ACRD ELECTORAL AREA 'C' LONG BEACH - COMMUNITY WILDFIRE RESILIENCY PLAN

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Alberni-Clayoquot Regional District

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FREQUENTLY USED ACRONYMS

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CFFDRS	Canadian Forest Fire Danger Rating System
CFS	Community Funding and Support
CI	Critical infrastructure
CRI	Community Resiliency Investment
CWRP	Community Wildfire Resiliency Planning
DP	Development Permit
DPA	Development Permit Area
FBP	Fire Behavior Prediction System
FCFS	FireSmart Community Funding and Supports
FESBC	Forest Enhancement Society of British Columbia
FESIMS	Forest Enhancement Society Information Management System
FMP	Fire Management Plan
FSCCRP	FireSmart Canada Community Recognition Program
FNESS	First Nations Emergency Services Society
HIZ	Home Ignition Zone (also see Structure Ignition Zone)
HRVA	Hazard Risk and Vulnerability Analysis
LRMP	Land and Resource Management Plan
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
MOTI	Ministry of Transportation and Infrastructure
PSOE	Provincial State of Emergency
PSTA	Provincial Strategic Threat Assessment
OCP	Official Community Plan
RSWAP	Resource Sharing Wildfire Allocation Protocol
SOLE	State of Local Emergency
SWPI	Strategic Wildfire Prevention Initiative
UBCM	Union of British Columbia Municipalities
VAR	Values at Risk
WRR	Wildfire Risk Reduction
WUI	Wildland Urban Interface

DEFINITIONS

Area of Interest (AOI): The AOI for a CWRP includes all the area that lies within the municipal boundary, regional district boundary, or First Nations land including First Nation reserve land, land owned by a Treaty First Nation (as defined by the Interpretation Act) within treaty settlement lands, or land under the authority of an Indigenous National Government boundary.

Wildland-Urban Interface (WUI): any area where combustible forest fuel is found adjacent to homes, farm structures or other outbuildings. This may occur at the interface, where development and forest fuel (vegetation) meet at a well-defined boundary, or in the intermix, where development and forest fuel intermingle with no clearly defined boundary.

Values at Risk (VAR): The human or natural resources that may be impacted by wildfire. This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

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

EXECUTIVE SUMMARY

Wildfire is becoming increasingly prevalent across the BC landscape, with climate change impacting moisture regimes, temperatures, and weather patterns. Wildfire threat and the associated risk to communities within the Wildland Urban Interface (WUI) is therefore likely to increase due to climatic changes, making it more critical than ever to understand wildfire risk and identify the most effective strategies for its mitigation.

The purpose of this Community Wildfire Resiliency Plan (CWRP) is to identify wildfire threats within and surrounding the Alberni-Clayoquot Regional District Electoral Area C (ACRD EA – C), and to quantify the risks and impacts to the community from wildfire. The CWRP outlines strategies to reduce threat and risk by providing recommendations to decrease the likelihood of wildfires entering the community, to increase the preparedness of the community to respond to wildfires, and reduce the potential loss of homes, businesses, and critical infrastructure from wildfire. This CWRP is intended to provide guidance to District staff and to educate and motivate EA – C community members to take part in FireSmart.

The CWRP focuses on wildfire risk assessment and the seven FireSmart disciplines including:

- Education,
- Legislation and planning,
- Development considerations,
- Interagency cooperation,
- Cross-training,
- Emergency planning, and
- Vegetation management.

Several factors are considered when determining a community's wildfire risk, including the landscape surrounding the community, the fuel types, fire history, and weather data. The wildfire threat identified in EA – C's wildland urban interface and surrounding area is **low to moderate**. However, with the unknown impacts of climate change, coastal communities should be prepared for unpredictable climatic events such as increased frequency or size of wildfires.

Table 1 lists all the recommended actions for EA – C, categorized by the seven FireSmart disciplines. Actions are prioritized as: **moderate, high, and very high**, based on anticipated effectiveness in reducing overall wildfire hazard and risk.

TABLE 1: LIST OF ALL COMMUNITY WILDFIRE RESILIENCE PLAN ACTIONS. PRIORITY LEVELS 'HIGH' AND 'VERY HIGH' ARE COLOURED RED.

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Risk Assessment						
The purpose of a risk assessment is to identify the specific risks to a community and its assets. An ongoing review of the risk assessment should occur and an update to this CWRP should occur in at least 10 years.						
1. Read and understand this CWRP's identified risks and recommended actions. The currently identified risks include: I. The ACRD Electoral Area C lacks their own Fire Departments and fire suppression resources. Although the Millstream and Willowbrae communities are within the Fire Protection Zone of the Ucluelet Fire Department, other communities and critical infrastructure within the ACRD Electoral Area C are not serviced. Furthermore, all communities must expect a ground response time of about 2.5 hours from the BCWS Mid-Island Zone in Errington, BC. II. There are currently no fire hydrants in the communities of Port Albion and Salmon Beach. One fire hydrant is present in Willowbrae. In the event of a wildfire, BC Wildfire Service responders must currently rely on water shuttling with tenders to ensure a sufficient water supply. The District of Ucluelet does not have a water tender. III. Wildfire hazard and FireSmart principles may not be currently embraced by the community due to a historically wet climate and a lack of historical wildfire occurrence. Local climate modelling indicates increasing potential for wildfire, and the threat of wildfire will likely increase if temperatures and drought days increase. IV. Interface/Intermix areas including Port Albion, Salmon Beach, and Ittatsoo Bay are at high risk in the event of a wildfire as they are surrounded by forest and have limited options for evacuation. Additionally, the risk of fire spreading into the forest from structure fires in these areas is high.	FireSmart Coordinator and Emergency Program staff	Very High	Immediate	FireSmart Coordinator, and local elected officials to spend some time becoming familiar with this CWRP. Participation from: the Ministry of Forests, Parks Canada, and local First Nations.	FireSmart Coordinator, Emergency Program Staff, and leadership comprehend the risks and actions to take within this CWRP and consider next steps for implementing recommendations.	N/A

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
V. Recreational tourism is high in the summer which substantially increases community populations: especially Salmon Beach. As well, provincial regulations allow for backcountry camping on crown land for up to two weeks. This approach sees large numbers of unsupervised campers in un-serviced areas. This and the increase in community population both increase the potential for fire ignitions. VI. Most critical infrastructure and neighbourhoods have an 'extreme' FireSmart hazard rating. Given there are no restrictions requiring new home buildings to be constructed with FireSmart materials and to use FireSmart landscaping, such as a Wildfire Development Permit process, this risk will remain or could increase over time. VII. Much of the WUI is private land which limits the ACRD's ability to prescribe and implement vegetation management activities on the landscape, putting more importance on private landowners to take action to reduce wildfire hazards on their property. VIII. Interagency cooperation dealing with wildfire could be improved. Increased and continued interagency cooperation with local governments and other agencies is recommended to address this. IX. As recreation vehicles become more popular within the ACRD Electoral Area C in areas such as West Main Road, and near Ucluelet or the Pacific Rim National Park, an increase in human caused wildfire ignitions could increase.						
Education						
Education is a critical piece of resiliency planning as it relates directly to the recruitment and retention of community members in the FireSmart program as well as reduces the probability of wildfire ignitions within the WUI.						
2. Although the ACRD currently has a FireSmart Coordinator, ACRD Electoral Area C does not have its own nor is it sharing one with another electoral area. It is recommended that the	Emergency Services Department	Very High	Immediate	Part-time FireSmart Coordinator at $35,000/year.	Continued funding available for an individual	Funding is available to pay a FireSmart

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
ACRD look for ways to hire a FireSmart Coordinator more locally. One option would be to build a regional partnership with the District of Ucluelet and share a halftime Coordinator.					who is enthusiastic about promoting FireSmart	Coordinator for one year.
3. Hold a FireSmart event/open house to introduce FireSmart concepts to community members and educate them on things they can do around their homes to reduce fire hazard. This should be held annually in a central public location between May and October.	FireSmart Coordinator	Very High	Annually	Social media, posters, resources to run the event (ie. tent, food, etc.)	Participation by minimum of 25 residents.	Funding is available under UBCM's Community Resiliency Investment (CRI)[1] program to support a salary for a FireSmart Coordinator. Due to a lack of community centres, it is suggested that these events could be hosted by larger population hubs such as Ucluelet or Tofino.
4. Distribute FireSmart promotional resources to members of the public at local businesses, FireSmart events, or other community events.	FireSmart Coordinator	High	Ongoing	FireSmart promotional items.	Participation by minimum of 25 residents	FireSmart promotional items can be found on the FireSmart BC website[2]
5. Promote/encourage and complete FireSmart Home Assessments, and promote/encourage participation in the FireSmart rebate program on private property for those	FireSmart Coordinator	Very High	Immediate/Ongoing	A certified Local FireSmart Representative must	Participation by minimum of 15 residents who complete at least one	Funding for Homeowner Rebate in

[1] https://www.ubcm.ca/cri/firesmart-community-funding-supports
[2] https://firesmartbc.ca/resource-ordering-form/

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
community members who are interested. Provide recommendations on actions they can take to make their homes more FireSmart and reduce the risk of loss and damages in the event of a wildfire.				complete the home assessments. Communication resources such as District website, FireSmart Home Assessments.	eligible FireSmart activity on their home	FireSmart program is available under UBCM's CRI[1] program on a per-structure basis.[3]
6. Assist homeowners with removal of hazardous vegetation and debris around their homes by: I. Organizing Community Chipper Day(s) and/or Community Cleanup Day(s), and II. Promoting the ACRD's Call and Receive Service.	FireSmart Coordinator, Community Services Department	High	Annually	Chipper, disposal bins	Removal of hazardous vegetation, invasive plants and other flammable materials around homes.	Funding is available through the UBCM's CRI program[1]
7. Have the neighbourhoods of South Long Beach, Port Albion, Salmon Beach, Midlands, Uplands, and Oceanfront apply for FireSmart Canada's Neighbourhood Recognition Program. Once recognized, annually renew for FireSmart Recognition.	FireSmart Coordinator	Moderate	Immediate, then Annually	A certified Local FireSmart Representative.	FireSmart Neighbourhood Recognition for the Millstream/Willowbrae, Port Albion, and Salmon Beach neighbourhoods	Application to be filled out and required actions for recognition must be completed[4]
Legislation and Planning						
Legal or regulatory changes and community planning will improve community resiliency by encouraging and supporting the Area's members to change their decisions to build a more resilient community.						
8. Consider developing a Wildfire Development Permit (WDP) bylaw ideally along with a Wildfire Development Permit Area (WDPA, see below). A WDP bylaw would regulate how and where new home builds follow FireSmart. Details specified should include:	FireSmart Coordinator, Planning & Development Department	High	Immediate	ACRD to work with a wildfire consultant and lawyer to develop the WDP bylaw language. Public	Development permits limit building materials and landscaping vegetation that are a high fire hazard.	Funding is available under UBCM's CRI[5] program to support

[3] https://firesmartbc.ca/wp-content/uploads/2020/06/FireSmart-Assessment-Work-Hours-Estimate-Form-CRI.pdf
[4] https://www.firesmartcanada.ca/programs-and-education/neighbourhood-recognition-program/
[5] https://www.ubcm.ca/cri/firesmart-community-funding-supports

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
I. Housing materials (siding material, decking and windows), and II. Vegetation reduction and new planting in and around homes/businesses.				meetings and review by the ACRD Board will be necessary throughout this process. Estimated Cost: $25,000		development considerations.
9. Develop an ACRD-wide FireSmart communication strategy outlining a process and timeline to effectively educate community members on wildfire risk and how to participate in FireSmart.	FireSmart Coordinator	Moderate	Within 2 years (2025)	Communication resources	Community members become more aware of FireSmart principles	N/A
Development Considerations						
Development considerations deal with how planned development (home, business and critical infrastructure) should be designed to optimize the Area's resiliency to wildfire.						
10. Working with ACRD planners and an outside consultant, develop a spatially based Wildfire Development Permit Area (WDPA). This WDPA should also be incorporated into the WDP bylaw (discussed above). The WDPA would be a GIS representation of potential wildfire threat and could be used for other ACRD planning purposes. The WDPA should also align with existing Environmental Development Permit Areas.	Planning and Development Department	High	Within 5 years	Hire a consultant to assess where Development Permit areas should exist based on current wildfire threat. Estimated budget: $25,000	Planners would have additional information to work with when making long-term plans for development.	Funding is available under UBCM's CRI[5] program to support development considerations.
Interagency Cooperation						
To increase and share local knowledge, develop relationships and to collaborate on future projects.						
11. Continue to re-establish a Community FireSmart and Resiliency Committee year over year for the region. This should be made up of local government, Parks Canada and	FireSmart Coordinator, Emergency	Very High	Immediate	Communication Resources	Hold a meeting with all committee members involved. Participation in this committee is	Funding is available through the UBCM's CRI program[6] to

[6] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
large forestry licensees including Mosaic and the local community forest managers. Discussion topics should include: • Wildfire resiliency co-funding opportunities, • Emergency management and evacuation planning, • Forest fuels abatement and planning, • Education and event planning for FireSmart, and • Reduction of human caused wildfires, particularly when dealing with tourists and recreational vehicles in areas along West Main.	Services Department				becoming a requirement for CRI applicants starting in 2024.	support participation in interagency meetings
12. Upon completion of the West Coast Evacuation Route Plan, create and distribute plan-related information to ACRD Electoral Area C residents online on the ACRD website, and in public offices in Port Alberni. Discuss the evacuation plan at committee meetings.	FireSmart Coordinator, Emergency Services Department	High	Upon completion of the evacuation plan in March 2023.	ACRD website, social media	At least one established source by which ACRD Electoral Area C's staff and residents can access the plan	The evacuation plan for ACRD Electoral Area C is still in development at the time of writing this document. While the intention to distribute the evacuation plan may already exist, it's been included here to reinforce its importance.
Cross-Training						
Cross-training increases the District's wildland firefighting capacity while simultaneously supporting the structural volunteer fire department.						

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
13. Partner with the other west coast municipalities and First Nations, especially the District of Ucluelet, on future FireSmart grant applications to pool funding for cross-training opportunities. Such opportunities could include the WSPP-115 course (training for structure protection unit crews).	Emergency Services Department	Very High	Annual	Communication Resources	Partnership with the District of Ucluelet	Applicability of other cross-training opportunities is contingent on this action being successfully achieved
Emergency Planning						
Emergency Planning informs community leaders and members on how to respond to different types of emergencies.						
14. Work with a consulting engineer or planner to determine specific feasibilities for increase in water availability within ACRD Electoral Area C. This feasibility assessment should look at the potential for installation of hydrants or dry hydrants and suppression capacity within ACRD Electoral Area C neighbourhoods including Willowbrae, Port Albion, and Salmon Beach.	FireSmart Coordinator, Emergency Services Department	High	Within 10 years (2025)	The CRI program provides funding to pay consultants or experts to analysis and provide specific options for increasing water availability. Est. cost: $25,000.	Sufficient fire hydrants installed in all neighbourhoods of ACRD Electoral Area C including Willowbrae, Port Albion, and Salmon Beach.	N/A
15. Expand the use of the ACRD emergency notification system (Voyent Alert) from the Alberni Valley and Bamfield to ACRD Electoral Area C.	FireSmart Coordinator, Emergency Services Department	Very High	Ongoing	Posters, social media, other communication resources	Participation and passing of emergency response tests/exercises by at least 50 residents	N/A
16. Work with the District of Ucluelet to purchase or acquire ancillary suppression equipment including a sprinkler protection unit, portable tanks, hoses, and portable pumps. Consider the option to build a cache to store this suppression equipment within the ACRD Electoral Area C or otherwise share a storage area.	FireSmart Coordinator	Very High	Immediate	Funding and/or source of capital to purchase fire equipment.	Resources secured and desired fire equipment purchased.	Funding is available through various sources including the UBCM's CRI

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
						program[7] and Economic Recovery Fund[8] for specified equipment.
Vegetation Management						
The purpose of vegetation management is to reduce wildfire risk through the reduction of vegetative fuels available for consumption, while supporting forest values and healthy ecosystems.						
17. Implement FireSmart recommendations resulting from the completed FireSmart Critical Infrastructure (CI) Assessment to critical buildings/infrastructure to reduce hazard score ratings to Moderate or Low. Critical Infrastructure Assessments were completed for all CI within Area "C" for the development of this CWRP. Vegetation surrounding CI was often identified as one of the highest hazards. The critical infrastructures with the highest hazard identified are: I. Pumphouse in Millstream II. Water Tower in Millstream.	FireSmart Coordinator, Community Services Department	High	Within the next 5 years (2028)		FireSmart recommendations have been implemented for the highest priority CI to reduce the hazard score rating to Moderate where possible.	Funding is available through the UBCM's CRI program.
18. Encourage homeowners to complete FireSmart activities around or on their homes utilizing the Homeowner Rebate in the FireSmart program through use of social media, the internet, and FireSmart events.	FireSmart Coordinator	Very High	Within 5 years	Local FireSmart Representative to complete home and infrastructure assessments.	Complete FireSmart improvements on numerous homes per year	FireSmart activity rebate program on ACRD website

[7] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

[8]

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
19. Encourage – Promote the removal of all vegetation from the Non-Combustible Zone and encourage using fire-resistant plants in landscaping. This can be done by promoting nearby nurseries that can supply these plants. Cedar trees within the first 10m (Zone 1) of the home should be encouraged for removal.	FireSmart Coordinator	High	Immediate	A certified Local FireSmart Representative.	15 residents have implemented FireSmart landscaping and vegetation removal on their property by 2027	N/A

INTRODUCTION

Wildfire is a natural disturbance agent on the landscape, but with warming temperatures and changing precipitation regimes due to climate change, the frequency, severity, and size of wildfires in British Columbia has been increasing in the last decade. This can be seen in 2017 and 2018, which were two of the worst wildfire seasons in BC history, with 1.2 and 1.3 million hectares burned, respectively[9]. The most recent 2021 wildfire season has been notable as well, with approximately 868,000 hectares burned, 181 community evacuation orders, and 304 community evacuation alerts[10]. The increased presence of fire across BC, along with lessons learned, advances in knowledge, and loss prevention programs have encouraged the need for deliberate and effective wildfire risk prevention measures to occur within the wildland-urban interface (WUI), or the area where structures and other human development meet or intermingle with surrounding wildland/vegetative fuels[11].

Overview/CWRP Background

Community Wildfire Resiliency Plans (CWRPs) are the next generation of Community Wildfire Protection Plans (CWPPs) in British Columbia. CWPPs were introduced in 2004 as a comprehensive and science-based approach toward wildfire risk reduction planning that reflects local priorities and provincial goals for wildfire mitigation[12]. Key provincial goals of the newly revised Community Wildfire Resiliency Planning process are to:

- increase communities' capacity and understanding of wildfire threat and risk,
- foster greater interagency collaboration across administrative boundaries,
- be more responsive to the needs of different types of communities throughout British Columbia, and
- develop achievable and accountable action items for reducing wildfire threat and risk.

Specifically, the new CWRP process addresses the seven principles/disciplines of FireSmart Canada[13]:

1. Education
2. Vegetation Management
3. Legislation and Planning
4. Development Considerations
5. Interagency Cooperation
6. Cross-training
7. Emergency Planning

In 2022, Frontera Forest Solutions Inc. was retained by the Alberni-Clayoquot Regional District (ACRD) to develop a CWRP for land within the bounds of ACRD's electoral area C (furthermore, EA - C). The ACRD has a CWPP updated previously in 2019 for the Alberni Valley and Bamfield area. Threat from wildfire has become a greater concern in recent years from increasing summer recreation and tourism, an increase in population and development within EA - C, and the unknown potential impacts of climate change to coastal forests, necessitating the development of a new CWRP.

[9] *Wildfire Season Summary - Province of British Columbia (gov.bc.ca)*
[10] *https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary#provstat*
[11] *https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/what-is-the-wui/*
[12] *https://www.ubcm.ca/sites/default/files/2021-05/2021%20CWRP%20Supplemental%20Instruction%20Guide.pdf*
[13] *https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/seven-firesmart-disciplines/*

Purpose

The purpose of this CWRP is to identify wildfire threat within and around EA - C communities, to quantify the potential risks and impacts to the community from wildfire, and provide strategies for reducing identified threats and risks. Specifically, the landscape-level wildfire risk assessment methods of this CWRP will inform goals that will aim to:

1. Reduce the likelihood of wildfire entering communities within EA - C,
2. Increase the safety of community members in the event of a wildfire, including egress safety,
3. Reduce the impacts/losses to property and critical infrastructure by employing FireSmart principles, and
4. Ultimately provide recommendations to reduce the negative economic and social impacts of wildfire to EA - C.

Plan Development Summary

The area of interest (AOI) for this CWRP is the ACRD's EA - C. The WUI is characterized as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. For the purpose of this CWRP, the WUI is defined as a one-kilometer buffer around structures and development within EA - C (see Figure 2).

In developing this CWRP, the consultants worked through these three key phases:

1. Consultation with stakeholders, local government representatives, and wildfire specialists; information sharing with District representatives such as FireSmart Coordinator Randy Thoen throughout plan development and ensuring linkages with existing plans (See LINKAGES TO OTHER PLANS below).
2. Identification of the values at risk and assessment of local wildfire threat; wildfire threat assessments take into consideration the natural fire regime and ecology, Provincial Strategic Threat Analysis (2021), field assessments and forest fuel type verification, and GIS wildfire threat analyses (see Wildfire Risk Assessment.
3. Developing a risk mitigation strategy; a guide for the ACRD to implement wildfire mitigation and risk reduction activities in EA - C. The risk mitigation strategy focuses on FireSmart activities around homes and structures, legislation and planning around emergency management, prioritization of fuel treatments, and wildfire response recommendations to reduce overall wildfire threat within communities (See FIRESMART DISCIPLINES).

LINKAGES TO OTHER PLANS

There are many plans that can relate and help inform the CWRP by providing background information and guide the development of the CWRP. The following plans in Table 2 were consulted in the development of the CWRP and to avoid unnecessary replication of information and align with existing objectives.

TABLE 2: KEY PLANS AND RELATIONSHIP TO CWRP.

Plan Type	Description	Relationship to CWRP	Additional Information
Long Beach Electoral Area Emergency Plan (2020)	A high-level overview of the potential risks that EA - C faces. The plan outlines notification, chain of command, roles and responsibilities, vulnerabilities, and emergency response and logistics in the event of a natural disaster or other emergency.	Within the Emergency Plan, BC Wildfire was listed as the primary response for suppression for wildfires within the community. Wildfires were identified as a "very high hazard" to the EA - C.	
Alberni-Clayoquot Regional District - Community Wildfire Protection Plan Update (2019)	An assessment of the ACRD's wildfire readiness. The report provides recommendations for both the Alberni Valley and EA - A Bamfield.	The 2019 CWPP provides a baseline for wildfire preparedness within the community and provides recommendations for mitigation. Since the CWPP was written the ACRD has established a FireSmart program with a focus on creating defensible space for homes in the WUI.	
South Long Beach (Area C) Official Community Plan (2007)	The official community plan (OCP) for ACRD's EA - C. The OCP outlines future development goals, emergency planning and community services.	The official community plan highlights deficits in suppression capacity and defines wildfire preparedness as an objective for future planning and development.	
Vancouver Island Land Use Plan (2000)	The Vancouver Island land use plan designates land use over the next 10 years. The Maggie land use area is designated as an enhanced forestry zone. Within this area there are plans for limited second growth timber harvest, but most of the focus is on maintaining visual objectives on the coast as well as near Maggie Lake.	The Vancouver Island land use plan determined land use in and around EA – C communities from 2000 to 2010. The main objective in these areas was maintaining visual values. Understanding previous land use gives an indication of long-term objectives for this area.	Vancouver Island Land Use Plan (2000)

COMMUNITY DESCRIPTION

Area of Interest

For the purpose of this CWRP, the AOI is the land located within the boundary of the ACRD's EA - C (Figure 1). Excluded lands are any First Nations treaty or reserve lands or any other federally managed lands including parks, and municipal lands. The ACRD EA-C is located on the western side of Vancouver Island and encompasses a land area of approximately 448,417 hectares. Despite the large extent of EA - C, the majority of the population lives on or near the Ucluelet peninsula. Population hubs of EA - C have been identified as neighbourhoods in Figure 2. Important sites adjacent to the AOI include the District of Ucluelet (DoU), the District of Tofino, and Pacific Rim National Park Figure 3. These sites are all in the coastal western part of the AOI. Communities within the AOI are primarily dependent on emergency resources from these sites. The AOI encompasses traditional territory of the Toquaht and Yuułuʔiłʔatḥ (Ucluelet) First Nation. The only access is via the Tofino-Ucluelet Highway branching south off from Highway 4.

Wildland-Urban Interface

The WUI occurs where homes, structures, and critical infrastructure are found adjacent to or intermixed with combustible vegetated lands. The WUI differs from the AOI in that, historically in BC, the WUI was created by buffering an area where structure density is greater than 6 structures/km² by 2 km. The 2 km buffered area was originally designed to represent a reasonable distance that embers from a wildfire can travel to ignite a structure. However, for the purpose of the provincial FireSmart Community Funding and Support (FCFS) program eligibility, the eligible WUI within this CWRP is redefined as a maximum of one kilometer from the area identified using kernel density estimation, where structure density is greater than 6 structures/km². Figure 2 illustrates the resulting eligible WUI for this CWRP.

There were five WUIs identified within the AOI: Tofino Long-Beach Airport, Port Albion, Ittatsoo Bay, Salmon Beach, and South Long Beach. Of the five WUIs Salmon Beach was the most densely populated. The remainder of this plan will focus on the land in and around these WUIs. Protection of population hubs is an imperative consideration for wildfire preparedness. Completing FireSmart activities in vulnerable communities will help to reduce losses and impacts related to wildfire. For this CWRP, FireSmart Wildfire Hazard Assessments were completed for Millstream, Willowbrae, Port Albion, and Salmon Beach neighbourhoods. A breakdown of scores and recommendations for each CI can be found in the Vegetation Management section later in this document.

Community Information

The AOI lies on the west coast of Vancouver Island and delimits a boundary from part of Barkley Sound southeast of the Broken Islands, extending northwest until a series of features south of Nootka Sound. Some of these features include the northern edge of Hesquiat Peninsula Provincial Park, Irving Lake, and the southwestern boundary of Strathcona Provincial Park. EA - C has an approximate population of 875 people. Population growth between 2016 and 2021 was 29%. The local economy of EA - C is primarily based in recreation and ecotourism. The Pacific Rim National Park lies adjacent to EA - C. During summer months there is a significant influx of people into the area visiting parks and other forested areas. Communities are small and spread out in the area with a population density of 0.3 people per square kilometer. All the population centers lie near the coast and near to the DoU and District of Tofino.

TABLE 3: COMMUNITY DEMOGRAPHICS (STATISTICS CANADA, 2021).

Total Population (year)	**875 (2021)**
Population Density (people per sq. km)	0.3
Median Age (years)	38.8
Housing Units	680
Median Household Income	$ 69,500 (2020)

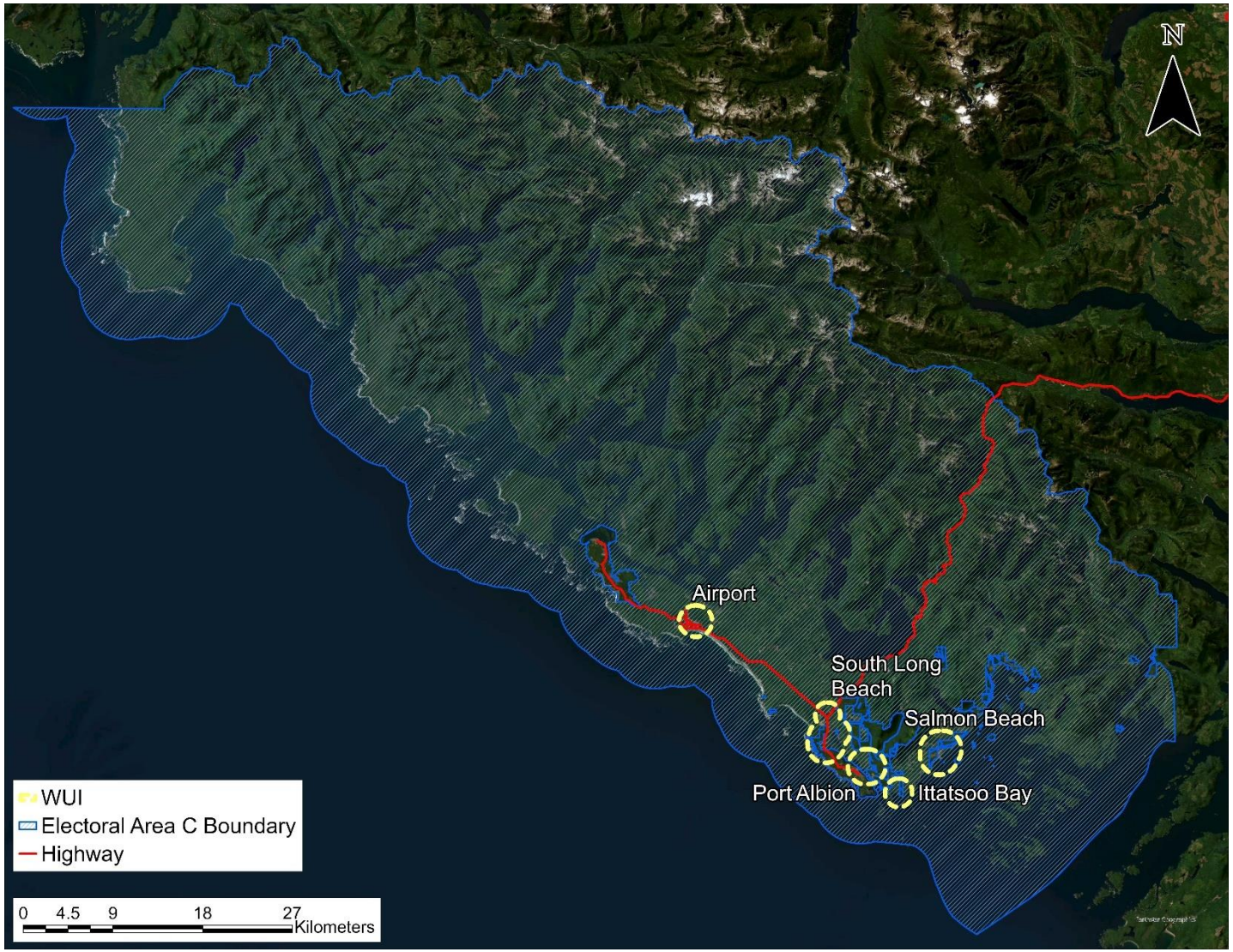


FIGURE 1: GENERAL OVERVIEW MAP OF LAND WITHIN THE AOI REPRESENTED BY THE BOUNDARY OF EA - C. THE WUI IS DENOTED BY THE YELLOW DASHED LINES NEAR THE COASTLINE.

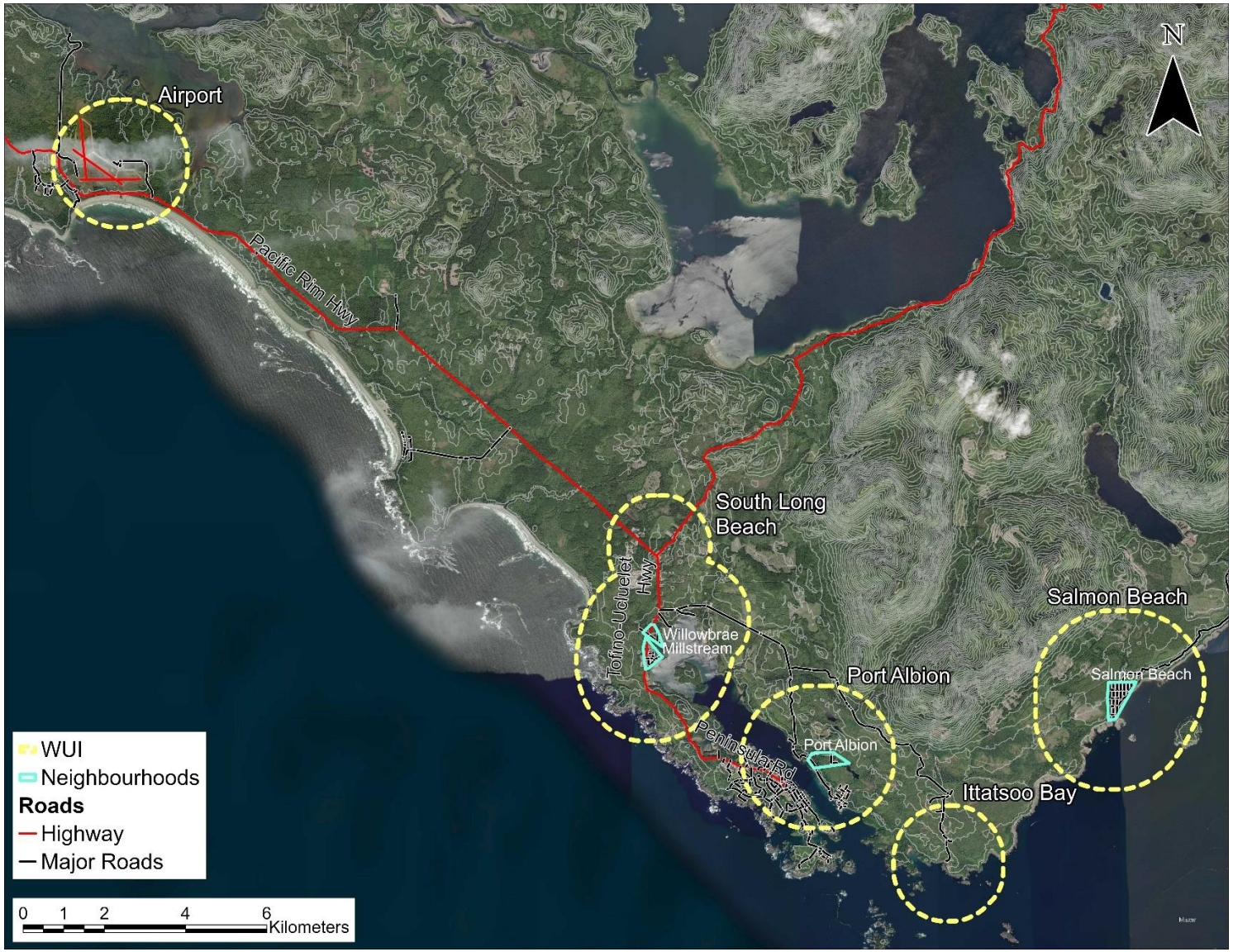


FIGURE 2: OVERVIEW MAP OF THE WUI ZOOMED INTO THE NEIGHBOURHOODS OF EA – C ELIGIBLE FOR FIRESMART ACTIVITIES.

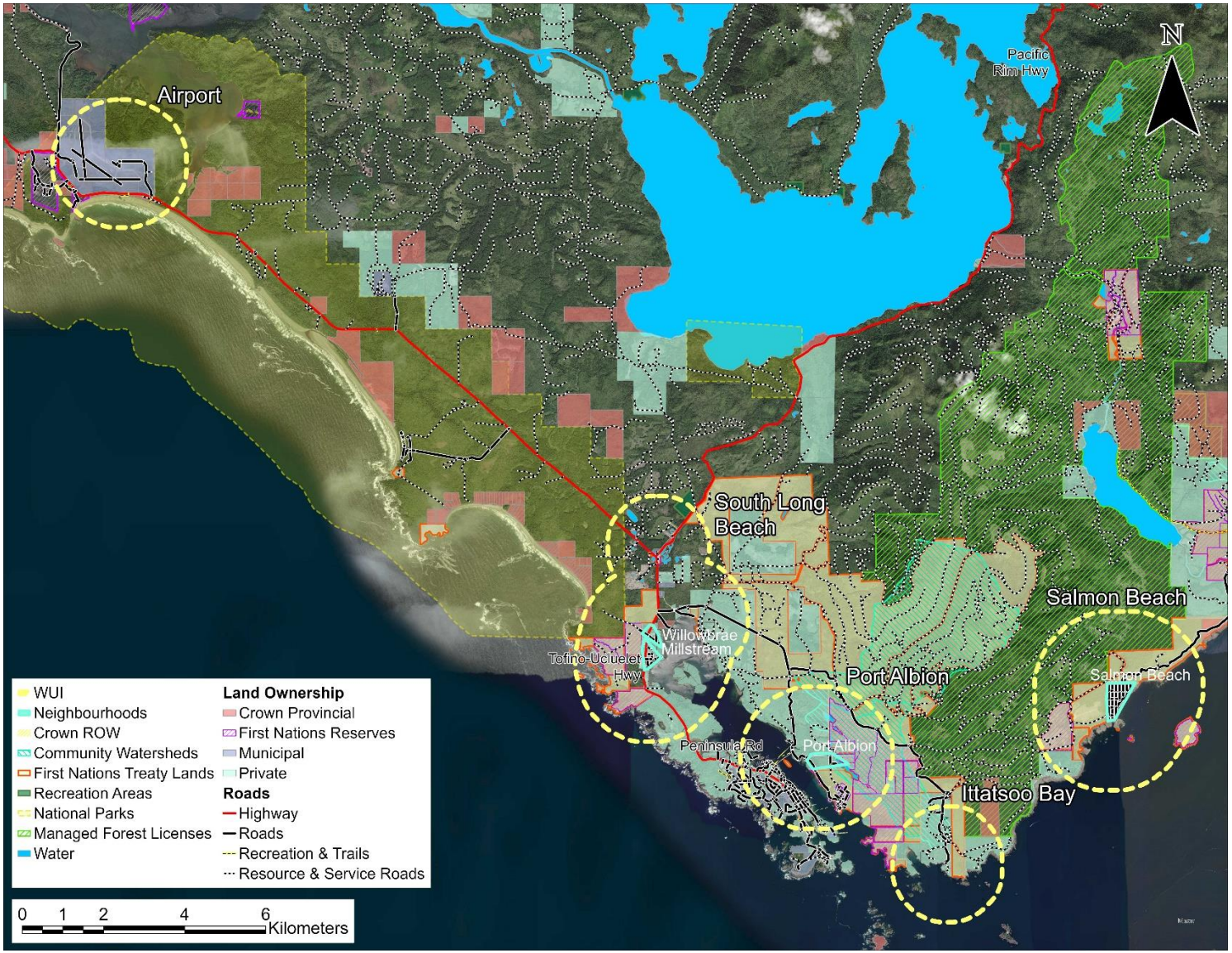


FIGURE 3: GENERAL OVERVIEW MAP OF LAND OWNERSHIP AND TENURE NEAR TO THE NEIGHBOURHOODS OF EA - C.

WUI Values at Risk

The following section is a description of the extent to which wildfire has the potential to impact the values at risk (VAR) identified within the AOI. VAR are the human or natural resource values that may be impacted by wildfire; this includes human life, property, critical infrastructure, high environmental and cultural values, and resource values. High VAR are often found within the WUI, but can also be geographically isolated, such as a communication tower. See Figure 4 for a mapped overview of inventoried VAR within this CWRP.

Human Life and Safety

Human life and safety are the highest priority in the event of a wildfire. A key consideration is the evacuation of at-risk areas and safe egress when necessary. Evacuation can be complicated by the unpredictable and dynamic nature of wildfire. Orderly evacuation takes time and safe egress routes can be compromised by quickly moving/changing wildfire, or by traffic congestion and accidents.

EA - C is remote and egress can be complicated and lengthy for its communities. Rapid evacuation is important for positive outcomes. The nearest large city is Port Alberni, around 100 kilometers east. There are two routes that can be taken: Port Albion Road to the Tofino-Ucluelet Highway or the Maggie Lake FSR to Highway 4. All these roads are single carriageways, which can easily become congested during evacuation, particularly during high tourism season.

Critical Infrastructure

Critical infrastructure (CI) are buildings or structures that are essential to the health, safety, security, economic wellbeing, and/or effective functioning of a community or government. Protection of CI during a wildfire event is an important consideration for emergency response preparedness and effectiveness, ensuring that coordinated evacuation can occur if necessary, and that essential services can be maintained and/or restored quickly after an emergency event. CI includes emergency and medical services, electrical and gas services, transportation and primary road networks, drinking and wastewater systems, social/support services, and communications infrastructure. Completing FireSmart activities around CI will help to reduce losses and impacts related to wildfire. Structures and CI identified within and around EA – C WUIs are shown in Figure 4 and Figure 5.

The following CI were identified within EA - C:

1. Water Towers,
2. Substation,
3. Water Treatment Plant,
4. Pumphouse,
5. BC Hydro Offices, and
6. Tofino Long-Beach Airport structures.

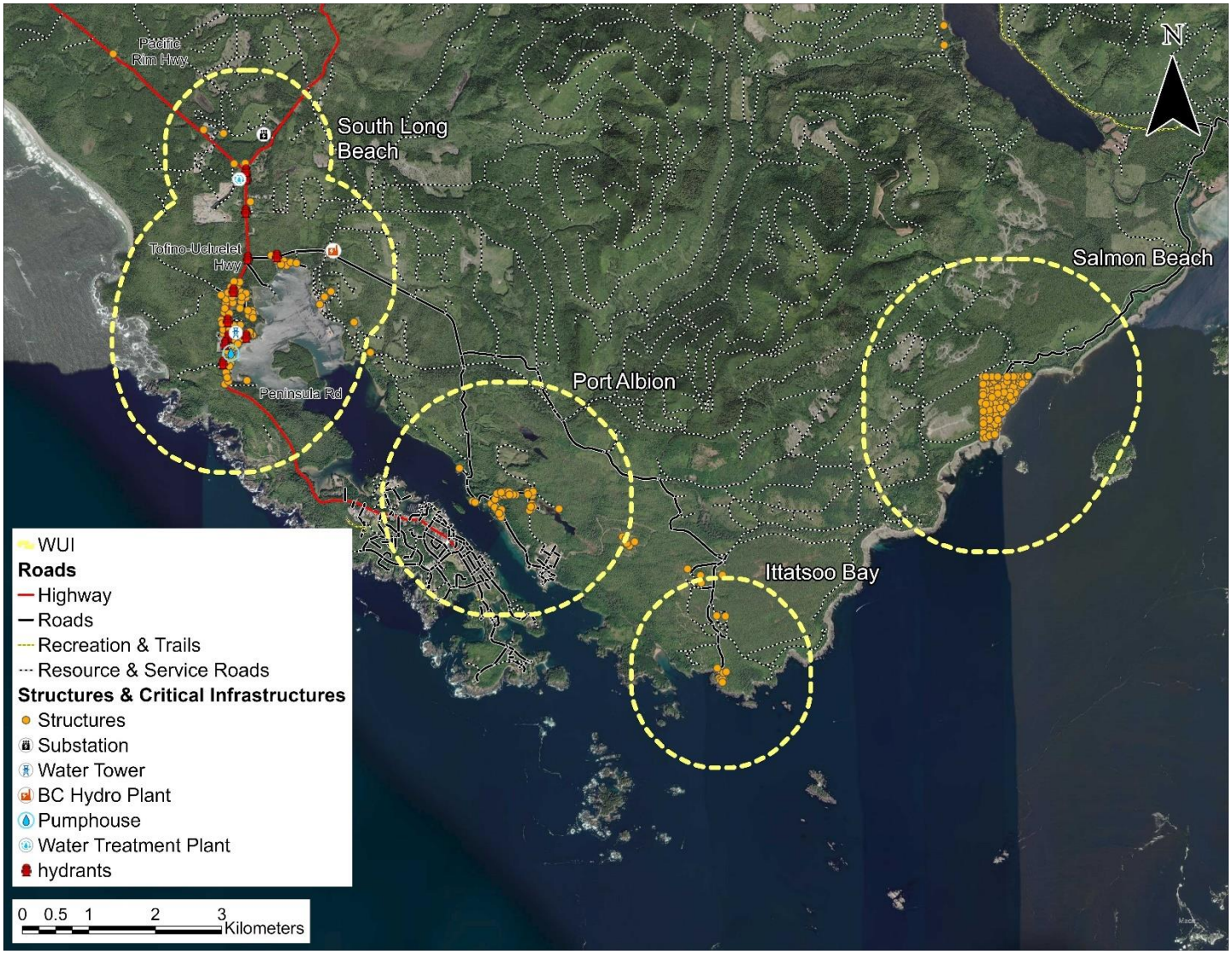


FIGURE 4: AN OVERVIEW OF STRUCTURES, CRITICAL INFRASTRUCTURE, AND FIRE HYDRANTS NEAR TO THE SOUTH LONG BEACH, PORT ALBION, ITTATSOO BAY, AND SALMON BEACH NEIGHBOURHOODS OF EA – C.

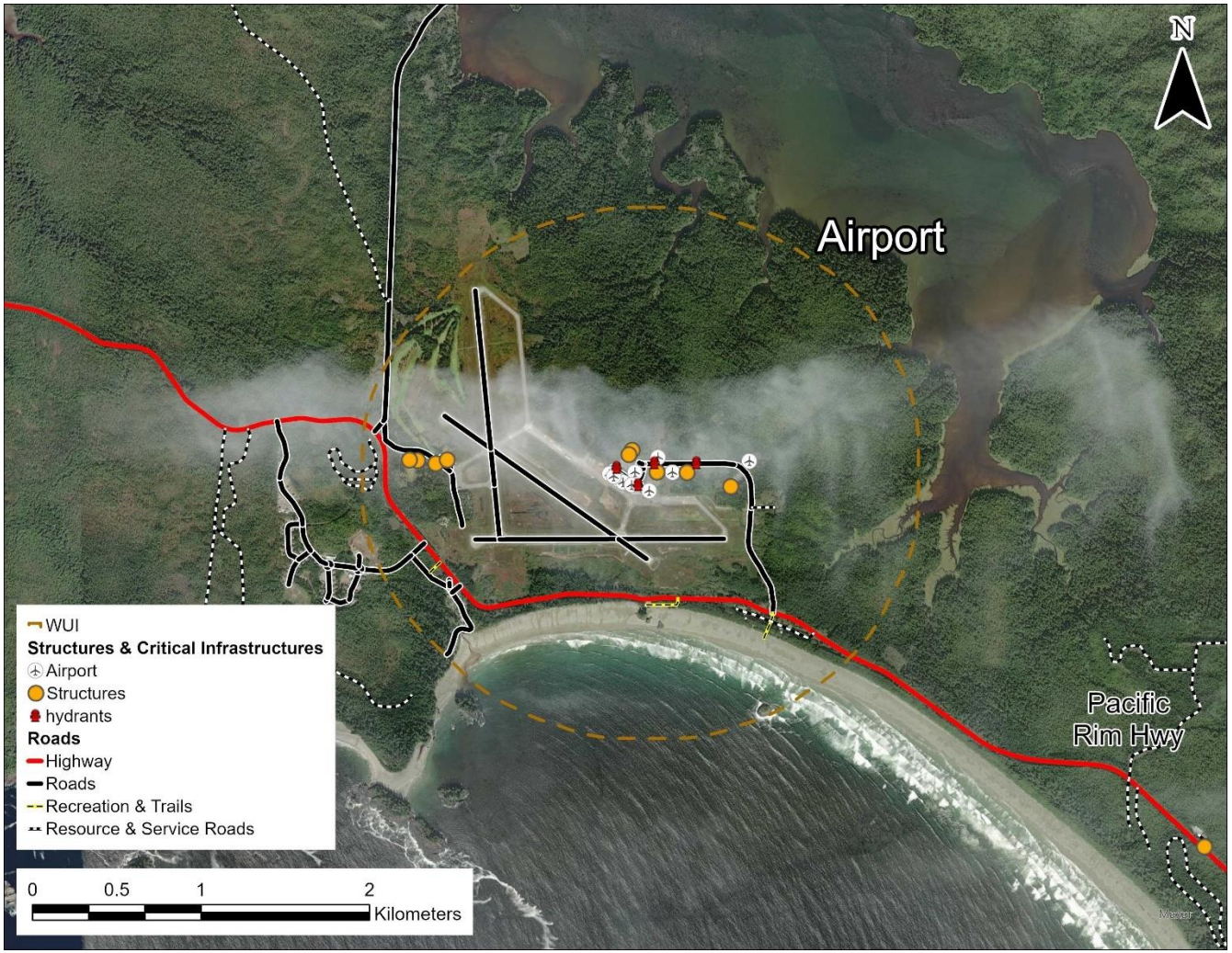


FIGURE 5: AN OVERVIEW OF STRUCTURES, CRITICAL INFRASTRUCTURE, AND FIRE HYDRANTS NEAR TO TOFINO LONG-BEACH AIRPORT IN EA - C.

For this CWRP, FireSmart Critical Infrastructure Assessments were completed for most of the Critical Infrastructure listed above. A breakdown of scores and recommendations for each CI can be found in the Vegetation Management section later in this document.

Community Water Supply

There are two main water systems in EA – C run by the ACRD: the Long Beach Airport System and the Millstream Water Supply. The Long Beach Airport System is supplied by a deep well in the Pacific Rim Park. The reservoir holds 1364 cubic meters of water and provides 21 cubic meters per day. However, demand from this water supply has dropped since Tla-o-qui-aht First Nation changed water supplies. The Millstream System provides 31.4 cubic meters per day from two shallow wells; the reservoir only holds 656 cubic meters. In 2014, a backup connection was created between Millstream and Ucluelet's water supply. However, the Ucluelet water supply has failed in the past. In January of 2022, an earthquake caused a break in the line between Ucluelet and Yuułuʔiłʔatḥ. Yuułuʔiłʔatḥ was left without clean water for almost two months.

Fire Suppression Capabilities

EA – C does not have a fire hall. The DoU has agreements with the ACRD to provide response coverage to portions of EA - C. The ACRD also has agreements with the DoU and with the District of Tofino to provide response coverage to Tofino Long-Beach Airport. The DoU's fire department owns two structural fire engines. There is full hydrant coverage within Millstream and around Tofino Long-Beach Airport. However, Willowbrae only has one hydrant at the intersection of Willowbrae Rd. and the Tofino-Ucluelet Highway. The other neighbourhoods lack any fire hydrants. This deficiency causes challenges in suppression response. Wildland fire suppression capabilities are also limited as the DoU's fire department has insufficient wildland fire suppression gear including a water tender, bladder tanks, pumps, hoses, nozzles, etc. Wildland fire suppression in South Long Beach and at the Tofino Long-Beach Airport would rely on structural gear as well as response from BC Wildfire Service. This suppression in the other neighbourhoods would rely exclusively on response from BC Wildfire Service.

Initial attack from BC Wildfire Service aims to keep new ignitions under one hectare and held within 72 hours. Suppression success is high on the west coast of the Island because fuel moisture and weather doesn't typically get dry enough to have the fire take off and become out of control. Initial response to communities considered in this plan could be by vehicle or helicopter; it is a 15 min helicopter flight from the Port Alberni base, or a 2.5 hour drive from the Errington base. The DoU's Fire Department may also be requested to provide initial suppression to areas outside their fire protection jurisdiction if BCWS is unable to respond rapidly based on the provincial response capacity.

Electrical Infrastructure and Supply

Electrical Power is supplied by BC Hydro. A singular 69 Kv line diverges from the main 128Kv line running from Port Alberni to Tofino[14]. Due to the large distance this line travels through forested areas, the ACRD experiences frequent outages caused by trees striking the lines in the spring and fall. A number of private homeowners own power generators, however the number owned by community members is unknown.

High Environmental Values

Environmental values are an integral part of ACRD EA-C's social, economic, and cultural identity. These unique coastal old growth ecosystems are hosts to endemic species; within the AOI, there 16 occurrences red listed

14 https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/maps.html

species, and 20 occurrences of blue listed species[15]. Much of the EA-C is protected by the Pacific Rim Provincial Park which is designated as protected parklands. The recommendations proposed in this CWRP do not conflict with environmental values. The only modification of vegetation will occur in within FireSmart setbacks on private land or around critical infrastructure. All vegetation management in these zones will be in compliance with bylaws, and supported by FireSmart best practices.

[15] *https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/known-locations-of-species-and-ecosystems-at-risk/cdc-imap-theme*

WILDFIRE RISK ASSESSMENT

Wildfire Environment

The environment in which wildfire occurs is influenced by three main components: topography, vegetation (fuel), and weather. Together, these components interact to characterize the overall wildfire environment and influence wildfire behaviour (Figure 6).

FIGURE 6: THE WILDFIRE ENVIRONMENT TRIANGLE[16].

Topography

Topography is a landscape component that can influence fire behavior, particularly slope and slope position. Slope position affects the temperature, solar intensity, fuel moisture, and relative humidity as a consequence of varying degrees of solar irradiation. Slope affects local wind patterns, with steeper slopes facilitating greater up-slope wind speeds during the day, and fuels upslope being closer to flames during a fire. Warmer aspects and steeper slopes increase the rate of spread of a fire. Fire that spreads faster is more difficult to control, making potential values situated on upper slopes more vulnerable.

EA – C is defined by a large land area with varying topography. The highest mountain local to EA – C communities is Mount Ozzard (750 m), but also has many iconic coastal inlets and plateaus (Figure 7). The topography around the WUI is not a major contributor to fire behavior. The WUIs are located at sea level and is surrounded by water on two sides: the Pacific Ocean to the west and the Kennedy River to the east. The area around the WUIs is defined by a moderate slope (<40%), save for rocky outcrops. Port Albion and Salmon Beach are at the base of Mount Ozzard and have high points at 100 meters above sea level. Salmon beach is on a south facing aspect which tends to be hotter and drier during summer months. The Port Albion and Salmon Beach communities are advantageously at the bottom of the mountain. Additionally, the significant amount of water within the WUI's serves as a barrier to fire spread.

[16] https://catalog.extension.oregonstate.edu/em9230/html

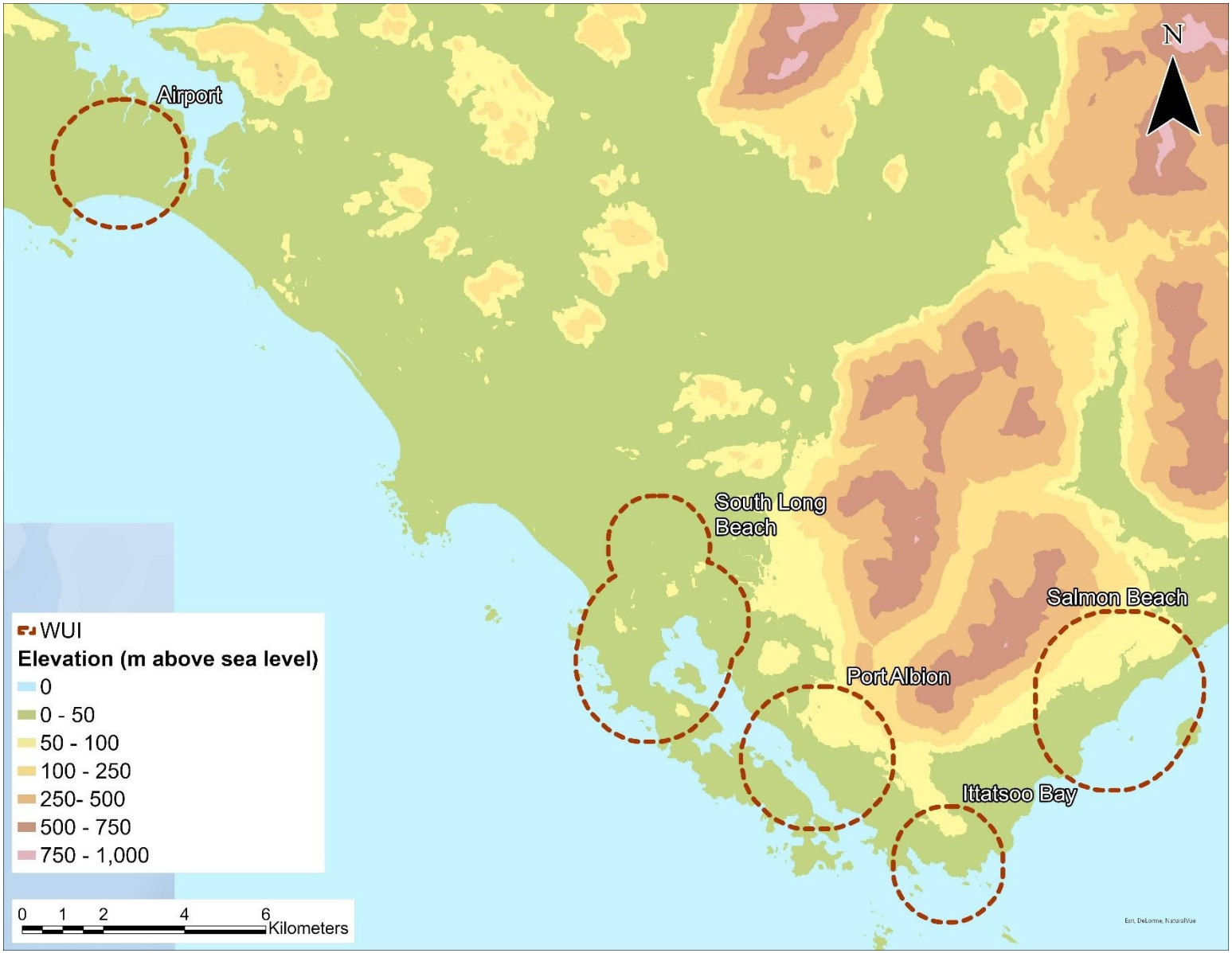


FIGURE 7: TOPOGRAPHIC MAP OF THE LAND NEAR TO THE NEIGHBOURHOODS OF EA - C USING A PROVINCIAL DIGITAL ELEVATION MODEL.

Biogeoclimatic Zones

The Biogeoclimatic Ecosystem Classification (BEC) system in BC describes ecological zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. Subzones may be further divided into variants based upon climatic variation and the resulting changes in the vegetative communities[17]. The area near to EA – C communities is comprised of one primary BEC subzone: the Very Wet Hypermaritime Coastal Western Hemlock (CWHvh) (Figure 8).

Very Wet Hypermaritime Coastal Western Hemlock (CWHvh)

The CWHvh occurs in hyper-maritime areas of the BC south coast. On Vancouver Island it is primarily restricted to a narrow coastal fringe on the outer coast of the Island. The CWHvh is the wettest BEC zone in BC with annual precipitation averaging 3300mm. The elevational limits range from sea level to approximately 200 m, transitioning to the CWHvm with increased elevation. The proximity of the CWHvh to the Pacific Ocean moderate's temperatures throughout the year, keeping them relatively cool. Fog, cloud, and drizzle are common throughout the year. Forest ecosystems in this subzone on zonal sites are dominated by western hemlock (Hw), accompanied by amabalis fir (Ba), western red cedar (Cw). Common understory species include salal, Alaskan blueberry, red huckleberry, and deer fern. Bog ecosystems occur commonly on low-lying terrain. The disturbance regime is defined by windthrow and pathogens with infrequent fires. Historically this meant high productivity old growth stands of Red Cedar and Western hemlock were relatively common climax forests. Disturbance events are typically small or patchy in size resulting in uneven-aged, multi-storied stands across the landscape.

[17] BEC WEB (gov.bc.ca)

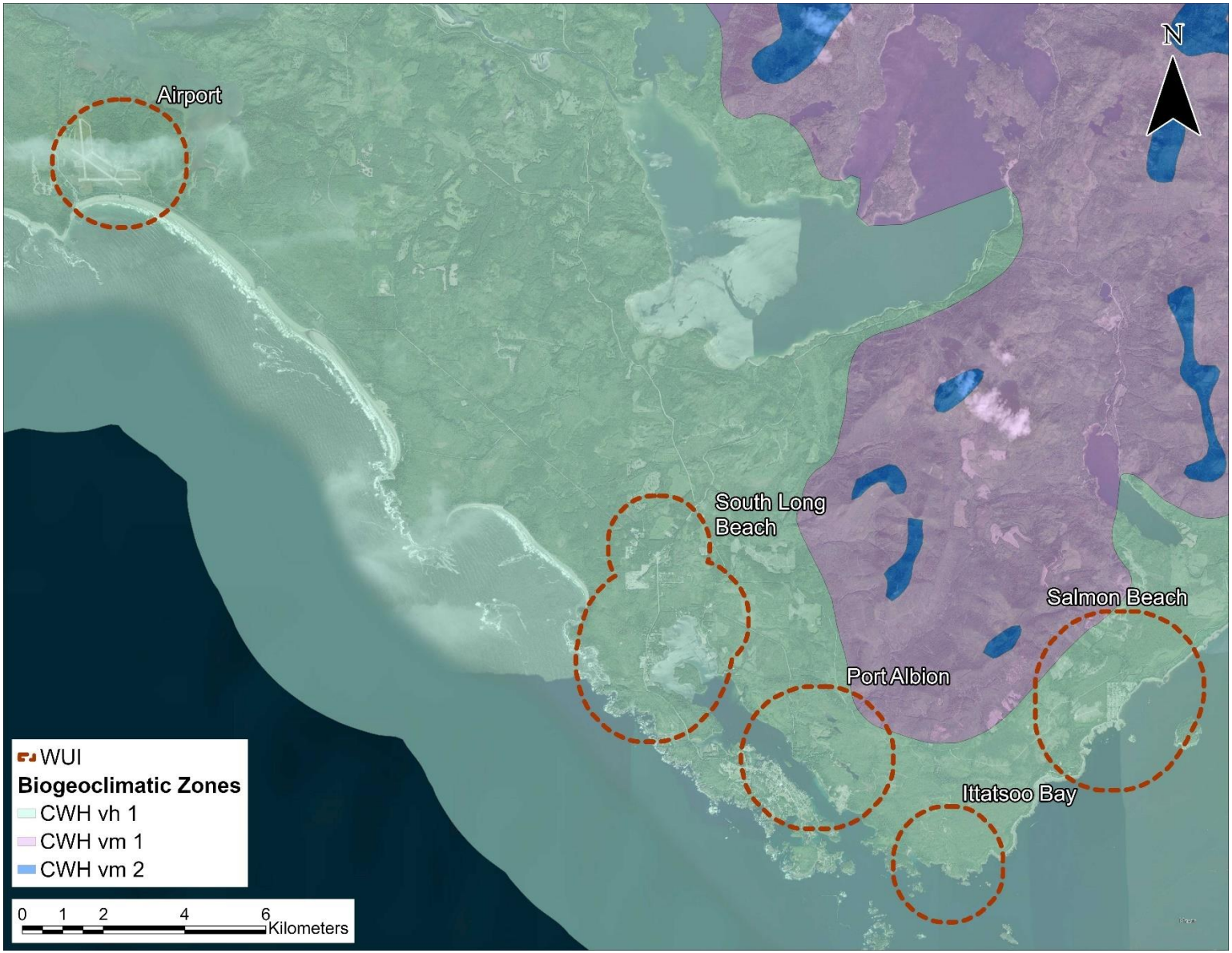


FIGURE 8: BIOGEOCLIMATIC (BEC) ZONES NEAR TO THE NEIGHBOURHOODS OF EA-C.

Forest Health

The EA - C is located in the Arrowsmith Timber Supply Area (TSA). Several health agents exist in the Arrowsmith TSA. Root diseases, especially *Phellinus* and *Armilaria,* summer drought, risk of fire, and losses to windthrow in partial harvest areas are of highest concern[18]. Forests in this area are moderately disturbed by forest harvesting. Trees in this area have historically been mature and windfirm. Currently, large swaths of forest adjacent to the Barkley FSR are experiencing dieback: potentially caused by prolonged drought conditions. Climate change-related forest health concerns are anticipated to become more prevalent. With reduced summer rainfall and higher average temperatures; drought will stress trees exacerbating existing forest health concerns.

Weather and Climate

Weather attributes including temperature, relative humidity, precipitation, wind speed and wind direction are critical factors in the ignition, spread, and duration of wildfires. Climate is the most important factor influencing the development of forest ecosystems, providing for vegetative fuel that interacts with daily weather to create the conditions for potential wildfire behaviour. EA – C has a coastal climate with short cool summers, and long winters with high precipitation and moderate temperatures. The climate is regulated by the ocean so there aren't extremes in temperature. The warmest month is August which gets an average high of 19°C. While the coolest month is December which gets an average low of 4°C[19].

The weather in communities of EA - C is very similar to that of the DoU. The local area has high seasonal precipitation variability with summer months getting significantly less rain. The months of July and August sees around 75mm of monthly precipitation on average, while November through January sees nearly 500mm of monthly precipitation on average. By contrast, on the east side of Vancouver Island, Nanaimo experiences the rain shadow effect from the Vancouver Island Ranges. The result is an average monthly precipitation of 30mm in the summer months and an average monthly precipitation of 150mm November through January. This means EA – C communities receive two and a half times more rain in the summer months, and over three times more rain in the winter months. The result is a temperate rainforest in the surrounding landscape that is typically not prone to fire ignitions. However, preliminary analyses of the future impacts of climate change suggest growing season moisture deficits will increase, particularly in southern and coastal BC[20]. Deficits occur where monthly precipitation is less than monthly evaporative demand (reflecting solar radiation, air temperature, relative humidity, and wind)[21]. Predicted impacts of climate change on the forested landscape near EA – C communities is discussed further in the Climate Change section below.

Wind influences fire behaviour and direction of fire spread and is summarized in the wind roses from the Tofino Long-Beach Airport weather station (Figure 9). The wind rose data is compiled daily at 12:00 p.m. local time and provides estimates of prevailing wind directions and wind speed. Throughout the duration of the wildfire season (middle of May to end of September), prevailing winds tend to blow primarily from the northwest.

[18] *https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/silviculture/silviculture-strategies/arrowsmith_tsa_irmp_situational_analysis_v1_4.pdf*
[19] *https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,ucluelet,Canada*
[20] *https://www.for.gov.bc.ca/hfd/pubs/docs/Tr/Tr045.htm*
[21] *https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/applied-science/2a_va_bc-climate-change-final-aug30.pdf*

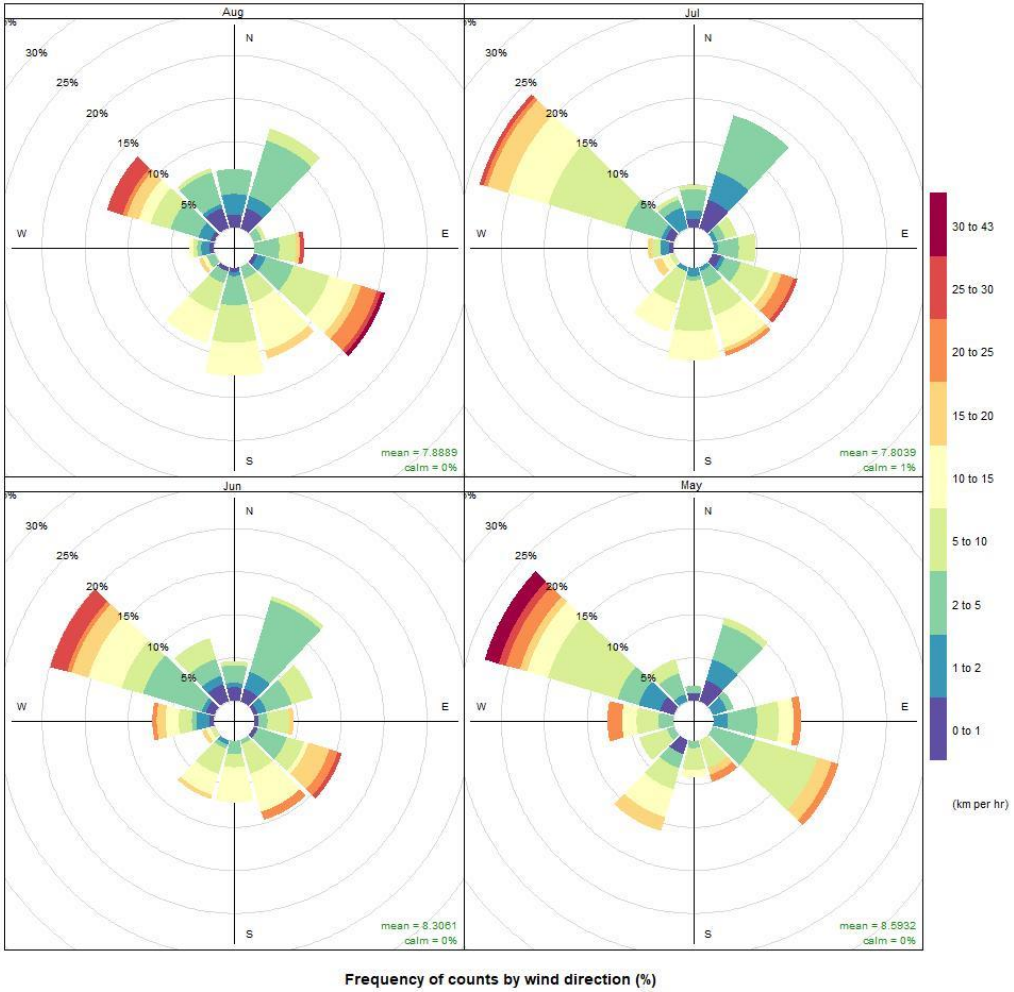


FIGURE 9: WIND ROSES DERIVED FROM THE TOFINO LONG-BEACH AIRPORT WEATHER STATION THROUGHOUT THE PEAK FIRE SEASON (MAY TO AUGUST) FOR YEARS 2015 TO 2022.

Climate Change

An important component of building community resiliency is recognizing the potential impacts of climate change and being proactive in preparing the community for those changes. Although wildfire historically has not been a significant natural ecosystem disturbance on the west coast of Vancouver Island, ecosystem structures and the disturbances acting on them may shift under a changing climate. Projections and predictions made utilizing the ClimateBC climate model program (Wang et al) were used to determine some basic potential future climate variables including precipitation and temperature in both the winter and summer seasonal windows on the landscape surrounding EA – C communities. Different ranges of 30-year increments were selected to represent three different future timeframes, 2011-2040, 2041-2070, 2071-2100. Recorded temperature and precipitation from a current year range of 1991-2020 was modeled using the same program and guidelines to ensure an even comparison. Each of these ranges were modeled to get a representation of the change over time the area could potentially experience in both temperature and precipitation, given predetermined climate change algorithms. A detailed summary of the model and algorithms used can be found in Appendix B: Climate Modeling Using Climate BC.

Appendix B: Climate Modeling Using Climate BC.

The following tables show the modeled values for seasonal temperature and seasonal precipitation for both the current period and each 30-year future period up to the year 2100.

TABLE 4: CLIMATE MODEL PROJECTIONS TABLE FOR WINTER PRECIPITATION (MM). BLUE PERCENT CHANGES DEPICT AN INCREASE IN OVERALL PRECIPITATION.

Time Period	Season	Precipitation Range (mm)	Difference (mm)	% Change
Current (1990 - 2020)	Winter	1115 - 2298	0	0
2040 (2011 - 2040)	Winter	1169 - 2425	+73	+ 6%
2070 (2041 - 2070)	Winter	1227 - 2542	+132	+ 11%
2100 (2071 - 2100)	Winter	1246 - 2589	+160	+ 13.5%

TABLE 5: CLIMATE MODEL PROJECTIONS TABLE FOR SUMMER PRECIPITATION (MM). BLUE PERCENT CHANGES DEPICT AN INCREASE IN OVERALL PRECIPITATION. YELLOW PERCENT CHANGES DEPICT A DECREASE IN OVERALL PRECIPITATION

Time Period	Season	Precipitation Range (mm)	Difference (mm)	% Change
Current (1990 - 2020)	Summer	247 - 614	0	0
2040 (2011 - 2040)	Summer	242 - 608	-1	- 0.27%
2070 (2041 - 2070)	Summer	241 - 613	+5	+ 1.36%
2100 (2071 - 2100)	Summer	231 - 589	-9	-2.45%

Table 4 above demonstrates a fairly steady increase in predicted precipitation during the winter season. Table 5 shows that changes in precipitation during the summer season over the next 80 years is uncertain and will likely be similar to current levels of summer precipitation. It is important to note that precipitation projections, particularly regional and seasonal patterns, contain much more uncertainty than temperature projections.

TABLE 6: CLIMATE MODEL PROJECTIONS TABLE FOR WINTER TEMPERATURE (°C). ORANGE PERCENT CHANGES DEPICT AN INCREASE IN RELATIVE TEMPERATURE

Time Period	Season	Temperature Range (°C)	Difference (°C)	% Change
Current (1990 - 2020)	Winter	(-1.4) - 5.8	0	0
2040 (2011 - 2040)	Winter	(-1.1) - 6.1	0.3	4.2%
2070 (2041 - 2070)	Winter	(-0.2) - 7	1.2	16.7%
2100 (2071 - 2100)	Winter	0.5 - 7.7	1.9	26.4%

TABLE 7: CLIMATE MODEL PROJECTIONS TABLE FOR SUMMER TEMPERATURE (°C). ORANGE PERCENT CHANGES DEPICT AN INCREASE IN RELATIVE TEMPERATURE

Time Period	Season	Temperature Range (°C)	Difference (°C)	% Change
Current (1990 - 2020)	Summer	11.4 - 15.6	0	0
2040 (2011 - 2040)	Summer	12.3 - 16.5	0.9	21.4%

Time Period	Season	Temperature Range (°C)	Difference (°C)	% Change
2070 (2041 - 2070)	Summer	13.2 - 17.4	1.8	42.9%
2100 (2071 - 2100)	Summer	14 - 18.2	2.6	61.9%

Table 6 and Table 7 above demonstrate that temperatures in both the winter and summer seasons are predicted to increase significantly in the next 80 years, relative to current temperature ranges. Therefore, winters near to EA – C communities are predicted to be warmer and wetter, with a predicted increase in extreme storm and wind events. Of particular concern is a greater than 60% predicted increase in summer temperatures by 2100, with little predicted changes in precipitation. If summers on the west coast become warmer with similar precipitation patterns or slightly less precipitation, this can have substantial impacts on terrestrial communities and tree survival. Preliminary analyses suggest growing season moisture deficits will increase in coastal BC[22]. Moisture deficits occur where monthly precipitation is less than the monthly evaporative demand (reflecting solar radiation, air temperature and humidity, and wind). Moisture deficits and potential for resulting tree mortality can cause both increased ignition potential and fuel build up on coastal areas.

Wildfire History

Historically, the rare stand-initiating disturbance events and are categorized as a Natural Disturbance Type (NDT) 1. Disturbance events are dominated by large wildfires with a return interval of approximately 125 years[23], resulting in large areas of even-aged regenerating stands. EA – C is dominated by wet temperate rainforests, and has relatively few topographic features. As a result, fires around the EA – C have been infrequent and relatively small (<50 Ha). The last significant wildfire in the EA – C WUI was in 1958 near the Tofino Airport which burned just over 25 hectares (Figure 8). The Ucluelet Fire Department regularly responds to beach fires left overnight, but has had only one wildfire in the past 3 years.

An interview with Joshua Macy, Wildfire Officer for the Mid Island Fire Zone - Errington/Port Alberni, provided insight into the wildfire behaviour and history on the west coast of Vancouver Island. There are little to no natural occurrence of fires and no known history of cultural burning by local First Nations. Fires in the area are human caused and typically occur in artificially created fuel types ie. open grass, slash, and under very specific weather conditions. Recreational fire ignitions are more common inland towards the Kennedy Lake area. Fire ignitions rarely grow to be over a few hectares and remain on the ground as surface fires.

[22] https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/applied-science/2a_va_bc-climate-change-final-aug30.pdf

[23] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/cariboo-region/cariboochilcotin-rlup/biodiversity_guidebook.pdf

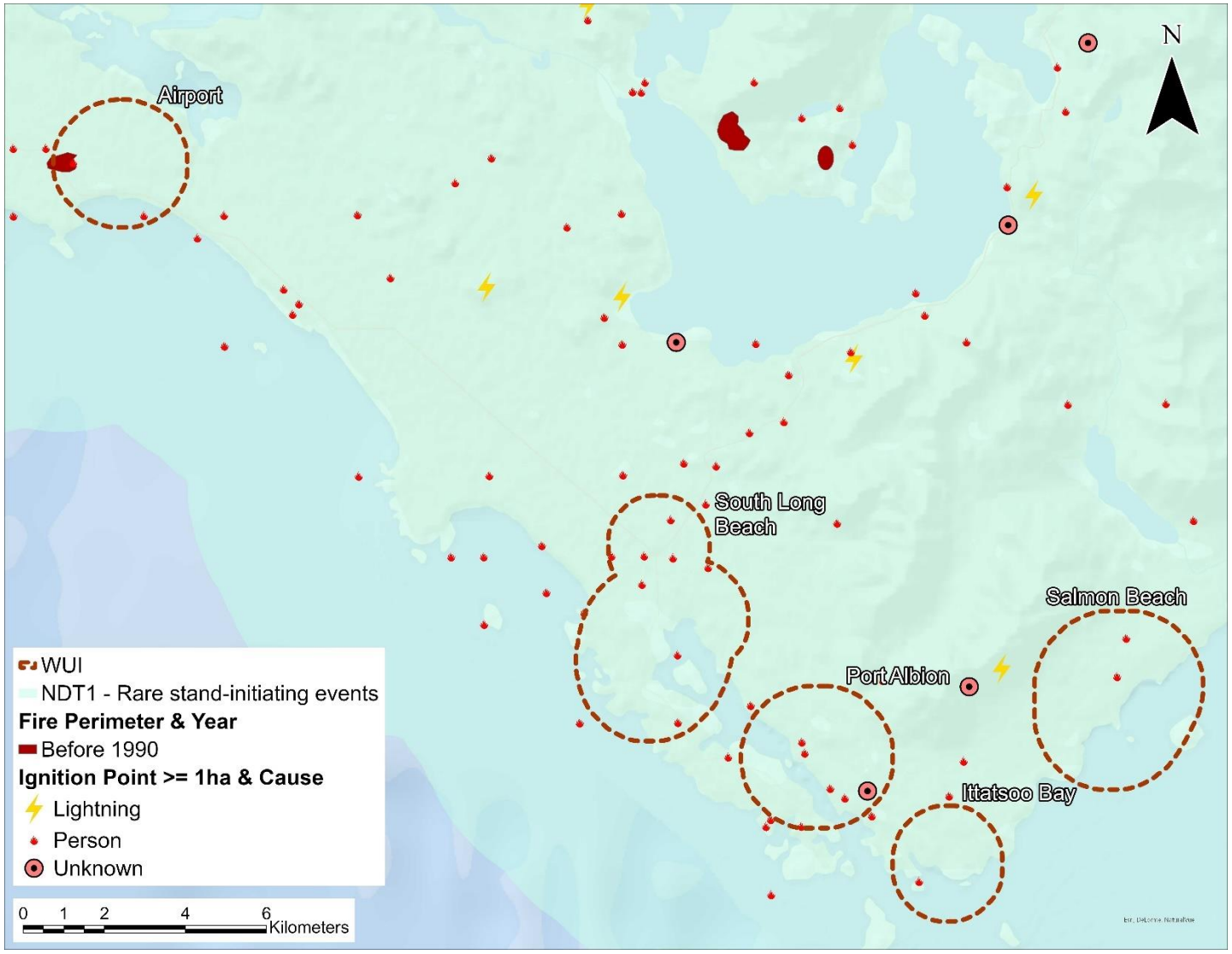


FIGURE 10: FIRE HISTORY OVERVIEW MAP INDICATING NATURAL DISTURBANCE TYPE (NDT) REGIMES, EXTENT OF HISTORICAL FIRE PERIMETERS, AND LOCATIONS OF WILDFIRE IGNITIONS RESULTING IN FIRES ONE OR MORE HECTARES IN SIZE.

Fuel Types

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and sixteen fuel types modeled based on characteristic fire behaviour within common boreal vegetation under defined weather conditions[24]. In general, fuel types are defined in the FBP System by overall vegetation structure, dominant overstory species, and understory, ladder fuel, and forest floor characteristics[25]. Fuel typing is a subjective process, as many of the vegetation communities of BC are not suitably represented by the boreal-based FBP fuel types. Therefore, the most appropriate fuel types were assigned based on best-available scientific research and information, professional experience, and practical knowledge. There are notable limitations with the fuel typing system for the purpose of this CWRP including: a fuel typing system designed to describe fuels which do not occur within the AOI, fuel types which cannot accurately capture the natural variability within a spatial polygon, and limitation in the data used to create the initial fuel types. The most prevalent forested fuel types within the established ACRD WUI are: C-5 (47%), D-1/2 (14%), M-1/2 (4%), and C-3 (2%) (Figure 11).

Table 8 below provides further description of each of the prevalent fuel types. C-3 fuel types are considered the most hazardous fuel types identified within the WUI, with high likelihood of crown fire and spotting potential. C-5 fuel types generally have a moderate potential for active crown fire, however this potential can increase when wind-driven and/or under drought conditions. M-1/2 fuel types can be hazardous depending on the percent composition of conifers in the overstory and understory. The D-1/2 fuel type is considered low hazard for crown fire or spotting potential due to high moisture retention in foliage, with fires primarily burning as a surface fire with low-moderate intensity and rate of spread.

TABLE 8: FUEL TYPES IDENTIFIED WITHIN THE WILDLAND URBAN INTERFACE OF ACRD EA – C. FUEL TYPES IDENTIFIED WITHIN THE WILDLAND URBAN INTERFACE OF ACRD EA – C.

Fuel Type	FBP/ CFDDRS Description	BC/AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type- Crown Fire/ Spotting Potential
C-3	Mature jack or lodgepole pine. Stands that have matured at least to the stage of complete crown closure.	Dense immature stands containing Douglas fir, western redcedar and/or western hemlock. Understory conifer layers may be present.	Surface and crown fire, potential for very high fire intensity and rate of spread	High
C-5	Mature stands of red pine and eastern white pine. The understory is of moderate density of	Mature, low density coastal vegetation communities of mature Douglas-fir, western hemlock and/or western	Under drought conditions, fuel consumption and fire intensity can be	Low-Moderate

[24] https://cfs.nrcan.gc.ca/publications?id=10068

[25] *Perrakis, D. and G. Eade. 2015. BC Wildfire Service. Ministry of Forests, Lands, and Natural Resource Operations. British Columbia Wildfire Fuel Typing and Fuel Type Layer Description 2018 Version.* https://cfs.nrcan.gc.ca/publications?id=39432

Fuel Type	FBP/ CFDDRS Description	BC/AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type- Crown Fire/ Spotting Potential
	conifers and/or deciduous shrubs.	redcedar. High crown base height and high deciduous shrub component. Often accompanied by dead woody fuel accumulations.	higher due to dead woody fuels	
D-1/2	Pure aspen stand (leafless and green). A conifer understory is noticeably absent.	Deciduous stands with greater than 80% deciduous overstory composition.	Always a surface fire, low to moderate rate of spread and fire intensity	Very Low
M-1/2	Boreal mixed wood (leafless and green) comprised of various coniferous and deciduous species.	Moderately well-stocked mixed stand of conifers (20-80%) and deciduous species, low to moderate dead, down woody fuels.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)	<26% conifer (Very Low); 26-49% Conifer (Low-Moderate); >50% Conifer (Moderate-High)

The original provincial PSTA fuel type dataset was relatively accurate, with the exception of stands mapped as C-5. Overall, the existing PSTA wildfire threat and subsequent wildfire risk did not change significantly and remained within the same threat classification (low, moderate, high, extreme). For these particular fuel type change polygons, both wildfire threat and wildfire risk were determined to be moderate. During the field data collection process, the following fuel type error was noted in the provincial dataset:

- **M-1/2 incorrectly mapped as C-5**

The above fuel type changes were approved by the acting Provincial Fire Management Specialist, Dana Hicks. A revised local PSTA threat score was determined for those updated fuel type polygons where a wildfire threat assessment worksheet had been completed based on stand attributes verified in the field. Subsequently, the local wildfire risk for these updated polygons was determined based on the updated local PSTA fire threat, using the applicable BCWS guidance document[26]. These results can be found in Appendix A: Determining Wildfire Threat and Risk at a Local Level Based on Updated Fuel Types.

[26] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_determining_wildfire_threat_and_risk_at_a_local_level.pdf*

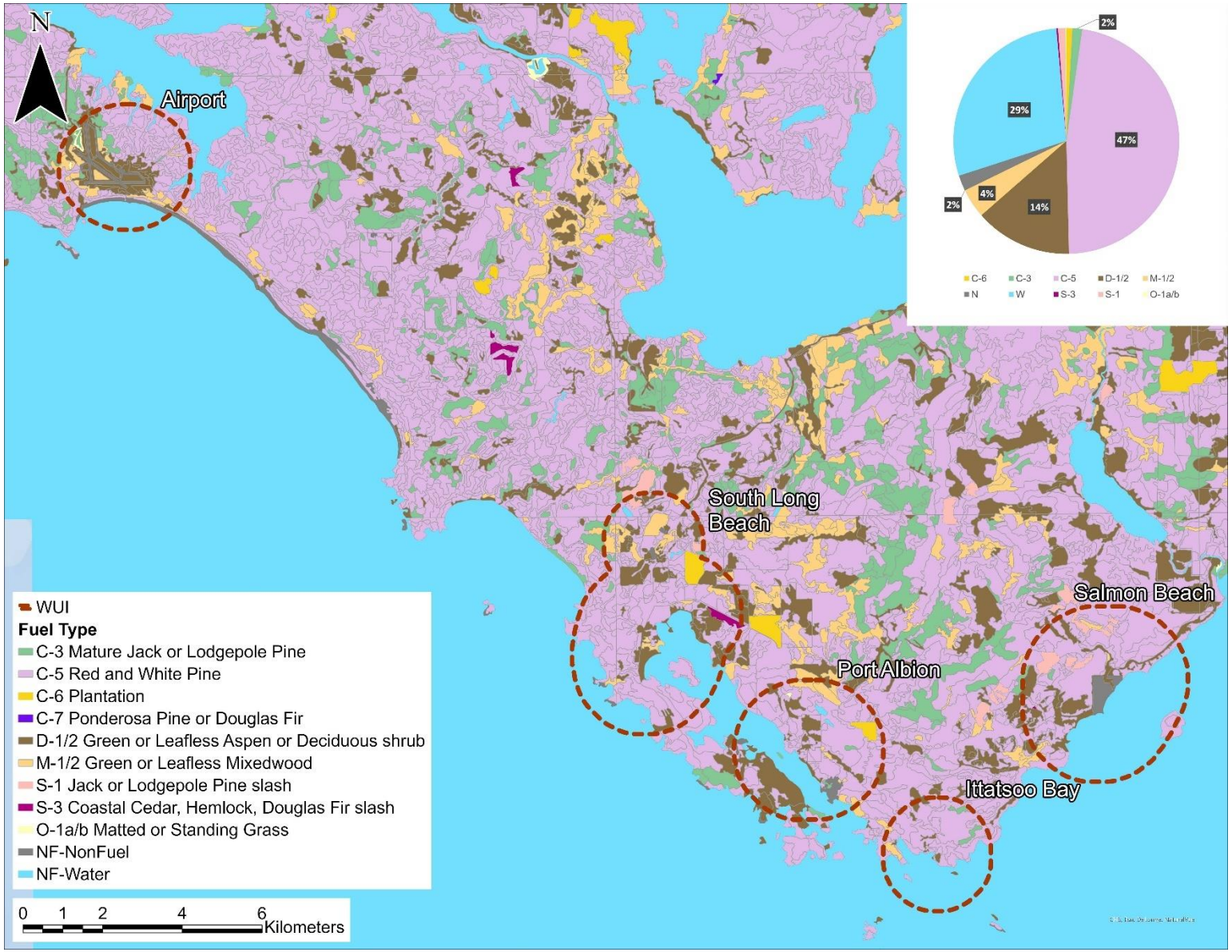


FIGURE 11: FIGURE 11: FUEL TYPES WITHIN THE WUIS AND SURROUNDING AREAS.

Canadian Forest Fire Danger Rating System (CFFDRS)

The national Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. Fire Danger Classes provide a relative index of how easy it is to ignite a fire and how difficult control is likely to be. A network of fire weather stations is maintained throughout the province during the fire season by the MFLNRORD, and the recorded data are used to determine fire danger represented by Fire Danger Classes on forest lands within/around a community. The fire danger information can be obtained from the BCWS and is most commonly utilized by municipalities and regional districts to monitor fire weather, restrict high risk activities when appropriate, and to determine hazard ratings associated with bans and closures.

The BC *Wildfire Act* [BC 2004][27] and *Wildfire Regulation* [BC Part 3/2021][28] specify responsibilities and obligations with respect to fire use, prevention, control, and rehabilitation, and restrict high risk activities based on Fire Danger Classes. The five Fire Danger Classes are defined as follows:

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

It is important for the development of a fire prevention program to determine the average periods of exposure to high and extreme fire danger. Around communities in EA – C there have been no "high" or "extreme" danger days in the period between years 2015 and 2022. However, less extreme danger days can still require significant resources for suppression.

[27] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/04031_01
[28] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/11_38_2005

Fire Threat: PSTA

The Provincial Strategic Threat Analysis (PSTA) Fire Threat Rating is a spatial dataset developed by the BC Wildfire Service to assess and predict potential wildfire threat and risk to values, utilizing three primary inputs including: fire occurrence density, spotting impact, and head fire intensity[29]. Values ranging from 1 to 10 are generated based on an average weighting process of the aforementioned three inputs. The values were then grouped into the following general threat class descriptions: **low (1-3); moderate (4-6); high (7-8); and, extreme (9-10).** Water bodies were automatically given a value of 'no threat' (-1). The PSTA analysis has historically not been completed for private land, so private land is automatically given a value of 'no data' (-2).

Near communities within EA – C, wildfire hazard is generally low throughout. The Port Albion region across the Ucluelet inlet has the highest identified wildfire threat in the Ucluelet fire protection area based on knowledge from local wildfire officer Joshua Macy. Figure 12 shows the breakdown of PSTA fire threat rating values within and around EA – C communities. A medium proportion (29%) of the WUI is classified as 'no threat' due to the surrounding water. The high proportion of private land within the WUI has resulted in 20% of its classified area as having 'no data' available. The remaining data 51% of the area is broken down as follows: 39% Moderate, 11% Low, and 1% High. The surrounding forested C-5 and C-3 fuel types have an overall threating rating of **Moderate**. From this, we can assume that the forested C-5 and C-3 areas on private land also have a fire threat rating of Moderate. Deciduous forests will have a fire threat rating of Low.

[29] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020-wildfire-threat-assesment-guide-final.pdf*

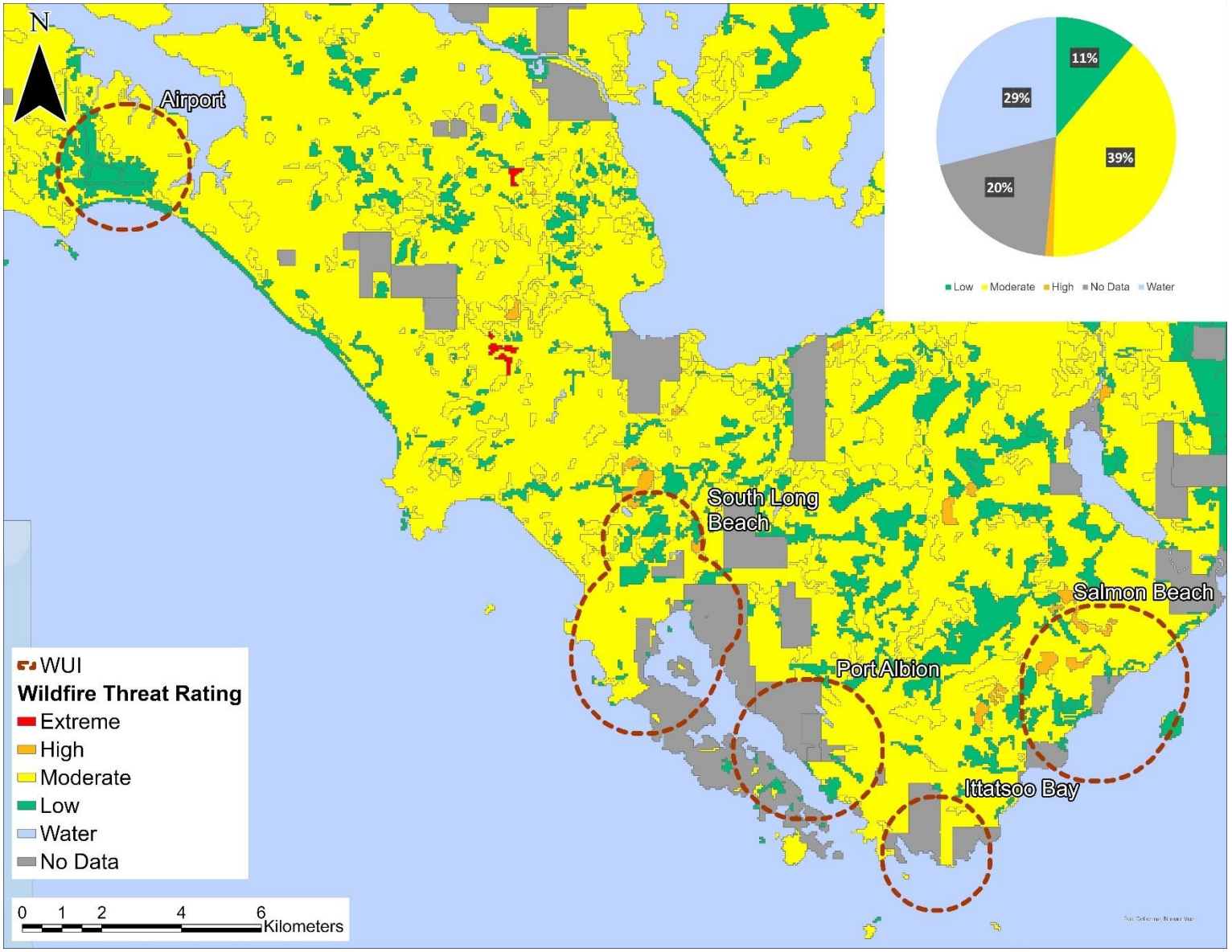


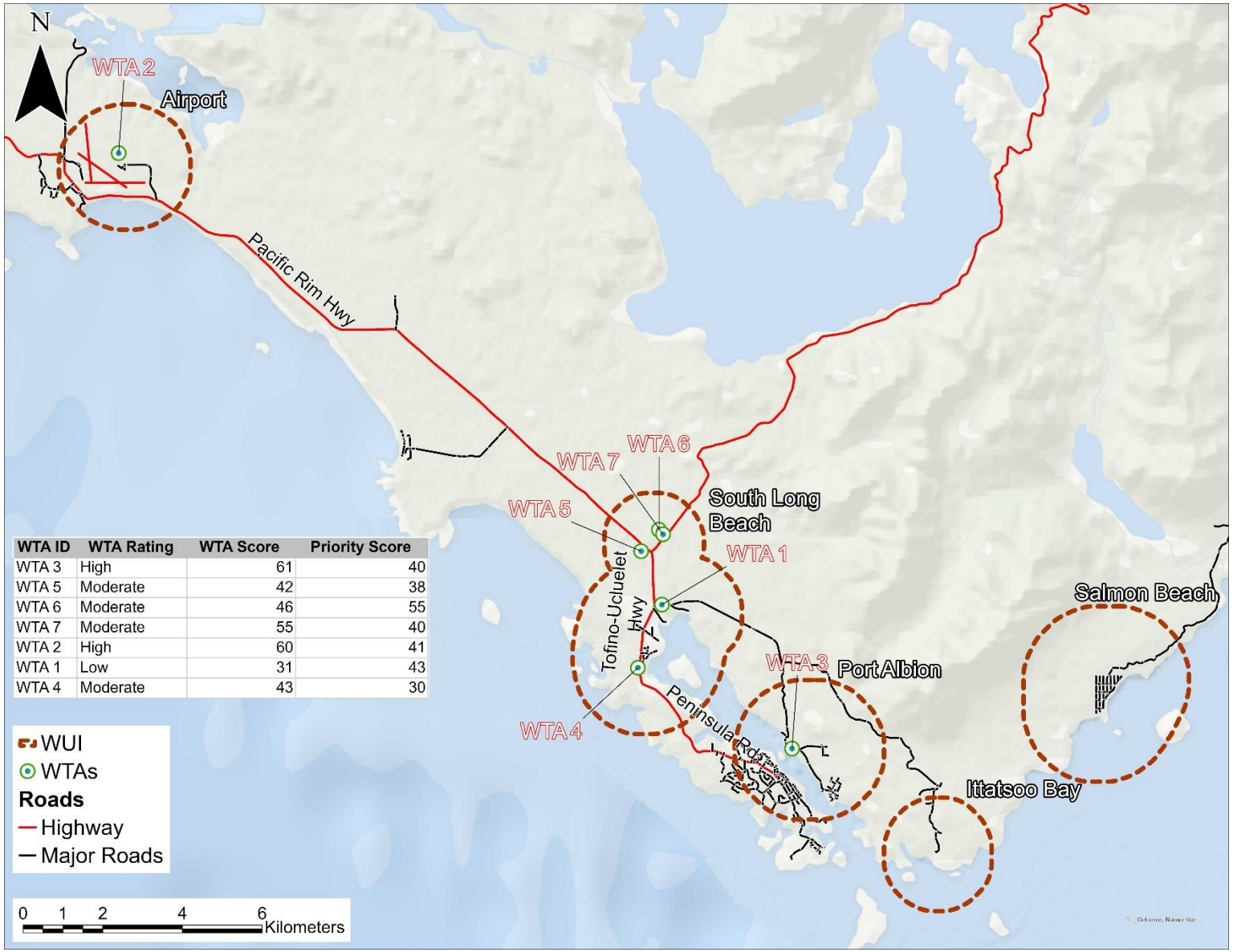
FIGURE 12: PROPORTION OF EACH PSTA THREAT RATING CLASS WITHIN THE WUIS.

Local Wildfire Threat Assessment

Part of the process of developing this CWRP involves on-the-ground verification and assessment of local vegetation types and the inherent wildfire threat of forested areas within and around a community. Wildfire threat is assessed using the Wildfire Threat Assessment (WTA) tool developed by BC Wildfire Service[30], which focuses on forest stand attributes and fuel structure, independent of fire weather and other fire behaviour components which are contained in the PSTA data.

The author completed field verification and wildfire threat analysis for the EA – C WUI (Figure 13). Seven Wildfire Threat Assessments were completed in various forested areas (Figure 13); 57% of assessed areas achieved a wildfire threat rating of **Moderate**, 29% a **High** threat rating, and 14% a **Low** threat rating. High threat ratings were associated with either higher cover of horizontally continuous fuel or an increased presence of large woody debris. Figure 13 below contains a table outlining the wildfire threat rating for each completed WTA.

[30] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020-wildfire-threat-assesment-guide-final.pdf*



WTA ID	WTA Rating	WTA Score	Priority Score
WTA 3	High	61	40
WTA 5	Moderate	42	38
WTA 6	Moderate	46	55
WTA 7	Moderate	55	40
WTA 2	High	60	41
WTA 1	Low	31	43
WTA 4	Moderate	43	30

FIGURE 13: WILDFIRE THREAT ASSESSMENTS (WTA) COMPLETED THROUGHOUT THE EA - C WUI AREAS.

Local Wildfire Risk Assessment

Stand attributes, fuel structure and landscape data collected in the WTA are used in conjunction with the provincial PSTA Wildfire Density and Spotting Impact spatial datasets to develop a new PSTA Fire Threat Rating that more accurately reflects local characteristics.

The Relative Risk Classification scoring system is outlined in the BCWS document *Determining Wildfire Threat and Risk at a Local Level*[31] and is summarized in Table 9 below. A detailed breakdown of the risk assessment inputs and methodology can be found in Appendix A: Determining Wildfire Threat and Risk at a Local Level Based on Updated Fuel Types.

TABLE 9: THE WEIGHTED WILDFIRE RISK SCORE (OUT OF 10) AND THE CORRESPONDING RELATIVE WILDFIRE RISK CLASSIFICATION FROM THE BCWS DETERMINING WILDFIRE THREAT AND RISK AT A LOCAL LEVEL DOCUMENT.

Relative Wildfire Risk Classification	Weighted Wildfire Risk Score
Low	0 - 3.9
Moderate	4 – 6.9
High	7 – 8.9
Extreme	9 - 10

The new PSTA Fire Threat Rating is then used along with landscape and topographic data to develop an overall wildfire risk score and relative risk classification (Table 10). Wildfire risk differs from wildfire threat in that it takes into consideration the proximity of human values to the vegetated area being assessed. Determining wildfire risk helps foresters identify vegetative areas within or around a community that would benefit from vegetative and fuel management treatments to help reduce the overall threat to surrounding values.

TABLE 10: REVISED LOCAL WILDFIRE THREAT SCORE BASED ON WTA DATA AND TOPOGRAPHICAL FEATURES USED TO CALCULATE OVERALL WILDFIRE RISK SCORES AND CLASSIFICATION. WEIGHTING FOR EACH INPUT IS SHOWN IN BRACKETS.

WTA ID	Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope % (5%)	Total Wildfire Risk Score	Relative Risk Classification
1	1.8	8	10	1	1	6.0	Moderate
2	5.4	8	10	1	1	7.1	High
3	5.3	8	10	1	1	7.1	High
4	3.5	8	10	1	1	6.6	Moderate
5	3.5	8	5	1	1	5.1	Moderate
6	3.5	10	10	1	1	7.2	High
7	3.5	8	5	1	1	5.1	Moderate

[31] https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_determining_wildfire_threat_and_risk_at_a_local_level.pdf

FIRESMART DISCIPLINES

EDUCATION

Public education and outreach efforts help community members learn about wildfire and its potential impacts to their communities. In addition, these efforts should be designed to help individuals understand their role in taking action to reduce risk. Education and outreach activities are designed for all groups to benefit, including elected officials, community planners, residents, visitors, businesses, land managers, first responders, and more.

Effective education is important to inform community members about the risk of wildfire and ways to minimize the risk in the WUI. It is important that information is shared accurately and clearly to be effective at informing the target audience. The following sections will identify areas to focus on, delivery methods and actions to provide education.

FireSmart BC[32] and FireSmart Canada[33] provide several resources that are available to communities to use to learn about reducing their risk of wildfire. These websites provide a number of resources such as brochures, video, posters, and guidebooks that can be distributed within the community. Also, community websites and social media accounts are valuable resources to connect with the community and a broader audience and to distribute information from FireSmart Resources. It is important to put regular updates on website and social media accounts about FireSmart information, events, meetings, and informing on the publication of the CWRP.

There are a number of training programs through FireSmart BC that can help educate the community, such as Neighbourhood champion, FireSmart 101 and Local FireSmart Representative (LFR) training. The Neighbourhood champion workshop[34] is a half-day workshop delivered by a Local FireSmart Representative that is aimed at community members that want to help implement the FireSmart Canada's Neighbourhood Recognition Program or want to serve as a Neighbourhood Champion to advocate for wildfire safety. Local FireSmart Representatives[35] are individuals trained to understand the wildland fire hazard assessment process and appropriate wildfire mitigation measures available to individuals or small groups of homes. To become an LFR, community members can take the FireSmart 101 course. FireSmart 101[36] is an online course that provides an ample introduction to FireSmart. It educates participants about the WUI, the importance of FireSmart, and the seven FireSmart principles. Then community members will need to sign up for an LFR workshop. The LFR workshop is designed to assist participants in becoming familiar with and implement all components of the FireSmart Canada Neighborhood Recognition Program (FCNRP).

FireSmart Canada's Neighbourhood Recognition Program[37] educates community members on how to increase their home's chance of survival in the event of a wildfire through proactive actions, while encouraging neighbours to work together to reduce losses and damage. The more neighbourhoods that become recognized, the safer the community is as a whole. The mitigation actions that are developed for the FireSmart Neighbourhood Recognition Program align with the recommendations of this CWRP. Homeowners are encouraged to implement FireSmart

[32] https://firesmartbc.ca/
[33] https://www.firesmartcanada.ca/
[34] https://www.firesmartcanada.ca/programs-and-education/neighbourhood-recognition-program/become-a-firesmart-neighbourhood/firesmart-community-champion-workshops/
[35] Courses | FireSmart BC
[36] FireSmart 101 | FireSmart (firesmartcanada.ca)
[37] How to apply for the FireSmart Canada Neighbourhood Recognition Program (FCNRP) | FireSmart BC

recommendations around their homes to further increase their home's chance of survival; the most important zone is the first 1.5m around the home (non-combustible zone).

Current Status and Action Planning

Earlier this year, the ACRD hired a FireSmart Coordinator to facilitate and manage their FireSmart program. The ACRD provides FireSmart information on their website,[38] including information on the home assessments and rebate program, as well as resources such as the FireSmart homeowner's manual, landscaping guide, evacuation checklist, and fact sheets. The ACRD offers a Call and Receive service for Alberni Valley residents looking to remove non-FireSmart vegetation from around their homes. The service has been successful in urban areas but less so in rural areas.

The FireSmart Coordinator is responsible for the whole regional district and is based out of Port Alberni. This makes outreach to communities of EA-C challenging as they are all about 90 min away, nearby to the DoU. Residents of EA-C are welcome to attend FireSmart events in the DoU. However, these events are not targeted. The barriers to outreach also limit the distribution of FireSmart promotional resources. The following are recommended action items for the ACRD to increase FireSmart awareness, education and action in communities in EA-C:

Action #2: Although the ACRD currently has a FireSmart Coordinator, Area C shares one with five other electoral areas. It is recommended that the ACRD look for ways to hire a FireSmart Coordinator more locally. One option would be to build a regional partnership with the DoU and share a halftime Coordinator.

Action #3: Hold a FireSmart event/open house to introduce FireSmart concepts to community members and educate them on things they can do around their homes to reduce fire hazard. This should be held annually in a central public location between May and October.

Action #4: Distribute FireSmart promotional resources to members of the public at local businesses, FireSmart events, or other community events.

Action #5: Promote/encourage and complete FireSmart Home Assessments and promote/encourage participation in the FireSmart rebate program on private property for those community members who are interested. Provide recommendations on actions they can take to make their homes more FireSmart and reduce the risk of loss and damages in the event of a wildfire.

Action #6: Assist homeowners with removal of hazardous vegetation and debris around their homes by:

I. Organizing Community Chipper Day(s) and/or Community Cleanup Day(s), and

II. Expand the ACRD's Call and Receive Service to EA - C.

Action #7: Have the neighbourhoods of South Long Beach, Port Albion, Salmon Beach, Midlands, Uplands, and Ittatsoo Bay apply for FireSmart Canada's Neighbourhood Recognition Program. Once recognized, annually renew for FireSmart Recognition.

[38] *https://www.acrd.bc.ca/firesmart*

LEGISLATION AND PLANNING

Legislation and Regulation can be a very effective tool for reducing wildfire risk on provincial crown lands and within the administrative boundaries of a local government or First Nation community. Provincial acts and regulations provide the means for local governments and First Nation communities to implement wildfire risk reduction actions through by-laws.

Bylaws

The following bylaws relating to wildfire protection currently exist for the EA - C:

South Long Beach (Area C) Official Community Plan (OCP), Bylaw No. P1166, 2007

Provides guidance for land use, development, and community evolution throughout EA – C amongst other goals and objectives.

Subsection 1.2.2 – Challenges and Opportunities – Background:

Within the Community Services segment of this subsection, the coverage of the DoU's Fire Department is said to extend out to the Tofino-Ucluelet Highway properties until Pacific Rim Park, and out to properties on Port Albion Road as far as the "bailey" bridge. Fire protection in the Port Albion neighbourhood is identified to be inadequate. Properties along Barkley Sound including Salmon Beach are said to rely on their own resources for fire protection.

Subsection 3.6.2 – Natural Hazard Areas Policies:

b) The Alberni Clayoquot Regional District encourages the provision of a 10-metre buffer between buildings and forested areas in new subdivisions adjacent to forestland and woodlots of 20 hectares or more, in order to provide a fuel-free zone for fire protection.

c) The Alberni Clayoquot Regional District encourages all public and private development activities, subdivision and rezoning applications – including road crossings, utility rights-of-way and trails – to be planned and implemented in a manner that will reduce risks associated with forestry interface fires.

e) The Alberni Clayoquot Regional District encourages property owners to adhere to the relevant Provincial guidelines to protect properties and communities from wildfire risk.

Section 4.0 Goal 2: To Retain Rural Character:

The OCP states that the community wishes to maintain its rural character and that it does not wish to become a "full service" community or to merge with the DoU.

Subsection 4.4.2 – Rural Residential Comprehensive Development Area Policies:

q) Infrastructure and services will be designed using appropriate development standards, including green infrastructure, and FireSmart principles.

Subsection 5.7.2 – Resource – Private Forestry Policies:

h) The Alberni Clayoquot Regional District encourages forestland owners and owners of adjacent residential properties to manage trees and vegetation in a manner that avoids fire risk.

Subsection 6.1 – Community Services Objectives:

f) To improve fire protection

Subsection 6.3.2 – Drinking Water Policies:

e) The Alberni Clayoquot Regional District will continue to work with the DoU and senior levels of government to resolve the issue of water for fire protection in Port Albion.

Subsection 6.7.1 – Fire Protection and Emergency Services Objectives:

a) To provide adequate and efficient fire protection for all residents of South Long Beach.

Subsection 6.7.2 – Fire Protection and Emergency Services Policies:

a) The Alberni Clayoquot Regional District will work with the DoU to establish emergency plans and procedures for the protection of all residents and visitors.

b) The Alberni Clayoquot Regional District will work with the DoU, First Nations and property owners to establish adequate levels of fire protection within fire protection areas supported by the community.

c) The Alberni Clayoquot Regional District will work with the Yuułuʔiłʔatḥ and residents to provide access to bulk water for fire protection purposes for the Port Albion area.

Fireworks Control, Bylaw No. 219, 1977

A bylaw to prohibit the sale and regulate the discharge of firecrackers and fireworks.

1. Prohibits the sale or disposal of firecrackers and fireworks in the ACRD.

2. Prohibits the explosion of firecrackers and fireworks in the ACRD.

3. Allows for organizations to apply for permits to use fireworks for a special event or festival.

Authorization of the South Long Beach Fire Protection Services Agreement, Bylaw No. A1044, 2002

A bylaw to authorize the ACRD to enter into a service agreement with the DoU to provide fire protection services to a portion of EA – C.

Long Beach Emergency Planning Service Establishment, Bylaw No. E1059, 2019

A bylaw to establish a service to provide for emergency planning and response for EA – C.

The Building Bylaw, Bylaw No. PS1011, 2021

A bylaw to provide for the administration of The Building Code.

Subsection 12 – Responsibility of Owner During Construction:
2) During the progress of work, request the Building Inspector to make or cause to be made the following inspections…

c) when framing and exterior sheathing of the building are complete, including fire-stopping…

Outdoor Burning Smoke Control Regulation, Bylaw No. R1032, 2021

Campfires and two types of open fires (A with smaller vegetative debris and B with larger vegetative debris) are described in subsection 2. Campfires and category A and B fires require fire-fighting equipment including a shovel, a rake, and a connected hose to be on-hand, and require that a competent person be present at all times during burning to control the fire. Campfires are permitted at any time with a minimum distance of 5 m from any building, structure or property line. Category A and B open fires are permitted between March 1 and April 30, and between September 15 and November 15. Category A Open Fires are restricted to be 2 m from any vegetation or

combustible materials, 5 m from any building or structure, and 10 m from any property line. Category B fires require the establishment of a fuel break surrounding the fire.

Provincial Acts and Regulations

BC Building Act and Building Code

The building act provides consistency in technical building requirements across BC and sets training and qualification requirements for building officials.

BC Open Burning and Smoke Control Regulations

BC Open Burning Smoke Control Regulation (OBSCR) covers open burning of wood debris (vegetative material) to manage smoke and fine particulate matter from contributing to poor air quality[39]. OBSCR has requirements that pertain to burning for community wildfire risk reduction. The OBSCR requires anyone conducting an open burn for wildfire risk reduction to submit the plan to a director, to give notification to the community about the burn plan, that a ventilation forecast is "good" or "fair", and that the burn is completed within a day[40].

BC Wildfire Act and Wildfire Regulations

BC *Wildfire Act* and Regulation sets out legal responsibilities and obligations for everyone in BC that are enforceable during bans and restrictions[41]. This Act and regulations could impact this CWRP recommendations and treatments when a provincial fire ban is in effect.

Federal Acts and Regulations

Canada Federal Fisheries Act

The Federal *Fisheries Act*[42] is in place to provide a framework for the management and control of fisheries in Canada, as well as conservation and protection of fish and fish habitat. Any wildfire prevention and mitigation treatments that could impact fish or fish habitat, including riparian areas will need to adhere to the legal requirements of this Act.

Canada Federal Species at Risk Act (SARA)

SARA[43] is federal legislation to prevent species from extinction and/or extirpation in Canada and provide recovery strategies for extirpated, endangered, and threatened species, as well as prevent species of concern from becoming threatened or endangered. The CWRP treatments and recommendations will need to consider species at risk and follow the requirements and prohibitions set out in SARA.

Legislation and Planning: Current Status and Action Planning

The OCP for EA – C mentions fire protection which broadly support the improvement of this service. The OCP states that EA – C should work with the DoU and First Nations property owners to achieve this. It also does generally encourage the adoption of FireSmart principles for the development of new structures and buildings. The OCP could be revised as it was developed in 2007. Bylaws within EA – C exist to address the control of: fireworks, smoke emissions from fires, and permissible fire types and conditions for their allowance. Development bylaws

[39] https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/openburningregulation
[40] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/152_2019/
[41] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/governance/legislation-regulations
[42] https://laws-lois.justice.gc.ca/eng/acts/f-14/
[43] https://laws-lois.justice.gc.ca/eng/acts/S-15.3/

require inspection for fire-stopping but do not explicitly identify FireSmart construction materials or landscaping practices. The following bylaw exists in regard to emergency planning and response within Area C:

Bylaw E1059 states: "*A bylaw to establish a service to provide for Emergency Planning and Response for Electoral Area "C" (Long Beach)*": The Long Beach Emergency Plan provides authority to activate the plan with the Protective Services Manager or designate and Chief Administration Officer or designate. Further guidance is provided in the plan's emergency response guidelines to the specific hazard.

Action #8: Consider developing a Wildfire Development Permit (WDP) bylaw ideally along with a Wildfire Development Permit Area (WDPA, see below). A WDP bylaw would regulate how and where new home builds follow FireSmart. Details specified should include:

I. Housing materials (siding material, decking and windows), and

II. Vegetation reduction and new planting in and around homes/businesses.

Action #9: Develop an ACRD-wide FireSmart communication strategy outlining a process and timeline to effectively educate community members on wildfire risk and how to participate in FireSmart.

DEVELOPMENT CONSIDERATIONS

Development decisions, such as land use types, structure density, road patterns, and other considerations, shape the built and natural environments. These decisions can bring lasting impacts to the WUI and wildfire risk by affecting public and first responder safety and survivability of homes, critical infrastructure, and other community features. Considering these factors early in the development process can reduce wildfire risk to life, safety, and property.

The ACRD EA-C has seen a 29% increase in population since 2016. As the region has become a popular tourist destination the community has steadily grown. As a result, the region gets a large influx of residents during the summer months. Increases in the number of people utilizing forests around the ACRD increases the likelihood of ignitions. It will be important to consider wildfire threat for new building and structure developments. Additionally, residential and other development in rural areas that are in proximity to forested areas are at higher risk from wildfires, with a higher importance for FireSmart development policies.

New development should consider some of the following strategies to reduce the chances of structural losses from wildfire:

- Use of fire-resistant exterior construction materials within the established development permit area, following FireSmart recommendations and standards.
- Inclusion of minimum setbacks from forested edge and top of slope based on FireSmart principles.
- Use of FireSmart landscaping (low flammability plants, appropriate spacing and low flammability aggregates/ ground cover based on FireSmart principles).
- Mitigation of fire hazard through fuel management activities based on qualified professional recommendations (prescriptions and oversight).
- Prompt removal of combustible construction materials, thinning/ fuel management debris, or clearing debris during the fire season.
- Review and approval process for submitted applications.
- Post-development inspections and sign-offs.
- Enforcement and regulation (consequences of non-compliance).

Development Considerations: Current Status and Action Planning

Minimal FireSmart or wildfire protection measures and recommendations have been incorporated into EA-C's development requirements, permits, or policies.

The following are recommended action items moving forward in regards to FireSmart development considerations:

Action #10: Working with ACRD planners and an outside consultant, develop a spatially based Wildfire Development Permit Area (WDPA). This WDPA should also be incorporated into the WDP bylaw (discussed above). The WDPA would be a GIS representation of potential wildfire threat and could be used for other ACRD planning purposes. The WDPA should also align with existing Environmental Development Permit Areas.

INTERAGENCY COOPERATION

It takes the collaborative efforts of multiple stakeholders working together to achieve a fire resilient community. These people include the local fire departments, local government staff, elected officials, First Nations representatives, industry representatives and provincial government residents in your area. Individually they are responsible to their own organizations, but all of the stakeholder organizations are dependent upon each other to develop an effective Community Wildfire Resiliency Plan and undertake a successful wildfire response.

Development of a Community FireSmart and Resiliency Committee (CFRC)

The Community FireSmart and Resiliency Committee (CFRC) is a board of community members and agencies that can influence and implement wildfire risk reduction in and around a neighborhood or community[44]. The goal of the CFRC is to coordinate and collaborate between local and provincial agencies to move forward the seven FireSmart principles within the community, ultimately increasing the community's resiliency to wildfire. Members of this committee could include local representatives such as local fire departments, First Nations, local government staff or elected officials, along with regional/provincial agencies such as BC Wildfire Service, Emergency Management BC, BC Parks, First Nations Emergency Services Society (FNESS), Forest industry partners and non-government organizations.

The goals of the CFRC are to:

- Develop or maintain a Community Wildfire Resiliency Plan.
- Provide collaboration and coordination on Community Funding and Supports Projects, and Crown Land Wildfire Risk Reduction project initiatives that reduce risk to municipalities, First Nation communities and supporting critical infrastructure.
- Collaborate on a communication and public education strategy with multiple local governments.
- Develop a fuel management planning table in collaboration with FLNRORD and other agency staff.
- Develop/update, implement, and monitor the success of a completed Community Wildfire Resiliency Plan.
- Streamline FireSmart Home Assessment and FireSmart grant programs by sharing capacity between multiple local authorities.
- Develop a network of Local FireSmart Representatives in the area and coordinate their activities within the region.
- Create an advocacy program for participation in the FireSmart Canada Neighbourhood Recognition Program and work towards increasing the number of recognized neighbourhoods in the region each year.
- Coordinate applications to the Community Resiliency Investment program and other funding opportunities.
- Identify FireSmart activities that should be undertaken to best build wildfire resiliency in higher risk areas; connect and share information to the public via social media.
- Identifying funding sources to access and support priority projects from Provincial, Federal and Regional Programs, ensuring the coordination of project initiatives that span multiple jurisdictions and scales over space and time.
- Identify and recommend opportunities for continuous program improvement to BC FireSmart Committee.

Interagency Cooperation: Current Status and Action Planning

The ACRD is currently forming a CFRC to increase FireSmart awareness and community support, and implement FireSmart and wildfire risk reduction activities throughout the ACRD. The ACRD is currently developing an evacuation plan (The West Coast Evacuation Route Plan) specific to EA-C. The plan will be released in March 2023. The plan will be made available online on the ACRD website.

[44] https://firesmartbc.ca/wp-content/uploads/2020/06/Community-FireSmart-and-Resiliency-Commitee-Guidance-1.pdf

EA-C is rural with a sparse population. Communities within EA-C would benefit from increased collaborative efforts with nearby communities. These efforts would include partnering on funding applications, and developing agreements for local residents to use firefighting equipment. Potential benefits have been outlined in the other sections of the FireSmart Principles.

Forested lands adjacent to communities in EA-C are managed by private owners, First Nations, Mosaic Forest Management, or the Barkley Community Forest. Observed surface fuel loading on some of these adjacent lots was concerning. The following are recommended action items moving forward in regard to FireSmart Interagency Cooperation:

Action #11: Continue to re-establish a Community FireSmart and Resiliency Committee year over year for the region. This should be made up of local government, Parks Canada and large forestry licensees including Mosaic and the local community forest managers.

Discussion topics should include:

- Wildfire resiliency co-funding opportunities,
- Emergency management and evacuation planning,
- Forest fuels abatement and planning,
- Education and event planning for FireSmart, and
- Reduction of human caused wildfires, particularly when dealing with tourists and recreational vehicles in areas along West Main.

Action #12: Upon completion of the West Coast Evacuation Route Plan, create and distribute plan-related information to ACRD Area “C” residents online on the ACRD website, and in public offices in Port Alberni. Discuss the evacuation plan at committee meetings.

CROSS-TRAINING

Wildland-Urban Interface resiliency planning and incident response draw on many different professions who do not typically work in a wildfire environment. Cross-training of fire fighters, public works staff, utility workers, local government and First Nations administration, planning and logistics staff, and other key positions will help support the development of comprehensive and effective wildfire risk reduction planning and activities, as well as a safe and effective response.

Cross-training ensures that fire fighters within the community are trained in both structural and basic wildfire suppression[45]. For communities within the WUI it is important that professionals are well trained to ensure proper response to fire. Some training programs available are:

- Basics wildland fire training
- Structure protection training
- Incident Command System training
- Local FireSmart Representative training
- FireSmart Home Partners Mitigation Specialist training
- FireSmart Community Champion training

Cross-Training: Current Status and Action Planning

EA-C has no firefighting capacity. The population is still too sparse and too small to support the development of a volunteer fire department. Training can only be made available to emergency responders through a partnership. The following are recommended action items relating to FireSmart Cross-training:

Action #13: Partner with the other west coast municipalities and First Nations, especially the DoU, on future FireSmart grant applications to pool funding for cross-training opportunities. Such opportunities could include the WSPP-115 course (training for structure protection unit crews).

[45] *Cross-training | FireSmart BC*

EMERGENCY PLANNING

Community preparations for a wildfire emergency requires a multi-pronged approach. Individuals and agencies need to be ready to react by developing plans, mutual-aid agreements, resource inventories, training and emergency communication systems. All of these make it possible for a community to respond effectively to the threat of wildfires as a whole.

An Emergency Management Plan is beneficial in coordinating response efforts and increasing efficiency and effectiveness of communications and evacuations in the event of an emergency. An emergency management plan should focus on emergency preparedness, response activities, and recovery.

Emergency Planning: Current Status and Action Planning

EA-C residents face potential threat from wildfire, particularly the rural areas within the District located adjacent to forested landscapes. There are two reliable evacuation routes including the Tofino-Ucluelet Highway and the Maggie Lake FSR. Both of these routes lead to Highway 4. Highway 4 is a difficult road to travel under normal conditions as it is narrow and winding with swift weather changes. Land adjacent to Highway 4 west and southwest of Port Alberni is predominantly forested. The ACRD created a comprehensive Emergency Management Plan for the region in 2020. The ACRD Emergency Management Plan provides direction on best strategies for communication and response activities for ACRD.

There is no suppression equipment in EA-C available for use by qualified residents. Currently residents of ACRD can subscribe to the DoU and/or the District of Tofino's emergency notification systems (Voyent Alert). These systems can notify them of fires and/or tsunamis via text, email, and/or phone call. The following are recommended action items moving forward regarding Emergency Planning:

Action #14: Install hydrant access or dry hydrants and suppression capacity within ACRD Area "C" neighbourhoods including Willowbrae, Port Albion, and Salmon Beach.

Action #15: Expand the use of the ACRD emergency notification system (Voyent Alert) from the Alberni Valley and Bamfield to ACRD EA-C.

Action #16: Purchase or acquire ancillary suppression equipment including a sprinkler protection unit, portable tanks, hoses, and portable pumps. Build a cache to store this suppression equipment or work with the Ucluelet Fire Department or others to share a storage area.

VEGETATION MANAGEMENT

The general goal of vegetation management is to reduce the potential wildfire intensity and ember exposure to people, infrastructure, structures, and other values through manipulation of both the natural and cultivated vegetation that is within or adjacent to a community. A well-planned vegetation management strategy that is coordinated with development, planning, legislation, and emergency response wildfire risk reduction objectives can greatly increase fire suppression effectiveness and reduce damage and losses to structure and infrastructure.

Fuel management, also referred to as vegetation management or fuel treatment, is an important element of wildfire risk reduction within the WUI. The objective of fuel management treatments are to alter aspects of wildfire behaviour, such as decreasing potential intensity, to limit damage to infrastructure and allow for safer and more effective suppression strategies. Vegetation management within and around the community can be accomplished through two different activities:

1. Residential scale FireSmart landscaping: The removal, reduction, or conversion of flammable plants (such as landscaping for residential properties, parks and open spaces) in order to create more fire-resistant areas in the FireSmart Non-Combustible Zone and Priority Zones 1, 2 and 3.
2. Fuel management treatments: The manipulation or reduction of living or dead forest and grassland fuels to reduce the rate of spread and head fire intensity and enhance the likelihood of successful suppression, generally outside of the FireSmart Noncombustible Zone and Priority Zones 1, 2 and 3.

Vegetation Management: Current Status and Action Planning

To date, there have been no vegetation management treatments completed for the purposes of fuel reduction and wildfire mitigation within the boundaries of EA-C. Forested lands adjacent to communities in EA-C are managed by private owners, First Nations, Mosaic Forest Management, or the Barkley Community Forest. FireSmart home assessments are voluntary to private land/homeowners; few private homes in the study area have completed a FireSmart home assessment or implemented FireSmart recommendations/activities around the property within EA – C.

The authors completed FireSmart Neighbourhood assessments[46] with the results outlined in Table 9 and Table 11. Table 11 indicates that there is presently some concerning FireSmart hazards across all neighbourhoods with a final mean score of approximately 30% for all factors across all neighbourhoods.

The authors completed FireSmart Critical Infrastructure assessments[47] for five of the ACRD's identified CI. This was only a select five of the total CI for the entire study area. The remaining CI that were not assessed should be prioritized for assessment by a Local FireSmart Representative.

A summary of FireSmart Assessment scoring, as well as recommendations to reduce wildfire risk for those CI, are presented in Table 14. Table 14 indicates that four of the five assessed CI currently possess an 'extreme' hazard rating.

[46] https://firesmartbc.ca/resource/fcnrp-neighbourhood-wildfire-hazard-assessment-form/
[47] https://firesmartbc.ca/resource/firesmart-critical-infrastructure-guide/

TABLE 11: FIRESMART NEIGHBOURHOOD DESCRIPTIONS AND SAMPLE SIZES ASSESSED IN THIS CWRP.

	Millstream	*Willowbrae*	*Port Albion*	*Salmon Beach*
Total Structures	61	21	34	386
Assessments Completed	16	9	7	28
Proportion of Structures Assessed	26	43	21	7

TABLE 12: FIRESMART NEIGHBOURHOOD ASSESSMENT SCORES FOR THIS CWRP.

Hazard Factor	Description	Percentage Passing (%)			
		Millstream	*Willowbrae*	*Port Albion*	*Salmon Beach*
Roofing Materials	Proportion of homes that have fire-rated roof materials (metal, clay, asphalt shingles)	88	78	100	93
Gutter Type and Roof Cleanliness	Proportion of homes that have cleaned and maintained roof and gutters	94	100	100	89
Vents and Openings	Proportion of homes that have non-combustible fire-rated vents with 3 mm screening	6	0	0	4
Building Exterior or Siding	Proportion of homes that have non-combustible or ignition-resistant siding	25	11	14	25
Ground-to-Siding Clearance	Proportion of homes that have 15 cm non-combustible vertical ground-to-siding clearance	63	67	57	39
Balcony, Deck, Porch	Proportion of homes that have a non-combustible deck with no	19	33	43	18

Hazard Factor	Description	Percentage Passing (%)			
		Millstream	*Willowbrae*	*Port Albion*	*Salmon Beach*
	combustibles under deck				
Window Glass: Multi-pane vs single-pane windows	Proportion of homes that have multi-pane windows	0	0	0	14
Non-Combustible Zone (NCZ)	Proportion of homes that have treated NCZ	6	22	29	7
Zone 1	Proportion of homes that have treated Zone 1	0	11	9	4
Zone 2	Proportion of homes that have treated Zone 2	0	0	9	4
Mean Neighbouhood Hazard Score (%)		30	32	34	30

TABLE 13: TABLE 13: FIRESMART NEIGHBOURHOOD VULNERABILITY ASSESSMENTS COMPLETED FOR THIS CWRP.

	Millstream	*Willowbrae*	*Port Albion*	*Salmon Beach*
Mean Neighbouhood Hazard Score (0.5)	35	34	33	35
Emergency Response Time Score (0.2)	21	24	45	100
Population Score (0.3)	32	11	18	100
Vulnerability Score[48]	49	42	47	85

[48] *Davies IP, Haugo RD, Robertson JC, Levin PS (2018) The unequal vulnerability of communities of color to wildfire. PLoS ONE 13(11): e0205825. https://doi.org/10.1371/journal.pone.0205825*

TABLE 14: FIRESMART CRITICAL INFRASTRUCTURE ASSESSMENTS COMPLETED FOR THIS CWRP, INCLUDING SCORES AND RECOMMENDATIONS.

CI	Critical Building	Critical Structure	Non-Combustible Zone	Zone 1 (1.5-10m)	Zone 2 (10-30m)	Total Score	Recommendations
Pumphouse: South end of Millstream	90	N/A	30	30	45	195	Bring building characteristics into compliance with FireSmart, and thin and prune coniferous vegetation within Zone 2.
Water Tower: Center of Millstream Neighborhood	N/A	0	30	90	45	165	Remove coniferous vegetation within Zone 1
Substation: Northeast of Tofino-Ucluelet Highway and Highway 4 Junction	N/A	0	0	60	25	85	Remove conifers in Zone 1. Thin and prune coniferous vegetation in Zone 2.
BC Hydro Offices	0	N/A	0	30	45	75	Remove coniferous vegetation in Zone 1. Thin and prune coniferous vegetation in Zone 2.
Water Treatment Plant	0	N/A	0	0	5	5	Maintain surface vegetation to less than 10 cm in Zone 2.

The following are recommended action items moving forward in regards to FireSmart Vegetation Management and fuel treatments:

Action #17: Implement FireSmart recommendations resulting from the completed FireSmart Critical Infrastructure (CI) Assessment to critical buildings/infrastructure to reduce hazard score ratings to Moderate or Low. Critical Infrastructure Assessments were completed for all CI within Area "C" for the development of this CWRP. Vegetation surrounding CI was often identified as one of the highest hazards. The critical infrastructures with the highest hazard identified are:

I. Pumphouse in Millstream
II. Water Tower in Millstream.

Action #18: Encourage homeowners to complete FireSmart activities around or on their homes utilizing the Homeowner Rebate in the FireSmart program through use of social media, the internet, and FireSmart events.

Action #19: Encourage – Promote the removal of all vegetation from the Non-Combustible Zone and encourage using fire-resistant plants in landscaping. This can be done by promoting nearby nurseries that can supply these plants. Cedar trees within the first 10m (Zone 1) of the home should be encouraged for removal.

APPENDICES

Appendix A: Determining Wildfire Threat and Risk at a Local Level Based on Updated Fuel Types

The Determining Wildfire Threat and Risk at a Local Level guidance document from BCWS[49] was used to assist in determining the revised local PSTA threat score for each polygon where a Wildfire Threat Assessment (WTA) worksheet was completed in the field (Table 15). Professional judgement was also an important factor, given that the guidance does not specify the specific weighting of each wildfire component to calculate the original PSTA threat score. All revised PSTA scores remained within the 'Moderate' threat classification represented by the original assigned threat score.

TABLE 15: REVISED LOCAL PSTA SCORES BASED ON STAND ATTRIBUTE DATA FROM WILDFIRE THREAT ASSESSMENT WORKSHEETS COMPLETED IN THE FIELD.

WTA ID	Updated Fuel Type	Original Threat Score	New Fuel Assessment Score (60%)	Wildfire Density Score (30%)	Spotting Impact Score (10%)	Revised PSTA Score
1	C-5 (no change)	4	2	1	3	1.8
2	C-3 (no change)	5	8	1	3	5.4
3	C-5 (no change)	4	8	1	2	5.3
4	C-5 (no change)	4	5	1	2	3.5
5	C-5 (no change)	4	5	1	2	3.5
6	D-1/2 to M-1/2	3	5	1	2	3.5
7	C-5 (no change)	4	5	1	2	3.5

Once the revised local PSTA threat score was determined, it was used to assess the total wildfire risk for each WTA polygon representing a fuel type change (Table 16). The weighting for each contributing attribute is given in the table. Weighted scores for each attribute were derived from the applicable WTA. Relative Risk Classification was determined based on the total weighted score ranges outlined in Table 17, which is provided in the guidance document. The total wildfire risk score for all assessed polygons fell within the 'Moderate' risk classification.

[49] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_determining_wildfire_threat_and_risk_at_a_local_level.pdf*

TABLE 16: LOCAL WILDFIRE RISK SCORE FOR EACH WTA POLYGON BASED ON FIELD VERIFIED UPDATED FUEL TYPES.

WTA ID	Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope % (5%)	Total Wildfire Risk Score	Relative Risk Classification
1	1.8	8	10	1	1	6.0	Moderate
2	5.4	8	10	1	1	7.1	High
3	5.3	8	10	1	1	7.1	High
4	3.5	8	10	1	1	6.6	Moderate
5	3.5	8	5	1	1	5.1	Moderate
6	3.5	10	10	1	1	7.2	High
7	3.5	8	5	1	1	5.1	Moderate

TABLE 17: RELATIVE WILDFIRE RISK CLASSIFICATION BASED ON A WEIGHTED TOTAL WILDFIRE RISK SCORE

Relative Risk	Weighting
Low	0-3.9
Moderate	4-6.9
High	7-8.9
Extreme	9+

Appendix B: Climate Modeling Using Climate BC

Climate BC is a MS Windows application and program that uses the PRISM, Parameter-elevation Relationships on Independent Slopes Model, to project climate variables in British Columbia at an Annual, Seasonal or Monthly increment. The program generates scale-free climate data for specific locations or areas. The following methodology was used when creating spatial climate layers in Climate BC as well subsequent scaling that occurred post processing of variables.

Inputs and Parameters:

A DEM layer that is representative of the study area is loaded into the program to instigate area processing. With the DEM layer in the program a decision in what General circulation models (GCMs) were to be used and at which Shared Socioeconomic Pathway (SSP) they would be evaluated at.

The following table represents the different SSPs that could be chosen from for a projects analysis:

TABLE 18: SHARED SOCIOECONOMIC PATHWAYS IN THE IPCC SIXTH ASSESSMENT REPORT[2].

SSP	Scenario	Estimated warming (2041–2060)	Estimated warming (2081–2100)	Very likely range in °C (2081–2100)
SSP1-1.9	very low GHG emissions: CO_2 emissions cut to net zero around 2050	1.6 °C	1.4 °C	1.0 – 1.8
SSP1-2.6	low GHG emissions: CO_2 emissions cut to net zero around 2075	1.7 °C	1.8 °C	1.3 – 2.4
SSP2-4.5	intermediate GHG emissions: CO_2 emissions around current levels until 2050, then falling but not reaching net zero by 2100	2.0 °C	2.7 °C	2.1 – 3.5
SSP3-7.0	high GHG emissions: CO_2 emissions double by 2100	2.1 °C	3.6 °C	2.8 – 4.6

SSP	Scenario	Estimated warming	Estimated warming	Very likely range in °C
		(2041–2060)	(2081–2100)	(2081–2100)
SSP5-8.5	very high GHG emissions:	2.4 °C	4.4 °C	3.3 – 5.7
	CO_2 emissions triple by 2075			

A SSP of 2-4.5 (245) is chosen for the evaluation in this report as it represents an intermediate GHG emission and is considered to be the most likely temperature projection.

An ensemble of GCMs is evaluated together to get a representative output for a study area. This is done to find the most accurate projections for both current Climate standings and future normal period predictions. An ensemble of 13 GCMs is evaluated against one another to get representative outputs for a multitude of climate variables available through the program. An ensemble of 8 GCMs can be used as well as both options are available within the program. The Amount of GCMs used for an evaluation depends on the intricacy of the analysis and the detail required for the anticipated outputs. The climate variables selected for evaluation in this project were as follows:

- Winter Average Precipitation (mm)
- Summer Average Precipitation (mm)
- Winter Average Temperature (C)
- Summer Average Temperature (C)

Each climate variable was represented spatially for the study area and values were compared to the Current normal Period derived values. To keep consistency, the program was also used with the same parameters to produce the current normal period derived values so a comparison evaluation could be done.

Normal periods were chosen to show the change over time until the end year of 2100. The following are the normal period ranges:

- Current: 1991 – 2020
- 2040: 2011 – 2040
- 2070: 2041 – 2070
- 2100: 2071 – 2100

Rescaling Temperature:

Temperature outputs given by ClimateBC needed to be rescaled to match the metric scale, this process was done using processing tools in ArcPRO. To rescale the georeferenced tiff. The output layer from ClimateBC needs to be loaded into ArcPRO and run through the Raster Calculator tool. The following equation was run to rescale the raster:

'Raster layer' / 10 = Rescaled Temperature Raster

Difference Comparison:

With all the outputs processed, rescaled and downloaded a comparative analysis is done to determine the relative change in precipitation and temperature when future normal periods are evaluated against the current periods modeled outputs. The difference comparison takes the change in precipitation and temperature in each future normal period and converts the value into a proportion for that variable range. If an area experiences more precipitation in future periods the percent change value recorded will be a positive value. Similarly, if the temperature increases in a future normal period, the percent change value will be positive indicating the percent of change the variable experienced compared to the baseline.

Findings are presented in a Table format with conditional formatting of percent change to indicate the severity.

Disclaimer:

Climate modeling is a complex and intricate process that requires a high degree of manipulation and input to get the desired analysis. The parameters chosen for this analysis were carefully considered and evaluated so as to produce the most accurate results for the project and its associated area. It is understood that many different variables could be changed or manipulated in order to produce different outputs for the same analysis.