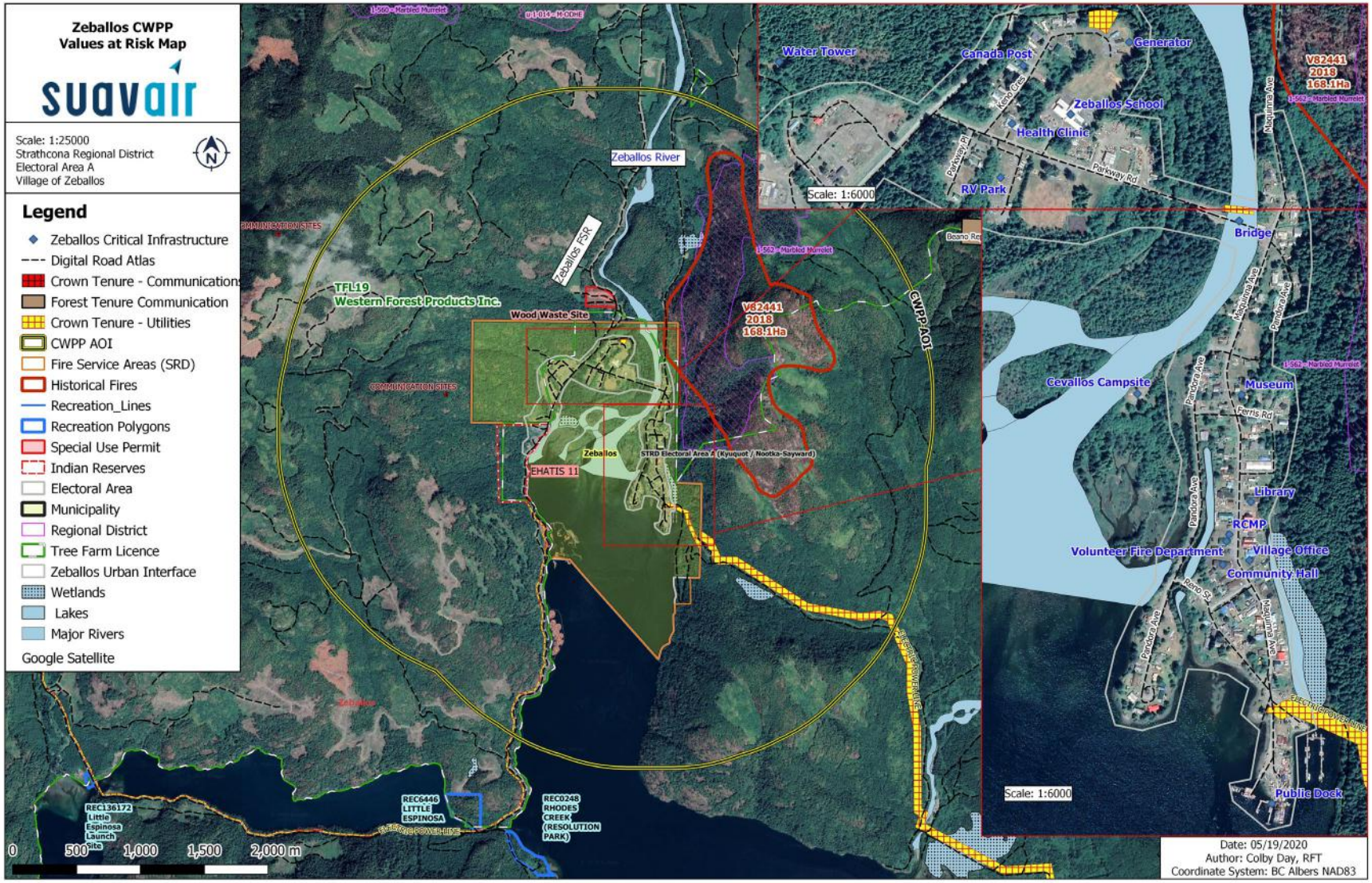
The Village is supplied with electricity from the BC Hydro power grid, through a transmission line running from Tahsis in a northwest-southeast direction through forested and mountainous terrain. The transmission line poles are constructed of wood, which are susceptible to fire damage.

Photo 3. Wooden power poles running into Zeballos.

3.2.2 Communications, Pipelines and Publicly Owned Buildings

The Village is currently serviced with telephone, cable, and internet. There is no cellular phone coverage in Zeballos, the closest communities with cellular coverage are Port McNeill or Woss. Other forms of emergency communication include VHF radio, HAM radio, and satellite phones.

Publicly owned infrastructure within the Village includes the Zeballos Elementary / Secondary School, Zeballos community hall, Canada Post office, fire hall, health clinic, RCMP community policing station, Village Office, library, recycling depot, ball park and heritage museum. A public dock is maintained by the Village for water transportation. The fuel is available at the Fuel Dock, operated by the Village. There is no natural gas service to Zeballos.



Map 5. Village of Zeballos Values at Risk.

3.2.3 Water and Sewage Infrastructure

The water supply for the Village and Ehattesaht/Chinehkint First Nation comes from a subsurface aquifer well adjacent to the Zeballos River. Water is pumped to a 125,000 gallon water tower for storage. A backup generator is connected to the water system should the main power source become unavailable. This water is available for firefighting efforts with fire hydrants strategically placed throughout the Village and Ehatis.

As the public water supply comes from underground flows, there is the potential for water shortages during periods of drought, which tend to coincide with higher fire risk. There is the potential for water shortages from the system, which was a concern during the 2018 wildfire event but did not materialize as a problem. There is no method to monitor how much water capacity remains in the underground wells. Alternative emergency water sources for firefighting efforts could include external sources such as pumping water directly from the ocean or Zeballos River.

Photo 4. Critical Infrastructure east of Sugarloaf Bridge.

Photo 5. Critical Infrastructure west of Sugarloaf Bridge

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 in order to effectively determine wildfire risk and identify mitigation activities.

3.3.1 Drinking Water Supply Area and Community Watersheds

Communities that depend on surface water from a specific watershed should be aware that wildfire has the potential to cause significant damage to soils, high rates of sedimentation and/or landslides that can degrade water quality for many years. In worst-case scenarios, the water supply may have to be abandoned (temporarily or permanently) or new water treatment infrastructure may need to be built, which can take several years and substantial funding.

The drinking water source for the Village is a subsurface aquifer located adjacent to the Zeballos River which drains from a watershed area of 18,600 hectares.[22] Zeballos won the

[22] BGC Engineering Inc. Zeballos River Floodplain Modernization & Future Landslide Risk Assessment. 2018.

"Best Tap Water" competition from the BC Water & Waste Association in 2017.[23] The area is not within a designated community watershed, as defined in the *Forest & Range Practices Act*.

The community has had previous concerns about the use of fire retardant on water quality and the fire department does not currently use foam as a firefighting system. During the 2018 wildfire, an air-tanker made two drops of fire retardant to act as a fire break between the fire and the village. No measurable impact was made to the water from their testing, although possibly because the retardant was dropped downstream of the water intake.

3.3.2 Cultural Values

Indigenous cultural heritage resources include archaeological sites, traditional use sites, historic buildings and artifacts, and heritage trails, or any other objects or places of "historical, cultural or archaeological significance to British Columbia, a community or an aboriginal people.[24] The AOI is within the traditional territories of the Ehattesaht Chinehkint First Nation and Nuchatlaht First Nation.

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

Due to site sensitivity, the locations of archaeological sites are not published publicly by the MFLNRO Archaeology Branch. When fuel treatments are prescribed by a professional forester, part of their due diligence will be accessing the Remote Access to Archeological Data (RAAD)[25] for previously identified sites, consulting with the First Nations groups, and ground-truthing the area. Above ground archaeological sites could include culturally modified trees (CMTs), which require protection and cannot be altered in a fuel treatment. Below ground archaeological sites could include buried artifacts or midden that would be impacted by machinery or fuel burning.

Non-archaeological cultural heritage in BC is generally not protected by statute, but the use of and access to these resources is enshrined as a constitutionally protected Aboriginal right. Locally identified cultural heritage values that may be impacted by wildfire or suppression efforts can be included, if agreed to by the local First Nation.

3.3.3 High Environmental Values

A legally established wildlife habitat area (WHA 1-562) for marbled murrelet is within the AOI. The majority of this WHA was impacted by the 2018 Gold Valley fire and the habitat may no longer be suitable for marbled murrelet but at present is still classified as a WHA. Another

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[23] Campbell River Mirror "Zeballos wins the title of best tap water in B.C." (https://www.campbellrivermirror.com/news/zeballos-wins-the-title-of-best-tap-water-in-b-c/)

[24] Archer, CRM. 2009. Cultural Heritage Resource Identification and Management in Forestry Developments: A Supplement to the FREP Protocol. Ministry of Forest Lands and Natural Resource Operations.

[25] BC Government – Archaeology Branch. (https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/data-site-records/raad)

important value is the Zeballos River, a critical drainage system for multiple salmon species, steelhead, and trout.

3.4 Other Resource Values

The AOI includes portions of the timber harvesting land base with valuable commercial tree species including western red cedar, douglas-fir, western hemlock, amabilis fir, and sitka spruce. Other resource values include established visual quality objectives and recreational opportunities.

3.5 Hazardous Values

Hazardous values, such as propane tanks, explosives storage, fuel yards, or landfills pose a safety hazard to emergency responders. Zeballos' landfill for residential debris is located 10km away on Fair Harbour FSR and is not within the AOI. Within the AOI, there is an active wood waste landfill site that is operated by Western Forest Products, containing wood, bark, and organic debris that is generated from their dry land sort (Special Use Permit S25342). Spontaneous combustion in wood waste piles is a potential fire hazard.

Photo 6. Wood waste landfill operated by Western Forest Products.

The Zeballos Fuel Dock has several large storage tanks for gasoline, diesel, marine fuel, and propane. The fuel dock is surrounded by water on three sides and has limited flammable fuels around it.

Photo 7. Fuel storage tanks at the Zeballos fuel dock.

Many homes in Village use propane and the tanks are often situated next to the home. If overheated, propane tanks can explode. FireSmart planning and practices to mitigate the risk of propane tanks near homes is discussed in Section 5.2 below.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
3.	High	To mitigate the risk of a WUI fire starting and spreading from the wood waste landfill.	Engage the tenure holder on developing a risk management plan that addresses the potential for spontaneous combustion at the wood waste site. Options may include keeping stand-by water tanker/equipment on site during high fire danger and/or FireSmart planning around the site.	Village, MFLNRORD Collaborate with tenure holder.

SECTION 4: WILDFIRE THREAT AND RISK

The intent of this section is to summarize the factors that help determine the wildfire risk around the community. These factors include natural fire regime and ecology, Provincial Strategic Threat Analysis, and a local wildfire risk analysis.

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

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

4.1 Fire Regime, Fire Weather and Climate Change

The intent of this sub-section is to provide the ecological context of wildfire for the community and to describe the role of fire (frequency and intensity) in the local ecosystem under historical conditions, and the potential implications of future conditions, caused by the interruption of the natural fire cycle and/or climate change.

4.1.1 Fire Regime and Fire Weather

Natural Disturbance Regime

The AOI is defined by the regional climate of the Coastal Western Hemlock (CWH) very moist maritime subzone (vm) as described in the BC biogeoclimatic zone classification system.[26] The CWHvm climate is generally wet and humid with cool summers and mild winters.[27] CWHvm is classified as natural disturbance type 1 (NDT1) – rare stand-initiating events. The mean return interval for stand replacing disturbances in NDT1 variants is generally 250 years, the longest return interval of all NDT's in the province.[28] When disturbances such as fire occur, they are usually small and result in irregular edge configurations and patterns. However, it is more likely that forest disturbances are caused by wind, terrain instability, or isolated forest disease.

Fire Weather

The Canadian Forest Fire Danger Rating System[29] (CFFDRS) is a computer-based model used to assess fire danger and potential fire behaviour. The two main parts of the CFFDRS are: the

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[26] About BEC. https://cfcg.forestry.ubc.ca/resources/cataloguing-in-situ-genetic-resources/about-bec-and-bgc-units/

[27] A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region, 1994. Available from https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh28.htm.

[28] BC Forest Practices Code Biodiversity Guidebook September 1995. Available from https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf.

[29] Natural Resources Canada. Forest fire danger rating tool. 2016. https://www.nrcan.gc.ca/our-natural-resources/forests-forestry/wildland-fires-insects-disturban/forest-fire-danger-rating-tool/14470.

fire weather index system[30] (FWI) and fire behaviour prediction system[31] (FBP). Hourly weather data is collected throughout fire season (April to October) at automated weather stations throughout British Columbia to support the CFFDRS. Fire Danger Classes are summarized by the BC Wildfire Service as follows:

Table 3. Summary and description of Fire Danger Classes.

Fire Danger Classes[32]	Definition / Fire Behaviour Summary
Class I/II – Very Low/Low	Fires may start easily and spread quickly but there will be minimal involvement of deeper fuel layers or larger fuels.
Class III – Moderate	Forest fuels are drying and there is an increased risk of surface fires starting. Carry out any forest activities with caution.
Class IV – High	Forest fuels are very dry, and the fire risk is serious. New fires may start easily, burn vigorously, and challenge fire suppression efforts. Extreme caution must be used in any forest activities. Open burning and industrial activities may be restricted.
Class V – Extreme	Extremely dry forest fuels and the fire risk is very serious. New fires will start easily, spread rapidly, and challenge fire suppression efforts. General forest activities may be restricted, including open burning, industrial activities and campfires.

High Fire Danger is considered as danger class ratings IV or V (high or extreme). High fire danger occurs mostly in July and August, however it can begin as early as May and extend through September.

Regional Weather Stations

The nearest long term BCWS weather station is Woss Camp (about 32km northeast of the Village). Fire Danger Class Ratings for the Woss Camp Weather Station are available from 1970-2019. Weather conditions in Woss may vary due to its relative inland valley bottom location compared to Zeballos' location at sea level closer to the west coast.

[30] Natural Resources Canada. Background Information: Canadian Forest Fire Weather Index (FWI) System. https://cwfis.cfs.nrcan.gc.ca/background/summary/fwi

[31] Natural Resources Canada. Background Information: Canadian Forest Fire Behaviour Prediction (FBP) System. https://cwfis.cfs.nrcan.gc.ca/background/summary/fbp

[32] BC Wildfire Service. Fire Danger. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/wildfire-situation/fire-danger?keyword=danger&keyword=rating

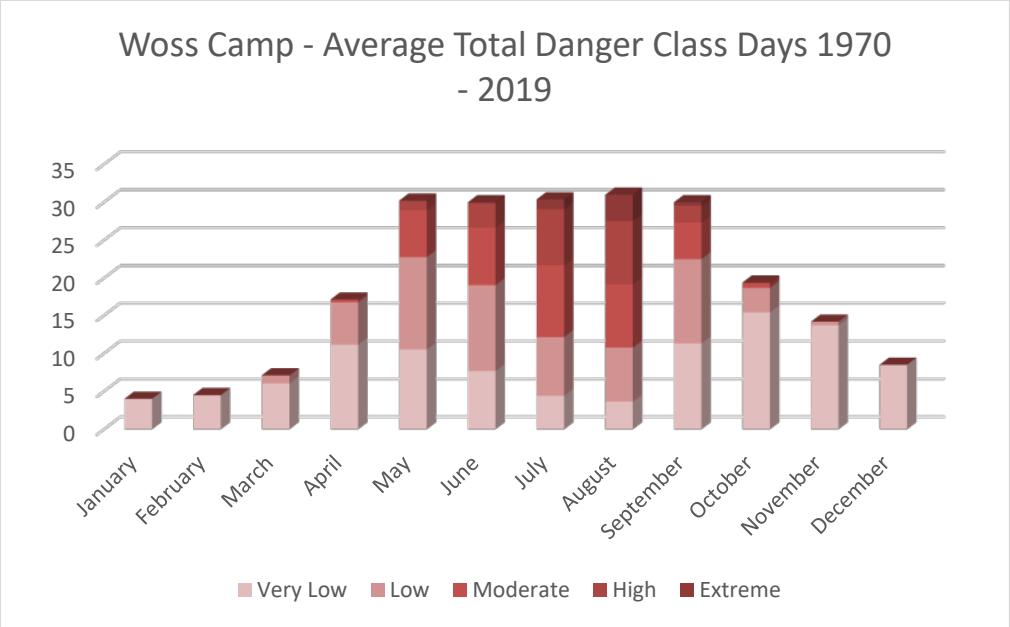

Figure 1. Woss Camp weather station average monthly total danger class days 1970-2019.

The other nearby weather station is TS Artlish, located about 17km northwest of Zeballos. Fire danger class days are available for years 2007-2019. The weather data recorded at TS Artlish is more representative of conditions in Zeballos than the Woss Camp station. In August 2018, when the most recent wildfires in the region took place, TS Artlish recorded 25 of 31 days to be High or Extreme fire danger.

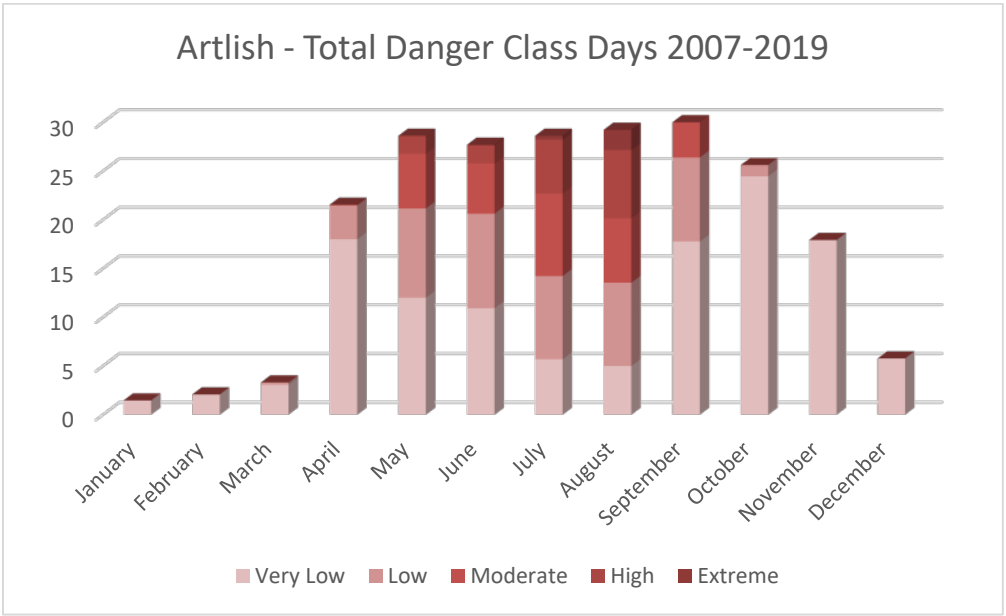

Figure 2. TS Artlish weather station average monthly total danger class days 2007-2019.

Forest Health Issues

There are no known landscape level forest health issues that contribute to large scale changes in fire regime or forest attributes. Forest harvesting is the main driver of forest cover changes within the AOI.

Human Development and Natural Events

The most significant human development in the AOI is forest harvesting which alters the fuel type and hazard around the community. Recent forest fires in 2018 have also altered forest cover in the area.

4.1.2 Climate Change

Climate change actively impacts coastal forests, weather patterns, soils, hydrology, and seasonal water availability. For Vancouver Island, climate change has resulted in a 0.8°C increase in annual temperature from 1900-2013.[33] Climate change will continue to impact Vancouver Island by increasing the frequency of relatively warm years, increased intensity of heavy precipitation events, increased flood events, increased summer drought conditions, and increased forest fire frequency and severity due to dry conditions.

In addition to warming temperatures, climate projections for the West Coast region to the 2050s indicates significantly less (-51%) spring snowfall, increased seasonal moisture variability, increased frost-free days, and lengthened dry seasons.[34] Reduced snow-pack and moisture variability suggest that watersheds may transition to be rainfall-dominated, requiring greater need for water conservation and storage. The expected impacts of climate change on the Strathcona Regional District area include decrease in snowpack, high intensity precipitation, increase in hot/dry conditions, increase in temperature, longer dry season, and reduced water supply.[35] Figure 3 shows the 30-year regional averages for cumulative seasonal precipitation and temperature projections for the west coast of BC for the 2020s, 2050s, and 2080s.The width of the bands indicate the range of the projections. Note the trend toward warmer temperatures in all seasons, and greater variability in seasonal precipitation with less precipitation in the summer months. This table was directly sourced from the Pacific Climate Impacts Consortium.[36]

The scale and scope of climate change impacts are constantly evolving. Climate projections describe the inevitability of longer dry seasons, reduced spring/summer moisture availability, and warmer temperatures – which lead to greater numbers of high/extreme fire danger class days. Climate change contributes to the likelihood of more intense wildfire seasons on Vancouver Island moving forward. Climate change impacts emphasize the importance of risk and mitigation actions recommended in this CWPP.

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[33] Lewis, J. April 2019. Climate Change and Vancouver Island. Available from https://srd.ca/wp-content/uploads/2018/10/Climate_Change_Campbell_Riv_2018_Lewis.pdf

[34] Pacific Climate Impacts Consortium. November 2013. Climate Summary for West Coast Region. Available from https://www.pacificclimate.org/analysis/publications/climate-summary-west-coast.

[35] Pacific Climate Impacts Consortium. 2012. Summary of Climate Change for Strathcona in the 2050s. Available from http://www.plan2adapt.ca/tools/planners?pr=27&ts=8&toy=14.

[36] Pacific Climate Impacts Consortium. November 2013. Climate Summary for West Coast Region. Available from https://www.pacificclimate.org/analysis/publications/climate-summary-west-coast.

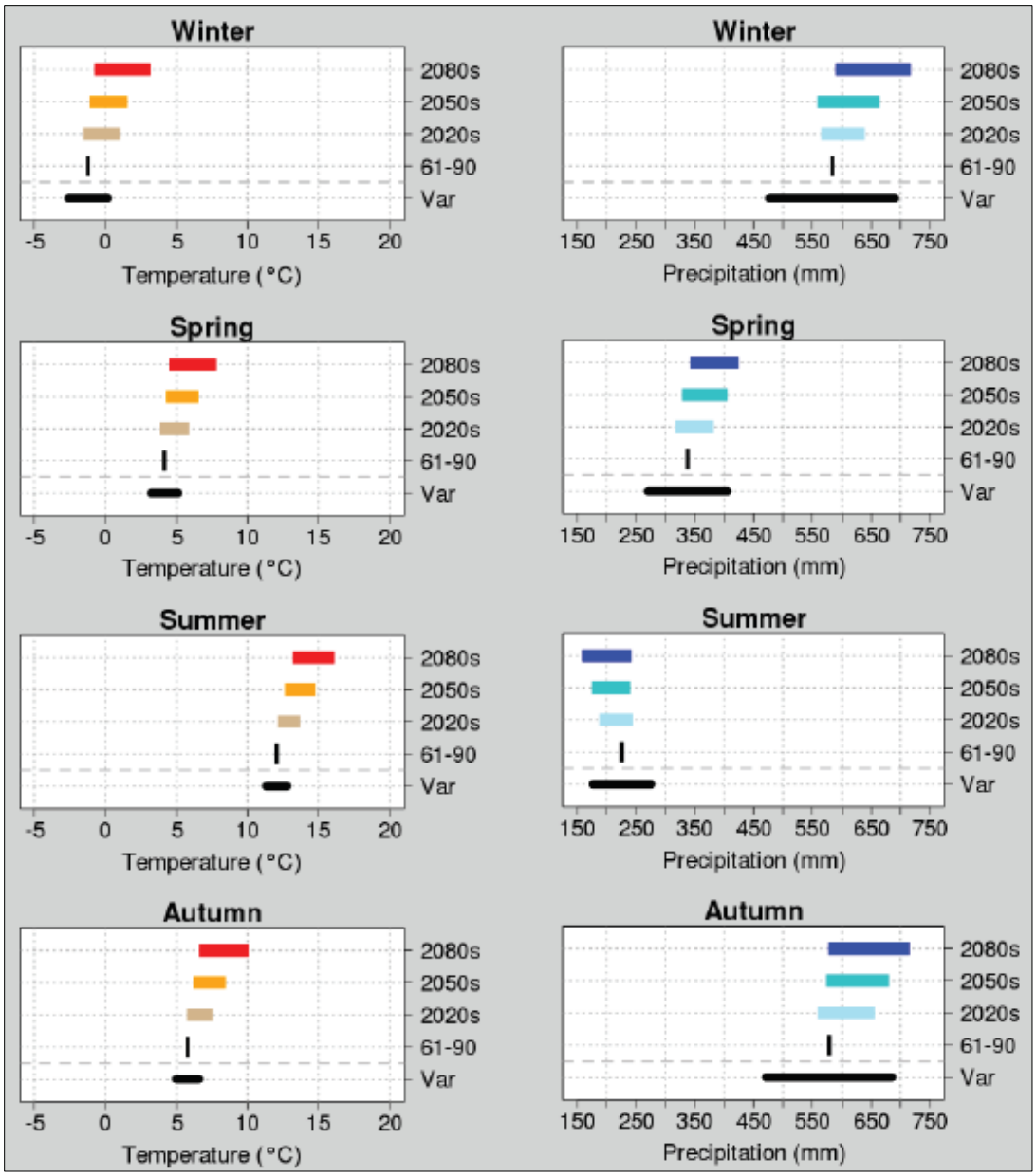

Figure 3: Cumulative seasonal precipitation and mean seasonal temperature projections for 2020s, 2050s, and 2080s. 30-year regional averages for the West Coast of BC. The width of the bands indicate the range of the projections.[37]

[37] Pacific Climate Impacts Consortium. November 2013. Climate Summary for West Coast Region. Available from https://www.pacificclimate.org/analysis/publications/climate-summary-west-coast.

4.2 Provincial Strategic Threat Analysis (PSTA)

The PSTA[38] is a provincial level geographic information system (GIS) spatial analysis and provides a starting point to assess the local wildfire threat. The PSTA utilizes and interprets provincial fuel type mapping, historical fire occurrences, topography, and historical weather station data.

The PSTA assesses wildfire threat within wildland urban interface (WUI) polygons at a provincial level. The WUI, or interface, is the area where human development and wildland vegetation mix; where human developments intermingle with forests and other vegetative fuel types.[39] The threat analysis output is a wildfire threat rating classification of No threat, Low, Moderate, High, or Extreme.

The key inputs to the wildfire threat analysis are fire density, head fire intensity, and spotting impact. The Wildfire Threat classification is weighted based on 30% fire density, 60% head fire intensity, and 10% spotting impact.

Fire Density

Fire density is the ignition and spread potential based on historic fire patterns. There are 10 fire density classes (1 being the lowest and 10 the highest), based on the approximated weighted fire frequency within a 10km radius. The fire density rating within the AOI is 3 to 5.

Head Fire Intensity

Head fire intensity (HFI) is the intensity of the flaming fire front during 90th percentile weather conditions (highest 10% temperatures, and lowest 10% of relative humidity values). Head fire intensity is related to the rate of spread and fuel consumption of the leading edge of a fire. This factor is important to know for fire suppression effort and safety.

Spotting Impact

Spotting impact is the ability of burning embers to be sent into the air for some distance and start new fires. Embers cause most of the structural losses in the event of interface wildfires. The spotting impact within the AOI is Low to Moderate.

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[38] BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development. 2019. Provincial Strategic Threat Analysis: 2019 Update https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/psta

[39] BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development. 2017. Provincial Strategic Threat Analysis: 2017 Update. Available from https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/psta/download-psta-historic.

4.2.1 Fire History

MFLRORD and the BCWS maintain the BC Historical Fires Database. Fires that occurred between 1950-2019, larger than 4 hectares have been captured in this database (Map 6). According to historical fire data (Table 4), the largest fire was the 168 ha Gold Valley Fire in 2018, which impacts were discussed in Section 2.3 Past Wildfires, Evacuations and Impacts. This was the only recorded lightning caused fire in Zeballos since 1950. Prior to the 2018 fire, there had only been 6 fires since 1950, all of them were under 4 hectares and human caused. Fire prevention awareness and education on human caused fires remains an important point of emphasis. Due to reporting and documentation, the number of recorded fires is likely an underestimation of the actual number of fires that have occurred.

Table 4. Recorded wildfire history within the Zeballos AOI since 1950.

Size Class (ha)	Total fires 1950-2008	Lightning 1950-2008	Human 1950-2008	Total Fires 2008-2019	Lightning 2008-2019	Human 2008-2019
<4.0	6		6			
4.0-10.0						
>10.0				1	1	
TOTALS	6		6	1	1	

Map 6. Historical fires recorded in the Zeballos area since 1950.

4.3 Local Wildfire Threat Assessment

The intent of this sub-section is to provide a detailed assessment of the local wildfire threat, including field reviewed fuel characteristics, proximity of fuel to the community, local fire spread patterns, topographical considerations and local factors.

4.3.1 Fuel Type Assessment

Fuels in the area are generally mature conifer forests (C-5), young and dense conifer forests (C-3), recently harvested cut blocks (S-3), and some alder/cottonwood/maple deciduous patches (D-1/2). A detailed description of fuel types and fuel type changes is provided in Appendix A1.1 Fuel Type Attribute Assessment.

PSTA fuel types have been verified and updated through spatial analysis. The available spatial information from Data BC, RESULTS, proprietary LIDAR data, forest cover, and other spatial data shared for use on this project by Western Forest Products Inc., updated Google Earth imagery, was analyzed for fuel type verification and adjustments. The major changes to the fuel type layer that resulted within the AOI included:

- recently harvested cut blocks (less than 5 years) were changed to fuel type S-3,
- water areas were corrected with more accurate spatial data sources,
- harvested blocks older than 5 years, coniferous, dense pole sized stands over 4m tall, less than 60 years old, were updated to C-3 fuel type

4.3.2 Proximity of Fuel to the Community

Fuel closest to the community usually represents the highest hazard as it is the most likely to spread fire to nearby infrastructure. The recommended approach is to treat fuels to achieve a desired level of hazard reduction, from the value or structure outward, ensuring mitigation continuity. Fuels adjacent to the values and/or structures at risk receive the highest rating followed by progressively lower ratings moving away from the value.

The local wildfire threat assessment process subdivides the WUI into 3 areas – the first 100 meters (WUI 100), 101 to 500 meters (the WUI 500), and 501 to 2000 meters (the WUI 2000). These zones provide guidance for classifying threat levels and subsequent priorities of treatments. The first 100m (WUI 100) is further broken down into Priority Zones 1, 2, and 3 in the FireSmart Planning and Activities section 5.2 below.

4.3.3 Fire Spread Patterns

Wind speed, wind direction, and fine fuel moisture condition influences wildfire trajectory and rate of spread, and is summarized in the ISI Rose(s) from the local representative BCWS weather station – TS Artlish from 2007-2015. Wildfire that occurs upwind of a value poses a much more significant threat to that value than a fire that occurs downwind. The northerly wind direction is considered the dominant direction for the local wildfire threat assessment. More detailed information about wind directions is found in Appendix A1.3 Fire Spread Patterns.

4.3.4 Topography

Topography is the arrangement of natural and physical features in an area; it influences fire behavior and wildfire risk to values. Slope percentage influences a fire's trajectory and rate of

spread. Slope position of the value relates to the ability of a wildfire to gain momentum during an uphill run and affects the potential impact to the value.

Slope Percentage Class

The community is on slopes <20%. Steep slopes rise above to the east (60-100%). Generally, slopes will cause preheating of fuel in a direction away from the community rather than towards it. The fire behaviour implications of slope percentage classes are summarized in Appendix A1.4 Topography.

Slope Position of the Value

Zeballos is located at the bottom of the slope where normal rates of fire spread apply. Slope position of a value relates to the ability of a wildfire to gain momentum during an uphill run. A value at the bottom of the slope is equivalent to a value on flat ground; a value on the upper 1/3 of the slope would be impacted by high preheating and faster rates of spread than a value on flat ground. The fire behaviour implications of slope position are summarized in Appendix A1.4 Topography.

4.3.5 Local Wildfire Threat Classification

A local wildfire threat classification was completed; the process of this threat classification is summarized in Appendix A1.5 Local Wildfire Threat Classification. For an updated wildfire threat classification map, see Map 7. Generally, the wildfire threat around the Village is Moderate to High.

Table 5. Summary of wildfire threat classification within the AOI.

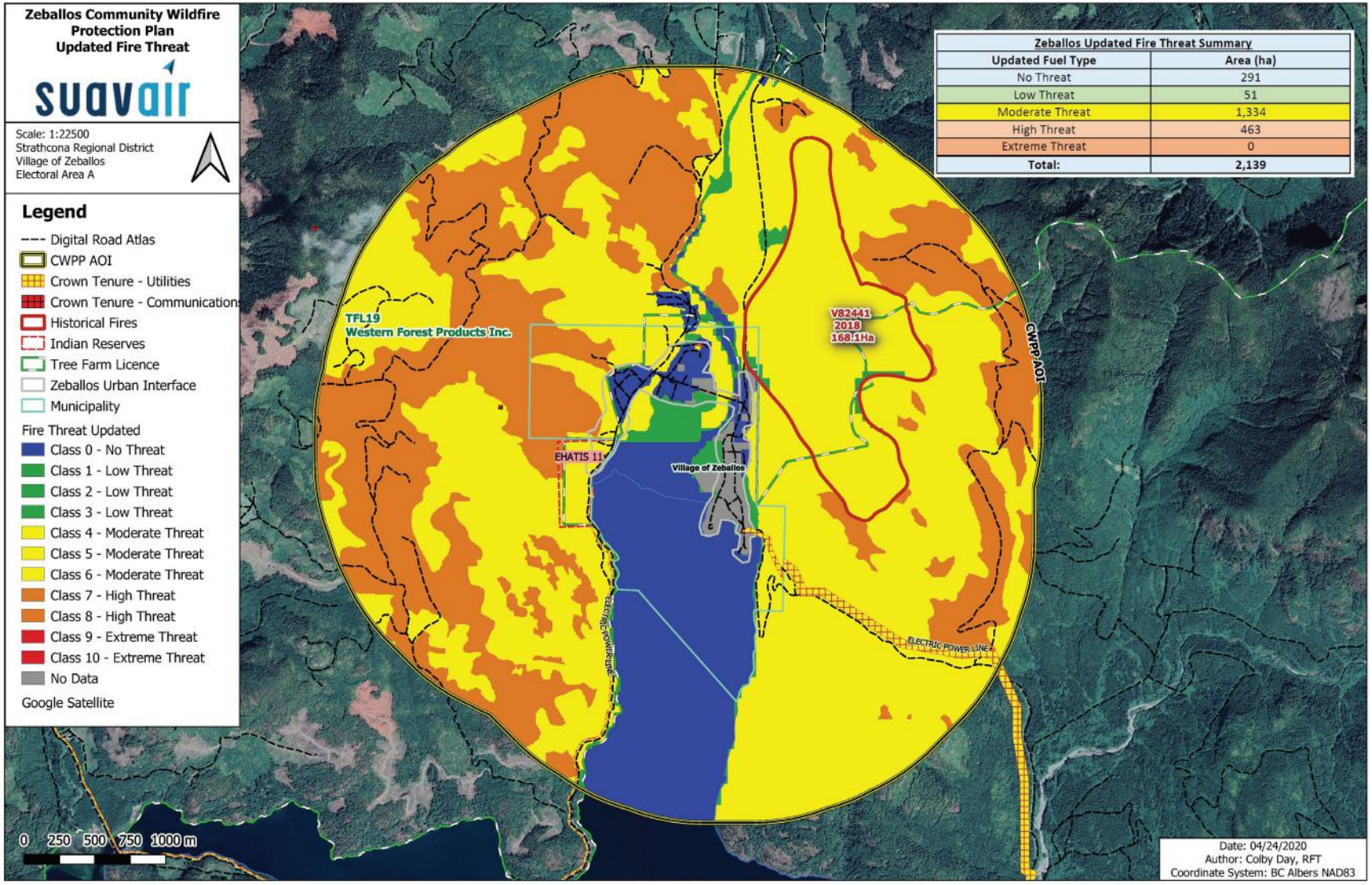
Wildfire Threat Class	2019 PSTA Area (ha)	2019 PSTA % of AOI	Updated 2020 Area (ha)	Updated 2020 % of AOI
Extreme	48	2%	0	0%
High	544	26%	629	29%
Moderate	1046	49%	1176	55%
Low	242	11%	43	2%
Very Low / No Threat (Water)	259	12%	297	14%
Total	2139		2139	

4.3.6 Local Wildfire Risk Classification

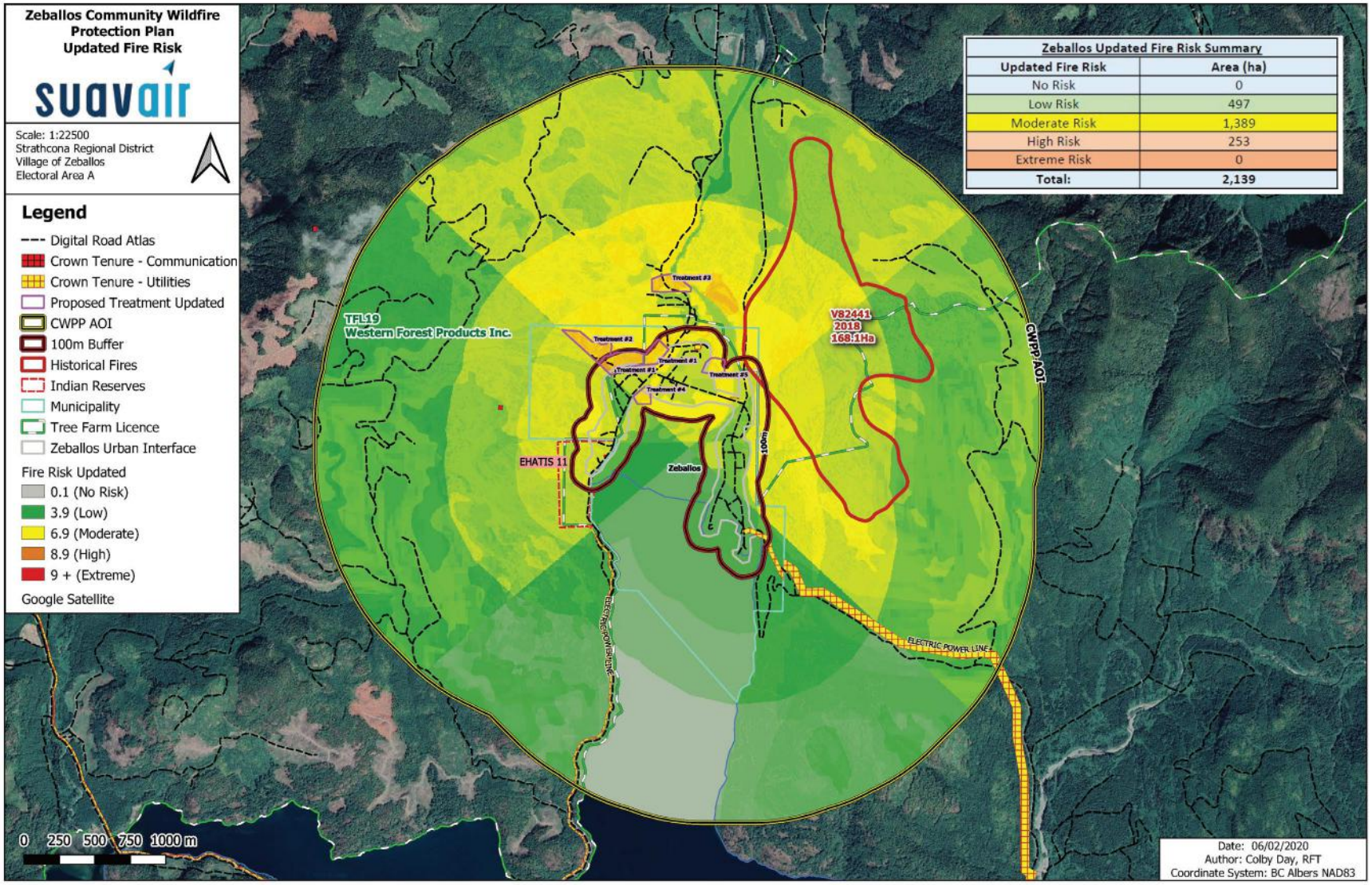
The 2019 PSTA data classifies the Zeballos WUI as Risk Class 4 (Moderate). A local wildfire risk classification was completed based on the updates to the fuel type layer and local wildfire threat classification. Proximity to structures/values, fire spread patterns, and topography are the other key determinants of wildfire risk. The detailed wildfire risk assessment process is found in Appendix A1.6 Local Wildfire Risk Classification. The Local Wildfire Risk Classification ranges from Low to High with higher risk areas in closer proximity to the Village (Map 8 and Table 6).

Table 6. Summary of local wildfire risk classification areas within the AOI.

Local Wildfire Risk Class	Area (ha)	% of AOI
Extreme	0	0%
High	253	12%
Moderate	1389	65%
Low	497	23%
Very Low / No Threat (Water)	0	0%
Total	2139	



Map 7. Zeballos local wildfire threat classification.



Map 8. Zeballos local wildfire risk classification with recommended treatment areas.

SECTION 5: RISK MANAGEMENT AND MITIGATION FACTORS

The intent of this section is to outline the strategies the community can put into practice to reduce the risk and the impact of a wildfire. Risk mitigation choices can vary by community, fuel type, ecology, hazard, terrain factors, land ownership, other unique local risk factors, local government and First Nation capacity, and/or public acceptance.

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

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

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

5.1 Fuel Management

In general, fuel treatment activities create post-treatment stand conditions that will result in reduced fire behaviour.[40] Treatment strategies should prioritize surface and ladder fuel changes over canopy changes.[41] Fuel treatments should aim to reduce surface fuel loading, increase the height to live crown through reduction of ladder fuels, and reduce crown closure as necessary.

Crown fires in mature coastal forests require support from heat generated by burning of surface fuels and understory (ladder fuels). Understory thinning of surface fuels and ladder fuels are the main consideration for fuel treatments in moist coastal forests. The vertical arrangement of fuels is an important consideration for fuel treatment prescriptions. In mature coastal forests, the natural canopy crown height is elevated from the forest floor. Without significant surface and ladder fuels, it is less likely that crown fires will occur. Figure 4 and Figure 5 illustrate the role of understory thinning and how ladder fuels can contribute to crown fires.

Surface fuels that remain in harvested cut blocks (slash, distributed or piled) also contribute to wildfire hazard across the landscape. Harvested areas dry out faster, dead and down material does not retain moisture and is more susceptible to ignitions. Surface fires in slash tend to spread quickly and can build up heat and intensity, spreading into adjacent mature stands as surface and crown fires. Therefore, fire hazard abatement in harvested cut blocks is critical, especially when harvested areas occur within the WUI.

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[40] BCWS Fuel Management Prescription Guidance 2019. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2019_fuel_management_prescription_guidance.pdf

[41] Ibid.

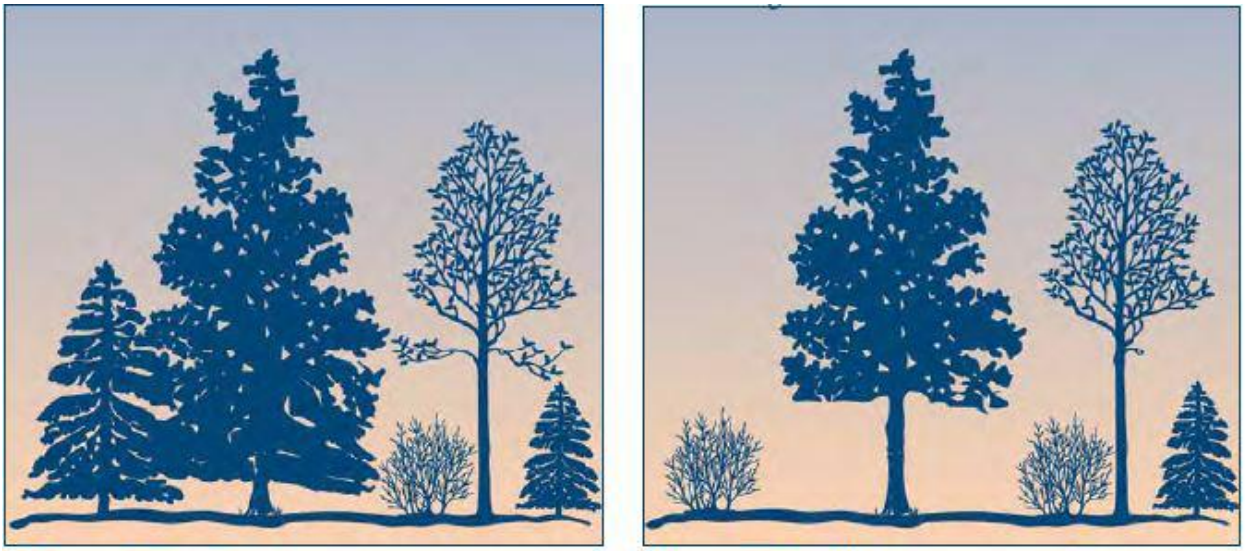


Figure 4. Understory thinning can reduce surface and ladder fuels.[42]

Figure 5. Vertical arrangement of ladder fuels can carry a fire from the surface into the forest canopy.[43]

[42] Partners in Protection. FireSmart Protecting Your Community from Wildfire. https://firesmartcanada.ca/wp-content/uploads/2018/10/FireSmart-Protecting-Your-Community.pdf.

[43] Ibid.

5.1.1 Fuel Treatment Areas

The 2011 CWPP identified a number of high hazard areas for fuel treatments. 36.5ha of Priority 1 treatment areas were identified. Recommendations #33 from the 2011 CWPP:

"A number of high hazard areas immediately adjacent to or embedded in Zeballos have been identified and should be the focus of a progressive thinning program that is implemented over the next five to ten years. Thinning should be focused on the highest Priority 1 fuels identified in Map 11. A qualified professional forester (RPF), with a sound understanding of fire behaviour and fire suppression, should develop treatment prescriptions. Any treatments that take place on sloped sites must be prescribed with consideration given to slope stability. Where slope stability may be an issue (such as above the western border of the wildland urban interface), a Professional Geotechnical Engineer should review the treatment prescriptions."

To date, no treatments have been conducted within the AOI. Two main barriers to conducting fuel treatments are cost and land ownership/jurisdiction. 2011 CWPP Priority 1 treatment areas are on both private and public land. Crown land fuel treatments can be funded by the BC Forest Enhancement Society. Municipal land and private land treatments may be funded through UBCM. Funding sources for fuel treatments and other projects are outlined in Table 1.

Based on the updated risk analysis and classification, 5 treatment areas are recommended, summarized in Table 7.

Table 7. Summary of recommended treatment areas in the Zeballos AOI.

Treatment Area	WUI Threat / Risk	Priority	Approx. Area (ha)	Land Ownership	Comments / Rationale
1	High/High	High	5.1	Crown (TFL)	High risk within WUI100
2	High/High	High	3.1	Crown (TFL)	High risk within WUI500
3	High/High	High	2.6	Crown (TFL)	High risk within WUI500, next to wood waste site
4	Mod/High	Med	1.1	Municipal	High risk within WUI100
5	Mod/Mod	Low	1.4	Municipal	Mod risk within WUI100, FireSmart project potential with school

Any fuel management activities planned on Crown land, or beyond those described in the FireSmart Activities section, should engage the professional advice of a qualified Registered Professional Forester. Qualified professionals should be relied on to create site level fuel management prescriptions that have specific measurable targets, contain site specific

objectives, and align with other legal and non-statutory objectives including First Nations consultation requirements.[44]

Proximity affects risk and therefore fuels in close proximity to structures in the Valley, where private land is situated, are higher risk. Therefore, recommended treatment areas are within 500m (WUI500) of structures in the Valley. No treatment is recommended beyond the WUI500 because it is unlikely to occur over the lifetime of this CWPP. This CWPP should be re-visited in 5 years to determine progress on recommended actions, at which time additional fuel treatment areas may be recommended.

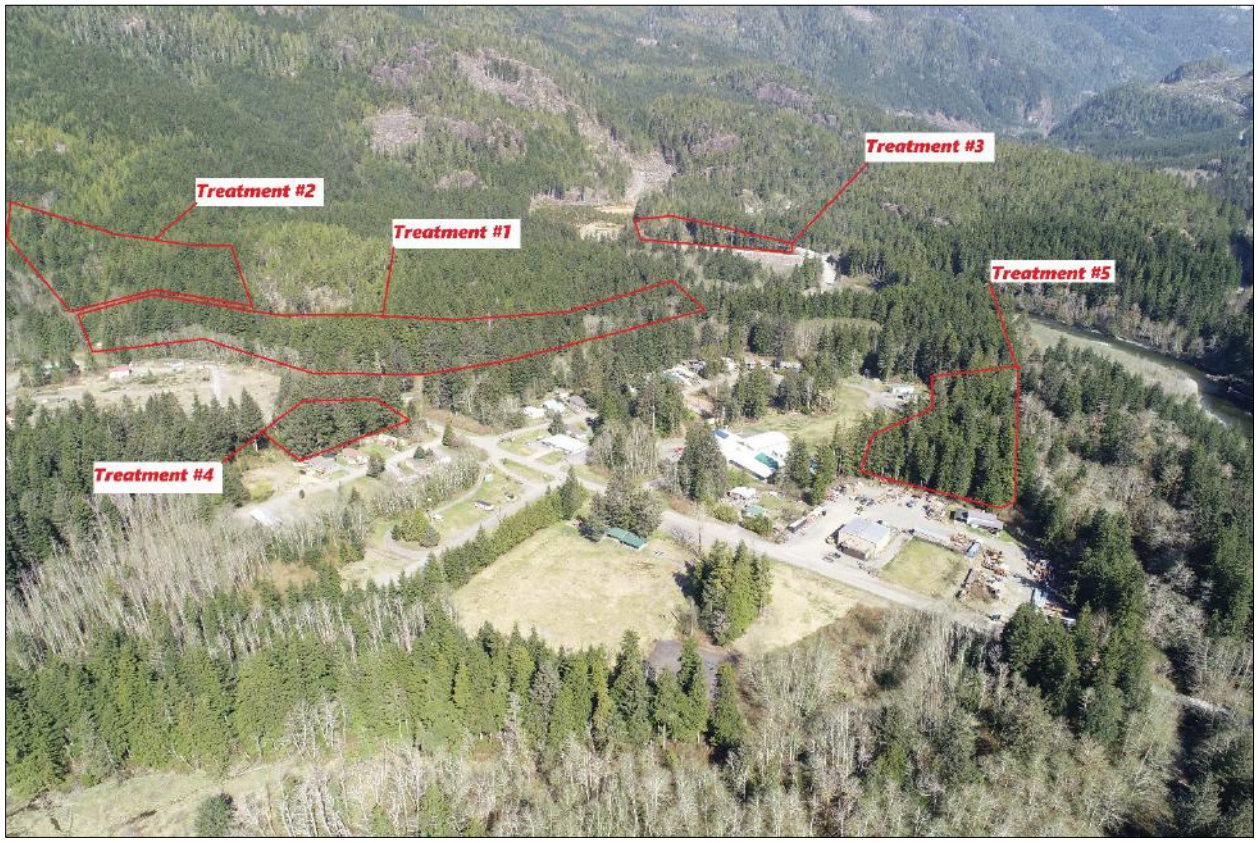
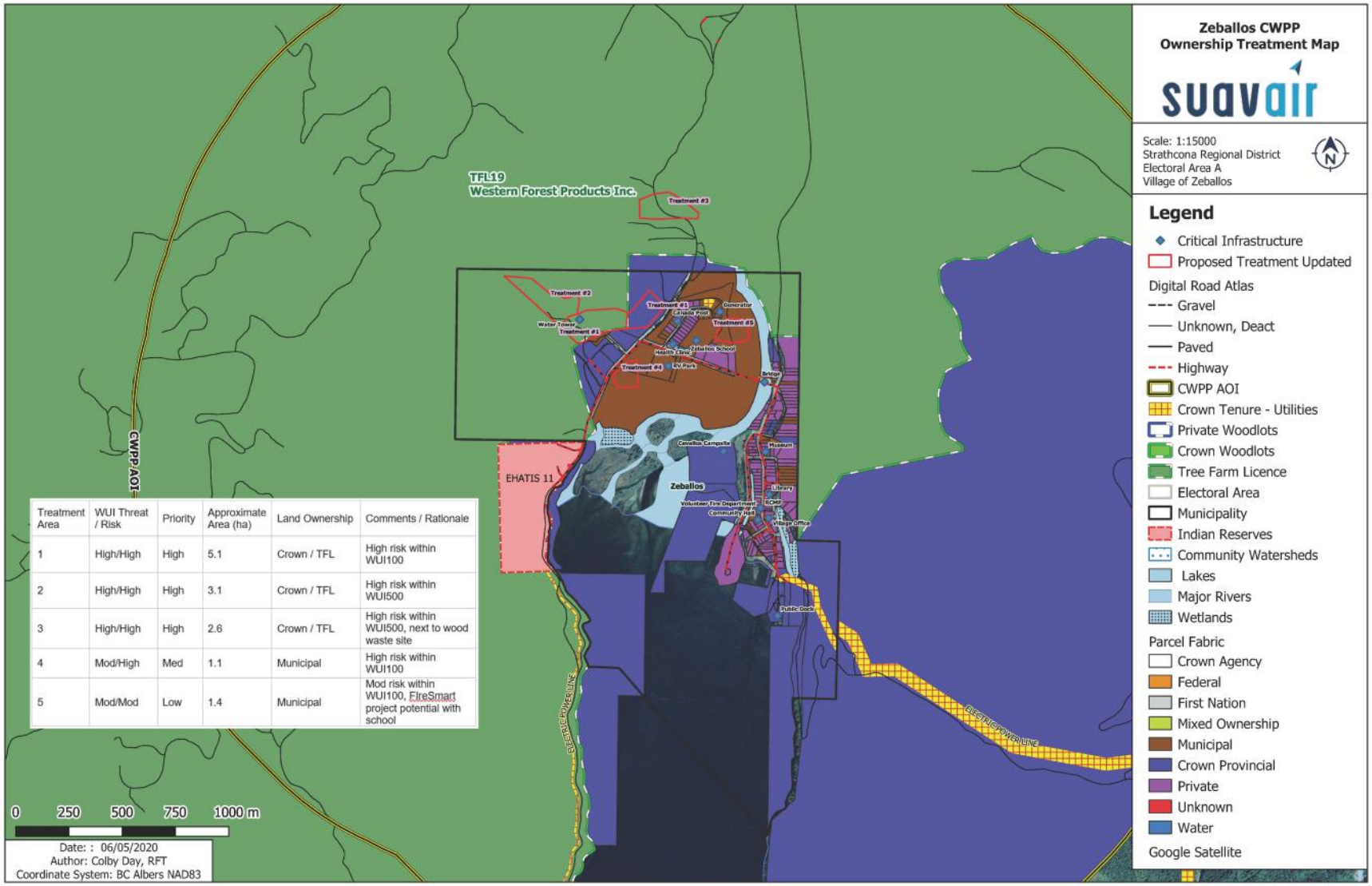


Photo 8. Aerial overview of proposed treatment areas.

[44] BCWS Fuel Management Prescription Guidance 2019. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2019_fuel_management_prescription_guidance.pdf



Treatment Area	WUI Threat / Risk	Priority	Approximate Area (ha)	Land Ownership	Comments / Rationale
1	High/High	High	5.1	Crown / TFL	High risk within WUI100
2	High/High	High	3.1	Crown / TFL	High risk within WUI500
3	High/High	High	2.6	Crown / TFL	High risk within WUI500, next to wood waste site
4	Mod/High	Med	1.1	Municipal	High risk within WUI100
5	Mod/Mod	Low	1.4	Municipal	Mod risk within WUI100, FireSmart project potential with school

Map 9. Zeballos recommended treatment areas and land ownership classes.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
4.	Med	To reduce the fuel hazard within high risk areas identified within 500m of the wildland urban interface.	Engage a qualified forest professional in developing and implementing site level prescriptions for each treatment area identified in Table 7. The forest professional may also refer to Priority 1 treatment areas in the 2011 CWPP. Where treatments are identified on crown lands, consult and collaborate with Ehattesaht Chinehkint First Nation, forest tenure holders, and Campbell River Natural Resource District (MFLNRORD).	Village and/or SRD Collaboration with forest tenure holder and MFLNRORD on Crown lands.

5.2 FireSmart Planning & Activities

The intent of this section is to summarize the current level of FireSmart that has been completed, is under implementation, and to identify areas that are FireSmart, or have received FireSmart recognition through the FireSmart Canada Recognition Program, and to identify future FireSmart activities within the AOI.

FireSmart is a planning tool to help communities living in the wildland urban interface (near forests) reduce the likelihood of disaster and catastrophic loss in the event of a wildfire near their community. The 7 disciplines of FireSmart are: vegetation management, public education, legislation, development, planning, cross-training, and interagency cooperation. The BC FireSmart Begins at Home Manual provides detailed information on how residents can work towards protecting their homes from wildfire.[45] Currently, there are no FireSmart Recognized communities/neighbourhoods within the AOI.

WUI fires are complex incidents involving both structures and forests. Wildland fires can spread towards the community and structural fires can spread from the community towards the forest. Due to the remote location and absence of fire protection services, it is critically important to consider the impacts of WUI fires in both directions. In the event of WUI fires, BCWS resources should not be solely relied on to save properties. Figure 6 shows the WUI disaster sequence where citizens and landowners can act to break the sequence.

[45] BC FireSmart Begins at Home Manual. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/prevention-home-community/bcws_homeowner_firesmart_manual.pdf

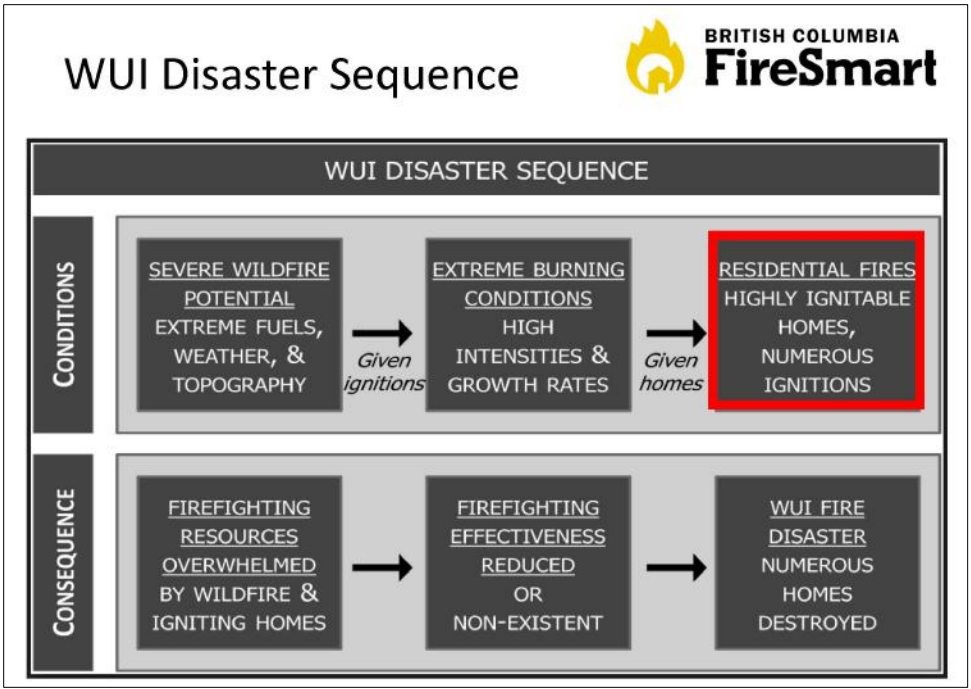


Figure 6. Wildland urban interface (WUI) disaster sequence and where residents can break the disaster sequence.

Wildfires have the potential to impact communities in many ways. Structure losses and evacuations are the main impacts of wildfire and both can cause significant emotional, financial, and physical stress. Structure and home losses due to wildfire are a result of fire ignitions caused by radiant heat, convective flames, and wind driven embers. Embers (small flaming or glowing particles) are associated with more than 50% of home losses from wildfires. Embers can be carried up to 2km's under specific fire weather conditions. 85-90% of homes without combustible roofs and with 10m of clearance from combustible materials will likely survive a major wildfire.

Adopting FireSmart principles and engaging in FireSmart practices is the best way private landowners can take responsibility and action on reducing the WUI fire hazard and risk of loss to their homes and communities. FireSmart activities by homeowners can make a big impact on the home's susceptibility to fire. Activities such as mowing lawns, pruning bushes, removing needle and leaf accumulations from gutters, and keeping combustible materials away from homes can make a big difference.[46] The conditions of the Structure (Home) Ignition Zone (SIZ) are a main determinant of whether a home/structure will be lost due to a WUI fire (Figure 7). Simple actions to modify the SIZ can make a big difference. Figure 8 shows the priority areas for vegetation management within the SIZ.

[46] FireSmart. 10 Tips to FireSmart your home. (https://firesmartbc.ca/10-tips-to-firesmart-your-home/)

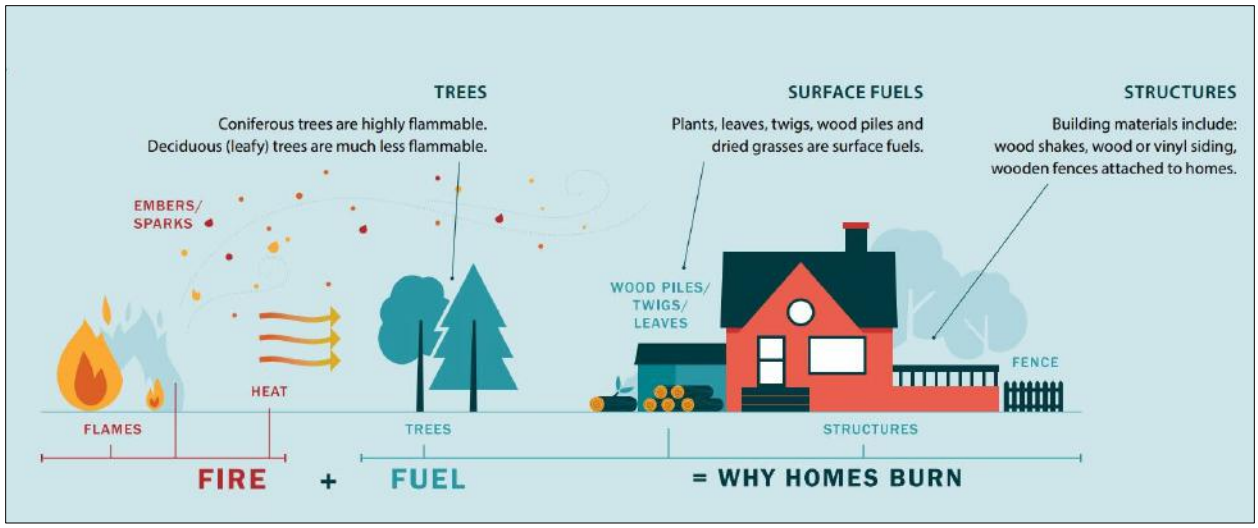


Figure 7. Why homes burn during WUI fire incidents.[47]

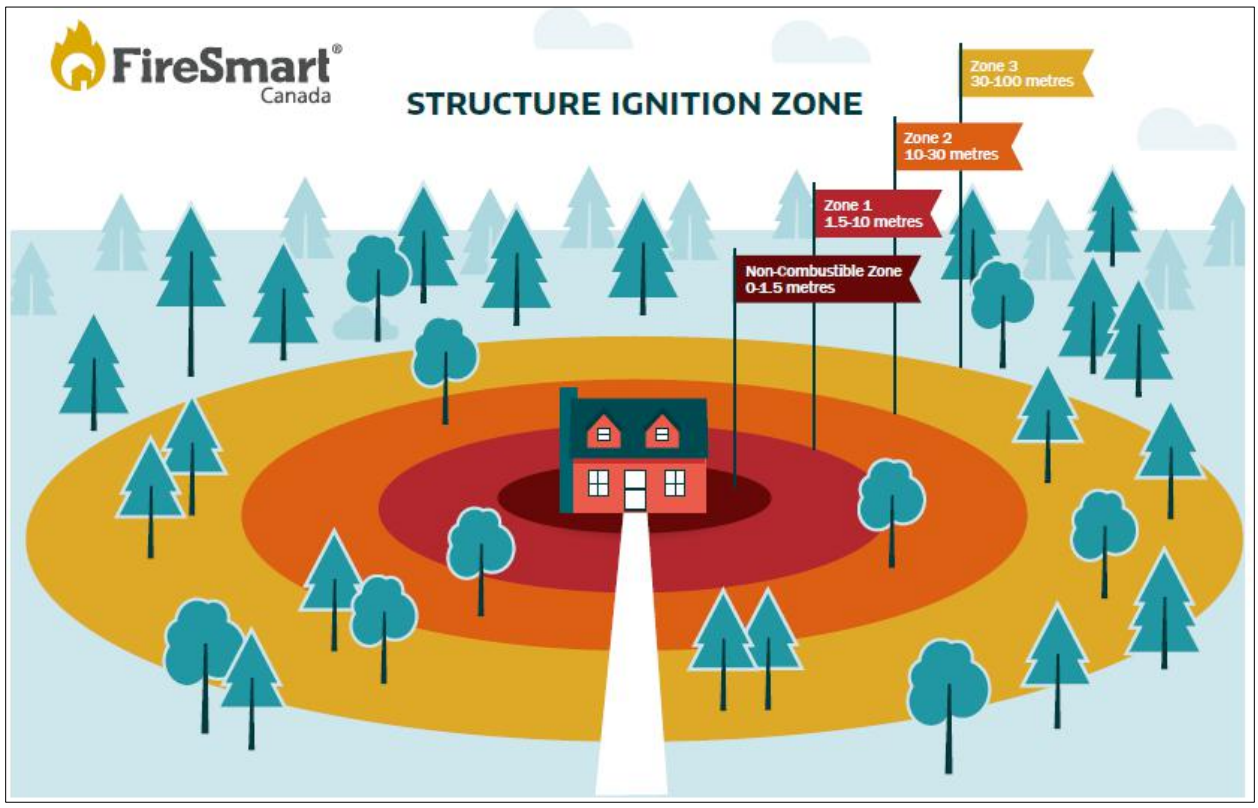


Figure 8. The FireSmart structure ignition zone.

[47] FireSmart – Why Homes burn in WUI Fire Incidents https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart

5.2.1 FireSmart Goals & Objectives

The general goal of FireSmart is to encourage communities and citizens to adopt and conduct FireSmart practices to mitigate the negative impacts of wildfire to assets on public and private property. Findings from a study of the 2016 Horse River wildfire in Fort McMurray indicate that FireSmart principles were one of the main reasons why individual homes survived, regardless of the broader wildfire threat surrounding them[48]. This was true in both the urban and rural areas.

Goals of FireSmart

The goal of FireSmart is to encourage homeowners to conduct FireSmart practices on their property to reduce damages and minimize the hazards associated with wildfire. These practices should aim to:

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

5.2.2 Key Aspects of FireSmart for Local Governments and First Nations

The intent of this sub-section is to provide a summary of FireSmart activities that can be used to measure current level of implementation and to recommend next steps. There are many different ways that members of the community and stakeholders can provide options to mitigate the risk. A general list of FireSmart practices and activities can be found in Appendix 3: FireSmart Practices and Activities.

Due to the remoteness of the AOI, limited infrastructure, and limited fire protective services, it is highly recommended that all private property owners and community members engage with the FireSmart program and begin adopting FireSmart practices around their homes and properties.

The following is generalized guidance for FireSmart activities within the structure/home ignition zone, this guidance applies to all structures within the WUI:

- Regularly clear roofs of debris build up (moss, leaves, branches)
- Remove all combustible materials within 1.5m of the structure
- Remove all vegetation and flammables 3m from gas/propane tanks. Gravel/rock fill materials should be used directly below the tanks.
- Remove all dead/down materials (branches, leaves, etc.) from within 10m of the structure
- Store firewood piles at least 10m from the home
- The areas around fire pits and burn barrels should be free of flammable materials for at least 3m
- Cover burn barrels with fine (6mm) mesh

[48] Al Westhaver, Why some homes survived: Learning from the Fort McMurray wildfire disaster (Toronto: Institute for Catastrophic Loss Reduction, 2016). https://issuu.com/iclr/docs/westhaver_fort_mcmurray_final_2017.

- Close in eaves with fascia and screen soffits (3mm mesh)
- Clean out flammable items from below decks/balconies; and close in the areas below decks/balconies to prevent the accumulation of embers
- Maintain 3m tree spacing in Zone 2 (10-30m from structure)
- Prune all branches to a height of at least 2m within Zone 2

If structural upgrades or new construction is planned, it is recommended that FireSmart guidelines for materials are followed:

- Preferred roofing materials: clay/tile, fibreglass/asphalt composite shingles, metal, fibrous cement, tar/gravel.
- Preferred exterior siding: stucco, concrete, metal. Logs or heavy timber are better than wooden siding or vinyl.
- Use fire resistant materials for decks, close in the areas below balconies and decks

More information regarding FireSmart guidelines is available in the BC FireSmart Begins at Home Manual[49] and/or contacting a Local FireSmart Representative.[50]

5.2.3 Identify Priority Areas within the Area of Interest for FireSmart

The intent of this sub-section is to use of the information gathered on local wildfire threat and risk assessments (Section 4.0 above) to best understand the priority areas for FireSmart planning and activities. This could be based on the relative level of wildfire risk adjacent to established neighbourhoods, although the application of FireSmart principles to isolated critical infrastructure could also be a priority.

Table 8: Summary of recommended priority FireSmart areas – High risk areas within WUI100.

Area ID	Wildfire Risk Rating (E/H/M/L)	Recommended FireSmart Activities
Treatment Area #1: Works Yard/Zeballos FSR	High	• Contact a LFR to conduct a FireSmart Hazard Assessment • Invite all interested community members to attend • Implement Hazard Assessment recommendations through community work parties for municipally owned lands
Treatment Area #4: Parkway	High	
Treatment Area #5: Zeballos School	Mod-High	

The following recommendations are made regarding FireSmart activities:

[49] BC FireSmart. FireSmart Begins at Home Manual. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart

[50] Local FireSmart Representative look-up. https://firesmartbc.ca/local-firesmart-representatives/

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
5.	High	To increase community awareness and participation in the FireSmart program.	Contact a Local FireSmart Representative to conduct a Local FireSmart Champion workshop to find a local champion to organize community FireSmart initiatives.	Village and/or SRD
6.	High	To reduce fuel hazard for identified FireSmart priority areas (high risk fuels within WUI100).	Contact a Local FireSmart Representative to conduct FireSmart Hazard assessments for the priority areas listed in Table 8.	Village and/or SRD
7.	Low	To improve community FireSmart awareness.	Deliver FireSmart education within the K-12 public school system. Utilize FireSmart Education Kits and the FireSmart BC Education package.	Village and/or SRD
8.	Med	To improve community FireSmart awareness.	Contact a Local FireSmart Representative to deliver Public education materials at annual community events.	Village and/or SRD
9.	High	To reduce fuel hazard on private land and provide alternatives to open burning.	Offer alternative yard waste disposal options including periodic collection and community chipping services.	Village and/or SRD
10.	High	To improve community awareness of the FireSmart program.	Encourage residents to complete the free, online, FireSmart 101 course.	Village and/or SRD
11.	Med	To reduce the ignition risk within the FireSmart structural ignition zone.	When new construction or building upgrades to publicly owned buildings occurs, use preferred FireSmart building materials wherever possible.	Village and SRD. Provide information to other public agencies such as School District, Health Authority.

5.3 Community Communication and Education

Following the 2018 wildfire season, wildfire risk was at the forefront of public awareness on northern Vancouver Island. The challenge is to maintain this level of awareness, interest, and orientation towards action outside of major wildfire seasons. Education plays a critical role in shaping public perception around WUI fires, and the steps that can be taken to reduce risks to human safety and property. Lack of understanding can lead to inaccurate assumptions of the fire hazard, risk, and responsibility for risk reduction. Communication is another critical part of emergency planning and response in the event of a WUI fire. Educations and communication in advance of a WUI incident is required to ensure community members are prepared, informed about their roles and the roles of the Village, fire department, SRD, and BCWS.

Moving from the planning phase to successful implementation of specific activities requires that the community be well informed of the reasons for, and the benefits of, specific mitigation activities. Communication with First Nations' communities, residents, visitors, landowners, industrial stakeholders, and provincial government agencies is required for the successful implementation of this plan. Continual engagement between the Village, SRD and other players throughout the duration of this CWPP (at least 5 years) is required to sustain momentum in addressing the recommendations.

The CWPP will be made accessible to the community in the following ways:

- A video presentation made available to the Strathcona Regional District Emergency Coordinator and Chief Administrative Officer of the plan results and recommendations
- Hard copies and digital copy of the plan submitted to the SRD and Village administration
- A digital copy of the plan should be uploaded to the Village website
- A digital copy should be uploaded to the Strathcona Regional District Emergency Planning website
- Alternative community communication forums can also be used to share selected highlights from the plan, including the Village Voice or social media accounts.

The development of a comprehensive communication and/or public education strategy is outside the scope of this CWPP. However, important communication and education initiatives are recommended below.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
12.	High	To communicate the content of the CWPP and to improve public awareness of the CWPP and FireSmart recommendations.	Make the CWPP report and associated maps available to the public through Village website, SRD website, and public meetings Share CWPP with forest tenure holders within the AOI	Village and SRD
13.	High	To improve community awareness of wildfire threat and risk, and of the actions that can be taken to mitigate risk.	Use SRD social media accounts to regularly promote wildfire preparedness, wildfire safety, and FireSmart practices information. Posts can redirect followers to the established	SRD

			resources of FireSmart BC, BC Wildfire Service, and Prepared BC.	
14.	High	To reduce the risk of human-caused ignitions by improving community awareness of local bylaws, provincial wildfire regulations, and wildfire safety.	Develop a Village of Zeballos specific Wildfire Safety and Preparedness informational factsheet for distribution to residents within the Fire Protective Services Area. Information should include best practices for open burning, where/how to access fire weather information, venting index information, open fire/campfire bans (BCWS), relevant Bylaws and legal information.	Village and/or SRD
15.	High	To improve community awareness of wildfire threat and risk, and of the actions that can be taken to mitigate risk.	Organize an annual Community Fire Safety or Community Wildfire Preparedness day. Activities may include: checking fire extinguishers and smoke alarms in homes; conducting FireSmart clearing of Priority 1 (up to 10m) zones around critical community infrastructure, FireSmart presentations, fire department demonstrations, etc. The Safety day could be timed with Fire Prevention Week which takes place annually during the 2nd week of October each year. October 4 to 10, 2020 is the next Fire Prevention Week.	Village and/or SRD

5.4 Other Prevention Measures

Human-caused ignitions are preventable and will continue to be a focus of wildfire prevention measures. Human-caused ignitions can result from industrial activities, campfire use, arson, cigarette butts, open burning debris pile escapes, discarded materials, fireworks, amongst other sources. The recorded Historical Fires data shows that the overwhelming majority of fires in the AOI have been human-caused. Therefore, a focus of this CWPP is to make recommendations that will reduce the number of human-caused ignitions.

Fire prevention can be achieved through communication and education initiatives, as well as through the development and implementation of policies and regulations, including operational guidelines and restrictions. Fire prevention can be addressed at the community level through

various avenues. Danger class rating signs within fire protection zones, public communication, industrial work restrictions and fire bans are examples of public fire prevention measures. Zeballos currently has a Fire Danger Class Rating sign situated at the junction of the Zeballos FSR and Parkway Road. This sign is also where fire bans are posted. Although the fire danger ratings are established by the BCWS, the Zeballos Fire Department is responsible for updating this sign. In addition to the fire danger rating sign, fire ban notices are also posted at the Zeballos RV Park and the Cevallos Campsite, updated by the Zeballos Fire Department.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
16.	Med	To reduce the risk of human-caused ignitions by promoting alternative means of yard waste management and disposal.	Provide residents with information on alternatives to burning yard waste. Link this information on the Village and SRD websites. Alternatives to burning include community chipping days, composting, or xeriscaping.	Village and/or SRD

SECTION 6: WILDFIRE RESPONSE RESOURCES

The intent of this section is to provide a high level overview of the resources that are available to local governments in the case of a wildfire. Interface fires are complex incidents that typically involve both wildland and structural fires. During times when many fires are burning in the Province and threatening multiple communities at the same time, resource requests can exceed the resources available. In BC, these resources are deployed according to BC Provincial Coordination Plan for Wildland Urban Interface Fires (revised July 2016).[51]

6.1 Local Government Firefighting Resources

The intent of this sub-section is to identify implications of wildfire that impact firefighting efforts (e.g. loss of electrical power and water pressure and supply), the contingencies that have been put in place, and any recommended measures that would help to make community firefighting more effective. Include a high level summary of mutual aid agreements.

6.1.1 Fire Departments and Equipment

The Zeballos Volunteer Fire Department (ZVFD) is responsible for fire protective services within the municipal boundary and the Ehattesaht Chinehkint First Nation. In the past 5 years, ZVFD has responded to 4 chimney fires and 1 WUI fire. Zeballos does not have any formal mutual aid agreements with other local or regional fire departments. ZVFD currently (in 2020) has 8 active members trained to exterior structural firefighting standards. 4 members have additional S-100 Basic Fire Suppression and Safety and S-215 Fire Operations in the Wildland Urban Interface training.

The apparatuses available include one fire engine (Engine 23 is a 2015 Ford F550 Diesel Engine, 4×4, 4 door, 840 GPM, CAFS system, 300 gallon water tank with 30 gallon foam cell. Foam monitor, two traverse 1 ½" foam and CAFS lines and one 2 1/2" foam and CAFS line), and one rescue unit. Wildland fire equipment includes two small water pumps, 2000 feet of forest fire hose with nozzles, and one portable water tank.

Smoke and poor air quality had a significant impact on the community during the 2018 wildfire season. Without equipment or resources to reduce the impacts of poor air quality, several residents had no other choice but to leave the community for health reasons. The BC Centre for Disease Control offers various resources related to understanding the impacts of wildfire smoke and how to mitigate those impacts.[52]

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
17.	Low	To mitigate the potential impacts of heavy wildfire smoke and poor air quality on the	Improve indoor air quality with the purchase and use of High-Efficiency Portable Air (HEPA) filters. Consider setting up air	Village

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

[52] BC Centre for Disease Control. Wildfire Smoke. http://www.bccdc.ca/health-info/prevention-public-health/wildfire-smoke

		community.	quality refuge area (ie: community hall, or school gymnasium) during heavy smoke events to provide relief. Purchase N95 respirator masks for distribution to community members during heavy smoke conditions to reduce smoke exposure.	

Photo 9. Zeballos Volunteer Fire Department, Engine 23.[53]

6.1.2 Water Availability for Wildfire Suppression

Water is the most important suppression resource when combating fire. It is essential that there be sufficient water supply available throughout the year. As described in Section 3.2.3 Water and Sewage Infrastructure the local water supply comes from an underground aquifer and is pumped to a water storage tower with a storage capacity of 125,000 gallons. In the event of losing power from BC Hydro's grid, there is a backup generator that would continue to pump water. The Village has full geographical coverage with hydrants located systematically throughout Zeballos and Ehattesaht Chinehkint First Nation.

The ZVFD Engine 23 has the capability to draft water from the ocean or Zeballos River if the engine can get close to the water source. In 2018, to fight the Gold Valley fire, a BCWS helicopter bucketed water from deeper sections of the Zeballos River.

[53] Zeballos Fire Department Website. Apparatus. (http://www.zeballosfire.com/apparatus/)

6.1.3 Access and Evacuation

In the event of emergency evacuations, motor vehicle accidents are a serious concern. The narrow, forested roadways add to this hazard. The Village is accessed by the one-way in and out Zeballos FSR. Zeballos FSR is both the primary access for personnel responding to the emergency from outside the Village, and the primary evacuation route. Secondary and tertiary evacuation routes are water or air based and described in further detail within the Village of Zeballos Emergency Plan. The baseball field is identified as the community helicopter landing and pick up site. Zeballos FSR is also the primary evacuation route for Ehattesaht Chinehkint First Nation, Nuchatlaht First Nation, and Ka:'yu:'k't'h'/Che:k:tles7et'h First Nations.

The 2018 wildfires impacted Zeballos FSR and Maquinna Avenue. During the August 2018 wildfire, Maquinna Ave. was closed due to the fire burning directly adjacent to the road, eliminating that access route. Furthermore, Maquinna Ave was shut down from October 2018 to April 2019 due to safety concerns from falling debris from the burned slopes. This resulted in Parkway Road being the only access and evacuation route for residents in the east part of town. The impacts of wildfire on road access highlights the importance of secondary access routes

The Village is working towards constructing an all-terrain vehicle trail that would connect the Villages of Zeballos and Tahsis. The trail's location and route has been established but requires funding with no planned construction date yet. If built, this would offer an alternative land-based evacuation route for both Zeballos and Tahsis but not likely to facilitate a large scale community evacuation.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
18.	High	To continue to advocate for the maintenance of and improvements to Zeballos FSR.	Continue to work with the road tenure holder stressing the importance of road maintenance and right-of-way maintenance (danger trees, ladder and surface fuels).	Village and SRD with MFLNRORD

6.1.4. Training

Training is important to build capacity within the suppression and emergency management area. Training for SVFD members, emergency support services, and community members are considered in this section. Emergency Support Services depend on trained volunteers across the Province. Relevant training courses are listed in Appendix 4: Wildfire and Emergency Response Training Courses. Recruitment and training of volunteer fire department members is an ongoing activity that should remain a focus for the Village.

The current level of communication between the ZVFD and BCWS is often dictated by fire season demands and there is not a defined system for annual communication. Annual in-person meetings between the local fire departments, Village administrations, SRD Emergency Services and the BCWS would strengthen working relationships and be beneficial when WUI incidents occur.

Miscommunication and lack of information regarding emergency support services was identified by the Village as an issue related to the 2018 fire response. Volunteer burnout was also identified as an issue.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
19.	Med	To continue recruitment and retention efforts for volunteer fire department members.	Regularly schedule open houses or recruitment days for the Zeballos Volunteer Fire Department. Connect with the community regularly through social media and consider its use as an advertising tool.	Village, Fire Department
20.	High	To continue to ensure all volunteer fire department members are trained to wildland firefighting standards.	Ensure all members of Zeballos Volunteer Fire Department complete Wildland Forest Firefighter Level 1 (SPP-WFF 1) or S-100 training. SPP-115 (structure protection workshop) is also recommended.	Village, Fire Department with SRD support
21.	Med	To maintain volunteer capacity in emergency support services available to the community.	Apply for funding at the Village or regional level to recruit, train, and purchase equipment for emergency support services.	Village and/or SRD
22.	Med	To maintain ZVFD's readiness for responding to WUI fires.	Include wildfire-specific training sessions that include: fire line construction, pump operations, sprinkler protection, portable water tank deployment, and wildland hose operations. Interface training should include completion of a wildfire simulation exercise and safety training specific to wildland fire and risks inherent with natural areas. Work with the BCWS North Island Fire Zone, and SRD to conduct annual joint training or mock exercises.	Village, Fire Department
23.	High	To maintain and improve wildfire emergency communication across agencies and jurisdictions.	The SRD should arrange an annual meeting, prior to fire season, to include BCWS – North Island Fire Zone, EMBC, and local fire department representatives to review incident command structure and emergency support services in the event of a WUI fire.	SRD

6.2 Structure Protection

The intent of this section is to provide a summary of what is available to the community for structure protection and provide any recommendations. The Village currently does not have sprinkler kits or a structural protection unit (SPU). Campbell River Fire Department has the nearest structural protection unit (SPU). During the 2018 Gold Valley Fire (V82441), a State of Local Emergency was declared and a SPU from Comox Fire Rescue was deployed and the Port McNeill Fire Department was also called to respond to help protect structures in the Village. SRD and the Village should ensure that mutual aid agreements or other necessary agreements are in place for the deployment of SPU's.

No.	Priority	Objective	Recommendation / Next Steps	Responsibility
24.	High	To improve equipment availability for structure protection.	Engage the City of Campbell River / Campbell River Fire Department in mutual aid/service agreements for assistance and deployment of the City's structural protection unit in the event of the WUI fire impacting the Village/Electoral Area.	Village and/or SRD
25.	Med	To improve community capacity for structure protection.	Encourage property owners to purchase sprinkler kits and water supply systems for sprinkler kits to deploy on their homes/critical structures	Village and/or SRD
26.	Med	To lower the risk of ignition around structures in the community.	SRD Building Department to recommend to Village/Electoral Area A property owners the use of rated roofing materials, lower risk siding materials, 10m setbacks from vegetation, propane tank locations. Develop best practices guidance for building within the electoral area. Link property owners to the BC FireSmart Begin at Home Manual and FireSmart Home Development Guide under the Building Department section of the SRD website.	SRD

APPENDIX 1: LOCAL WILDFIRE THREAT PROCESS

This section is only required for local government land or First Nations land and is optional for provincial Crown land

The key steps necessary to complete the local wildfire threat assessment are outlined below:

1. Develop local fuel type map
2. Consider the proximity of fuel to the community
3. Consider fire spread patterns (i.e. ISI Roses)
4. Consider topography
5. Stratify the WUI based on relative wildfire threat
6. Consider other local factors
7. Identify priority wildfire risk areas for field assessment as outlined in the document below

A1.1 Fuel Type Attribute Assessment

The primary forest fire modelling system applied in Canada is the Canadian Forest Fire Danger Rating System (CFFDRS) which uses fuel types described in the Fire Behaviour Prediction (FBP) system. The diversity of ecosystems and biogeoclimatic zones in BC makes fuel typing a complex endeavour. The CFFDRS/FBP system is based largely on fire-prone forest types across Canada. Coastal forest types, including all the forest types within the AOI of this CWPP, are not as thoroughly researched or modelled to understand forest fire behaviour. Coastal forest types have different tree species, shrubs/herbs species, and stand structure when compared to the fuel types classified in the CFFDRS/FBP system.

Perrakis, Eade & Hinks[54] have applied the CFFDRS/FBP fuel types to the BC context and these fuel type descriptions are used in this CWPP. Regarding coastal forests, Perrakis et al. note the following:

> *"Coastal forests dominated by coastal Douglas-fir, redcedar and western hemlock at low elevations; and Amabilis fir and mountain hemlock at higher elevations, represent a unique challenge. These stands are very different in structure and vegetation composition than the boreal or sub-boreal vegetation that is addressed by most FBP fuel types. Older low elevation stands, with high canopies and low light and wind penetration, are typed as C-5, as described above. For varying ages of younger stands, research studies have suggested a U-shaped model for surface fuel hazard, where fine surface fuel loading is highest in younger (<20 years) and old-growth stages, and lower in pole-sized and mature stands (100-200 years) (Agee and Huff 1987); however, crown fire hazard was not considered. A similar pattern was also found by Feller and Pollock (2006), who examined different stand ages following harvesting in southwestern BC; however, that study also included a model of crown fire hazard, which showed a very different pattern, with crown fire hazard highest in dense pole-sized regenerating stands (20-90 years).*

[54] Perrakis, D., Eade, G., & Hicks, D. 2018. British Columbia Wildfire Typing and Fuel Type Layer Description. https://cfs.nrcan.gc.ca/publications?id=39432

These findings have been incorporated into the present fuel typing scheme by classifying dense pole-sized stands as C-3 (see above). Amabilis fir stands have been typed as M-2 40%conifer, representing predicted ROS and HFI values somewhere between C-5 and C-3 outputs (Figure 5). In most fire weather conditions, M-2 40%C produces ROS near the C-3 prediction, although at high and extreme fire danger conditions (ISI > 25 or so), the predicted spread rate is lower, representing more canopy openings and discontinuities which are believed to occur in these stands." (p. 26)

Regarding plantations:

"Coastal conifer plantations represent a specific case of uncertainty – species such as Douglas-fir and western redcedar growing on productive sites, with abundant herbaceous and shrub species in the understory; sometimes these blocks are planted directly through untreated slash; other times, slash is burned before planting; currently, these stands sometimes type out as C-5, sometimes as D-1/2, sometimes as slash (S-3), depending on the time since harvest, tree height and tree age of the dominant cohort; in the authors' opinion none of these is a particularly good fit, and more research is needed to represent managed stands in coastal areas." (p. 32)[55]

Generally, fuel types are defined by overall vegetation structure, dominant species, understory/ladder, and forest floor characteristics. Wildfire fuel types referred to in this CWPP are summarized in the table below.

Table 9. Description of fuel type layers.

Fuel Type	CFFDRS/FBP Description[56]	BC PSTA Description[57]	Local Description	Expected Wildfire Behaviour Under High Wildfire Danger
C-1	Spruce-lichen Woodland (open, parkland)	Pure black spruce stands with sparse vegetation density	Does not occur within the AOI	Similar to C-3
C-2	Boreal black and white spruce. Continuous feather moss, compacted organic layer.	Mid-elevation hybrid spruce stands	Does not occur within the AOI	Crown fire, high to very high fire intensity and rate of spread

[55] Perrakis, D., Eade, G., & Hicks, D. 2018. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description.* Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Retrieved from https://cfs.nrcan.gc.ca/publications?id=39432.

[56] FBP Fuel Type Descriptions. https://cwfis.cfs.nrcan.gc.ca/background/fueltypes/c1

[57] Perrakis, D., Eade, G., & Hicks, D. 2018. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description.* Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Retrieved from https://cfs.nrcan.gc.ca/publications?id=39432.

	Continuous shrub, low to moderate down woody fuel, tree crowns extend nearly to the ground. Moderately well stocked black spruce stands, bogs excluded.			
C-3	Mature jack or lodgepole pine. Continuous feather moss, sparse conifer understory, sparse down woody fuels. Fully stocked. Ladder fuels absent.	Pure and mixed Fd stands 4-12m tall; dense pure or mixed (100% conifer) dominated by Cw, Yc, Hw and 4-15m in height or >15m and <60 years old. Dense pole sized stands[58].	Dense Second or third growth douglas-fir/ western hemlock/ western red cedar forests over 4m tall and less than 60 years old. Clean/open understory.	Surface and crown fire, low to very high fire intensity and rate of spread
C-5	Red and white pine. Continuous needle litter; moderate herb and shrub layer, tree crowns separated from the ground. Moderately well stocked stands.	Used to approximate fire behaviour in mature stands of low-mid elevation coastal Fd/Hw/Cw.	Mature Douglas-fir/ western hemlock/ western red cedar forests	Burn rarely and typically with low intensity. Surface fuel loading can be high in older coastal stands, as a result fire intensity can be higher under drought conditions.
M-1/2	Boreal Mixed wood. Continuous leaf litter in deciduous portions, feathermoss and needles in conifer portions. Moderate shrub and continuous herb layers, down woody fuels, conifer crowns extend near	Amabilis fir stands typed as M-2 40% conifer to represent fire behaviour between C-3 and C-5 fuel types	Mature forests dominated by amabilis fir/mountain hemlock Higher elevation stands over 800-900m	Surface fire spread, torching of individual trees and intermittent crowning.

[58] Poles are defined as "a tree between a sapling and small sawtimber size. Size varies by region, e.g. for boreal and eastern forests 12-20cm dbh. Retrieved from https://cfs.nrcan.gc.ca/terms/category/21.

	the ground. Moderately well stocked mixed wood stands.			
D-1/2	Aspen. Continuous leaf litter, moderate shrubs and herbs, conifer understory absent. Moderately well stocked, semi-mature.	D-1 leafless; D-2 green Broadleaf species Conifer forest, 2-6 years Post-wildfire (low to moderate fire severity, open to very open stand structure)	Alder, cottonwood, or big leaf maple dominated stands, often along streams.	Surface fire, low to moderate rate of spread and intensity
S-3	Coastal Cedar-Hemlock-Douglas-fir Slash.	Slash types may over predict hazard in areas where slash hazard reduction has occurred (burning, piling, or site preparation)	Recently harvested cut blocks less than 5 years old.	Moderate to high rate of spread and high to very high intensity surface fire
W	Water	n/a	n/a	n/a
ND	No Data / Private Land	n/a	n/a	n/a
NF	Non-fuel	Conifer forest – dense (low fire severity; overstorey mostly unchanged), 1-3 years post-wildfire		

Table 10. Fuel type categories and crown spotting potential.

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

The accuracy of the local fire threat determination and fuel treatment design is directly linked to the accuracy of the fuel type information. If the fuel typing is incorrect based on significant disturbance such as harvesting or major fire, to the degree that the associated fire behaviour will drastically change the corresponding threat information will also be incorrect. BCWS annually produces a comprehensive fuel type layer for fire behaviour prediction using the Vegetation Resources Inventory (VRI) data, which is summarized in the following reference document.

As part of the CWPP planning process the BCWS fuel type layer attribute information should be verified using current data sources including imagery, new treatments, new developments or updated disturbance data.

As part of this process all changes should be documented and rationale provided, using Appendix 1 Wildfire Threat Assessment_FPB Fuel Type Change Rationale. This worksheet must be submitted to BCWSPrevention@gov.bc.ca for review and when approved incorporated into the CWPP.

Fuel Type Layer Changes within the AOI

PSTA fuel types have been updated through spatial analysis to determine any areas where fuel type mapping appears to be potentially inaccurate and a quality assurance process to validate. This process focused on areas that present the greatest potential inaccuracy, such as those listed below:

1. Areas with fuel management treatments (including Prescribed Fire) that are not mapped.
2. Recent silviculture treatments such as spacing and pruning.
3. Coniferous mapped as deciduous.
4. Grasses or shrubs mapped as forest.
5. Areas of non-fuel mapped as a fuel type.
6. Major disturbances (harvesting, wildfires, or land clearing for industrial purposes).
7. C7 fuel types with high Crown Closure.

In addition, this work should be focused on/ but not limited to, the areas of highest level of threat (e.g. higher hazard fuels C1, C2, C4, M2>50% conifer, upwind and/or closest to the community).

Fuels in the area are generally mature conifer forests (C-5), young and dense conifer forests (C-3), recently harvested cut blocks (S-3), and some alder/cottonwood/maple deciduous patches

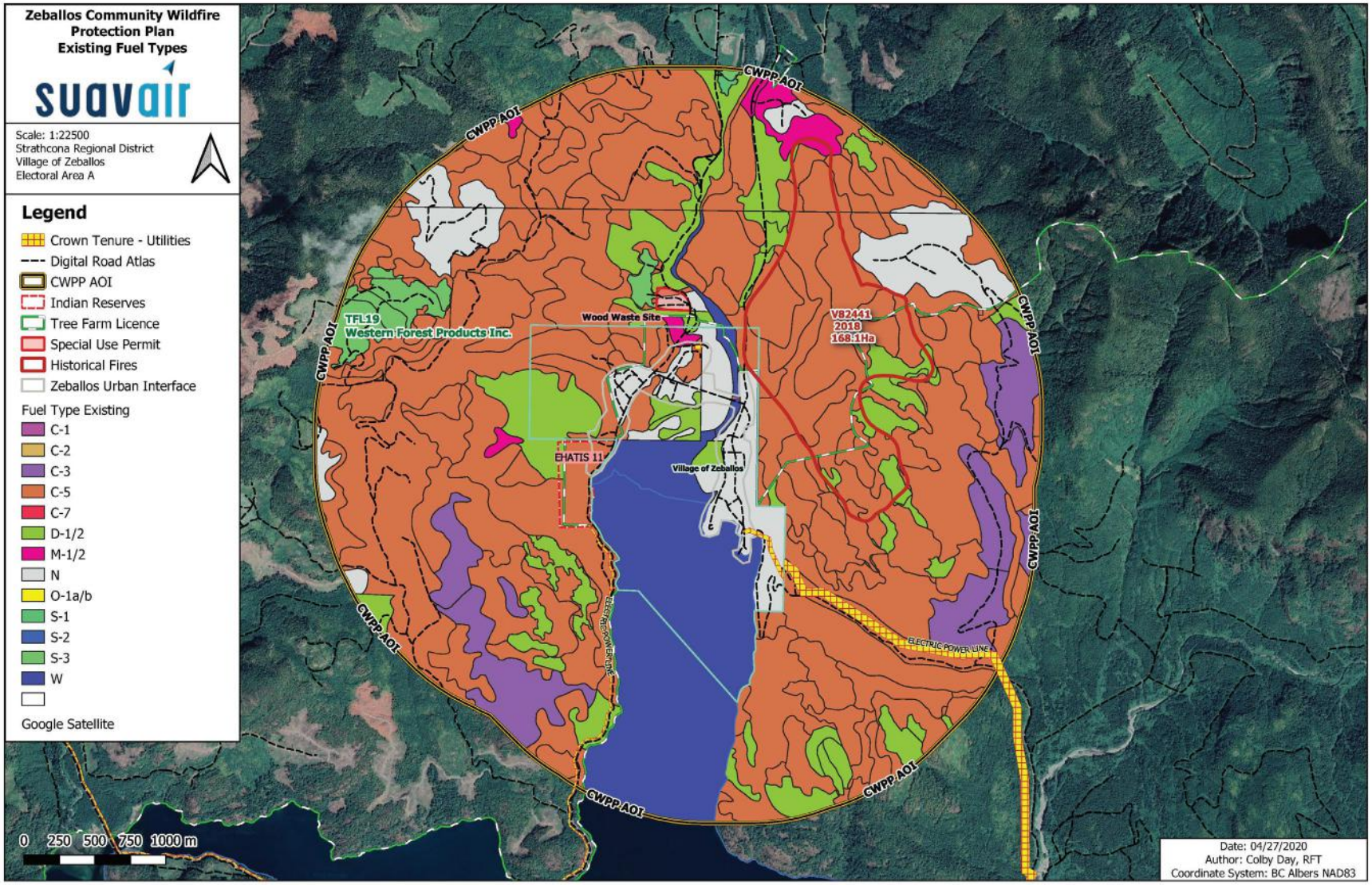
(D-1/2). A detailed description of fuel types is provided in Table 9. The available spatial information from Data BC, RESULTS; proprietary LIDAR data, forest cover, and other spatial data shared for use on this project by Western Forest Products Inc., updated Google Earth imagery, was analyzed for fuel type verification and adjustments. The major changes to the fuel type layer that resulted within the AOI included:

- recently harvested cut blocks (less than 5 years) were changed to fuel type S-3,
- water areas were corrected with more accurate spatial data sources,
- harvested blocks older than 5 years, coniferous, dense pole sized stands over 4m tall, less than 60 years old, were updated to C-3 fuel type
- Gold Valley Main fire boundary reclassified to D-1 based on time since fire

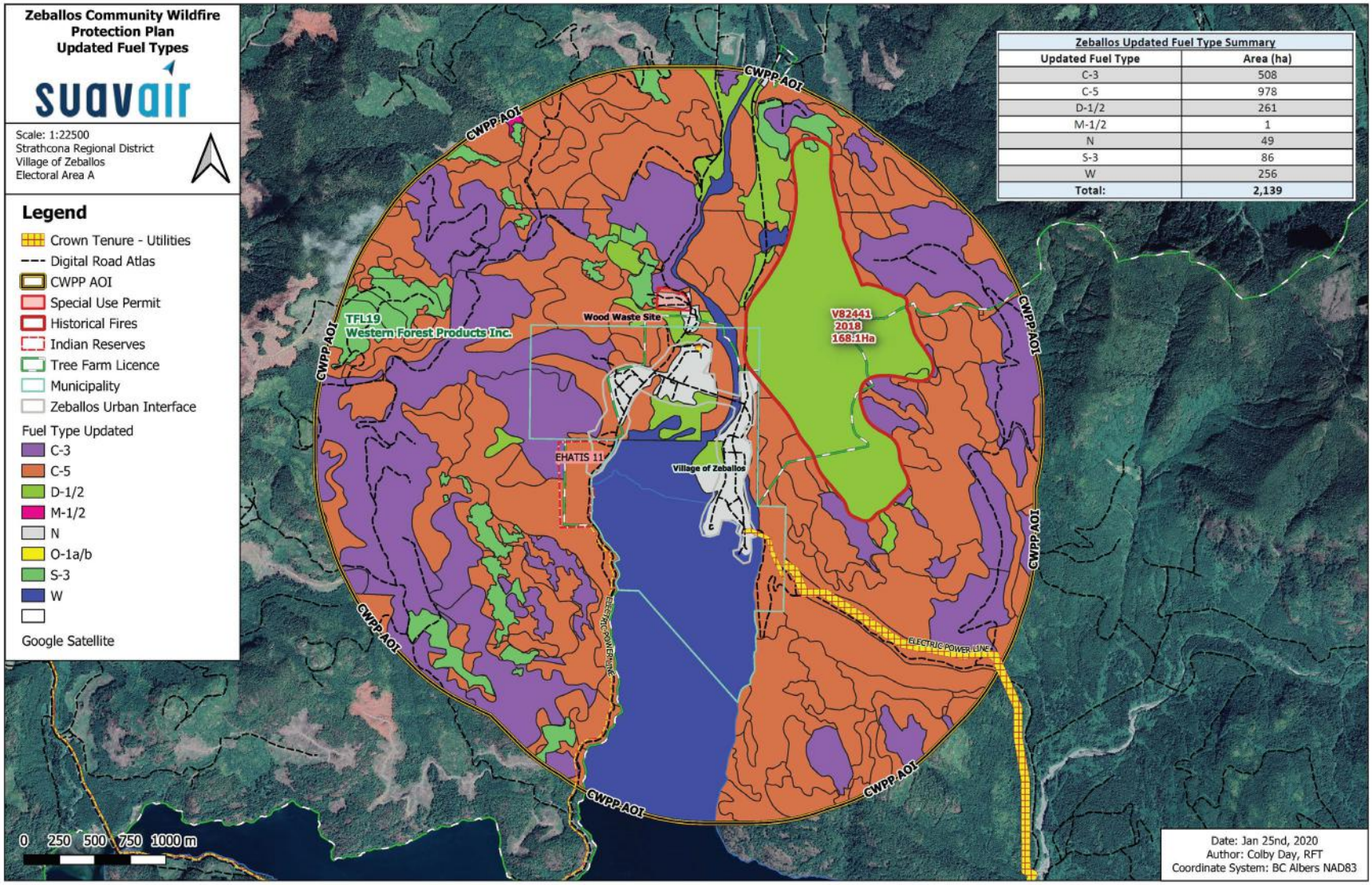
The changes in the fuel type areas are summarized in the Table and Maps below.

Table 11. Summary of fuel type classes within the AOI.

Fuel Type Class	2019 PSTA Original Area	2020 CWPP Updated Area	Net Change
C-3 (dense, pole sized coniferous forests)	128	508	380
C-5 (mature coniferous forest)	1321	978	-343
S-3 (recent harvest)	37	86	49
D-1/2 (deciduous)	210	261	51
M-1/2 (mixed conifer/deciduous; amabilis fir leading)	24	1	-23
W (Water)	248	256	8
Non-Fuel	171	49	-122
Total area	2139	2139	0



Map 10. Existing 2019 PSTA fuel types within the AOI.



Map 11. 2020 CWPP updated fuel types within in the AOI.

A1.2 Proximity of Fuel to the Community

Fuel closest to the community usually represents the highest hazard. The recommended approach is to treat fuels to achieve a desired level of hazard reduction, from the value or structure outward, ensuring mitigation continuity. Untreated areas between treatment areas and the value or structure may allow a wildfire to build in intensity and rate of spread, which can increase the risk to the value. To capture the importance of fuel proximity in the local wildfire threat assessment, the WUI is weighted more heavily from the value or structure outwards. Fuels adjacent to the values and/or structures at risk receive the highest rating followed by progressively lower ratings moving out.

The local wildfire threat assessment process subdivides the WUI into 3 areas – the first 100 meters (WUI 100), 101 to 500 meters (the WUI 500), and 501 to 2000 meters (the WUI 2000). These zones provide guidance for classifying threat levels and subsequent priorities of treatments.

Table 12: 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.

A1.3 Fire Spread Patterns

Wind speed, wind direction, and fine fuel moisture condition influences wildfire trajectory and rate of spread, and is summarized in the ISI Rose(s) from the local representative BCWS weather station – TS Artlish from 2007-2015. Wildfire that occurs upwind of a value poses a much more significant threat to that value than a fire that occurs downwind.

The TS Artlish weather station recorded mainly south/southwest/southeast winds in the April-October fire season months. However, the TS Artlish location is not representative of the topographical conditions around the Village. TS Artlish weather station is located at an inland position in an east-west orientated river valley, whereas the Village of Zeballos is at the head of a north-south oriented inlet and valley.

Another source for wind data is the Canadian Wind Atlas (CWA). The CWA[59] models wind speeds and direction from large scale and long-term atmospheric data. CWA data for the AOI shows dominant winds from the southeast, except for summer months (June, July, August) where the dominant wind direction is from the north. Strong southeast winds are characteristic of winter low-pressure systems along the coast of BC. The northerly winds recorded in the summer months are characteristic of summer frontal systems approaching from the north.[60] Furthermore, the north-south topographical orientation of Zeballos Inlet funnels winds in the north-south direction. The northerly wind direction is considered the dominant direction for the local wildfire threat assessment.

[59] Canadian Wind Atlas. http://www.windatlas.ca/maps-en.php

[60] NAV Canada. Local Area Weather Manuals – The Weather of British Columbia, Chapter 4 – Seasonal Weather and Local Effects. https://www.navcanada.ca/EN/media/pages/publications-operational-weather-manuals.aspx

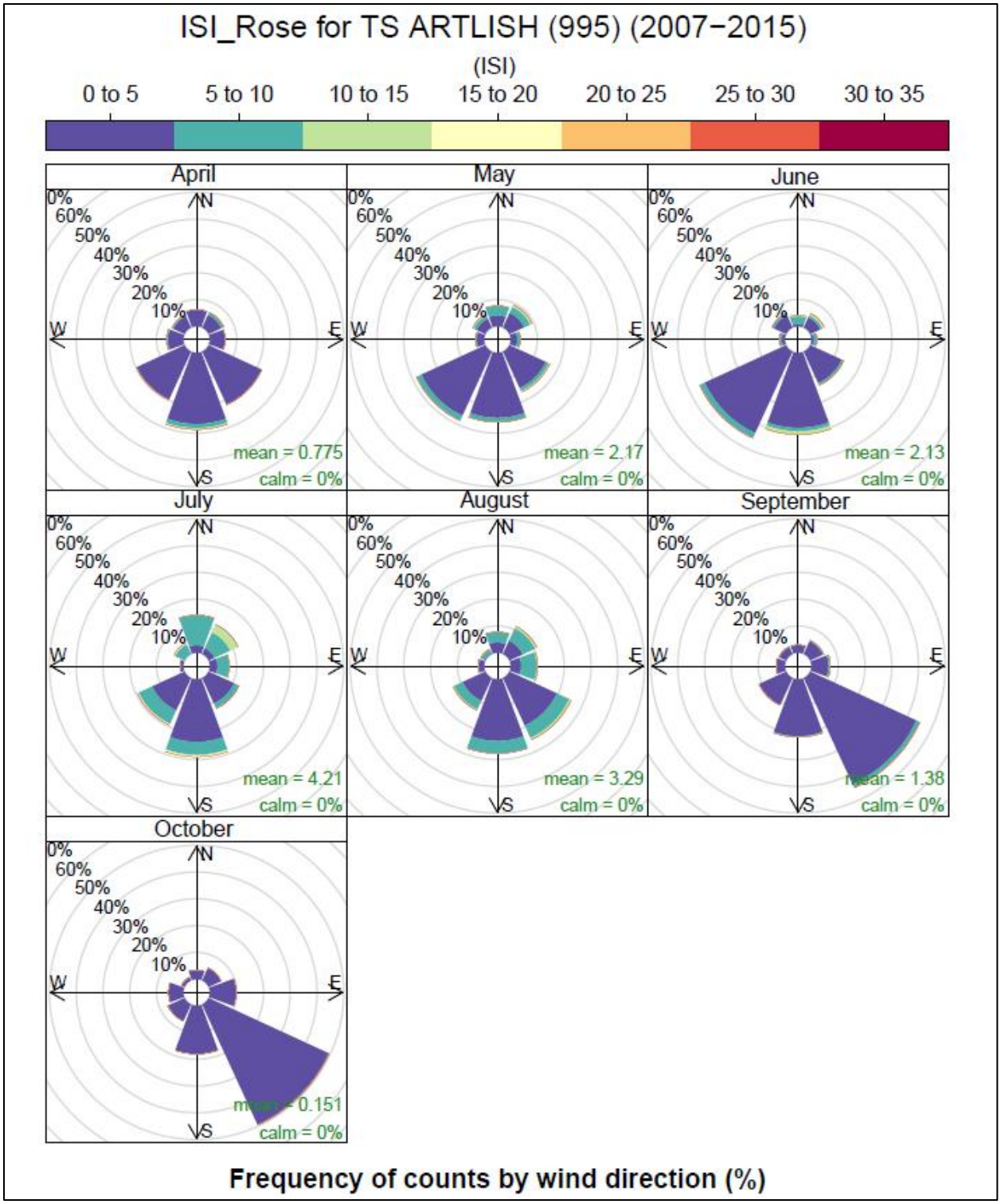


Figure 9. TS Artlish initial spread index roses for April to October, 2007-2015.

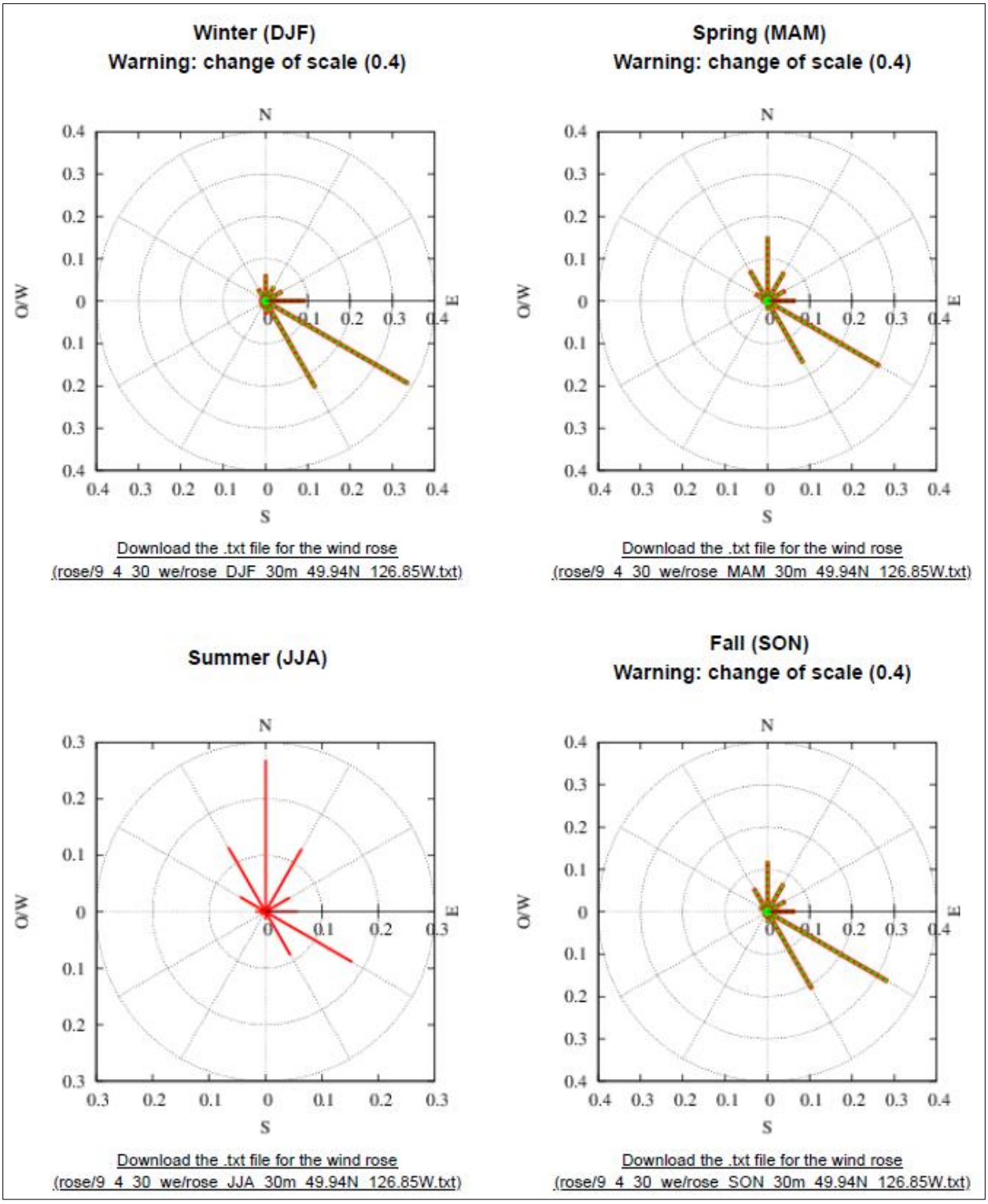


Figure 10. Canadian Wind Atlas wind roses for the Zeballos area. Summer winds from the North.

A1.4 Topography

Slope percentage and slope position of the value are both considered. Slope percentage influence a fire's trajectory and rate of spread. Slope position of the value relates to the ability of a wildfire to gain momentum during an uphill run and affects the potential impact to the value.

Slope Class

Determine slope percentages/classes for the WUI area. General fire behaviour implications of slope classes are summarized in the following table:

Table 13: Slope Percentage and Fire Behaviour Implications

Slope Percent	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.

Slope Position of the Value

Slope position of a value relates to the ability of a wildfire to gain momentum during an uphill run. A value at the bottom of the slope is equivalent to a value on flat ground; a value on the upper 1/3 of the slope would be impacted by high preheating and faster rates of spread than a value on flat ground.

Determine the values' location relative to the slope (bottom, mid-slope on a bench, mid-slope on a continuous slope, upper 1/3 of slope). When different portions of the community are in different relative slope positions, assess the portions separately. General fire behaviour implications of slope position to the value are summarized in the following table:

Table 14: 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 –	Impacted by fast rates of spread. No break in terrain features affected by

continuous	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.

A1.5 Local Wildfire Threat Classification

Classify the WUI into Local Wildfire Threat Classes based on the updated fuel map (Section 4.3.1). The following explains the process to be used in determining local wildfire threat:

1. Acquire the Provincial Strategic Threat Analysis and metadata from BCWS clipped to the area of interest.
2. Using the previously corrected fuel type map for the area of interest, find areas where the fuel types have been changed. Areas where there is no fuel type change use the PSTA threat score.
3. Look for a similar fuel type in the local area, crosswalk the HFI value from the similar fuel type to the corrected fuel type polygon and place into a table to recalculate the wildfire threat for the corrected polygon. Fire density and spotting impact numbers should not change due to any input at a local level. If the fire density seems to be misrepresentative of the local fire history, this can be captured in the rationale at the treatment design stage.

Table 15: PSTA Inputs Cross Walk Table (Updated January 2018)

	Head Fire Intensity (60%)	**Fire Density (30%)**	**Spotting Impact (10%)**	**Wildfire Threat Score (100%)**
Original PSTA Values	8 (C-5) 4 (C-5)	4 4	2 1	
Original Weighted Values	48 24	12 12	2 1	62 (10-Extreme) 37 (7-High)
Updated HFI (based on fuel type change)	1-2 (S-3) 1-2 (S-3)	4 4	1 1	
Updated Weighted Values	12 12	12 12	2 1	26 (5-Moderate) 25 (5-Moderate)

Table 16. PSTA Classification table - Low, Moderate, High, Extreme classifications taken from 2017 PSTA document.

	Water	Class 0	No Threat
Class 1	0.1 – 5 Low	Class 2	5.1 – 10 Low
Class 3	10.1 – 15 Low	Class 4	15.1 – 21 Moderate
Class 5	21.2 – 27 Moderate	Class 6	27.1 – 33 Moderate
Class 7	33.1 – 40 High	Class 8	40.1 – 47 High
Class 9	57.1 – 55 Extreme	Class 10	55.1 – 81 Extreme

A1.6 Local Wildfire Risk Classification

As part of the CWPP analysis, local wildfire risk will need to be determined. The following factors are assessed to determine the local wildfire risk score.

1. Corrected wildfire threat (based on locally verified fuel type changes) is described in Section 4.3.6 – Local Wildfire Threat Calculation. This category is weighted at 30% of the total risk score.
2. Proximity is described in Section 4.3.2 – Proximity of Fuel to the Community. This weighs the risk of fuel based on distance from the community, giving a higher score for risk nearest to the values at risk in the community. This is described as “working from the value outward to mitigate risk”. This category is weighted at 30% of the total risk score.
3. Fire spread patterns (Section 4.3.3) use ISI roses and fire perimeter history to forecast the most likely potential fire spread direction for an approaching wildfire to the relative position of the community. Stratify the WUI into areas that tend to be downwind, upwind, or off-set, to these fire spread patterns. Due to the high variability of this information from community to community, generic relative weightings are not provided here, and local evaluation and weightings based on the strength of the local wind direction and intensity patterns is required. This category is weighted at 30% of the total risk score (when clear patterns are evident).
4. Topography (Section 4.3.4) is an important factor in increasing the rate of spread and the resulting head fire intensity of a wildfire. Slope may have little influence depending on the area of the province where the community is located. This category is weighted at 10% (5% for position and 5% for slope class) of the total risk score.

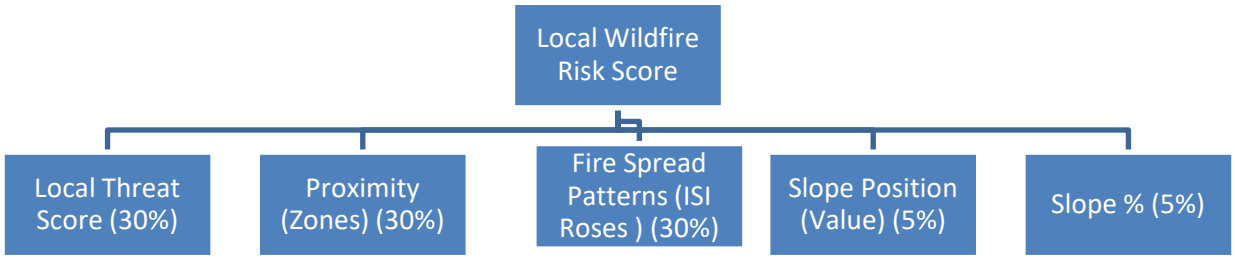


Figure 11: Local Wildfire Risk Inputs

Table explaining the weightings used in determining local wildfire risk are provided below:

Table 17: Local Wildfire Risk Summary

Local Threat Score (30%)	**Proximity (30%)**	**Fire Spread Patterns (30%)**	**Slope Position (5%)**	**Slope Percent (5%)**	**Wildfire Risk Score (100%)**
6.6/10	10/10 (within 100 m of value)	8/10 (west of community with predominant SW to NE wildfire spread pattern)	2/10 (lower part of the slope)	5/10 (30% slope)	7.73/10 (High)

Weighted Values

1.98	3	2.4	0.1	0.25	7.73

NB: Example of the process, not actual values used.

The wildfire risk assessment process outlined above provides a means to determine the wildfire risk as it applies to forest fuel hazard, proximity of fuel to the community, fire spread patterns and topography. These factors all influence how a wildfire could impact the community if ignition were to occur. It is also important for Professionals to consider and assess high forest fire risk activities, human use, and other environmental factors that affect wildfire threat and risk within different areas of the WUI. Note any additional local factors that influence (increase or decrease) the wildfire threat information that is unique to the community.

Where local factors are sufficient to justify changes to the wildfire risk values determined above, document the rationale and provide a map of any alterations, as part of the CWPP. Considering all of the factors noted above should allow the Professional to provide a comprehensive assessment of the wildfire hazard and risk. Summarize the Relative Local Wildfire Risk Weighting in the following table:

Table 18: Local Wildfire Risk Weighting

Relative Risk	Weighting
No Risk	<0.1
Low	0.1 – 3.9
Moderate	4 – 6.9
High	7 – 8.9
Extreme	9+

NB: The scoring system is based on a maximum score of 10.

A1.7 Summary of Fire Risk Classes

No Risk (Gray): The combination of the local fuel hazard (usually PSTA Class 0 or 1), weather influences, topography, proximity to the community, fuel (non-fuel) position in relation to fire spread patterns, and known local wildfire threat factors make it a no risk for threatening a community. These areas are non-fuel or sparsely vegetated and will not support spreading fires, and any patches of vegetation will usually self-extinguished. Low to no risk to any values at risk.

Low (Green): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it a lower potential for threatening a community. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle in extreme fire weather conditions. Fuel type spot potential is very low, low risk to any values at risk.

Moderate (Yellow): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns and known local wildfire threat factors make it possible that a wildfire in this area would threaten the community. Areas of matted grass, slash, conifer plantations, mature conifer stands with very high crown base height, and deciduous stands with 26 to 49% conifers. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle. Rates of spread would average between 2-5 meters/ minute. Forest stands would have potential to impact values in extreme weather conditions. Fuel type spot potential is unlikely to impact values at a long distance (<400m).

High (Orange): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it likely that a wildfire in this area would threaten the community. This includes stands with continuous surface/ crown fuel that will support regular torching/ candling, intermittent crown and/or continuous crown fires. Rates of spread would average 6 - 10 meters/ minute. Fuel type spot potential is likely to impact values at a long distance (400 -1 000m).

Extreme (Red): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it very likely that a wildfire in this area would threaten the community. Stands with continuous surface/ crown fuel and fuel characteristics that tend to

support the development of intermittent or continuous crown fires. Rates of spread would average >10 meters/ minute. Fuel type spot potential is probable to impact values at a long distance (400 -1000m or greater).These forest stands have the greater potential to produce extreme fire behaviour (long range spotting, fire whirls and other fire behaviour phenomena).

APPENDIX 2: STATUS OF 2011 CWPP RECOMMENDATIONS

#	Action	Status
Communication and Education		
1	Zeballos should consider working with the SRD, other municipalities in the SRD, and the MFML to develop a regional approach to enhancing education and communication. Public education programs could be enhanced by: 1) integrating a unit of “FireSmart” and wildfire safety into the elementary school curriculum for local children; 2) creating a “FireSmart” sticker program where Fire Department members attend residences and certify them as meeting “FireSmart” guidelines. The program should emphasize that all fires around Zeballos have been human caused and that reducing these ignitions will significantly contribute to the safety of the community.	Not completed - No known FireSmart programming at the schools or within the community.
2	The standard for website information about fire should include an outline of community fire risks and fire danger. Information should include fire bylaws, campfire bans, and wildfire hazard ratings updated during the fire season. The SRD and the communities should work to produce web-based information that can be hosted on the SRD website and linked to the individual community websites.	Mostly implemented - The Village fire department website (www.zeballosfire.com) shows updated fire danger rating and fire bans. Fire department’s website has a page on Home Fire Safety tips. This could be a good place for FireSmart information.
3	Zeballos, in conjunction with Tahsis and Gold River, should use the Record (an independent newspaper serving the North Island) to communicate fire danger to the community and region. They should continue to use this and other local media such as pamphlet mail outs to deliver FireSmart educational materials and to communicate information on fire danger during periods of high and extreme fire danger.	No longer applicable - The Record ceased publication in 2014. However, the village does have the "Village Voice" which could be used instead, as this publication is produced by Zeballos and sent to every residence in the community.
4	Signage consisting of current fire danger, campfire bans and general warnings regarding fire safety should be posted at the entrance and exit of the community on Zeballos Rd to ensure residents and especially tourists are aware of current	Complete - Two signs installed at the entrance and exit to the community.

	conditions.	
5	The Fire Department should work with the SRD and the Chamber of Commerce to educate the local business community, particularly businesses that depend on forest use (*i.e.,* tourism and recreation), on FireSmart preparation and planning. The CWPP should be presented to the community and used to highlight the risks facing Zeballos and areas where risk reduction can be undertaken in the community by businesses.	Not applicable - No chamber of commerce exists in Zeballos
Structure Protection		
6	Where homes and businesses are built immediately adjacent to the forest edge, Zeballos and the SRD should consider incorporating building setbacks into bylaw with a minimum distance of 10 m when buildings border the forest interface.	Ongoing
7	Zeballos should conduct a FireSmart hazard assessment of the community to educate residents on the hazards that exist on their properties and how to mitigate those hazards.	Not completed
8	Zeballos and the SRD should review the availability of a bylaw officer to help municipal officials enforce bylaws.	Ongoing with the SRD
9	The community and the SRD should investigate the policy tools available for reducing wildfire risk within the community to create and/or review and revise existing bylaws to be consistent with the development of a FireSmart community. These include voluntary fire risk reduction for landowners, bylaws for building materials and subdivision establishment, covenants for vegetation setbacks, delineation of Wildfire Development Permit areas, incentives such as exclusion from a fire protection tax, and education.	Not completed - No existing Building Bylaw. No capacity for bylaw enforcement, and no building inspector. Inspection and enforcement costs make this unrealistic.
10	Zeballos and the SRD should consider requiring the use of roofing materials that are fire retardant with a Class A and Class B rating on new buildings or when re-roofing is occurring. They should consider obtaining legal advice regarding the implementation of building requirements that are more restrictive than the BC Building Code. While restrictions to rated roofing are not supported in the Code at this time, there are several communities which have undergone or are undergoing various processes (e.g., lobbying, legal opinion, declaration of hazard by Fire Chief) to enact roofing bylaws within their Wildfire Development Permit areas.	Not applicable - Village of Zeballos does not have any designated Wildfire Development Permit areas in the OCP.
11	Zeballos should upgrade the vulnerable structures associated	Not completed - Needs

	with critical infrastructure to meet FireSmart standards.	clarification / attention
12	Zeballos should attach sprinklers to the bridge for use during a wildfire event to ensure evacuation and water supply to hydrants is secure.	No longer applicable - New steel bridge with concrete deck (Sugarloaf Bridge) replaced old bridge in 2017
13	Debris adjacent to critical infrastructure, such as power poles to the water supply, should be removed and chipped or burned prior to the fire season.	Ongoing
14	The SRD should consider working with the Building Policy Branch to create a policy structure that would enable communities in the SRD to better address wildland urban interface protection considerations for buildings.	Not completed
Emergency Response		
15	A formal communication structure should be established with the MFML so that information regarding fires in the region is communicated to Zeballos in a timely manner. This might be best achieved through joint cooperation with the SRD, other SRD communities and the MFML.	Not implemented (in recent years at least)
16	Consideration should be given to further developing a community evacuation plan. Appropriate evacuation routes should be mapped, considering Disaster Response Routes (DRR). Major evacuation routes should be signed and communicated to the public. This should include docks and other marine egress routes. In addition, alternative emergency responder access should be considered.	Not implemented - No evacuation plan currently 2015 Emergency Response Plan has some written procedures and key contacts / phone #'s
17	Evacuation planning should be coordinated with the Ehattesaht First Nation to ensure a coordinated approach from both communities.	Implemented
18	Marshalling points should be identified and signed and communicated to the public. Pre-planning for evacuation from these points should be completed prior to a wildfire event in order to identify and correct deficiencies and provide safe, efficient egress for the community.	Not completed
19	The use of the public dock as an evacuation centre via boats and barges should be reviewed. This is vital to ensure that evacuation procedures and limitations are identified and addressed prior to a wildfire event.	Not applicable - Zeballos does not own boats

20	To ensure that evacuation during a wildfire event is not impeded and that water supply to hydrants is maintained, the Zeballos Bridge should be considered key infrastructure and sprinklers installed to keep the bridge wetted during a wildfire event. This will also help reduce post-wildfire reconstruction.	No longer applicable - New steel bridge with concrete deck (Sugarloaf Bridge) replaced old bridge in 2017
21	As part of the evacuation plan, the community should develop strategies to quickly identify and clear car accidents that block or impede traffic during evacuation efforts.	Not completed
22	Creation of a second evacuation route between Zeballos and Tahsis should be considered. This would also serve as a secondary route in the case of other natural disasters that close existing evacuation routes. Zeballos, Tahsis, and the SRD should coordinate a feasibility review in conjunction with the Provincial Emergency Program.	Ongoing - Possible ATV Trail between Zeballos / Tahsis being constructed in future
23	During a large wildfire it is possible that critical infrastructure within Zeballos could be severely impacted by smoke. It is recommended that contingency plans be developed in the event that smoke causes evacuation of the community's incident command centres. Zeballos should co-operate with provincial and regional governments to identify alternate incident command locations and a mobile facility in the event that the community is evacuated.	Jurisdiction issue. If EOC is impacted by smoke, then likely the whole Village will need to be evacuated, then EMBC will take control.
Training / Equipment		
24	The following training should be considered: 1) The S100 course training should be continued on an annual basis; 2) A review of the S215 course instruction should be given on a yearly basis; 3) The S215 course instruction should be given to Fire Chiefs and Deputies; and, 4) Incident Command System training should be given to Fire Chiefs and Deputies.	Ongoing
25	The Fire Department should meet with the MFML prior to the fire season to review the incident command system structure in the event of a major wildland fire. The review should include designated radio channels and operating procedures. This could be coordinated with Zeballos and Gold River.	Ongoing
26	The SRD and Zeballos should seek funding to acquire a 4x4 truck with compressed air foam (CAF) system for accessing and fighting wildfires in areas that are within village boundaries such as the water supply infrastructure. As all recorded fires are human caused, most ignitions will be adjacent to roads or structures.	On hold - Environmental issue. The Village has a foam truck but no use of foam near the Village permitted until environmental concerns with foam runoff and water contamination resolved.

27	The Fire Department should seek funding to purchase a sprinkler kit to erect in the Village during a wildfire event or be incorporated in a mobile equipment cache. http://www.ubcm.ca/assets/Services~and~Awards/Documents/structural-protection-units-technical-specifications.pdf	Not completed
28	The community should consider reviewing its existing inventory of interface firefighting equipment to ensure that items such as large volume fire hoses, portable pumps and firefighter personal protection equipment (PPE) are adequate to resource the interface area. Fire Department personnel should have correct personal protective equipment and wildland firefighting tools. Hoses, pumps and other equipment should be compatible with MFML wildland firefighting equipment.	Completed / Ongoing Grant request submitted to purchase additional equipment (pumps).
29	Zeballos should consider working with Gold River, Tahsis, and the SRD to coordinate the creation of a sub-regional mobile cache of wildland firefighting equipment (i.e. one cache for Gold River, Tahsis and Zeballos). This would reduce the cost of purchasing and maintaining the cache and provide additional resources in the event of a wildfire.	No longer applicable. Distance, response times, access makes this not practical.
30	Zeballos should continue to encourage long-term and new residents to join the volunteer fire department using Zeballos website, mail outs and the Record to encourage residents to join. It is acknowledged that demographics make this increasingly difficult in Zeballos.	Ongoing
31	Formal mutual aid agreements should be established with MFML to ensure that adequate resources and manpower support are available in the event of a wildfire. The existing mutual aid agreement with Ehattesaht First Nation should be reviewed to ensure it meets the needs of the two communities adequately.	Completed - Fire Department covers Ehattesaht First Nation
Training / Equipment		
32	Where hazardous fuel types in Zeballos are located on private property, the Village should work with private property owners to ensure they understand the importance and principles of FireSmart. Zeballos should investigate ways to support residents reducing fuels, making homes FireSmart and raising awareness of ignition hazards.	Ongoing

33	A number of high hazard areas immediately adjacent to or embedded in Zeballos have been identified and should be the focus of a progressive thinning program that is implemented over the next five to ten years. Thinning should be focused on the highest Priority 1 fuels identified in Map 11. A qualified professional forester (RPF), with a sound understanding of fire behaviour and fire suppression, should develop treatment prescriptions. Any treatments that take place on sloped sites must be prescribed with consideration given to slope stability. Where slope stability may be an issue (such as above the western border of the wildland urban interface), a Professional Geotechnical Engineer should review the treatment prescriptions.	Not completed
34	Where structures abut the forested slopes of Zeballos, adequate setbacks from vegetation should be created (minimum 10 m) to reduce the probability of a house transmitting a fire to the forest.	Not completed
35	Zeballos should work with BC Hydro to ensure that: 1) transmission infrastructure can be maintained and managed during a wildfire event; and 2) the right-of-way vegetation management strategy includes consultation with the community and the Fire Department so that wood waste accumulations or vegetation do not contribute to unacceptable fuel loading or diminish the ability of the right-of-way to act as a fuel break.	Ongoing

APPENDIX 3: FIRESMART PRACTICES AND ACTIVITIES

AREA OF FOCUS	POTENTIAL PRACTICES AND ACTIVITIES
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 buildings[61] 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	Develop and/or participate in regional or local FireSmart planning tables

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

CO-OPERATION	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
7. FIRESMART DEMONSTRATION PROJECTS	Undertake FireSmart Demonstration Projects for publicly owned buildings or publicly and provincially owned critical infrastructure. This may include: Replacing building materials (i.e. siding or roofing) with fire-resistant materials Replacing landscaping with fire-resistant plants as outlined in the FireSmart Guide to Landscaping
8. FIRESMART ACTIVITIES FOR PRIVATE LAND	Planning for private land (only with private property owners' consent) Develop FireSmart Community Plans for specific areas Conduct FireSmart home and property assessments 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

APPENDIX 4: WILDFIRE AND EMERGENCY RESPONSE TRAINING COURSES

COURSE NAME	TARGET AUDIENCE	FORMAT	FURTHER INFORMATION
S-100 BASIC FIRE SUPPRESSION AND SAFETY (2005)	Contract fire crews	2 day, 16 hour course with classroom and field component	Required by OHS Regulation Section 26.3.1 for wildfire contract crews A list of recognized instructors is found here.
S-100A BASIC FIRE SUPPRESSION AND SAFETY ANNUAL RECURRENCY (ALSO KNOWN AS S-10A)	Refresher training for those with valid S100 training	0.5 day classroom and field components	
S-185 FIRE ENTRAPMENT AVOIDANCE & SAFETY (2006)	All those involved in fire suppression operations. General knowledge course on wildfire safety and entrapment avoidance	2-3 hour classroom training session	BCWS Information on Wildfire Training[62]
S-215 FIRE OPERATIONS IN THE WILDLAND/URBAN INTERFACE	Advanced training for wildland fire fighters	3 day instructor led course	
S-230 SINGLE RESOURCE LEADER (CREW BOSS)	Advanced training for wildland fire fighter supervisors	4 day instructor led course	
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 1001	Exterior and Interior Structure Firefighter training	7-12 weeks, depending on the delivery format (full-time or part time)	

[62] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/employment-and-contracts/wildfire-training

LEVELS 1 AND 2			
STRUCTURE PROTECTION PROGRAM WILDLAND FIREFIGHTER LEVEL 1 (SPP-WFF 1)	Additional training for structure firefighters	6 hours - classroom	Replaces S-100 for Structure Firefighters. BCWS information for structure firefighters working with WUI fires[63]
SPP-115 STRUCTURE PROTECTION WORKSHOP	Additional training for structure firefighters	7-8 hours, including classroom and practical	Focuses on the use of wildfire pumps and hose, application of sprinklers
TRAINING COURSES IN FIRESMART			
FIRESMART 101	Community members	Online	FireSmart Canada[64]
LOCAL FIRE SMART REPRESENTATIVE WORKSHOP	Fire professionals, resource professionals, emergency preparedness staff	2 days (16 hours), classroom. Offered by FireSmart Canada	FireSmart BC information can be found here.
FIRESMART COMMUNITY CHAMPION WORKSHOP	Community members	2-4 hours, offered by Local FireSmart Representative	Local FireSmart Representatives can be found here.
TRAINING COURSES IN EMERGENCY PLANNING AND MANAGEMENT			
FNESS FIRE PROTECTION LEADERSHIP GOVERNANCE TRAINING	Band council, staff, and administration	Tier 1 – Home Fire Protection Tier 2 – Community Fire Protection Tier 3 – Fire Departments	FNESS[65]
EMERGENCY SUPPORT	Community Volunteers	Online or In-Person	Justice Institute of BC[66]

[63] https://www2.gov.bc.ca/gov/content/safety/emergency-preparedness-response-recovery/fire-safety/wildland-urban-interface-fire-information

[64] FireSmart 101. https://firesmartcanada.ca/programs-and-education/firesmart-101/

[65] FNESS. Fire Protection Leadership Governance. https://www.fness.bc.ca/core-programs/fire-services

[66] Justice Institute of BC (JIBC). Emergency Support Services. https://www.jibc.ca/sites/default/files/emd/images/JIBC-ESS-Slick_Web_Ready_20150623.pdf

SERVICES LEVEL 1			
EMERGENCY SUPPORT SERVICE DIRECTOR	Community Volunteer	In-person	
INCIDENT COMMAND SYSTEM (ICS) LEVEL 100	First responders, local government administration, community organizations involved in response	In-person, on site; or Online	Justice Institute of BC. Eligible for BC Hydro Community Safety grant[67]
ICS LEVEL 200	First responders, local government administration, community organizations involved in response	Online	JIBC[68]

[67] BC Hydro Community Safety Grants. https://www.bchydro.com/community/community-giving/grants.html#safety

[68] JIBC. Incident Command System. https://www.jibc.ca/course/incident-command-system-level-100

APPENDIX 5: WILDFIRE THREAT ASSESSMENT – FUEL TYPE CHANGE RATIONALE

Provided in a separate PDF document.