Community Wildfire Resiliency Plan

Electoral Area A in the RDN

May 2022

Prepared for Regional District of Nanaimo
by Diamond Head Consulting

Community Wildfire Resiliency Plan for Electoral Area A in the Regional District of Nanaimo

May 2022

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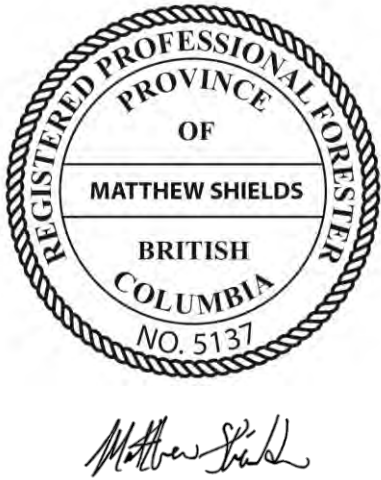**Submitted by**:
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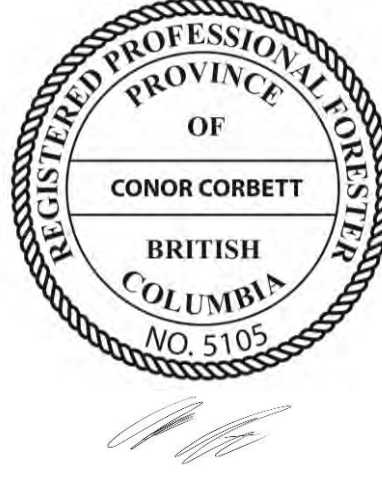Website: diamondheadconsulting.com

Professional Seal and Signatures

Matthew Shields, R.P.F.

Date signed: April 11, 2022

I certify that the work described herein fulfills the standards expected of a registrant of the Association of British Columbia Forest Professionals and that I did personally supervise the work.

Conor Corbett, R.P.F.

Date signed: April 11, 2022

I certify that I have reviewed this document and, while I did not personally supervise the work described, I have determined that this work has been completed to the standards expected of a registrant of the Association of British Columbia Forest Professionals.

Contents

List of Tables and Figures

List of Photos

Acknowledgements

Frequently Used Acronyms

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
CFFDRS	Canadian Forest Fire Danger Rating System
CFBPS	Canadian Fire Behavior Prediction System
CFS	Community Funding and Supports
CRI	Community Resiliency Investment
CVFD	Cranberry Volunteer Fire Department
CWPP	Community Wildfire Protection Plan
CWRP	Community Wildfire Resiliency Plan
DP	Development Permit
DPA	Development Permit Area
EMBC	Emergency Management British Columbia
EMP	Emergency Management Plan
FCFS	FireSmart Community Funding and Supports
FRPA	Forest & Range Practices Act
GIS	Geographic Information Systems
HRVA	Hazard, Risk, and Vulnerability Analysis
LRMP	Land and Resource Management Plan
MOE	Ministry of Environment
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
NCFD	North Cedar Volunteer Fire Department
OCP	Official Community Plan
PSTA	Provincial Strategic Threat Assessment
RDN	Regional District of Nanaimo
SWPI	Strategic Wildfire Prevention Initiative
UBCM	Union of British Columbia Municipalities
WRR	Wildfire Risk Reduction
WUI	Wildland-urban Interface

Executive Summary

The Regional District of Nanaimo (RDN) prepared this Community Wildfire Resiliency Plan for Electoral Area A (EA A), including the communities of Cassidy, Cedar, South Wellington, and Yellowpoint. This plan examines wildfire risk in the wildland-urban interface (WUI) of EA A and makes recommendations for the RDN to help build towards FireSmart communities.

The type of development and extensive forested areas that characterize EA A also contribute to its vulnerability to wildfire. Most residents live in an area called the WUI, where forests intersect with homes and businesses. In EA A, the line between forests and development is sometimes clear – like the boundary between patches of forest, farms, and conventional suburban development – and sometimes indistinct where houses are set amid the trees. These forms of development are called "interface" and "intermix" respectively and create different kinds of risk to the communities. Much of the infrastructure critical to the functioning of these communities, including water wells and electrical utilities, fire stations, communications, and community buildings, is located within the WUI. A geography of low hills, farmers' fields, small lakes, and the Nanaimo River Valley allows multiple routes of travel between most places in the community. Small areas near the coast have only one neighbourhood access. Because of the fragmented forest landscape, a wildfire causing community-wide evacuations is an unlikely event.

In the WUI, wildfire consultants conducted wildfire risk assessments on public land, examining structures and the characteristics of forest vegetation. These assessments and data from the Provincial Strategic Threat Analysis were used to map the wildfire risk in relation to known values throughout the WUI. The analysis shows that much of the public land base is characterized by a moderate wildfire risk. Development in these areas has placed buildings and infrastructure near forests that can sustain fires with moderate wildfire behaviour. Moderate wildfire threat means that a forest is expected to readily support wildfire of low to moderate intensity during the peak fire season. Wildfire risk on private land was not modelled; however, risk on private land is likely moderate, similar to public land. Risk on private land cannot be modelled under the funding terms for this project.

There are proactive measures that can be taken to reduce wildfire risk through education to increase public awareness, improve FireSmart programming for residents and RDN operations, emergency planning and interagency cooperation, and fuel management on public lands. The management of interface areas that are on private land is generally beyond the jurisdiction of local government. Therefore, public education and awareness of wildfire risk and options for mitigation and preparedness is a critical component of this Community Wildfire Resiliency Plan. The FireSmart program and its resources are the foundation for raising public awareness in EA A. Adapting this guidance to local circumstances is the overarching task of initiatives proposed in the Action Plan included in this document.

This Community Wildfire Resiliency Plan has been developed to acknowledge existing wildfire risk in the community. Risk has likely increased with climate change and will continue to do so, making the cyclical and repeat nature of community wildfire planning necessary and apparent. Recommendations in the Action Plan are framed with suggested priorities and implementation timeframes. The project partners recognize this Plan as a fundamental first step towards improving the resilience of EA A to the impacts of wildfires.

Introduction

Overview

To be resilient means to recover from difficulty. In the landscape of EA A, wildfire can cause great difficulties for people and communities. Emergency preparedness, wildfire response, vegetation management, community planning, and personal readiness are all important elements of building resiliency to wildfire. Being resilient doesn't mean that wildfire will never mark the community; instead, it means that EA A will emerge from a wildfire disaster with the community intact and recognizable.

This Community Wildfire Resiliency Plan (CWRP) examines wildfire risk in Electoral Area A (EA A) and makes recommendations for managing that risk in support of building resiliency to wildfire. The purpose of the plan is to propose pathways toward a FireSmart future for the community, focusing on actions that are within the Regional District of Nanaimo's (RDN) authority and capacity. Wildfire resiliency is not a single destination with a defined roadmap: although the recommendations made by the plan can each improve wildfire resiliency, many involve multiple values or long timeframes which deserve further consideration.

This plan is the result of a partnership between provincial and local governments that has allowed communities to access funding for community wildfire prevention since 2004. Funding for this plan was provided through the ***Community Resiliency Investment program***. The Community Wildfire Resiliency Plan assesses risk within the ***wildland-urban interface (WUI)***, an area of land where natural vegetation and urban development are in proximity to one another. The WUI is where wildfire can travel from wildland vegetation into the community and is where there is the highest concern for potential wildfire activity. To create the Community Wildfire Resiliency Plan, professional foresters visited public lands in the WUI to create accurate maps of wildfire risk. Although wildfire risk is not assessed for private land, the recommendations of the Community Wildfire Resiliency Plan are a resource for all residents of EA A.

> The ***Community Resiliency Investment Program*** is a program funded by the government of British Columbia to reduce the risk of wildfires and mitigate their impacts on BC communities.
>
> ***WUI*** is the area around communities where development is among or abuts forest, and consequently where development faces greater wildfire risk.

Recommendations follow the seven disciplines of FireSmart, the national program for community wildfire preparedness. The plan is shaped by community input from first responders, residents, and RDN or other local government staff. Read this plan to understand wildfire risk in your community, and what actions the RDN can take to support wildfire preparedness and prevention.

Photo 1. Homes in the Wildland Urban Interface (near Cedar).

The first three sections of the plan following this introduction consider the context of EA A and present the findings of the wildfire risk assessment. The communities' planning context and background for the creation of the CWRP is presented in _Relationship to Other Plans_ (p.6). A description of the community, including more detail on how the WUI is defined as well as a brief discussion of socioeconomic and environmental features within the plan area is contained in _Community Description_ (p.9). The results of wildfire threat assessments and local wildfire risk mapping are presented in _Wildfire Risk Assessment_ (p.31). This section also contains information on the historic fire regime and climate change factors that may influence future wildfire risk.

The following section bridges between the *Wildfire Risk Assessment* and the seven FireSmart disciplines, providing an *Introduction to FireSmart* (p.55) for readers who may not be familiar with FireSmart programming and concepts. This section also contains advice for the RDN on how to organize FireSmart programming and initiatives under the role of a regional FireSmart Coordinator.

The next seven sections identify community resources and needs in each of the seven FireSmart Disciplines:

- *Education* (p.63). This section examines how the RDN can improve or enhance outreach with residents or communities to increase awareness of wildfire risk and support for wildfire management.
- *Legislation and Planning* (p.74). This section addresses the major pieces of law and policy that are relevant to wildfire management and discusses how they could be amended or expanded to support wildfire prevention and preparedness.
- *Development Considerations* (p.80). This section looks at the regulation of development by municipal bylaws. Influencing development patterns is a useful way to shape FireSmart communities for the long term.
- *Interagency Cooperation* (p.88). Making recommendations for the ongoing effort to engage multiple stakeholders and partner institutions is the focus of this section.
- *Cross-Training* (p.93) This section concerns opportunities and challenges in ensuring more wildfire training for relevant emergency response personnel and neighbourhood FireSmart representatives.
- *Emergency Planning* (p.97) This section considers how parallel emergency planning processes and procedures can incorporate wildfire risk and reflect wildfire preparedness.
- *Vegetation Management* (p.101) This section discusses the costs and benefits of fuel management at the site, neighbourhood, and landscape scale to reduce wildfire risk. Opportunities of high priority for FireSmart landscaping treatments are identified for critical infrastructure and neighbourhoods, or the development of a fuel management prescription by a Registered Professional Forester.

These sections are followed by the *Action Plan & Implementation* (p.108) which provides notes about potential actions discussed in the preceding sections and prioritizes recommendations for implementation. The Action Plan can stand alone with the Executive Summary as a guide to improving wildfire resiliency in EA A. 33 recommendations to improve wildfire resiliency in the community are provided, organized by the appropriate FireSmart discipline and suggested priority.

Appendices (p.116) to the plan provide additional details, including a glossary of terms and a description of how public input was received and incorporated.

Plan Goals

Wildfire is a feature of the landscape. The patchwork of forests surrounding homes and communities are vulnerable to fire whether it is caused by nature or by human ignitions. The goals of the Community Wildfire Resiliency Plan respond to this reality in several ways and set an agenda that influences each following section of the plan. They represent *what the plan sets out to do*. Table 1 sets out the goals of the Community Wildfire Resiliency Plan.

Table 1. Goals of the Community Wildfire Resiliency Plan

Goals	
Public Health and Safety	Public safety is enhanced through all activities to prevent, prepare for, or manage wildfire.
Protection of infrastructure	Community infrastructure, including private property, public structures, and facilities are protected from wildfire.
Interagency Co-operation and Policy	Wildfire management planning, preparedness, prevention, suppression, and education occurs in co-operation with all relevant agencies and neighbouring local governments and First Nations.
Public Awareness, Education and Advocacy	Public understanding, support and awareness of wildfire risk management is increased through effective education, advocacy, and communication.
Sustainable Planning	Growth and development planning considers wildfire risk and mitigation as best practices.
Environmental Protection and Enhancement	Ecosystems that support biodiversity and environmentally sensitive features are protected and enhanced by wildfire management activities.
Adaptive Management	The effectiveness of wildfire management initiatives is monitored and continuously improved by reviewing actions and decision-making processes.
Financial Responsibility	Wildfire resiliency initiatives are pursued within sustainable budgets. Where appropriate, the RDN will seek external partnerships to expand funding available for wildfire resiliency initiatives.

Plan Objectives

The following objectives provide context on *how the plan will achieve its goals*. The primary objectives are to:

- Provide an updated understanding of wildfire risk within the WUI based on the provincial data available and site assessments.
- Identify high and extreme risk areas where the RDN should prioritize action to reduce wildfire risk and/or protect homes and infrastructure.
- Examine opportunities to adjust RDN bylaws, policies, or planning protocol to support improved wildfire preparedness and prevention.
- Help build capacity in fire suppression and response through identifying potential supports for local fire departments.
- Engage community members with information on wildfire risk management and respond to community concerns.
- Consider where partnerships with residents, communities, organizations, or other governments may be needed to improve wildfire preparedness and/or address wildfire hazard.

Plan Development Summary

This CWRP is one in a series of seven, one for each electoral area, funded by the 2021 Union of British Columbia Municipalities (UBCM) Community Resiliency Investment Program (CRI) grant. The previous community wildfire plans for EA A were prepared over ten years ago for the Cranberry and Cedar fire protection districts as part of the first generation of plans under the Province's Strategic Wildfire Prevention Initiative. The Community Resiliency Investment Program has since superseded this initiative and has created updated guidance for preparing a Community Wildfire Resiliency Plan. The RDN issued a request for proposals in the spring of 2021 for the development of a new plan meeting the Province's updated standards. The contract for preparing the plan was awarded to Diamond Head Consulting Ltd. in April 2021. Field assessments took place in the summer of 2021, along with meetings with local fire response personnel and community stakeholders. Public information sessions were held on August 26th and November 8th, 2021, and incorporated question and answer sessions during which members of the project team responded to public concerns. These meetings were held online, as adapted programming during the COVID-19 pandemic, and recordings have been made available on the RDN's Get Involved website. During the plan development phase, the Get Involved website for the project encouraged visitors to submit questions for the project team or explore additional resources about wildfire preparedness. A draft plan was submitted for review by community stakeholders in December 2021. With revisions from the community, the final plan was submitted for consideration by the RDN Board.

Relationship to Other Plans

The Community Wildfire Resiliency Plan is a strategic document that informs Regional District of Nanaimo (RDN) priorities for emergency services, operations, and community planning. The plan recommendations are not mandates, but suggestions that can be worked into the RDN's policies, programs, and activities. Implementation of the plan depends on changes to informal procedures, stated policy, new planning processes, and in some cases amendments to local government bylaws. The RDN's plans for government operations, emergency management and evacuation, corporate strategies, climate action, parks and urban forestry are all relevant to this plan. The plans of other governments, such as provincial or indigenous resource management plans, may also be of relevance to aspects of wildfire management.

Linkages to Existing Community Wildfire Plans

Community Wildfire Protection Plans were prepared by the North Cedar Volunteer Fire Department in 2008 and the Cranberry Volunteer Fire Department in 2007. The City of Nanaimo, which neighbours Electoral Area A (EA A) to the north, completed a Community Wildfire Protection Plan in 2016. As part of its Wildfire Resiliency Initiative, the RDN is preparing new Community Wildfire Resiliency Plans for the neighbouring EA As B (Gabriola, Mudge, and DeCourcy Islands) and C (Extension, Nanaimo Lakes Rd, East Wellington).

Table 2. Linkages to existing community wildfire plans.

Plan	Description	Relationship to CWRP
Community Wildfire Protection Plan for the Improvement District of North Cedar Including First Nations Lands (2008)	This is the community wildfire plan currently in place for the North Cedar Improvement District (within EA A). The plan was formulated under the previous Strategic Wildfire Prevention Initiative standards. The plan provides 12 recommendations to the Improvement District, including forming a "Wildland Fire Protection Committee" (interagency) to proactively address fire preparedness and emergency response capacity, creating an education strategy for FireSmart, and reviewing burning regulations within the Improvement District.	Provides context for the present CWRP and informs current recommendations. The older CWPP may remain relevant for actions/goals internal to the North Cedar Volunteer Fire Department and/or Snuneymuxw First Nation.
Community Wildfire Protection Plan – Cranberry Fire Protection District (2007)	This is the community wildfire plan currently in place for the Cranberry Fire Protection District (portions within EA A). Like the plan for North Cedar, this document was prepared under the previous Strategic Wildfire Prevention Initiative Standards. The plan provides 21 recommendations for the Protection District, including developing an education strategy for FireSmart, working with the RDN to	The plan provides context for the present CWRP and informs current recommendations. This plan may remain relevant for actions/goals internal to the Cranberry Volunteer Fire Department. The plan includes areas outside of EA A.

	encourage FireSmart development, and investigating fuel management opportunities with forest landowners.	
Community Wildfire Protection Plan – City of Nanaimo (2016)	The City of Nanaimo borders EA A to the north of Cedar. The plan included an analysis buffer around the City, incorporating parts of Cedar and South Wellington. These areas were characterized by low to moderate potential wildfire behaviour.	The plan provides informational value on wildfire risk and response in nearby areas.

Linkages to Other Plans

The RDN acts as the primary local government for its unincorporated areas. Regional Districts operate on a special service basis, providing only the services that are approved by their communities and using taxes/levies only to support this spending. Communities in unincorporated areas can also form Improvement Districts for specific taxation purposes, such as running the volunteer fire department. This arrangement is quite typical, with both local fire departments being managed by Improvement Districts separate from the RDN. The RDN retains responsibility for most local government services, including parks operations, waste removal, and bylaw enforcement. Local government plans for these services can influence the wildfire risk environment and reflect preparedness.

Table 3. Relationship of Community Wildfire Resiliency Plan to local government plans.

Plan	Description	Relationship to CWRP
EA A Official Community Plan (Bylaw No. 1620, 2011)	This plan is prepared by the RDN and develops a vision for land use within the community. Under the *Local Government Act*, Official Community Plans must address how a local government area's land is to be allocated by land use. These documents can also set local government policy for a variety of social and economic issues. Bylaws adopted by the local government must be consistent with the adopted Official Community Plan.	The plan addresses planning and land use in EA A, containing policies regarding growth and development that influence wildfire risk. The plan recognizes that wildfire was identified as a significant natural hazard in the 2008 Community Wildfire Protection Plan for North Cedar Improvement District and designates areas susceptible to natural hazard (including wildfire) on Map No. 1. The OCP also recommends that FireSmart materials be distributed through the development application process and that the RDN should work with several agencies to develop a fuel abatement program for the plan area. Recommendations are made to assess fire protection capacity as part of new development applications. The plan designates all of EA A as a "development approval information area" for the purposes of the RDN's Impact Assessment Bylaw (No. 1165, 1999).

Plan	Description	Relationship to CWRP
Emergency Management Plan	The RDN has maintained a region-wide emergency plan since 1995. The plan is updated periodically and considers the organization and hierarchy within the RDN during an emergency event, as well as the setup of the Emergency Operations Center. The related Hazard, Risk, and Vulnerability Analysis initiative established wildfire as an event of high likelihood and consequence in the RDN. The Emergency Management Plan identifies strategic wildfire response goals and objectives.	The Emergency Plan identifies processes and procedures the RDN will follow to secure infrastructure and provide emergency services to residents during a wildfire. The CWRP can inform emergency planning about wildfire risk, helping the RDN to make resource allocation and response decisions.
RDN Hazard, Risk, and Vulnerability Analysis	The Hazard, Risk, and Vulnerability Analysis (HRVA) is a document prepared by the RDN to contextualize the likelihood and consequence of a variety of different emergency scenarios, including earthquake, flooding, and wildfire. The HRVA for the RDN indicates wildfire is an event of high likelihood and consequence in the region – ranking wildfire as the primary risk among several other potential natural disasters. This rating reflects the extent of the forest interface in the community and the frequency of fire ignitions.	The HRVA established wildfire as a high-risk event within the RDN and supports the Wildfire Resiliency Initiative. The CWRP responds to the HRVA by providing more detail on the nature of wildfire risk in the community and potential actions to manage risk.
Parks & Trails Strategy	The RDN is currently renewing its Parks & Trails Strategy, which provides a vision for Regional parks and trails. The strategy identifies priorities for land acquisition, park and trail improvements, and guides core park services by the Recreation and Park Department.	Parks management is important for community wildfire planning because of its connections to vegetation management and ignitions caused by recreational activities.
Strategic Plan 2019-2022	The RDN's corporate strategic plan is updated every 3 years and is the highest-level planning document for the Board of Directors. The Strategic Plan sets a vision for the RDN and identifies key actions for local government regarding the RDN land base and authorities.	The CWRP will reflect core principles of local government established in the Strategic Plan. In the future, wildfire resiliency can inform provisions for social well-being, environmental stewardship, and climate change within the Strategic Plan.

In addition to local government plans, higher government land-use plans can apply to all or specific portions of EA A. The Vancouver Island Summary Land Use Plan (2000), established by order, guides forest practices in several "special management zones", none of which are located within EA A. Besides provincial land use planning, orders and notices established through the *Land Act, Forest and Range Practices Act, Oil and Gas Activities Act, Environment and Land Use Act*, and *Wildlife Act* can also influence the priorities and recommendations of the Community Wildfire Resiliency Plan due to constraints they may place on the crown land base. The British Columbia Wildfire Service may also create landscape-level "tactical fuel management plans" or risk management plans for specific provincial landscape units. No such plans are currently in place for EA A.

Community Description

Area of Interest

The area of interest defines the community boundaries for the Community Wildfire Resiliency Plan. The area of interest represents how the Regional District of Nanaimo (RDN) is organized around its communities and where recommendations from the plan apply. For this plan, the area of interest is Electoral Area A (EA A) of the RDN. EA A includes the lands on the east coast of Vancouver Island south of the City of Nanaimo and north of the Cowichan Valley Regional District. EA C of the RDN borders the community to the west. Several distinct communities are found in EA A, including Cedar, Cassidy, South Wellington, Yellowpoint, and dispersed development throughout the rural areas of EA A. The EA Also contains the Nanaimo River Indian Reserve Lands (No. 2, 3, and 4) of the Snuneymuxw Nation; these areas are administered by the Nation and are therefore not included in the area of interest.

EA A contains a diverse landscape despite its small area of approximately 60 km^2. The retreat of ice age glaciers left behind ridges and valleys – the high and low places that still separate forests and farmland. The Nanaimo River flows through a large valley in the northwestern quadrant of EA A, separating South Wellington from the rest of the communities. The coast features several small coves and rocky beaches on Stuart Channel. Between the ocean and the river, the terrain is hilly and includes several small valleys, including the locations of Holden and Quennell Lakes. A mix of forests are found. Riparian forests on the Nanaimo River floodplain mix stately black cottonwood and western redcedar. Away from the river, sandy and rocky soils support forests of Douglas-fir.

Wildland-Urban Interface

Within the Area of Interest, this plan pays special attention to a zone called the wildland-urban interface (WUI). The WUI is the area where combustible forest fuels are found adjacent to homes, businesses, farm structures, or other buildings and infrastructure. Since communities in EA A are surrounded by and include large areas of forest vegetation, most of EA A can be considered as part of the interface. This plan defines the WUI as the area within one km of a density of six buildings (or "structures") per km^2. This buffer of "structure density" creates a ring around the most populated areas of EA A, where most buildings and people would be at risk if a wildfire were to occur. The distance of one km has been selected to align this Community Wildfire Resiliency Plan with guidance from the Province and the BC Wildfire Service (BCWS), which use structure density classes to help plan wildfire response and prevention.

The shape and appearance of the WUI depends on the form of development that characterizes EA A. The WUI can be thought of as having two broad types that influence how wildfires are responded to. The first is simply called "interface" and refers to landscapes where the boundary between forests and developed areas can be seen at the scale of a neighbourhood or a community. Interface conditions imply a distinct boundary between homes and forests, and often result where development includes multiple-lot subdivision and land clearing, or where forests are separated from communities by farmland. The second type of WUI is called "intermix", which refers to landscapes where the boundary between forests and urbanized areas is indistinct and may only be apparent at the scale of an individual property. In these landscapes, homes and infrastructure are set among forest vegetation. This kind of development is common in rural areas where subdivision or farming haven't resulted in land clearing. EA A contains both conditions. Interface development describes conventional residential subdivisions near

Cedar and Cassidy as well as the boundary between farmland and forests, while intermix conditions are more typical in the eastern uplands where forests are more prevalent than agriculture. Figure 1 shows examples of these two conditions from EA A.

| *Interface* conditions are where the boundary of urbanized and forested areas is visible at the scale of whole neighbourhoods. | *Intermix* conditions are where the boundary of urbanized and forested areas is visible at the scale of single houses or groups of houses. |
| Cedar | Yellowpoint |
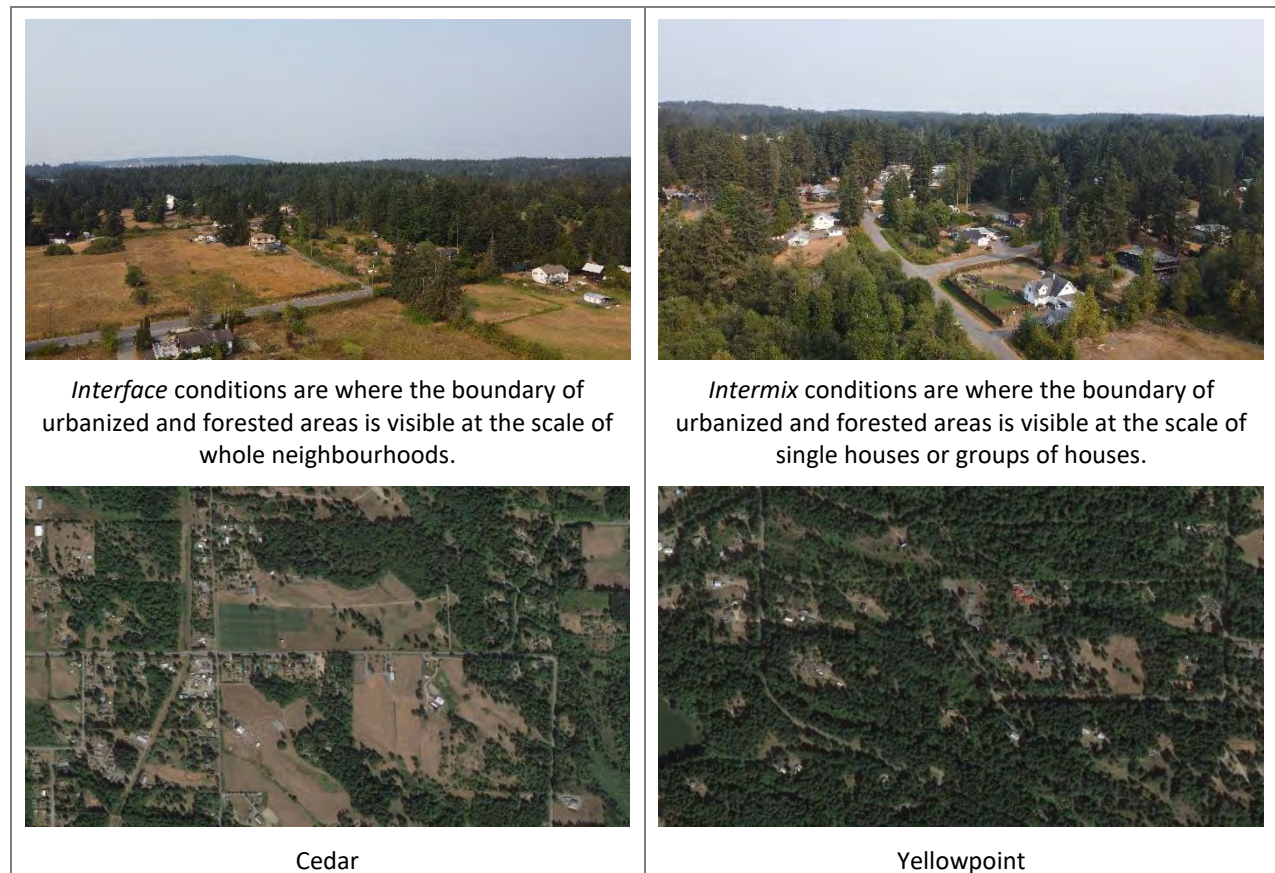
Figure 1. Visual comparison of "interface" and "intermix" conditions.

The shape of the boundary between homes and forests influences the pathways to home ignition and appropriate mitigation strategies. Forests and vegetation provide fuel to wildfires, although not all forests are equally hazardous. Homes in the intermix are surrounded by forest vegetation and are at risk of ignition through direct contact with flame, radiant heat from a nearby fire, and wind-borne embers or firebrands. Homes in the interface which directly border the forest boundary also face these three ignition sources, while homes toward the interior of a neighbourhood or subdivision remain at risk of wind-borne embers alighting on building surfaces or landscaping. Managing the landscape around buildings and using fire-resistant construction can help people living in the interface avoid damage to property during an oncoming wildfire. Since a significant number of wildfires are of human origin, managing the fuels between humans and forests also helps to contain human-caused fires before they spread into the surrounding landscape and become catastrophic events.
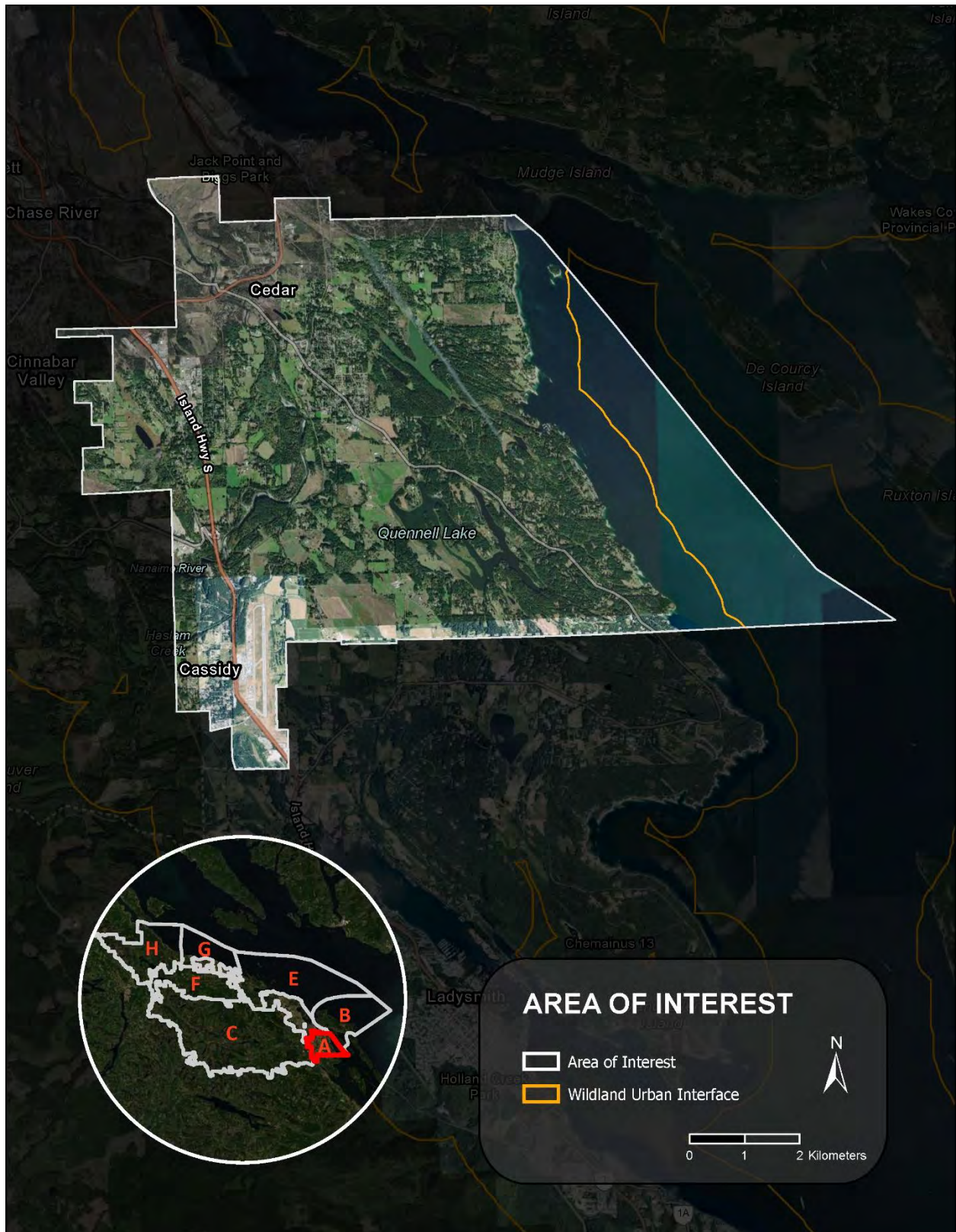
Figure 2. Area of interest for the plan and WUI.

Community Information

Demographics and Housing

The growth of EA A and housing is developed can have a large impact on its resilience to wildfire. This is because patterns of development influence wildfire risk, and a rising population puts additional demands on local emergency responders. If carefully planned, growth can help communities become resilient to wildfire by replacing outdated construction with modern building standards, introducing FireSmart development patterns, increasing the tax base, and adding new neighbours to shoulder the effort of community organizing and planning.

EA A constitutes a single census subdivision for Statistics Canada. The population of EA A at the 2021 Census was 7,481[1]. Only population figures from the 2021 Census were available at time of writing. All other statistics presented in this section are from the previous census in 2016[2]. In 2016, the number of private dwellings was 3,116, with just under 3,000 of these reported as being permanently occupied. The proportion of seasonal residences (4%) is lower than in other parts of the RDN and reflects EA A's historic role as a home to working families and farm communities.

The RDN completed a Housing Needs Report in 2020 as part of its mandate from the Province to plan for housing affordability. The Housing Needs Report contains information about the observed rate of growth across the RDN's municipalities and EAs and uses this information to forecast the growth in housing need until 2041. Across the RDN an additional 3,500 housing units are needed to meet forecast demand by 2026. The Report does not break down the forecast need by EA.

The population of EA A is characterized by a larger proportion of working families than the RDN as a whole, with larger average household sizes, higher labour force participation rate, and lower median age. As in other unincorporated areas, homeowners greatly outnumber other residents in the community (85% of the population), partly due to a lack of suitable housing for renters or other forms of occupancy (15%). Compared to the RDN, residents are more likely to live in households with three or more family members (32%). One- or two-person households make up 68% of all households, with almost one in four residents living alone. This is a lower proportion than in nearby areas. While income varies dramatically with household size, across all family types, residents have higher household incomes than their peers in the RDN. The average household income is just over $88,000 per year.

The communities' demographics will influence risk and appropriate emergency planning and response. On average, residents are young and belong to larger households. Despite this, a significant number of residents live alone (24%). In the community, these households are likely to be older retirees, some of whom are aging in place after losing a partner or loved one. Residents may need different supports to connect with emergency planning processes or receive direction from emergency responders during a

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[1] Statistics Canada. 2022. (table). Census Profile. 2021 Census. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released February 9, 2022. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E (accessed April 10, 2022).

[2] Statistics Canada. 2017. Nanaimo A, RDA [Census subdivision], British Columbia and Nanaimo, RD [Census division], British Columbia (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed September 23, 2021).

wildfire. Table 4 compares key demographic attributes of the community with the RDN and the wider province.

Table 4. Community Information for EA A.

Community Information	EA A	RDN	Province of British Columbia
Total Population (2021)	**7,481**	170,367	5,000,879
Land area (km²)	**60.31**	2,038.04	922,503.01
Population density (persons/km²)	**117.0**	76.4	5.0
Number of private dwellings	**3,116**	73,622	2,063,417
Number of dwellings occupied by usual residents	**2,990 (96.0%)**	68,904 (93.6%)	1,881,969 (91.2%)
Average household income ($)	**88,059**	77,868	90,354
Average household size (persons)	**2.3**	2.2	2.4
Households by tenure – owner	**2,555 (85%)**	50,930 (74%)	1,279,020 (68%)
Households by tenure – renter	**435 (15%)**	17,900 (26%)	599,360 (32%)
Prevalence of low-income, after tax (LICO-AT) (%)	**5.5**	8.6	11.0
Labour force participation rate (%)	**62.1**	55.2	63.9
Unemployment rate (%)	**7.8**	7.7	6.7
Median age (years)	**49.1**	51.1	43.0
Data Sources: *Reported total population is from the 2021 Census.* *All other figures are from the previous 2016 Census, which was the most recent available information at time of writing.*	*Statistics Canada. 2022. (table). Census Profile. 2021 Census. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released February 9, 2022. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E (accessed April 10, 2022).* *Statistics Canada. 2017. Nanaimo A, RDA [Census subdivision], British Columbia and Nanaimo, RD [Census division], British Columbia (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed October 7, 2021).*		

Fire and Emergency Response

Fire response is provided in EA A by the North Cedar and Cranberry Volunteer Fire Departments, each of which are the creation of an associated Improvement District. The Improvement Districts are a form of local government that are used to raise fees from a community for a specific service without taking on all the responsibilities of a municipality or regional district under the *Local Government Act*. The Improvement Districts cover nearly all of EA A, with two minor exclusions west of the Nanaimo River which contain no buildings. The CVFD provides fire suppression services to South Wellington and Cassidy under a service agreement with the RDN. While NCFD provides service east of the Nanaimo River and the airport to all areas. The North Cedar Improvement District also organizes community water and sewer services in the Cedar area to approximately 1300 homes. Cedar is the largest population centre in EA A.

Both CVFD and NCFD are registered with the Office of the Fire Commissioner, meaning they must meet standards for training set in the BC Fire Service *Playbook.*

NCFD has two full-time staff and 30 volunteer firefighters, all trained to the "full-service operations standard" under the *Playbook*. This means that the department can respond to the variety of exterior and interior fires that can occur in the community, including wildfires. Some members of the department have additional training relevant to wildfire, including courses for wildland response with the BCWS, deployment of structural protection units, leadership training, and incident command system. Fire Hall No. 1 on Yellow Point Road stores several vehicles, including dedicated engines, tenders, command, and support vehicles. The department maintains a "bush truck" modified from a Ford F350 base that is stocked with structural protection equipment. Recently, the department achieved Superior Tanker Shuttle Accreditation from the Fire Underwriter Survey of Canada. This means that the NCFD can provide the equivalent of municipal water supply within five km of municipal water sources using its equipment and training to draught and deliver water in place of local hydrants. However, the accreditation does not guarantee response times or the availability of all water sources within the improvement district. Some areas of the community remain further from the fire hall or available water supply, complicating wildfire response.

CVFD serves areas in the south and west of EA A from its Hall No. 1 on Morden Road in South Wellington and Hall No. 2 on Hallberg Rd in Cassidy. In recent years CVFD has had around 30 active volunteers and members headed by a full-time Fire Chief. The department is trained to the "full-service operations standard" under the *Playbook* and deploys to structural and exterior fires within the protection district and in neighbouring communities under service and mutual aid agreements. The department maintains a fleet of four engines, two tenders, and two command/support vehicles that use a standard wheelbase. While it does not have a dedicated "bush truck", one engine is a Ford F-550 4x4 wheelbase used to access ignitions in difficult-to-reach parts of the interface. Some members of the CVFD have participated in temporary deployments with the BCWS during interface fires. Three members formed part of a joint crew with NCFD to contribute to the effort to control interior wildfires during the 2021 fire season.

The Nanaimo Airport, located within EA A, has a dedicated firefighting apparatus to respond to crashes or other events on airport property. Two custom airport rescue firefighting trucks are maintained. This fleet is staffed by the Nanaimo Airport Authority and does not respond to incidents beyond airport property. In the event of a fire at the airport, Cranberry and other fire departments under mutual aid would respond to relieve and extend the initial attack mounted by the Airport's team.

Figure 3. Fire Protection Districts of the North Cedar and Cranberry Volunteer Fire Departments.

Table 5. Major resources for fire response inside EA A.

Organization	Major Resources for Fire Response
Cranberry Volunteer Fire Department (CVFD)	- ~30 volunteers trained in accordance with NFPA 1001 practice requirements and playbook guidance as full-service firefighters. - Eight response vehicles, including one engine on a modified four-wheel drive wheelbase. - Several thousand feet of supply hose for drafting and attack line, generally loaded on separate vehicles and cached at the fire halls. - A small number of hand tools and general wildland firefighting equipment. - Several members with minimum WSPP-FF-1 or equivalent wildland firefighting training and experience on BCWS crews.
North Cedar Volunteer Fire Department (NCFD)	- Two full-time members and 30 paid-on-call volunteer members trained in accordance with NFPA 1001 practice requirements as full-service firefighters. - Several response vehicles including one dedicated "brush truck" with a modified four-wheel drive wheelbase. - Several thousand feet of supply hose and attack line mounted on vehicles and stored at Hall No. 1 - Structural protection equipment stocked on the 4x4 "brush truck" vehicle. - Several members with WSPP-FF-1 or equivalent wildland firefighting training and experience on BCWS crews. Some members have higher level wildland training including OFC Engine Boss and Task Force Lead.
Nanaimo Airport Commission	- Specialized staff dedicated to initial response on Airport property. - Two specialized aircraft rescue and firefighting vehicles. - Community firefighters will also be dispatched from Cranberry and possibly other departments to the airport in the event of an emergency.

Values at Risk

Human Life and Safety

Protection of human life is the top priority in the event of a wildfire in the urban interface. While an imperfect measure, wildfire planning in British Columbia uses the density of "structures", typically buildings with civic addresses, as a proxy for population density. Areas with an average density of more than six structures per km^2 form the core of the wildland-urban interface (WUI).

The relationship between structure density and wildfire risk can be complicated by local geography. Intermix areas tend to have a lower density of structures, leaving room for native forest vegetation between homes and buildings. This is often associated with a higher risk for this form of development where relatively high-threat forest fuels predominate. Interface developments may have a low or high density of structures, depending on the landscape design and other land uses accompanying the construction of homes. At low structure densities, the layout of private property in intermix and interface areas may be quite similar; the difference is the yards of homes in intermix areas are treed while the yards of homes in interface areas will be substantially clear of native forest vegetation. While high structure densities are typically found toward the centre of towns and settlements, recent decades have seen more homes be located on the outskirts of communities adjacent to forests. This has occurred for several reasons, including rising land prices and the opposition of existing homeowners to new housing in their communities. This places more people at a higher risk of wildfire than building new homes in central locations.

Many residents of EA A are attracted to these communities because of the rural feel and relatively low cost of land and housing. This has resulted in intermix areas of rural estates, with homes set within and among the forest, as well as interface areas where conventional subdivision and land development have created suburban communities on the edge of forests and farms.

Development conditions and structure density affect all aspects of fire management response and can strongly influence fire behaviour. The connection between how communities are built and fire risk is discussed in greater detail in *Introduction to FireSmart* (p.55) and *Development Considerations* (p.80).

Human Health

In addition to the direct risks to life and safety, large uncontrolled wildfires can cause other human health impacts over a wide area. Residents of the community are familiar with the negative impact of poor air quality from wildfire smoke, which has been experienced on BC's South Coast during several recent fire seasons. Heavy smoke disproportionately affects vulnerable populations of the elderly, people with pre-existing medical conditions like asthma, and people with low incomes[3]. Smoke can also worsen the outcome of acute respiratory diseases like COVID-19.

By focusing on the wildfire or smoke event as a discrete emergency, the long-term negative effects of wildfire on physical and mental health may be underated. People who have been evacuated, lost property, been injured, or seen loved-ones struggle with health issues during an emergency may have significant and lasting trauma that inhibits their day-to-day routine and makes ordinary tasks and experiences difficult. Mental health issues such as depression and anxiety can linger in a community that has experienced wildfire long after the original emergency[4].
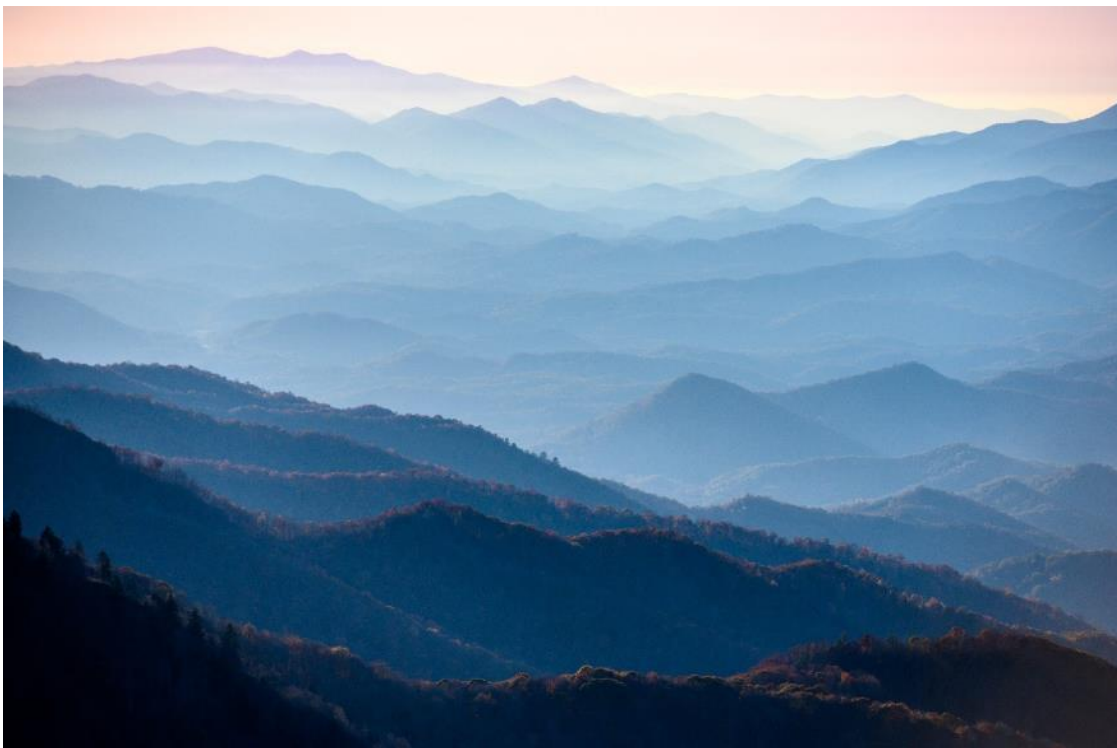
Photo 2. Smoke can reduce air quality and cause health problems. (Example from outside the RDN)

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[3] BC Centre for Disease Control. 2021 (October). "Wildfire Smoke" [webpage]. bccdc.ca/health-info/prevention-public-health/wildfire-smoke. Accessed October 21, 2021.
[4] Belleville, G., M.-C. Ouellet, & C.M. Morin. 2019. Post-traumatic stress among evacuees from the 2016 Fort McMurray Wildfires: Exploration of psychological and sleep symptoms three months after the evacuation. *International Journal of Environmental Research and Public Health. 2019*(16):1604 (14pp).
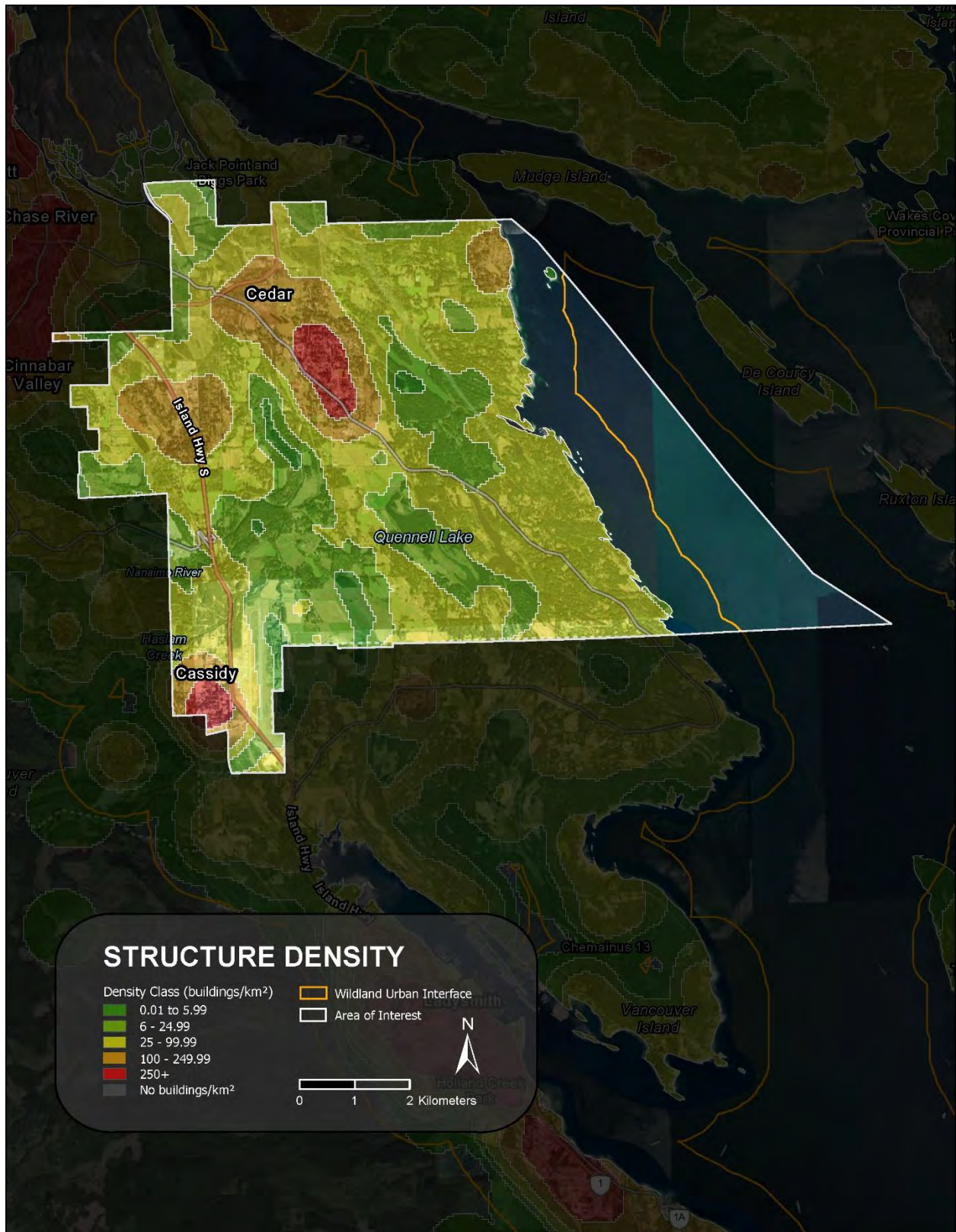
Figure 4. Structure density within the project area. The WUI represents a buffer of one km around areas of six structures per km² or higher.

Environment and Protected Areas

EA A is part of a unique ecosystem in Canada, the Coastal Douglas-fir biogeoclimatic zone. The mild, almost Mediterranean climate allows animals and plants to thrive that are not found elsewhere in Canada. In addition, the location of EA A on the Salish Sea means communities also host travelling and resident marine wildlife whose habitats can be impacted by what happens on shore. Birds like the federally protected Marbled Murrelet, dependent on coniferous forests, cliffs, and marine fishing grounds, bridge the divide between land and sea each day.

Slightly more than 3% of EA A is within parks and protected areas which is low relative to neighbouring EAs. Other public lands and suitable private lands increase the proportion of the area that offers natural and semi-natural habitats.

Forested environments, regardless of their conservation status, contain vegetation that can fuel a wildfire. Performing wildfire threat assessments for forested public land is a key piece of the Community Wildfire Resiliency Plan development. Public land often comprises the few remaining large, contiguous forests in a community's WUI. The RDN has acquired a variety of community and regional parks to provide people with places to recreate and enjoy nature. The Province has also established a handful of provincial parks. Hemer Provincial Park is the largest (94 ha) and contains an expanse of native coniferous forest in addition to much of Holden Lake and the historic Hemer farm. The largest public property in EA A is the federal land leased to the Nanaimo Airport. This area is composed of maintained lawns and tarmac and has very low environmental value. The largest contiguous forests are found on private land in the area.

Photo 3. Morden Colliery Provincial Park.

Wildlife, Species at Risk, and Protected Ecosystems

The BC Conservation Data Center (CDC) records BC's most vulnerable vertebrate animals and vascular plants, each of which is assigned to a provincial red or blue list according to their provincial conservation status rank. Species or populations at high risk of extinction are placed on the red list and are candidates for formal endangered species status. Blue-listed species are considered vulnerable to human activity and natural events. Four occurrences of blue-listed species and two occurrences of red-listed species are known within the project area. An additional nine occurrences of red-listed ecological communities are known. See Table 6 for a summary of these species and communities. Figure 5 depicts publicly available locations of these species and ecological communities.

Table 6. Species and ecological communities with designated provincial conservation status.

Occurrence ID #	Name	Type	Conservation Status
8386 8403	*Pseudotsuga menziesii / Mahonia nervosa* Douglas-fir / dull Oregon-grape	Ecological Community	Red
16821	*Quercus garryana / Bromus carinatus* Garry oak / California brome	Ecological Community	Red
14101	*Abies grandis / Mahonia nervosa* Grand fir / dull Oregon-grape	Ecological Community	Red
3976	*Ardea Herodias, fannini* subspecies Great Blue Heron, Fannini subspecies	Vertebrate	Blue
524	*Erynnius propertius* Propertius Duskywing	Invertebrate	Red
10764 10765 10766	*Alnus rubra / Rubus spectabilis / Equisetum arvense* Red Alder / Salmonberry / Common Horsetail	Ecological Community	Blue
11076 11077 11078	*Alnus rubra / Carex obnupta [Populus trichocarpa]* Red Alder / Slough Sedge [Black Cottonwood]	Ecological Community	Red
3967	*Pooecetes gramineus, affinis* subspecies Vesper Sparrow, Affinis subspecies	Vertebrate	Red
10808 10809	*Thuja plicata / Symphoricarpos albus* Western Redcedar / Common Snowberry	Ecological Community	Red

In addition to provincial conservation status, several specific wildlife species with federal protections under Canada's *Species at Risk Act (SARA)* are known or believed to inhabit the project area. These include the Vesper Sparrow, Little Brown Myotis, southern resident Killer Whale, Marbled Murrelet, Red-legged Frog, and Western Screech-owl. Of these *SARA*-listed species, only the Vesper Sparrow has designated critical habitat within the project area.

Wildfire can have positive and negative relationships with biodiversity, depending on the scale of time and space. The landscape in EA A developed in the context of sporadic wildfire, with plants and animals that have adapted to wildfire disturbance[5,6]. In the Salish Sea lowlands, Indigenous people used prescribed wildfire pre-colonization to maintain desirable meadow forage and food plants like camas[7,8]. Wildfires can support biodiversity by re-establishing a diversity of forest ages and tree sizes, the infrastructure of diverse ecosystems, within an area. Conversely, large, high-intensity fires can reduce biodiversity by destroying ecosystems and habitat features over large areas. Despite this, large fires can also play an important role in preserving the long-term health of an ecosystem by acting as a check on the proliferation of forest pathogens and other diseases of animals and trees. Because of urban development, climate change, and extensive modification of ecosystems, it is important to protect remaining reserves of high-biodiversity habitat or ecological communities from loss to wildfire when possible, or ensure wildfire affecting these areas is of a scale and intensity that supports the ecological community as a whole.

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[5] Murphy, S. F., M. G. Pellatt, & K. E. Kohfeld. (2019). A 5,000-year fire history in the Strait of Georgia Lowlands, British Columbia, Canada. *Frontiers in Ecology and Evolution*. 10 April 2019.

[6] Lucas, J. D. & T. Lacourse. (2017). Holocene vegetation history and fire regimes of *Pseudotsuga menziesii* forests in the Gulf Islands National Park Reserve, southwestern British Columbia, Canada. *Quaternary Research, 79* (3)-366-376.

[7] Beckwith, B.R. (2004). The Queen Root of this Clime: Ethnoecological Investigations of Blue Camas (*Camassia quamash, C. leichtlinii*; Liliaceae) Landscapes on Southern Vancouver Island, British Columbia. PhD dissertation, University of Victoria.

[8] Turner, N. J., D. Duer, & D. Lepofsky. (2013). Plant management systems of British Columbia's First Peoples. *BC Studies*, no. 179 (Autumn 2013), 107-133
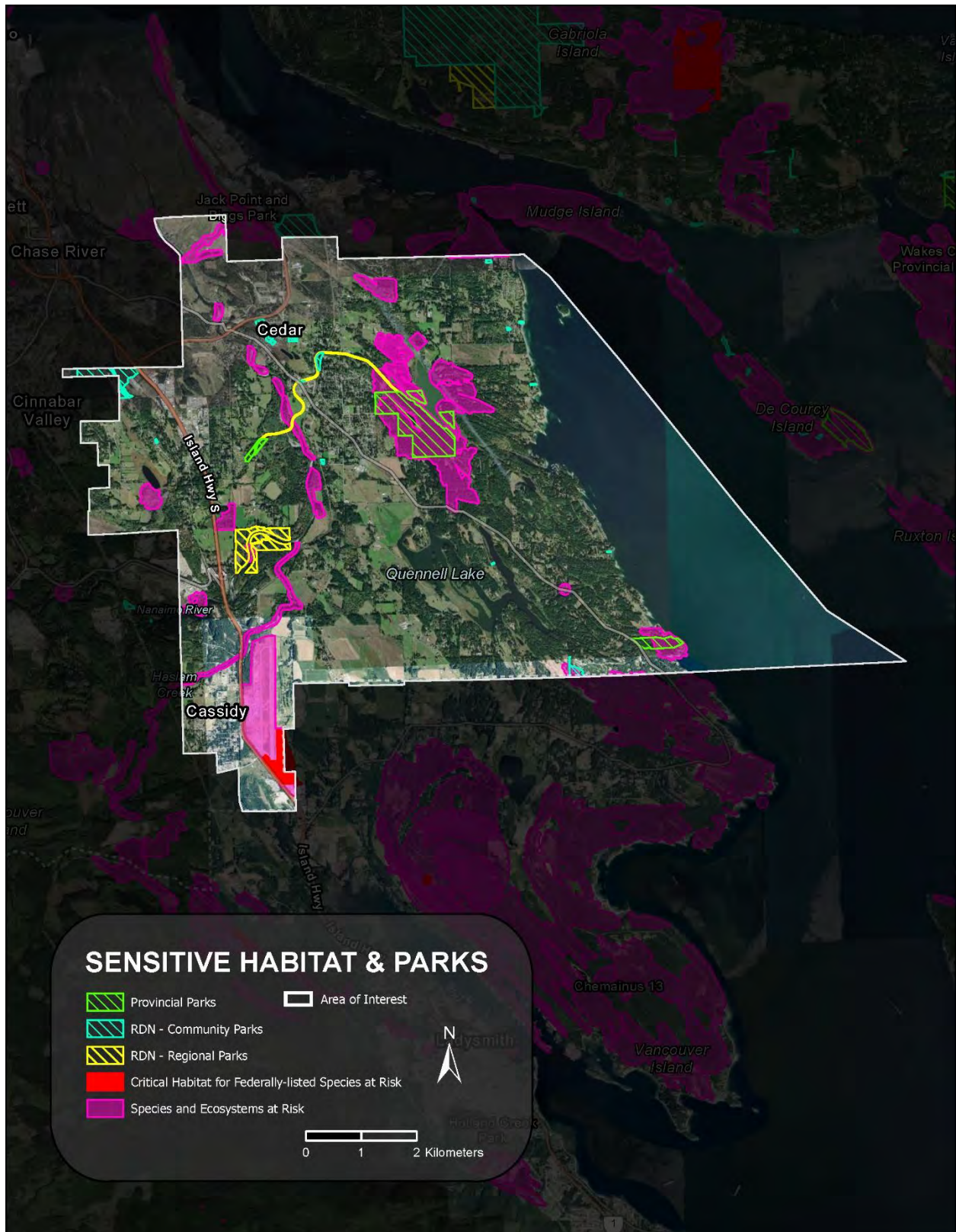
Figure 5. Protected areas and known locations of protected species or habitat.

Cultural and Archaeological Values

The landscape of EA A contains thousands of years of indigenous history and culture. This lengthy history between Indigenous peoples and the land has fostered a relationship that continues up to the present day. The area now within EA A includes lands in the core territory of the *Snuneymuxw* First Nation and Nations of the Hul'qu'minum Treaty Group. Indigenous people have lived in this landscape since time immemorial and continue to advocate for the return of unceded lands and settlement of modern treaties which would restore parts of their territories. Actions to advance wildfire management in indigenous traditional territory must involve local nations to ensure land management is in line with indigenous values and stewardship priorities.

The protection of pre-colonization cultural sites is supported by the Province through the *Heritage Conservation Act*. This *Act* allows the Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development to maintain a spatial database of archaeological and historical (post-colonization) sites related to indigenous culture and history. These can include cache pits, trails, fishing sites, cooking features, lithics (stone tools), grave sites, and human remains. Because of the sensitive nature of many of these sites, their locations cannot be published. Within EA A, 46 archaeological sites are known. Activities with physical impacts on the land, such as fuel management, within 50 metres of these sites must engage a qualified archaeologist to ensure sites are adequately protected under the *Act*.

Wildfire can cause loss of cultural values by causing damage to ecosystems and soils as well as historic and archaeological remains. While physical damage to cultural sites as the result of wildfire management is unacceptable, activities like fuel modification can help preserve cultural values by reducing the likelihood of high intensity, damaging wildfire. In other cases, wildfire management activities like prescribed burning or clean up of fine fuels can be planned to align with or even enhance cultural values and practices.

Hazardous Values

During a wildfire, some land-uses or economic activities are associated with higher risk because they involve flammable materials, high-temperature machinery, or chemicals hazardous to human health if improperly handled but are nonetheless important to the economic and social function of the community. In larger communities, hazardous values include railways, industrial facilities, gas stations, military installations, and landfills. In EA A, the most significant stores of hazardous values are likely to be fuel or other supplies located within commercial fuel stations or industrial properties. As the risks associated with storing flammable materials can never be fully eliminated, any properties with a propane tank or stores of fuel are the location of potentially hazardous values. These include auto, trade, lumber, and other industrial development concentrated along the TransCanada Highway (Hwy 1), the Nanaimo Airport, and gas stations. During a wildfire, any known or suspected location of hazardous values presents a danger to emergency responders and the public.

Major industrial facilities and the regional landfill are located just to the north of EA A in the City of Nanaimo. These facilities generally have on-site protocols for fire response and their own emergency management systems.

Other Resource Values

Wildfires can be large, landscape-scale events that create long-term impacts on sections of the economy that rely on forest resources or access to land, including eco-tourism, forest harvesting, fish and game, and mineral extraction.

A loss of mature forests to wildfire in the area would be felt emotionally by residents and visitors and may be measurable in reduced property values or tourism and overnight stays. Forest harvesting and non-timber forest products are minor components of forest land use in EA A. Wildfire is challenging particularly for holders of small private land parcels or forest tenures, who are less resilient to landscape-scale disturbance.

Despite EA A's history as a coal mining center, mineral extraction is limited to a few gravel and aggregates properties west of HWY 19A, with more activity contained within EA C. Gravel pits are less vulnerable to wildfire than other resource activities because they are typically fuel-free environments with few pieces of permanent infrastructure.

Critical Infrastructure

Critical infrastructure are the publicly owned assets, whether by the RDN, the Province, local Improvement District, or First Nation, that underpin the health and safety of the community and allow governance to take place. Critical infrastructure also includes public assets identified in a Hazard, Risk & Vulnerability Assessment undertaken by a local government. In developing the Community Wildfire Resiliency Plan, facilities deemed critical to the delivery of emergency services (like evacuation planning or fire protection) were considered, regardless of whether these facilities are owned by the RDN. The nature of government in unincorporated communities means that the RDN is directly responsible for only a few of these pieces of critical infrastructure. Additional sites and facilities have been included in consideration of field review by the consulting team and input from community members.

Electrical Power

Electrical power in EA A is mostly provided by overhead transmission lines. The electrical distribution network relies almost exclusively on above-ground transmission lines fastened to wood utility poles. Wooden poles are vulnerable to fire, and in many locations, these lines are within a few metres of forests. Power lines are also a source of ignition because branches and foliage that fall onto charged electrical lines can readily catch on fire. A high-voltage transmission line runs from north to south, passing from EA C to the Cowichan Valley Regional District just west of Cassidy and Nanaimo Airport. High-voltage lines are somewhat less likely to become sources of ignition because wider rights-of-way reduce the chance of vegetation contacting charged lines. BC Hydro inspects and manages vegetation along its utility corridors.

Electrical networks can be compromised in the event of a large wildfire. Not only can wildfire ignite electrical infrastructure but burned trees can fall on lines and disrupt service. Ensuring emergency operations have access to a sufficient supply of backup power is an important part of wildfire preparedness.

Photo 4. Electrical distribution network near Duke Point Highway.

Communications Infrastructure

Primary connections to telephone and internet service in most of the EA Are provided via the same overhead connections as are used for electrical power. Some rural residences are served by satellite telecommunications providers.

Cellular telephone service and text-based messaging services are frequently residents' primary means of communication. Cell service is provided by the three major Canadian telecommunications companies to all parts of EA A. Smaller providers may have incomplete network coverage in the area. Cellular towers for the different carriers are found in Cassidy, South Wellington, and Cedar. All towers are found on private land.

Radio communication is an important part of emergency response in EA A. The North Cedar and Cranberry No. 1 Fire Halls incorporate a radio broadcast transmitter for maintaining land-mobile communications between the fire departments and crews responding to an emergency. Cranberry Hall No. 2 has a lower wattage broadcast transmitter for local use in the Cassidy area.

Public Buildings and Facilities

A small number of institutions and public buildings are crucial for maintaining the function of government and community services. These buildings can include municipal halls or offices, physical emergency operations centres, fire halls, schools, hospitals, and transportation facilities. Ensuring the safety of public buildings and institutions during a wildfire is important for emergency response and community recovery after an event. During an emergency, these facilities may also be used as muster locations, evacuation reception centres or relief and supply points. Table 7 lists the facilities of critical importance to the RDN's emergency plans.

Photo 5. Cedar Community Secondary School in EA A.

Table 7. Public facilities and buildings within EA A.

Facility or Building Name	Location	Description
North Cedar Fire Hall (No. 1) *North Cedar Volunteer Fire Department*	2100 Yellow Point Rd. (Cedar)	Modern fire hall and administration center for the North Cedar Improvement District.
Cranberry Fire Hall (No. 1) *Cranberry Volunteer Fire Department*	1555 Morden Rd. (South Wellington)	Modern, renovated hall in South Wellington.
Hallberg Rd Fire Hall (No. 2) *Cranberry Volunteer Fire Department*	3500 Hallberg Rd. (Cassidy)	Small station with double vehicle bay serving the Cassidy area.
Nanaimo Airport	3350 Spitfire Rd. (Cassidy)	Major regional airport serving charter and commercial flights.
Cedar Elementary School (S.D. 68)	2215 Gould Rd. (Cedar)	Community school enrolling students grades K-7.
Cedar Community Secondary School (S.D. 68)	1640 Cedar Rd. (Cedar)	Secondary school enrolling students grades 8-12.

In addition to buildings identified in the RDN's Hazard Risk and Vulnerability Assessment, additional buildings in EA A serve a public function and may be important to protect during a wildfire. These include the Cedar Community Center and Woodbank Wellness Center (Snuneymuxw Nation), as well as transportation infrastructure such as the major bridges across the Nanaimo River.

Water Supply & Waste Treatment

Sources of freshwater are limited in the area. Inside the North Cedar Improvement District, 1300 homes rely on the water system in a suburban distribution network. Outside of the Improvement District, most residents rely on independent wells. A handful of subdivisions in EA A have collective water service areas, generally relying on shared wells or reservoirs. There are few sources of surface freshwater in lakes and streams in the area, though nearby properties often have licenses to use these resources. In recent years EA A, along with other parts of coastal British Columbia, has experienced severe water shortages during the summer due to a combination of reduced summer precipitation, warmer temperatures, and increased water use. The North Cedar Improvement District has had a moratorium on development in its service area since 2010 due to restricted capacity and the effects of drought on its water supply system.

Liquid waste is handled for most properties by septic systems. Some areas have combined sewerage services relying on collective septic fields or connections to the RDN's Duke Point Pollution Control Center.

Wildfire has a complex relationship with water supply. Fires tend to increase surface runoff by removing insulating, absorbent organic matter at the soil surface and increasing the so-called "splash impact" of raindrops on newly exposed mineral soils[9]. This impacts the rate of groundwater recharge, as well as affecting surface water sources with sedimentation and excess mineral nutrients downslope of burned areas.[10]. There have been cases where debris flows that have damaged homes and infrastructure were attributed to wildfire damage to soils[11]. The temperature and duration of heat in the soil can also impact the rate of groundwater recharge. At low to moderate temperatures, fire can create a water repellent layer in the subsoil that restricts infiltration, while at higher temperatures this layer may form but then be weakened or removed[12,13]. In EA A, protecting the drinking water supply and existing septic systems means protecting local hydrology from the potential impacts of wildfire and erosion.

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[9] Paige, G., & Zygmunt, J. (2013). The Science Behind Wildfire Effects on Water Quality, Erosion. *Living with Wildfire in Wyoming*. (p. 31-34). University of Wyoming: Laramie, WY.

[10] Emelko, M., & Sham, C. (2014). Wildfire Impacts on Water Supplies and Potential for Mitigation: Workshop Report. (p. 36). Waterloo, ON: Canadian Water Network and Water Research Foundation.

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[13] Wieting, C., B.A. Ebel, & K. Singha. (2017). Quantifying the effects of wildfire on changes in soil properties by surface burning of soils from the Boulder Creek Critical Zone Observatory. *Journal of Hydrology: Regional Studies*. *13* (2017) 43-57.
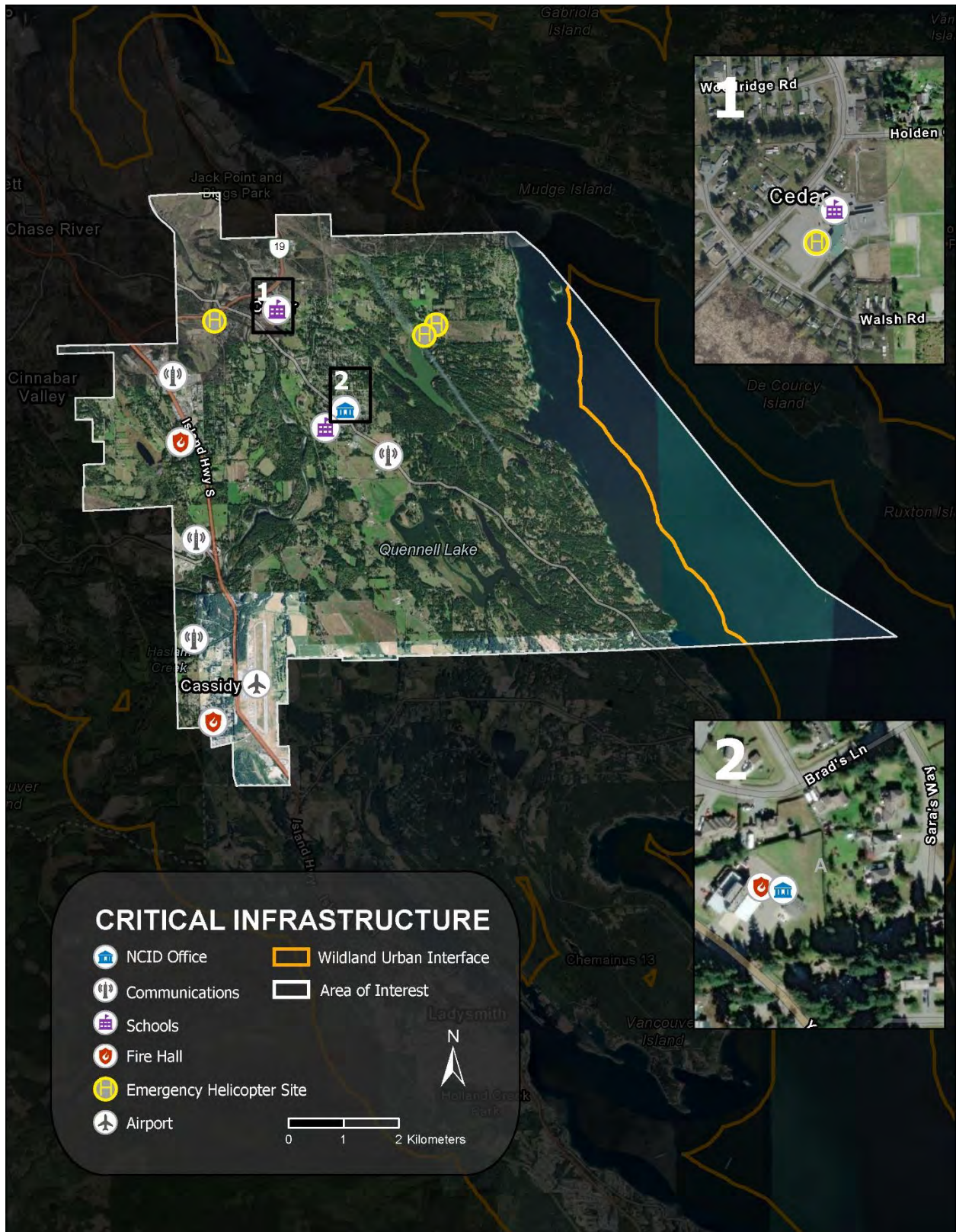
Figure 6. Public facilities considered critical infrastructure.

Wildfire Risk Assessment

Crucial to building resiliency in the community is understanding where wildfire risk is the highest, so that investments made by the Regional District of Nanaimo (RDN) are effective, sensible, and balanced with other community values and interests.

In this plan, the terms *wildfire threat* and *wildfire risk* to refer to different components of the community's vulnerability to wildfire. Both threat and risk have been modelled using data collected from forests in Electoral Area A (EA A). Wildfire threat refers to the potential fire behaviour that a natural area could sustain. Rating wildfire threat means looking at the factors of fuel loading, type, and distribution, slope and aspect, and weather conditions. Wildfire threat has no relationship to how close a forest is to populated areas or other values. Wildfire risk builds on wildfire threat by considering the proximity of forests to populated areas and other values.

> *Wildfire threat* is a ranking of potential fire behavior based on fuel conditions, weather conditions, slope, aspect, and other biophysical factors. This can also be referred to as wildfire behaviour potential.
>
> *Wildfire risk* is a measure of the probability of a wildfire occurring combined with the consequences or impacts it would cause.

Wildfire Environment

This section describes the components of wildfire threat in EA A. These components are topography, forest fuels (vegetation, debris, and organic soil), and weather.

Topography

Topography influences wildfire behaviour in several ways. In hills or mountains in the northern hemisphere, fuel loading is often less on south and west aspects because these are the warmer aspects with higher amounts of solar exposure and consequently drier microclimates less supportive of vegetation. Higher fuel loading is found on cooler north and east aspects, which at this latitude are more protected from direct solar exposure. Therefore, while warmer aspects burn more frequently on average, during the most extreme fire weather cooler aspects can often support more severe fire behaviour. On any considerable slope, wildfire spread is faster in the uphill direction. Hot air from a fire below will rise uphill, preheating forests above the head of the fire and drying fuels in advance of the flame. On steep slopes, flames also bathe the nearest upslope fuels to accelerate combustion. For these reasons, areas of steeper slopes are expected to have higher potential wildfire behaviour.

The terrain in EA A is subdued, with the highest points being less than 100 m above sea level. Along the eastern coast, the terrain is marked by low ridges and hills which tend to have west and east aspects dominating. The highest point is located in the northeast of EA A in Cedar-by-the-Sea. The central portion of EA A is a rolling plain between 20 and 40 m in elevation, centred on the Nanaimo River, which flows through a valley with limited relief. The major lakes, Quennell and Holden, occupy side valleys at the transition between the coastal hills and the Nanaimo River. Quennell Lake even bridges the divide between forests and farmland that follows this transition. The Nanaimo Airport (YCD) occupies the most significant piece of level ground south of EA A. West of here, the terrain rises towards larger hills and mountains running the length of Vancouver Island. South Wellington occupies a high point between the Nanaimo River and these foothills.

Fuels (vegetation)

Forest fuels are the dead and living vegetation and organic soil matter within and surrounding interface communities. Fuel conditions vary with the composition of tree species, live and dead proportions, density of understory shrubs and other plants, and other ecosystem characteristics. Fuels dominated by coniferous trees and shrubs are typically more flammable than deciduous forests due to their relatively low moisture content. Some plants produce volatile chemicals that readily burn, such as oils produced by scotch broom or gorse. Grasses burn quickly due to the large ratio of surface area to volume in their leaves, and because they persist in a dry, dormant state for much of the year through a process called curing. Deciduous broadleaved fuels, conversely, are more resistant to ignition due to their higher moisture content. Deciduous fuels may be left unburned during a wildfire that torches surrounding coniferous forests or grassland areas.

Forest fuels belong to one of four layers. First are ground fuels – this is the organic matter in the soil (soil carbon). Next are surface fuels, which includes all the dead branches, leaf litter, and low plants on or just above the surface of the ground. Above this, ladder fuels are the large shrubs, branches, and small trees that extend between the surface fuels and the overall height of the tree canopy. Lastly, crown fuels are the foliage, branches, and other vegetation lodged within the tree canopy.

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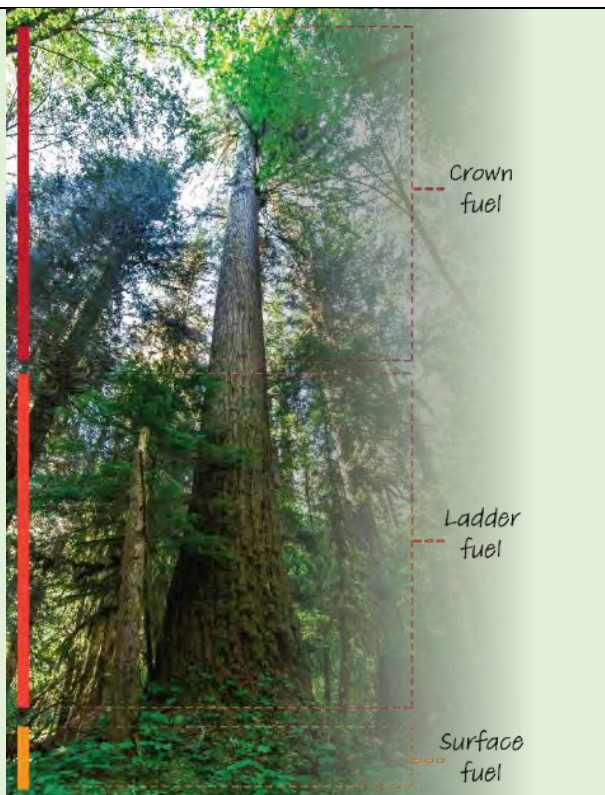
Photo 6. Forest fuel layers.

The combination of fuels from each of these layers is a strong influence on how quickly wildfire can grow and build intensity. The difference in behaviour between high-intensity and low-intensity fires is significant for preparedness planning and response. For example, BC Wildfire Service (BCWS) ground crews will action a fire burning with an intensity of more than 2,000 kilowatts per metre (kw/m). This is a measure of energy being put out by the head of an advancing fire. In forested environments, fires with high intensities can climb into tree crowns via ladder fuels. If conditions are right, ignition in the tree canopy will become an active *crown fire* – one where fire is spreading along the ground and through the crown simultaneously. These fires consume whole forests, from the soil to the tops of the trees, send embers far ahead on the wind to light new blazes, and are too dangerous to fight directly.

> *Crown fire* is a wildfire that involves fuels in the tree canopy. It can be "active", meaning fire is advancing through tree crowns simultaneously with surface fire spread, or "passive", meaning surface fire intensity is great enough to cause torching of single trees or small tree patches.

Photo 7. A wildfire with active crown fire. (Example from outside the RDN)

Crown fires become more likely where hazardous coniferous fuels have low *vertical* and *horizontal separation*. Amid the variety of forests, some combinations of species, sites, and climates naturally produce ecosystems that have less separation between the fuel layers (vertical separation) or neighbouring tree crowns (horizontal separation). The fuel characteristics of forests also change drastically over time as the ecosystem develops. In Canada, a standardized system of assigning real forests to 16 simplified fuel types is used to help model wildfire threat and risk. These are the fuel types of the Canadian Fire Behavior Prediction System. Although the fuel types were developed with the rest of Canada in mind, practice in British Columbia and applied research by the Canadian Forest Service and BCWS has resulted in several standard rules for assigning forests fuel types.

> *Vertical* and *horizontal separation* refer to fuel distribution within a forest and are used to help classify forests into standardized fuel types.

On the warm coast of the Salish Sea, most of the native coniferous forests are represented by the C-5 fuel type. This represents a coniferous forest with a relatively high horizontal and vertical separation of fuels, where a high intensity of surface fire would be required under normal weather conditions to create an active crown fire. As a result, C-5 forests on flat ground are typically rated to have moderate wildfire threat (potential wildfire behaviour). Young forests are typically denser and may have less separation between fuel layers and neighbouring tree crowns. In the RDN, these forests are assigned the C-3 fuel type, which is associated with high wildfire threat. C-3 forests were not observed within EA A during field visits. Other common fuel types in the area are M-2 (mixedwood) and D-1 (deciduous). Stands with a high proportion of deciduous trees are expected to have reduced wildfire threat. The wildfire threat in M-2 stands is significantly affected by the proportion of conifers found in them. Table 8 provides a breakdown of fuel types by total area.

Table 8. Summary of fuel types within EA A.

Fuel Type Name	Area (ha)	General description
C-5	2,049	Mature, low to moderate density stands of the native conifer Douglas-fir, generally over 40 years in age and over 15 m in height.
D-1/2	1,118	Deciduous stands with fewer than 25% coniferous composition.
M-1/2	723	Mixedwood stands with between 25 and 75% coniferous and deciduous composition.
N	195	Non-fuel areas – pavement, rock, extensive sand.
O-1a/b	2,055	Grass fuel types, also used to represent agricultural fields and large lawns.
W	1,032	Bodies of water, including freshwater and the ocean.
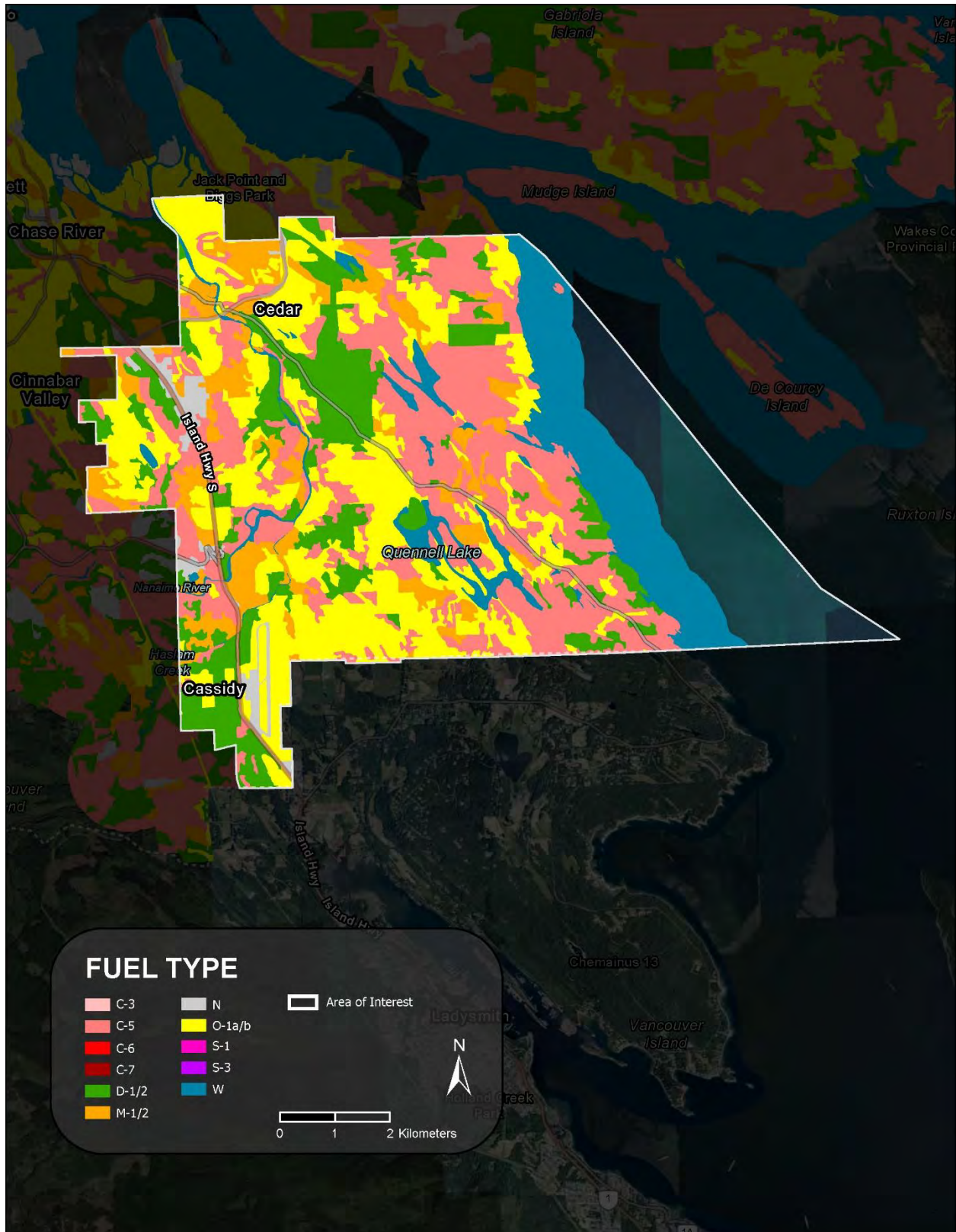
Figure 7. Fuel types in the area of interest.

Weather

Weather in EA A is strongly influenced by the surrounding ocean. Sea breezes cool the air during the summer and increase local humidity. In this section, weather data for Cedar are shown because of its central location in EA A. Average daily highs for Cedar have ranged between 7°C (December) and 24°C (July & August). Most precipitation arrives in fall, winter, and spring, with sharply reduced precipitation in July, August, and September. Snow is rare and may fall only once or twice per year. Due to subdued elevation, isolation, and mild climate, the ecosystems beyond the reach of the Nanaimo River do not receive appreciable moisture from snowmelt.
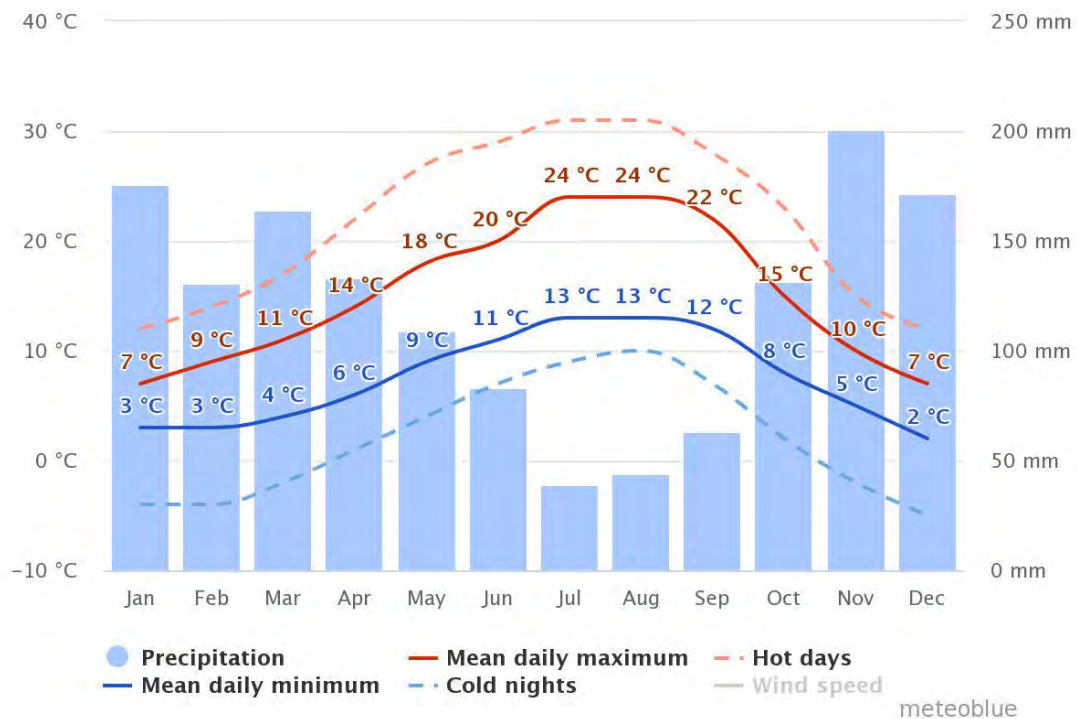
Figure 8. 30-year modelled climate averages for Cedar (meteoblue).

The Salish Sea directs winds throughout the year. Winter is the windiest time of year when the North Pacific Storm Track sends high winds and moisture to the area from the south. These events are often experienced here as strong east-southeasterly winds. Storms also come from the northwest, though these tend to be weaker. Occasionally, the region receives cold easterly outflow winds that channel through the valleys of the Lower Mainland and across the Straight of Georgia. While fire risk is very low during wet winter months, wind events are notable because they contribute to surface fuel loading by bringing small branches and needles to the forest floor. These fine fuels then dry out to become tinder for the next fire season.

Winds are subdued in the summer months when the area experiences high air pressure and mostly stable skies. The peak fire season is characterized by many warm, blue days. Typically, the average temperatures are exceeded when high pressure over the BC interior forces warm, dry air down to the coast. These events lower the relative humidity, raise temperatures, and increase the potential for fire ignitions. During severe fire seasons, they can also bring smoke to the area. Further south in Washington and Oregon similar east-to-west summer airflows have been linked historically to catastrophic fire seasons with hundreds of thousands of ha burned[14].

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[14] Abatzoglou, J.T., D.E. Rupp, L.W. O'Neill, & M. Sadegh. (2021). Compound extremes drive the western Oregon wildfires of September 2020. *Geophysical Research Letters 48*(8):
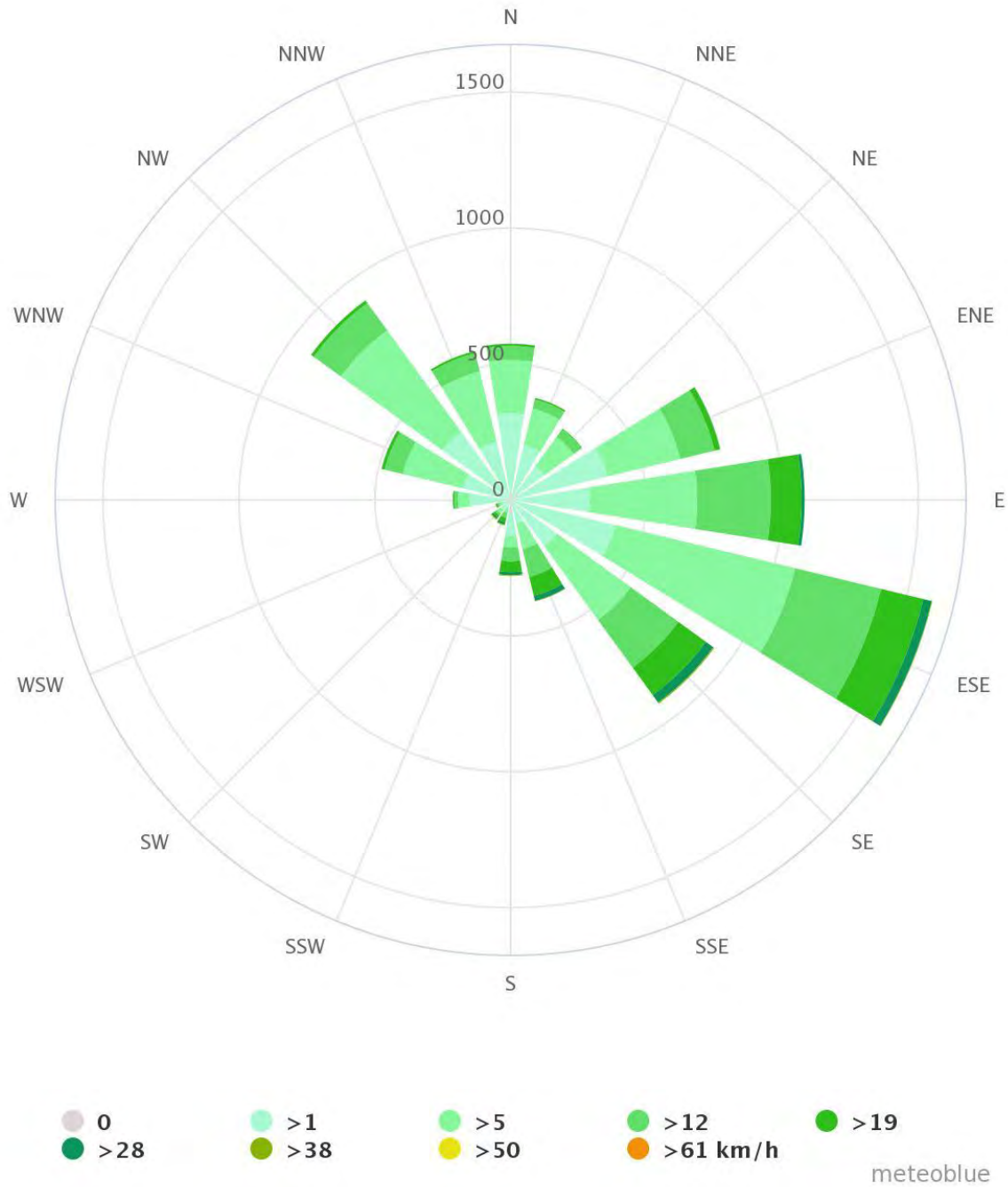
Figure 9. Wind rose diagram for Cedar (meteoblue). The diagram shows cumulative hours (the wind rose radius) at an average windspeed from each cardinal direction during the average year (1990-2020).
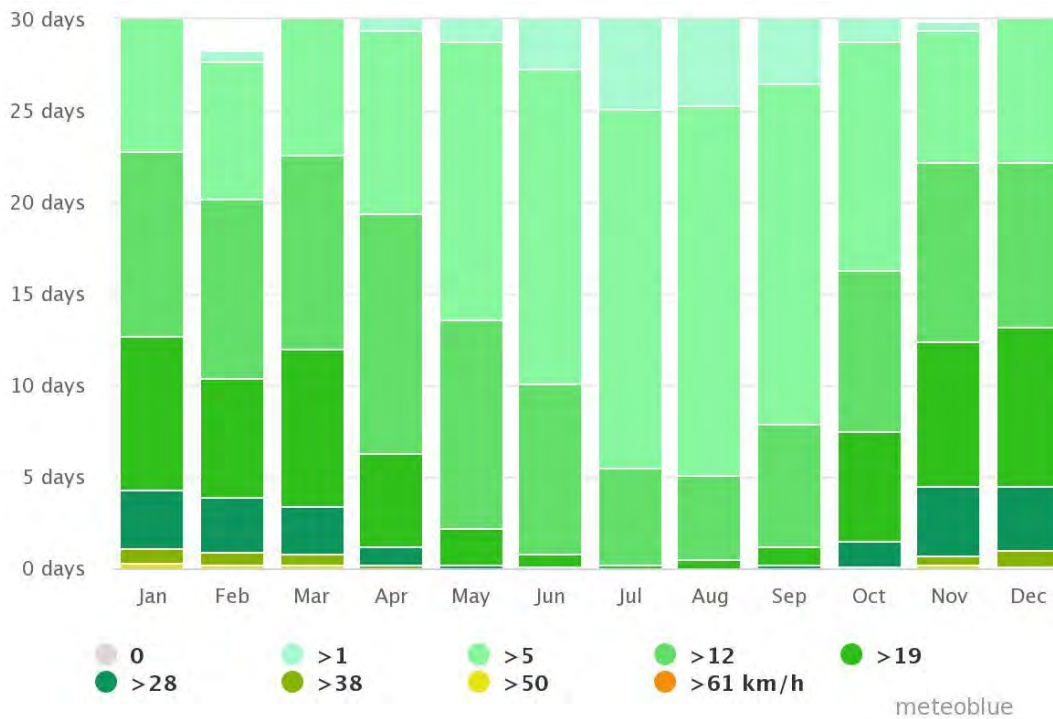
Figure 10. Windspeeds by month experienced for Cedar (meteoblue).

Fire Weather Rating

Fire Weather Rating is the use of weather measurements to assess likely fire behaviour for a defined forecast period. The BCWS monitors weather throughout the province. Fire weather is an essential component in most fire prediction models and is used to help determine a community's landscape-level wildfire threat. In Canada, temperature, relative humidity, wind, and 24-hour precipitation are tracked daily and recombined to calculate several index components of fire weather. While these variables are tracked annually, during most of the rainy season weather measurements fail to meet thresholds for the publication of calculated fire weather indices. The Canadian Forest Fire Danger Rating System carries rules about when in the year fire weather ratings need to be updated daily so the public and emergency responders can plan activities to mitigate fire risk. This is an estimate of the fire season, which is the period in the year during which wildfire activity is reasonably foreseeable. Historically wildfire season begins May 1 and lasts until September 30.

Table 9 shows weather averages during the core fire season (May-September) for the nearest BC Wildfire Management Branch weather station, which is located at the Nanaimo Airport (Cedar). Data shown cover the twenty-year period between 2000 and 2020, inclusive. Comparison statistics from 2018 and 2021 are presented separately to illustrate weather during recent years with elevated fire danger. The statistics show fire season weather is characterized by an extended period of hot, dry conditions in the area. In 2018 and 2021, years that featured highly active wildfire seasons in the rest of the province, prolonged drought occurred throughout July and August alongside higher-than-average temperatures.

Table 9. 20-year average weather (2000-2020), from BCWS Cedar (59).

	Weather Attribute	May	Jun	Jul	Aug	Sep
2000-2020	Maximum Daily High (°C)	28.0	31.3	34.5	33.1	28.4
	Daily Average High (°C)	15.9	18.8	22.0	22.1	19.3
	Monthly Average Rainfall (mm)	44.3	39.4	19.8	24.7	43.1
2018	Maximum Daily High (°C)	28.4	34.2	34.4	33.8	27.8
	Daily Average High (°C)	19.5	19.5	25.4	24.2	17.7
	Monthly Rainfall (mm)	4.6	43.8	1.6	2.4	104.2
2021	Maximum Daily High (°C)	25.2	41.3	35.0	37.4	27.8
	Daily Average High (°C)	17.2	23.5	26.1	24.7	18.8
	Monthly Rainfall (mm)	18.8	39.0	0	4.8	115.0

Climate Change and Wildfire Behavior

Climate change is causing changes to temperatures and precipitation patterns that impact forest health and wildfire risk. In 2021, the community faced a late-June heatwave that brought temperatures rarely recorded and touched off a long summer of drought. The 2021 "Heat Dome" was assessed by climate scientists to have been made 150 times more likely by human-caused climate change[15]. The Pacific Climate Impacts Consortium has modelled anticipated climate impacts for each regional district in British Columbia using the RCP 8.5 (high emissions) greenhouse gas emissions scenario[16]. The estimates show what the climate could soon look like if little action is taken to reduce greenhouse gas emissions. By the 2050s, the RDN could see annual average temperatures increase by 2.7°C. Rainfall is expected to increase by 7% annually and by 3.9% in summer. Despite this, PCIC projects the dry season in the region will lengthen. This is because as temperatures warm, more rainfall is needed to counteract the effect of increased evaporation and transpiration from soil and plants. The average figures for temperature and precipitation conceal an expected increase in the frequency of extreme events, such as the June 2021 heatwave. A shift to more intense rainfall events could counterintuitively contribute to predicted dryness, because intense precipitation events more often exceed the water infiltration capacity of soils and cause increased surface runoff rather than downward recharge of soil moisture.

Predictions for warmer, drier summers are ingredients for a longer wildfire season. Patterns observed in other parts of BC and North America suggest that hotter, drier conditions are likely to result in an overall

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[15] Philip, S.Y., S.F. Kew, G.J. van Oldenborgh, W. Yang, G.A. Vecchi, F.S. Anslow, S. Li, S.I. Seneviratne, L.N. Luu, J. Arrighi, R. Singh, M. van Aalst, M. Hauser, D.I. Schumacher, C.P. Marghidan, K.I. Ebi, R. Bonnet, R. Vautard, J. Tradowsky, D. Courmou, F. Lehner, M. Wehner, C. Rodell, R. Stull, R. Howard, N. Gillett, & F.E.L. Otto. (2021). Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021. World Weather Attribution. [Unpublished]. Accessed October 21, 2021. worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/

[16] Pacific Climate Impacts Consortium. 2021. Plan2Adapt [Online tool]. Accessed October 21, 2021. services.pacificclimate.org/plan2adapt/app/

increase in wildfire frequency[17,18]. Warmer temperatures in spring and fall will extend the duration of the fire season, extending periods of high wildfire hazard[19].

Climate change affects forest fuels as well as fire weather ratings. Climate change affects forest health by creating a mismatch between trees and the physical environment, which creates the conditions for outbreaks of insects and tree diseases[20]. More frequent or prolonged droughts reduce tree health and vigour, also increasing susceptibility to pathogens and pests[21]. Declining forest health tends to increase forest fuel loads because it increases tree mortality and morbidity Forest health damage agents can be biotic, like mountain pine beetle, or abiotic, like an unusual windstorm or frost. For example; in the Coastal Douglas-fir biogeoclimatic zone, the widespread decline of western redcedar due to drought stress has been observed. This has increased fuel loads in some cedar forests, particularly the fine fuel load of small branches and dropped foliage that contributes to increased surface fire intensity. At the same time, longer growing seasons may increase fuel production by allowing more photosynthesis.

Despite uncertainty about the pace of climate change and the drive toward mitigation, the fire season lengthen in recent years has been observed. The moist winter climate creates high volumes of foliage and woody material which are potential fuels during summer droughts. It is reasonable to expect that climate change impacts on forest health and weather patterns will result in an increase in wildfire intensity and frequency in EA A.

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[17]Kirchmeier-Young, M.C., N.P. Gillett, F.W. Zwiers, A.J. Cannon, & F. Anslow. (2019). Attribution of the influence of human-induced climate change on an extreme fire season. *Earth's Future, 7*: 2-10.

[18] Taylor, S., Régnière, J., St-Amant, R., Spears, J., & Thandi, G. (2010). High resolution simulations of fire weather indices and wildfire risk in British Columbia with climate scenarios. Victoria: Canadian Forest Service.

[19] Abatzoglou, J., & Williams, A. (2016). Impact of anthropogenic climate change on wildfire across western US forests. *Proc Natl Acad Sci USA* 113(42):11770–11775.

[20] Woods, A. J., Heppner, D., Kope, H. H., Burleigh, J., & Maclauchlan, L. (2010). Forest health and climate change: A British Columbia perspective. *The Forestry Chronicle, 86*(4), 412-422.

[21] Sturrock, R., Frankel, S., Brown, A., Hennon, P., Kliejunas, J., Lewis, K., Woods, A. (2011). Climate change and forest diseases. *Plant Pathology, 60*(1), 133-149.
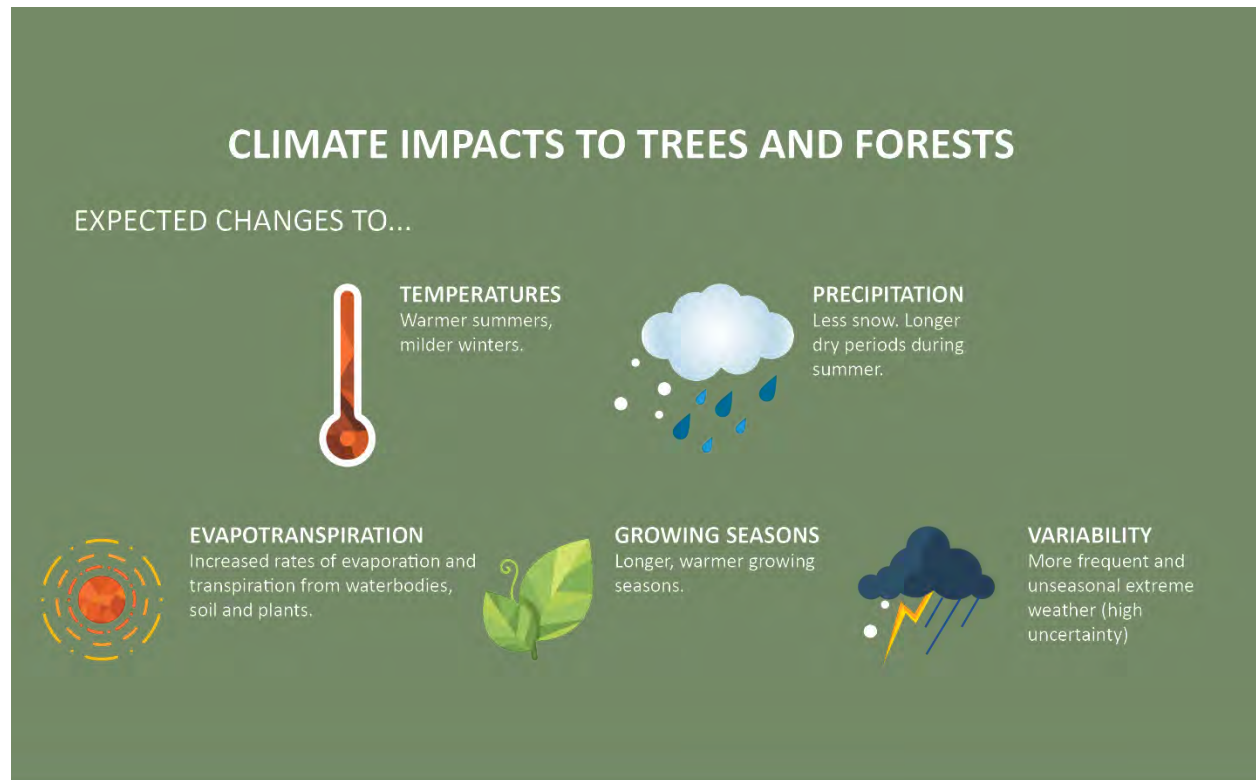
Figure 11. Potential impacts of climate change on wildfire behaviour.

Fire History

Climate and Ecosystems

EA A is within a zone of near-Mediterranean climate characterized by cool, wet winters and warm summers with long dry periods. The climate helps shape the **biogeoclimatic ecosystem classification (BEC)** and **fire regime**. The Biogeoclimatic Ecosystem Classification system is used in British Columbia to describe ecosystems by vegetation, soil, and climate. The entire province is divided into regional or landscape-scale classifications called zones, which each present a dominant vegetation community as the result of interactions between soils, climate, and ecology. It is apparent that wildfire is a disturbance that is directly related to the kind of ecosystems found here. The pattern of returning fire in the landscape is called the fire regime. Understanding fire regime helps us contextualize risk in the community and appropriate responses for management.

> **Biogeoclimatic ecosystem classification (BEC)** is the province-wide system used to relate climate, physical geography, and plant communities.
>
> **Fire regime** is the pattern of returning fire in a landscape, dependent on climate, ecological, and anthropological factors.

EA A is entirely within one BEC zone, the Coastal Douglas-fir Zone (CDF). This BEC zone occurs in the rainshadow of the Insular (Vancouver Island) mountains and is the driest, mildest area of British Columbia's temperate coastal rainforest. The CDF is characterized by warm, dry summers with an extended fire season. Table 10 compares climate averages for the CDF with the next most similar BEC category, the Coastal-Western Hemlock (very dry maritime) subzone (CWHxm).

Table 10. Climate maximums and minimums for weather stations in the CDF and the next most similar BEC category (CWHxm).

Biogeoclimatic Classification	Avg. Annual Precipitation (mm)	Avg. Summer Precipitation (mm)	Avg. Annual Temperature (°C)	Summer Heat to Moisture Index*
CDFmm	1038	198	9.8	89
CWHxm1	1427	285	9.3	62

Compared with nearby forests in the CWHxm, forests in the CDF have less annual and summer precipitation and less snowfall. Aridity during the early fire season is increased by the lack of supplementary water from montane snowmelt. These relatively dry conditions result in characteristic forests of pure Douglas-fir (*Pseudotsuga menziesii*), broken up by patches of broadleaved arbutus (*Arbutus menziesii*) on rocky outcrops. In wetter areas, forests can be mixed with red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera* var. *trichocarpa*), bigleaf maple (*Acer macrophyllum*), grand fir (*Abies grandis*), and western redcedar (*Thuja plicata*).

Disturbance Regime

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

resource. Today, foresters and ecologists alike recognize the role of periodic disturbance in maintaining healthy and diverse forests and ecosystems.

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

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

The Coastal Douglas-fir Zone is considered to belong to NDT 2 – ecosystems with infrequent stand-initiating events. This means that, before colonization, most new forests in the area would have sprouted after fires of moderate to severe intensity. "Stand-initiating" refers to the act of destruction that removes the existing forest and frees up space and resources for a new forest stand to grow in its place. Species like Douglas-fir are relatively shade-intolerant, meaning they cannot grow competitively under the shade of other trees. For this reason, the landscape of the CDF needs stand-initiating fire disturbance to reset ecosystems and allow new trees to grow. Pre-colonization *fire return intervals* in Coastal Douglas-fir forests are estimated to be 200 years. Fires would have been of moderate size (20 to 1000 ha) with unburned areas resulting from local geography and chance. Forests would have taken the appearance of a mosaic of even-aged stands with scattered veteran, fire-scarred trees[22]. Site-specific studies have shown through charcoal analysis that the fire interval was more frequent than 200 years in some coastal Douglas-fir forests[23, 24].

Fire return interval is the time between fires in a defined area, typically measured at the landscape scale.

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[22] Province of British Columbia. (1995). Biodiversity Guidebook. *Forest Practices Code of British Columbia*, p. 22.
[23] Murphy, S.F., M.G. Pellatt, & K.E. Kohfeld. (2019). A 5,000-year fire history in the Strait of Georgia lowlands, British Columbia, Canada. *Frontiers in Ecology and Evolution 7*(90).
[24] Lucas, J.D. & T. Lacourse. (2013). Holocene vegetation history and fire regimes of *Pseudotsuga menziesii* forests in the Gulf Islands National Park Reserve, southwestern British Columbia, Canada. *Quaternary Research 79*(2013): 366-376.

Changes in Fire Return Interval

Fire return intervals are not homogeneous in time or across the landscape, and most of all they reflect the cultural norms and practices of human society. Ecologists believe the present landscape of Douglas-fir forests and other mixed tree species took shape in the past 4500 years, following a period of pronounced warmer climate that allowed Garry oak (*Quercus garryana*) to enter the region from the south[25]. The influence of indigenous land management is evident in charcoal and pollen records from the Coastal Douglas-fir zone, showing a practice of cultural burning with low severity fire that caused Garry oak meadows to persist despite a cooling of the climate, more favourable to closed-canopy Douglas-fir forest[26]. These cultural burns were small fires set in the spring and fall to reduce the build-up of debris in forests, clear productive meadows of new conifer trees, and enhance valuable food crops and game forage among other purposes. Indigenous burning was seen as threatening by settlers, despite settlers using fire to clear land for farming. Cultural burning was restricted by the colonial government's Bush Fire Act of 1874. This ushered in a period of increasing government control over the land base and oppression of indigenous people and cultural practices. The 20th century was dominated by a "put-it-out" philosophy that emphasized the suppression of all fires in a bid to protect the timber resource and forest communities. The effectiveness of this approach is now being questioned as British Columbia's worst fire seasons accumulate in recent decades.

Photo 8. Wildfire impacts seen near North Cowichan, BC.

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[25] Hebda, R.J. (1995). British Columbia Vegetation and Climate History with Focus on 6 ka BP. *Geographie physique et Quarternaire, 49*(1), 55-79.

[26] Brown, K.J., N.J.R. Hebda, G. Shoups, N. Conder, K.A.P. Smith, J.A. Trofymow. (2019). Long-term climate, vegetation and fire regime change in a managed municipal water supply area, British Columbia, Canada. *The Holocene 29*(():1411-1424.

Recorded Fires in the Project Area

On the coast, large fires in recent history have been caused by human activities. Forest stands in many areas of coastal British Columbia originate after several hot, dry years between the 1880s and 1920s, during which land clearing, lumbering, railways, camping, and mining activities provided many sources of ignition[27].

The BCWS provides information on historic fires throughout British Columbia. Since 1950, there have been 187 wildfires recorded by the Wildfire Service in EA A. 47 of these were classified as "nuisance fires", which are fires that did not spread to surrounding vegetation but were nevertheless called into the Wildfire Service. 136 fires did spread to vegetation and required fire suppression. The remaining two reported fires were not located. The largest escaped fire during this period occurred in 2015 and burned over a dozen ha in the hills east of Nanaimo Airport.

The Wildfire Service also keeps longer reaching information on large fires. Between 1920 and 2020, 28 large fires (> 1 ha) occurred in EA A (including the 2015 fire). Other than the 2015 fire, all these fires occurred before 1948. In the last hundred years, fires have burned an estimated 2,200 ha in EA A. However, significant portions of this burned area are in other jurisdictions (where a single fire burned across an EA boundary). Much of the area burned in EA A has since been converted to other land uses.
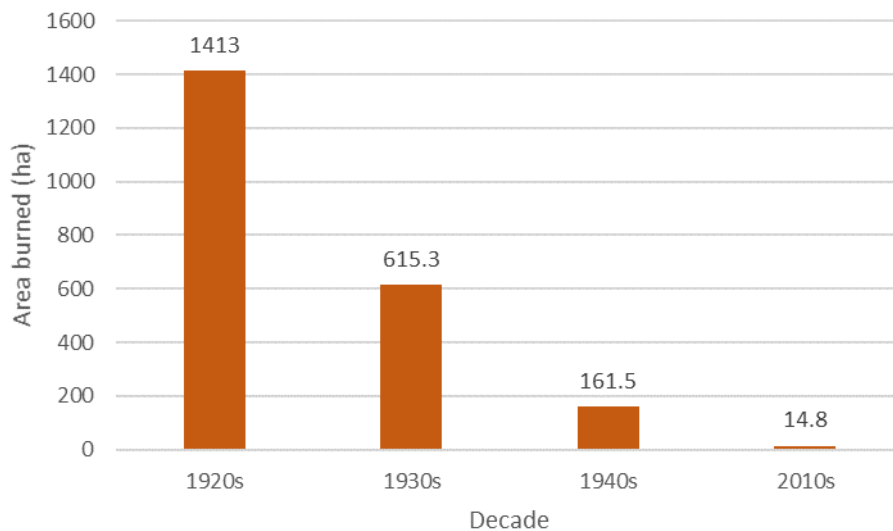
Figure 12. Area burned by decade, 1920-2020.

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[27]Parminter, J.V. (1978). An Historical Review of Forest Fire Management in British Columbia. [Thesis]. Vancouver: University of British Columbia.

Since 1950, the average size of fires is just under 0.5 ha, but this is distorted by a small number of escaped, larger fires. The median size of fires during this period has been 0.1 ha, or slightly smaller than a standard residential lot. This means that a large number of ignitions are not becoming large fires, and is a good indication of historic suppression success during the period since 1950.

Human intervention in the forest, both deliberate and unintentional, has impacted the fire regime in this area. Every fire recorded in the BCWS data since 1920 has been caused by humans except for two ignitions by lightning and two ignitions of unknown cause. Prohibition of indigenous cultural practices, growing opposition to slash-burning in expanding communities, and effective fire suppression have all limited fire behaviour since the major fires of the early 20th century. While there are still many ignitions in the interface owing to campfires, recreation, and other human causes, most are immediately extinguished by firefighters, community members, or unsuitable weather conditions.

Urban development in the forest interface has impacted forest stands by compacting soils, changing how water flows through the landscape, and opening stands to new wind and sun exposure. While these physical impacts can decrease forest health[28] and contribute to forest fuel conditions, the larger impact of urban development is to increase the potential sources of ignition within the forest by placing people, machines, and buildings -- and the activities that involve sources of heat or energy – close to forest fuels. Warmer, drier conditions caused by climate change in combination with more sources of ignition are increasing the risk associated with the interface of these temperate rainforests.

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[28] Zipperer, W.C. & R.V. Pouyet. (1995). Urban and suburban woodlands: a changing forest system. Syracuse, NY: United States Forest Service, US Department of Agriculture.

Provincial Strategic Threat Analysis

The Provincial Strategic Threat Analysis is a wildfire risk mapping exercise conducted at a provincial scale. This analysis is intended to be used as a starting point for assessments of local wildfire threat, which can then be refined and focused through a Community Wildfire Resiliency Plan. The Provincial Strategic Threat Analysis includes several spatial layers, including wildfire threat and fuel typing. The Community Wildfire Resiliency Plan involves updating these components of the Provincial Strategic Threat Analysis by integrating local weather and making field corrections to fuel typing for public land in the Area of Interest.

The analysis includes information and maps that describe fuel types, historical fire density, the potential for embers to land in an area (spotting impact), head fire intensity, and a final calculated wildfire threat score. Scores are then used to assign locations within the province into one of ten Fire Threat Classes. Threat Class 7 is a threshold used to describe where the most severe wildfire behaviour is expected. Areas of the province that fall into these higher classes are most in need of wildfire planning and mitigation. Areas rated as Class 7 or higher are where fire intensity, frequency and spotting can potentially cause catastrophic losses in any given wildfire season wherever ratings overlap with values at risk. Class 6 areas are also considered prone to dangerous crown fires at lower frequencies.

This analysis was completed at a coarse-scale to allow efficient processing of large areas. The Provincial Strategic Threat Analysis identified the majority of the public land area as a moderate threat (53% of public land). Overall, 83% of EA A's land area is privately owned and cannot be rated by this analysis.

Table 11. Summary of wildfire threat from Provincial Strategic Threat Analysis

PSTA Threat Rating (class)	Area (ha)*	% of land area
Extreme (9-10)	0	0%
High (7-8)	59	1%
Moderate (4-6)	540	9%
Low (1-3)	449	7%
No Data (Private Land)	5,102	83%
Water	2,005	N/A

*Minor differences in area totals between PSTA data and other tables result from different data resolutions.
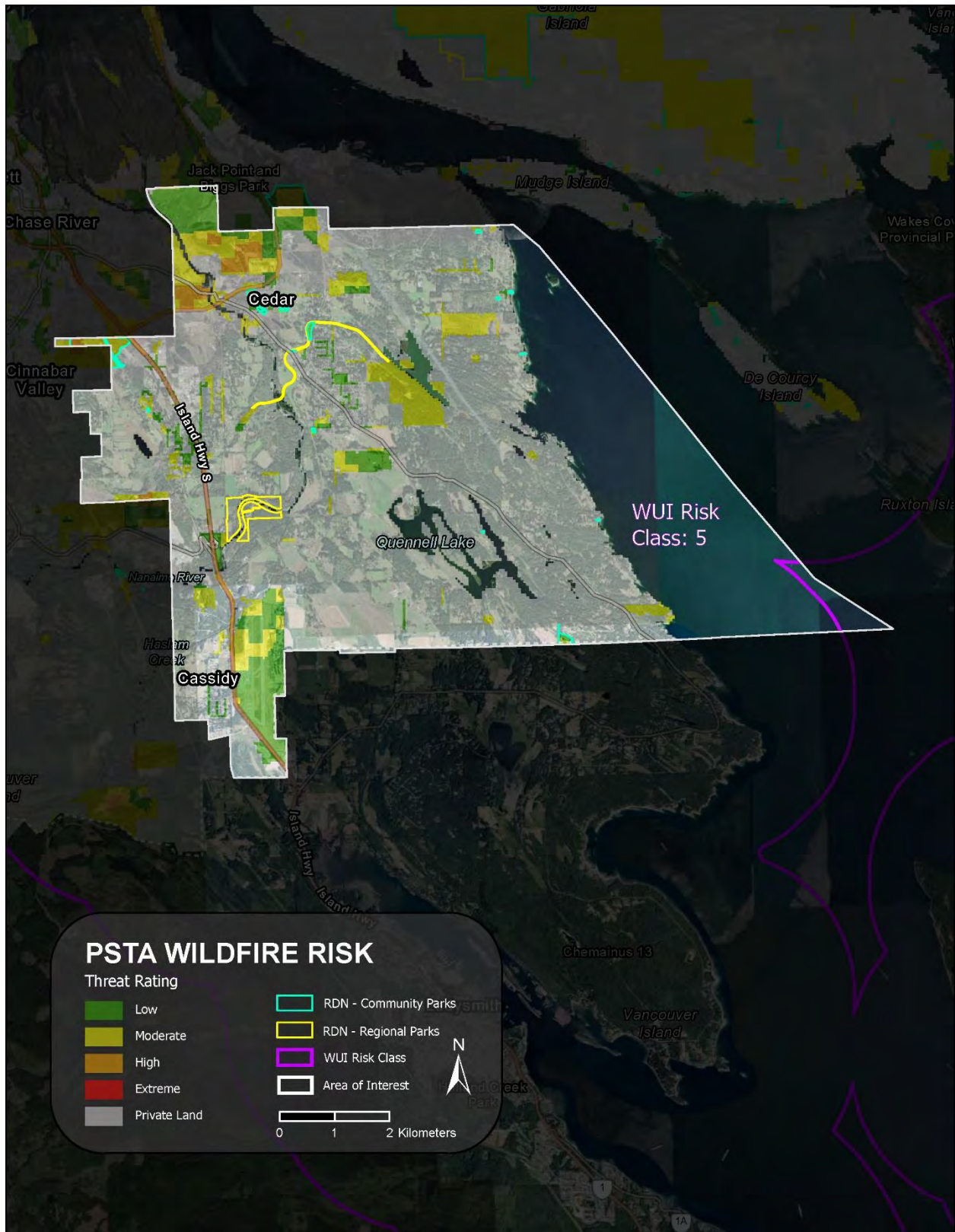
Figure 13. Wildfire threat ratings from Provincial Strategic Threat Analysis (PSTA)

The Provincial Strategic Threat Analysis is completed as a province-wide spatial layer with a 50-metre pixel size. This tool is useful for higher-level wildfire analysis and strategic emergency planning but lacks detail to support a local analysis of wildfire risk. Often errors or mismatches are identified when focusing on a specific area within this dataset. A key component of the Community Wildfire Resiliency Plan process is refining provincial data into maps of local wildfire threat based on local topography and validation of provincial fuel type information.

Wildfire Threat Assessment

Field checks of provincial data on public land were completed in July and August of 2021. These site visits were focused on parcels owned, leased, or otherwise maintained by the RDN within the WUI, though other public lands were also visited. The goal of these site visits was to assess the wildfire threat, ground-truth the provincial data, and identify feasible potential fuel treatment areas. Sites were identified for assessment in advance using desktop analysis which considered the following:

1. Provincial Strategic Threat Analysis – High and Extreme wildfire threat areas
2. Structure Density – areas near high structure densities
3. Critical infrastructure – sites identified in collaboration with the RDN as critical for emergency response and governance.
4. Crown and municipal land – only public land was visited. Privately owned land was not visited.
5. Locally identified areas – areas recommended for field checks by RDN staff and fire department personnel.

A total of 7 wildfire threat plots and 16 walkthrough assessments were conducted within the area of interest. Figure 14 shows the wildfire threat and risk results from the local threat assessment. Appendix C provides a detailed summary of the technical process for determining this local wildfire threat score.

Table 12. Summary of wildfire threat and risk from the local threat assessment.

Wildfire Threat	Area (ha)	% of land area	Wildfire Risk	Area (ha)	% of land area
Extreme	0	0%	Extreme	11.3	<1%
High	31.0	<1%	High	18.8	<1%
Moderate	862.3	14%			
Low	10.4	<1%			
Very Low	1,070.5	N/A			
No Data (Private Land)	5,198.6	86%	No Data	5,198.6	86%
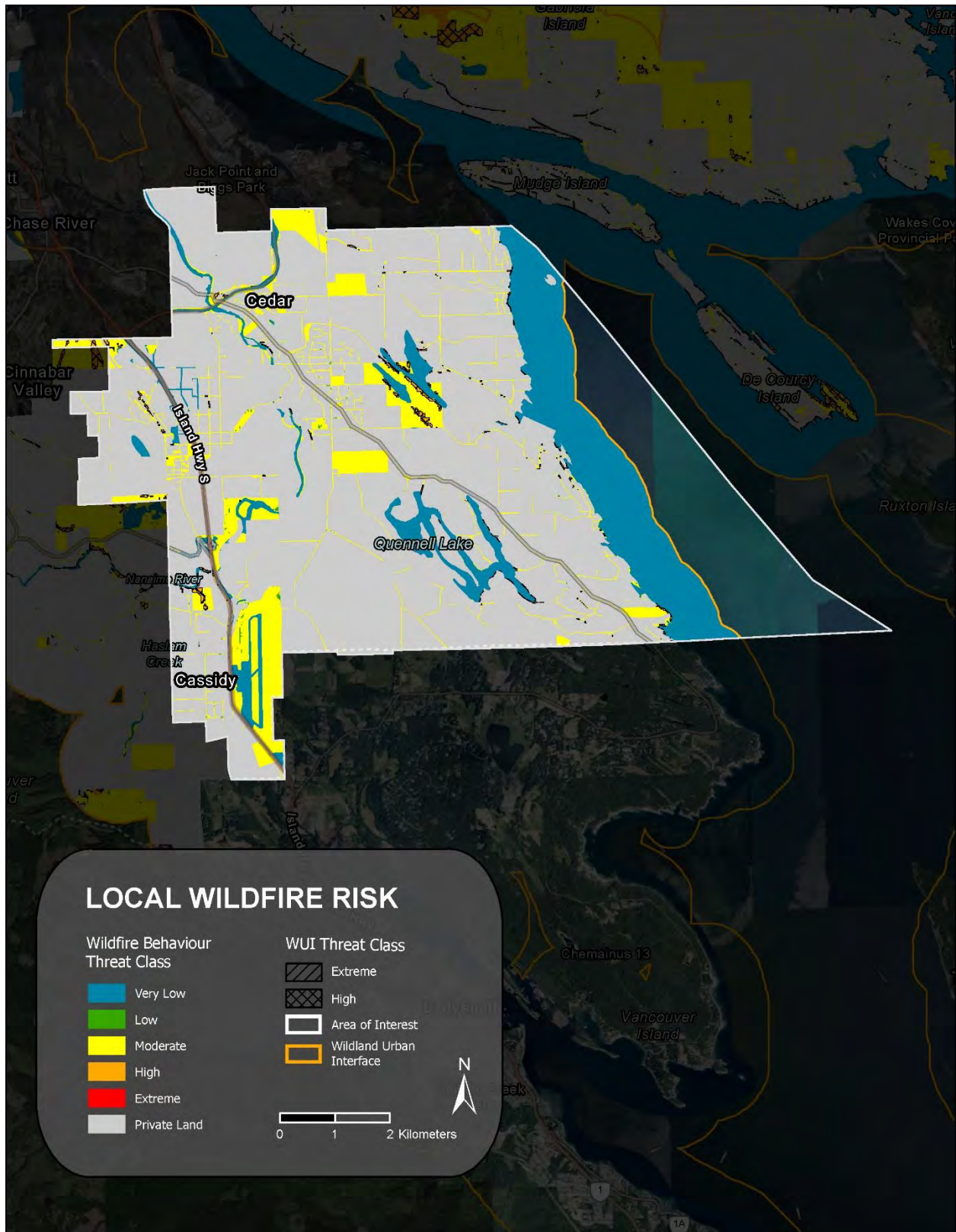
Figure 14. Wildfire threat and risk resulting from the local threat assessment.

Local Wildfire Risk Summary

Wildfire risk expresses wildfire behaviour is expected to threaten homes and other values. Risk is estimated based on the local wildfire threat assessments by intersecting areas with high and extreme wildfire threat with the proximity of structures and critical infrastructure in a geospatial analysis. Areas of higher wildfire threat within 500 metres of identified values are assigned high or extreme risk.

Overall, wildfire risk in the community is moderate. The potential wildfire behaviour in the landscape is generally moderate, with few forests posing a high threat of wildfire behaviour. There is an extensive wildland-urban interface (WUI) throughout EA A, yet the area of high and extreme risk is very small. This reflects two factors of the risk analysis. Under conventional methods, only forests with high and extreme wildfire threat are factored into the wildfire risk analysis. Because of the overwhelming dominance of moderate-threat rated forests, the area of pronounced wildfire risk is low. However, much of the community is characterized by interface conditions where homes border moderate-threat rated forests, or intermix development where there is a lack of clear boundaries between moderate-threat rated forests and homes.

Moderate threat characterizes EA A wherever mature to old-aged coniferous forests are found on gentle ground. Moderate threat also characterizes most mixedwood areas, where stands have between 25-75% deciduous composition in the overstorey or main forest canopy. Areas associated with moderate wildfire threat are capable of supporting fire during a typical fire season, but have a reduced likelihood of supporting a fire of high intensity. These forests require extreme fire weather and ignition conditions before they are expected to support active crown fire. Climate change may increase the likelihood of severe fire behaviour in these areas by raising fire weather indices above seasonal averages.

High threat is driven by different factors depending on location. In the few areas characterized by high threat, forests are likely to support intermittent crown fire in the hot, dry conditions brought by a typical fire season. Areas of high wildfire threat reflect locations where steep slopes are contributing to the estimated rate of fire spread. This effect increases with slope steepness and is typically minor on slopes of 20% gradient or less. In steeper areas, slope contributes to anticipated fire behaviour by preheating uphill fuels and causing more "bathing" of uphill fuels in flame due to slope geometry. High threat areas driven by slope are found within small areas of Hemer Park, on the shores of Quennell Lake, and in the Nanaimo River and Haslam Creek River valleys, where some short slopes are over 45%. These areas are somewhat discontinuous and may be broken by changes in terrain or the fuel environment.

High threat areas may be found in forests on private land that have not been included in the risk modelling.

Neighbourhoods of Higher Relative Risk

A complete understanding of risk requires us to consider all factors affecting the trajectory of a potential wildfire. These include the availability of access routes to and from affected areas for the public and emergency responders, as well as the availability of water supply for firefighting and level of training or response within communities that are geographically isolated from each other.

Cassidy and South Wellington are well-served by the province's major transportation network and have good connections to the limited-access TransCanada Highway. The highway corridor is wide enough that in some locations it potentially could function as a fuel break during a major interface wildfire. The Duke Point Highway also provides a major access route to South Wellington but is difficult to access from the Cedar community. Additionally, this highway is parallel to the expected direction of most fire spread, limiting its usefulness as a potential fire break.

Within EA A, the local transportation network offers at least two routes between most locations. Some routes of access exit EA A through the neighbouring Cowichan Valley Regional District and/or City of Nanaimo. There are only three crossings of the Nanaimo River in EA A, though two of these are major highways with significant roadway capacity. The third crossing is on Cedar Road and is a two-lane highway into the City of Nanaimo. Areas with only a single point of road access are generally limited in size. The largest such areas are in the northeast (Barnes/Holden Corso Road), east (several small subdivisions west and east of Yellow Point Road) and west (Spruston Road, Scotchtown Road). Each of these areas contains several dozen properties. Development in the Barnes Road and Scotchtown Road areas is more characteristic of *interface* conditions, where there are distinct boundaries between homes and forests. Both these areas also have a significant amount of land clearing for agriculture. Development in the Yellow Point Road and Spruston Road areas is more typical of *intermix* conditions, where individual homes are surrounded by forests. Intermix development presents intrinsically higher risk by offering more pathways for wildfire between forest vegetation and homes.

Water supply varies throughout EA A. Within the North Cedar Improvement District, development has been limited to maintain satisfactory water pressure in the Improvement District's distribution system. The status of development inside the NCID has been an issue of community debate for more than a decade, with a moratorium on new connections being in place. Most other areas lack fire hydrants or have limited community water supplies sourced from well water. There is potential near surface water sources like Holden and Quennell lakes for firefighters to draught water using pumps and hoselay. This potential in the Cranberry Fire Protection District is more limited due to a relative lack of suitable surface water supplies. Since June 2021, both departments have attained Superior Tanker Shuttle Accreditation, which provides an equivalency to hydrant protection to property within 8km from the two fire halls and within 5 km of recognized water supply points. However, interface wildfires can complicate shuttling operations by requiring the shut down of roads or by igniting multiple homes simultaneously.

Hazard, Risk, and Vulnerability Analysis

Hazard, Risk and Vulnerability Analysis is undertaken by local governments in British Columbia as part of their efforts to develop an Emergency Management Plan. This process results in a report which rates different kinds of disasters and emergencies by their likelihood and consequence and deals with similar concepts to wildfire threat (the potential for a disaster to occur) and wildfire risk (the consequences of that potential disaster). The RDN completed its most recent Hazard Risk and Vulnerability Analysis in 2019. This analysis found that wildfire was the natural hazard of top concern in the RDN, being an event of both high likelihood and significant anticipated consequences. Wildfire had the highest combined risk score of all hazards assessed, ahead of overland flooding, drought, severe winds, earthquake, and many other categories. The results of the Hazard, Risk and Vulnerability Analysis are one of the primary reasons the RDN has undertaken to study wildfire risk in this Community Wildfire Resiliency Plan.

Introduction to FireSmart

FireSmart is a nationwide program for wildfire preparedness and prevention. Each province has established a committee to prepare FireSmart guidance for landowners, residents, developers, local government, and emergency responders to help them understand wildfire risk and preparedness concerns and to support implementing actions to manage wildfire risk. FireSmart is a system of knowledge shared throughout Canada's wildland-urban interface (WUI) – training is available for individuals to become ambassadors for wildfire preparedness in their communities.

FireSmart is organized into seven "disciplines" or topic areas that address different aspects of wildfire preparedness:

- Education (p.63)
- Legislation and Planning (p.74)
- Development Considerations (p.80)
- Interagency Cooperation (p.88)
- Cross-Training (p.93)
- Emergency Planning (p.97)
- Vegetation Management (p.101)

 The following seven major sections of the Community Wildfire Resiliency Plan discuss each of these disciplines in turn and consider recommendations the RDN may pursue to improve wildfire preparedness. Where available, examples of programs, initiatives, policies, or actions that fit within each discipline are provided along with further sources of information. See the Action Plan (p.108)for a summary of recommendations and suggested priorities.

The Community Wildfire Resiliency Plan uses FireSmart terminology to discuss risks and recommendations in your community. If you are unfamiliar with FireSmart, this section provides an overview of FireSmart concepts and ideas. For additional detail, you may wish to review the resources of BC's FireSmart Committee to better understand the program's focus and language. You can find this information online at firesmartbc.ca.

FireSmart – How it Works

FireSmart programming and materials make recommendations for building and landscaping based on wildfire science. The focus of this program is on homes, but recommendations are generally applicable to any building in the WUI. During a wildfire, homes are ignited by:

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

Figure 15. Pathways to home ignition in the WUI.

FireSmart assessments divide the area around the home into four zones, which radiate out from the structure and reflect the different ignition pathways.

The Non-Combustible Zone is the area immediately adjacent to a structure, out to 1.5 m. A non-combustible surface should extend around the entire structure and any attachments, such as decks. Creating a non-combustible surface can be as easy as clearing vegetation and combustible material down to mineral soil.

Zone 1 is the area within 1.5 and 10 m of the home or building. In this area life and property are at higher risk from radiant heat. It has been shown through analysis of recent large-scale wildfires that the most important factors in protecting structures are the exterior construction materials and immediate landscaping next to homes[29]. FireSmart guidance emphasizes the use of non-combustible or fire-resistant building materials for decks and outbuildings along with landscaping plans that reduce the potential for direct exposure of the home to radiant heat or flame in this area. Cleaning up debris, garbage, or storage from around the home is also of primary importance in this area.

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

Zone 3 includes the area from 30 m out to 100 m. People and structures are at risk from ember transport associated with a wildfire in this area. FireSmart guidance in this area can recommend forest stand thinning, fuel management, and the designation of access and egress. The goal in this area is to prevent a crown fire, but the distance from the home means fuel management is generally not as aggressive as treatments in Zone 2.

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[29] Westhaver, A. 2017. Why some homes survived: Learning from the Fort McMurray wildland/urban interface fire disaster. *Institute for Catastrophic Loss Reduction* (ICLR) research paper series – number 56. (March 2017).

FireSmart Zones
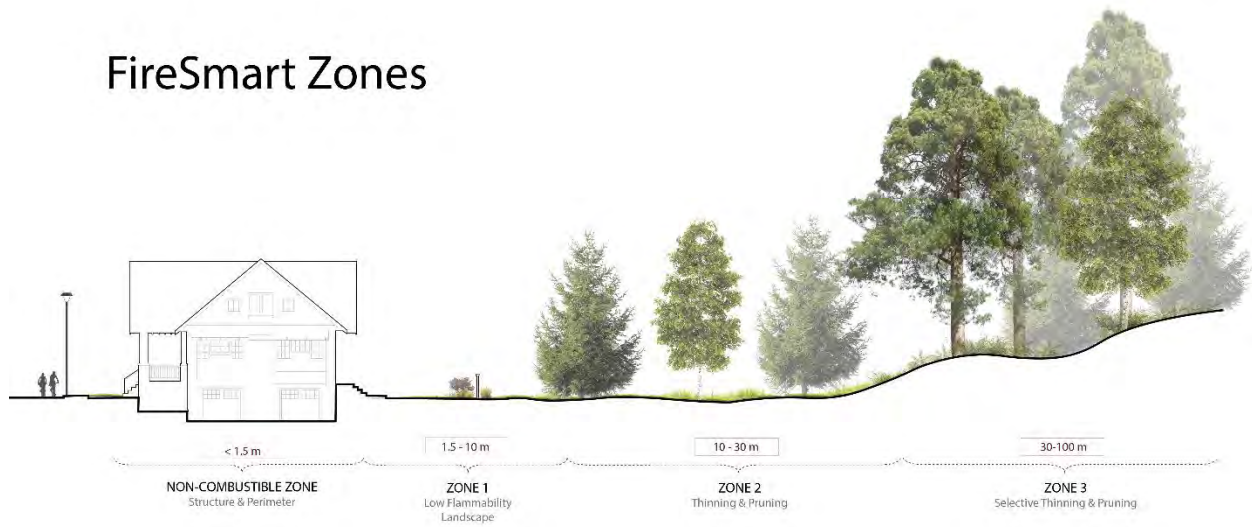
Figure 16. The FireSmart zone system.

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

FireSmart – Goals and Objectives

The overall goal of FireSmart is to encourage private landowners to adopt and conduct FireSmart practices to minimize potential wildfire damage to life and property. Specific objectives include:

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

Key Aspects of FireSmart for Local Government

FireSmart is the chosen frame for the Province's support of community wildfire planning at a local government scale. The Province supports local governments to prepare Community Wildfire Resiliency Plans and conduct other FireSmart initiatives via the Community Resiliency Investment Program. The Community Resiliency Investment Program is administered by the Union of British Columbia Municipalities. This program allows local governments to access additional funding for wildfire risk management. The program encourages local government to:

- Update or develop a Community Wildfire Resiliency Plan.
- Develop policies and practices for FireSmart design in public projects.
- Conduct FireSmart risk assessments on public buildings and critical infrastructure.
- Amend high-level strategic community plans to accommodate wildfire risk analysis.
- Train employees in fire management and emergency response.
- Collaborate across jurisdictions on wildfire matters.

Table 13 summarizes FireSmart activities that are eligible for Community Resiliency Investment Program funding, as of the 2021 program year. Eligible activities are reviewed annually. The Regional District of Nanaimo (RDN) should ensure its proposals consider the applicable program year and guide, and requirements may vary by application year.

Table 13. FireSmart activities eligible for Community Resiliency Investment (CRI) program funding (2022).

FireSmart Discipline or Program Area	Activity
1. Education	- Promotion of another eligible activity. - Organize and host public information meetings relating to another eligible activity. - Promote and distribute FireSmart educational materials and resources. - Support the organization of a Wildfire Community Preparedness Day. - Support the organization of a Neighbourhood Champion Workshop, community FireSmart day, or other related events, workshops and open houses. - Support neighbourhoods to apply for the FireSmart Canada Neighbourhood Recognition Program.
2. Community Planning	Develop or amend a Community Wildfire Resiliency Plan.

FireSmart Discipline or Program Area	Activity
	• Develop FireSmart policies and practices for the design and maintenance of public assets and lands. • Complete FireSmart assessments for publicly owned critical infrastructure.
3. Development Considerations	• Amend Official Community Plans or land use, engineering, subdivision, and public works bylaws to incorporate FireSmart principles • Revise landscaping requirements in zoning and development permit documents. • Establish Development Permit Area for Wildfire Hazard. • Include wildfire prevention and suppression considerations in the design of subdivisions • Amend referral processes for new developments to ensure multiple departments, including fire services and/or emergency management personnel, are included.
4. Interagency Co-operation	• Develop, coordinate, and/or participate in a Community FireSmart and Resiliency Committee • Participate in multi-agency planning tables for fire and/or fuel management. • Provide Indigenous cultural safety and humility training to emergency management personnel in order to more effectively partner with and assist Indigenous communities. • Attend the annual FireSmart BC conference.
5. Emergency Planning	• Develop and/or participate in cross-jurisdictional meetings and tabletop exercises focused on wildfire preparedness and suppression, such as seasonal wildfire readiness meetings. • Assess community water delivery ability as required for suppression activities. • Assess structure protection inventory. • Use and/or promote Emergency Management BC Wildfire Preparedness Guide for community emergency preparedness events focused on wildfire.
6. FireSmart Training and Cross-Training	• Support neighbourhood representatives or local government staff to become certified as Local FireSmart Representatives and support certified staff to become facilitators. • Wildfire Mitigation Specialist training for the FireSmart Home Partners Program. • Cross-train fire department members (registered departments) to include structural fire and interface fire training (subject to course/credential eligibility). • Cross-train emergency management personnel to provide ICS-100 (Incident Command System and WRR Basics Course)
7. FireSmart Projects for Critical Infrastructure	• Modify landscapes & construction in line with the recommendations identified in a FireSmart assessment and document hazard score reduction following completion.
8. FireSmart Activities for Residential Areas	• Conduct Home Ignition Zone Assessments for individual residential properties or homes. • Develop a rebate program to residential property owners that complete eligible FireSmart activities (limited to 50% cost sharing up to $500 per property). • Undertake Neighbourhood Wildfire Hazard Assessments and support the development of FireSmart Neighbourhood Plans for specific areas. • Provide off-site green waste debris disposal for residential property owners who have undertaken FireSmart activities.
9. Fuel Management	• Undertake planning and development for fuel management on public land, consistent with the BC Wildfire Service Fuel Management Prescription Guidance Document. • Undertake required professional assessments to support plan development.

FireSmart Discipline or Program Area	Activity
	• Implement new fuel management treatments on publicly owned land, or fuel management maintenance activities supported by a prescription. • Off-site debris disposal for approved fuel management or maintenance activities. • Additional money available for one "demonstration" fuel management project of no more than 5.0 ha in a public and accessible location with an educational component.
10. Additional Items (as they directly relate to eligible activities)	• Incremental staff and administration costs, including term contracts for a FireSmart Coordinator, Community FireSmart Resiliency Committee Coordinator, Qualified Local FireSmart Representative or Wildfire Mitigation Specialist, or summer/co-op students. • Consultant/contractor costs, including professional planners and foresters. • Public information costs.

The Role of a FireSmart Coordinator

Navigating all the aspects of FireSmart can be challenging for local government and private landowners. Local governments cannot often implement the FireSmart programming in addition to existing departmental responsibilities. To help with this issue, the Community Resiliency Investment Program allows local government to apply for term contract funding for a FireSmart Coordinator. Given the size and population of the RDN, and the diverse responsibilities of the Emergency Services Department, having a dedicated FireSmart Coordinator for the Region is desirable. This position could be housed within the Emergency Services department, working with the Emergency Planning Coordinator and ultimately reporting to the Manager, Emergency Services. This position would create new capacity for FireSmart programs and enable the RDN to have more contacts with members of the public. The primary responsibilities that could be assigned to this coordinator are summarised in Table 14.

Table 14. Potential Roles of the FireSmart Coordinator

FireSmart Activity Category	Role of FireSmart Coordinator
Education	• Support the development of a detailed communications strategy for FireSmart • Develop and conduct a public education program, including meetings or information sessions, public signage, and social media. • Distribute FireSmart materials through community partners and online.
Community Planning	• Support neighbourhoods to apply for FireSmart Canada Neighbourhood Recognition, including by supporting the facilitation and FireSmart events and demonstration projects. • Complete FireSmart assessments for critical infrastructure. • Conduct education for the RDN's planning staff on wildfire risk and FireSmart principles.
Development considerations	• Comment on wildfire issues within a development permit process on behalf of the Emergency Services department, when referrals are received from the Islands Trust.
Interagency co-operation	• Coordinate FireSmart initiatives between electoral areas and external partners as applicable, such as by representing the RDN in working groups or committees.
Emergency planning	• Provide comment on wildfire issues during emergency plan and response preparation.

FireSmart Implementation	• Coordinate retrofits and vegetation management for critical infrastructure.
	• With homeowners' consent:
	  ○ Conduct Home Ignition Zone Assessments for residential properties or homes.
	  ○ Help communities develop FireSmart Neighbourhood Plans.
	• Coordinate chipping days or bin programs to facilitate vegetative debris disposal.

Other	• Report on program implementation, progress, and community feedback regarding FireSmart. • Prepare grant applications

Having a FireSmart Coordinator working alongside the Emergency Services department is particularly important in translating FireSmart language and principles into the context of the RDN's communities. This arrangement provides program continuity and long-term oversight of the RDN's FireSmart messaging. Previously, attempts at establishing FireSmart neighbourhood committees have lost momentum when homeowners became discouraged by the strict appearance of the FireSmart Home Ignition Zone assessments. Ensuring that permanent staff continue to carry primary responsibility for RDN's FireSmart vision and message is one way to guard against this happening again. Ideally, permanent staff will be able to provide an incoming hire for this position with a clear understanding of the RDN's program priorities, key messages, and approach to FireSmart. Some of these elements have begun to be developed by this Community Wildfire Resiliency Plan in the following sections.

Education

Education is first among the seven FireSmart disciplines. Education enhances awareness of wildfire risk and prevention, which encourages individuals to act on private property while also building public support for initiatives by the government. An education component is currently mandatory for applications to Community Resiliency Investment Program grants for wildfire preparedness.

Recommendations attached to the Education discipline are meant to promote a sense of understanding, empowerment, and eventually shared responsibility. The goal of initiatives in this discipline is to create citizens, emergency responders, and government officials who can explain and act on wildfire risk in their communities. Because over 80% of the land base in the community is privately owned, education is also the primary tool available to local government for influencing wildfire risk outside of core authorities. By sharing the knowledge and techniques of FireSmart building and landscaping design, the RDN encourages residents to assess and address risk factors on their properties. Education is not just about emergency management personnel sharing information with residents, however. It's also about representing a vision of a FireSmart community that can inspire the Regional District of Nanaimo's (RDN) own departmental operations and feature in its communications with other public authorities and First Nations.

The RDN should plan its educational activities to complement existing outreach in EA A. The community has a wealth of knowledge among dedicated individuals who are already acting to manage wildfire risk. Both Fire Departments serving EA A maintain outreach with their communities through social media and community events. The RDN can support local organizations by collaborating during grant applications for FireSmart activities that further the interest of community wildfire resiliency.

Factors for Success

Vision of a FireSmart community

Public engagement is one of the most challenging aspects of community wildfire planning. For public engagement to be effective, the RDN needs to reframe managing wildfire risk as a collective undertaking with community and individual benefits. During the development of this plan, residents and local firefighters have expressed that interest in FireSmart declines when people are confronted with what seems like an expensive and impossible task – the task of making a forested community FireSmart. The RDN needs to present a vision of FireSmart that works for EA A and still adequately represents forest character. To do this, public messaging and materials should emphasize that any action to reduce fire hazard can have value. Building a FireSmart community takes time, and a focus should be made on promoting the FireSmart process rather than a scoring outcome.

Photo 9. Education is a key part of developing a FireSmart community.

Audience for communications

A second factor in the effectiveness of education initiatives is appropriate targeting of different audiences. In a diverse community like Electoral Area A (EA A), there are several ways for the RDN to consider targeting its FireSmart messaging and activities. Appropriate audiences for communications development depend on:

- **Different community areas.** Although this plan found similar levels of threat around the community, risk depends on further factors like population density, social vulnerability, and demographics. Additionally, some areas share a common point of access, reliance on a particular water source, distance to fire suppression resources, or other qualitative characteristics of risk that make it sensible to consider them as a group for the purposes of outreach. The two basic audiences within an area-based approach could be intermix and interface areas. Conventional suburban developments on lots of less than 0.1 ha tend to have interface characteristics, such as clear boundaries between forests and urban areas. Areas with larger lots tend to have more forest vegetation surrounding homes. There is more risk in intermix areas where more ignition pathways exist between forest vegetation and homes.

- **Age and household size.** EA A contains many families with young children while also remaining an attractive place for one- or two-person households of older retirees. Both young families and older people may face cost pressures that keep them from engaging in emergency preparedness or FireSmart initiatives. Ensuring that different groups are informed about wildfire risk is important to building resilience. Some members of these households may have difficulty with the manual labour involved in FireSmarting a property or may not have the time to participate in community activities outside of their other commitments. Finding ways to reach people where they are is an important consideration of recognizing diversity and building resilience.

- **RDN staff.** RDN staff in various departments work to provide services for the residents of EA A. Promoting FireSmart awareness among staff is an important part of improving policy within other departments and achieving cross-department support for initiatives of the Emergency Services department. The RDN is fortunate to have deep knowledge of wildfire risk and prevention within its parks department, where several staff members have backgrounds in forestry or with the BC Wildfire Service (BCWS). The RDN can work to ensure its departmental managers share the same understanding of FireSmart. The Emergency Services department can lead internal training and information sharing to ensure core personnel are familiar with the FireSmart program and principles.

- **Other jurisdictions and agencies.** The RDN is part of a web of local governments, improvement districts, and First Nations that provide administration to residents of EA A. There may be value in continuing to liaise with other governments serving the community to develop a shared understanding of wildfire threat and FireSmart. This can involve ensuring other government organizations like the North Cedar Improvement District and Snuneymuxw First Nation have been provided with the plan.

Information placement

The third factor for effective education is information placement. Both the timing and location of information provided to the public can influence the size of the audience for outreach and the imprint of the information presented. Timing of active outreach should respond to the cycle of the year in EA A, with in-person contacts and community events timed to correspond and respect the calendar of festivals, school, and summer holidays that make EA A unique. Informational contacts regarding RDN projects, such as fuel management, should take place during the shoulder season when both important stakeholders like the BCWS and members of the public have more time to dedicate to their review. Education can also be undertaken through passive outreach, through initiatives such as updating RDN webpages and informational signage in key parks. This factor also includes targeting the use of existing RDN resources wherever possible. Today, most people expect resources to be presented in digital and physical formats on request, so resources of both types should be considered. To leverage existing resources means to incorporate FireSmart information into places that are already being managed and maintained by the RDN, and can include physical locations like popular parks, or digital property like the RDN's website and social media identities. To increase the reach of emergency information during a wildfire, the RDN can continue to promote its mass emergency alerting system, Voyent-Alert!

Strategic communications

The final factor in successful public engagement around wildfire issues is the careful planning and documentation of a Communications Strategy for each FireSmart initiative undertaken. A strategy may be one or more documents comprising the RDN's plan to engage with specific populations or groups. The strategy can be available to the public or intended for internal use only. The purpose of such a strategy is to identify goals for an education initiative, several key messages for increasing public awareness of wildfire and FireSmart, and the expected outcomes of the proposed activity. Planning should be used to focus and correctly scope all RDN communications on wildfire within EA A, including printed and digital media and during in-person or online events.

Table 15. Potential key messages for a wildfire communications strategy

Potential Key Messages for Public Communications
• The communities of EA A are set beside and among forests, making them vulnerable to wildfires.
• The wildfire risk in coastal forests during the wildfire season is real, and most forests will support wildfire of moderate intensity.
• Predicted and observed climate change in the region is consistent with more aggressive wildfire behaviour.
• Private landholders have a large role to play in protecting life and property by adopting FireSmart practices for building and landscape maintenance and by being knowledgeable about local emergency plans.
• There are resources to support private landholders and neighbourhoods in becoming more FireSmart.
• The RDN can help reduce wildfire risk by strategically managing forest fuels on its park land and supporting FireSmart community development.

Initiatives to Consider

Creating opportunities for passive outreach

In developing initiatives within the Education discipline, the RDN should seek to leverage its existing resources and programs, where residents already come into contact with local government. Passive outreach means presenting and providing information about wildfire risk in a variety of formats that are received by residents in a self-directed fashion. The resources the RDN can use to create these opportunities include its digital and physical properties, human resources, and community liaisons.

Today, digital resources may be preferred and/or seen by more people. At a minimum, the Community Wildfire Resiliency Plan should be made public on the RDN's website. Currently, the RDN has a dedicated public engagement platform, *Get Involved*, where it is anticipated this plan and related resources developed during community engagement will be provided. Additional material can include videos of the recorded community presentations, slide decks, or interactive maps dedicated to summarizing the planning process and results. These resources can be advertised using the RDN's social media, or by appending a temporary completion announcement and link to outgoing RDN emails. Physical copies of the Community Wildfire Resiliency Plan are unlikely to be desired by most residents. However, some people prefer to review physical documents and may wish to obtain a copy. The RDN should consider printing the plans on request for socially vulnerable individuals or people with low digital literacy or without access to a computer.

rdn.bc.ca/get-involved-rdn

The RDN's major resource in EA A is its network of community and regional parks. The largest and most heavily used regional park in EA A is Nanaimo River Regional Park. Community parks typically have little developed infrastructure and see lower use, though some like Morden Colliery and Kipp Rd are a few ha in size. The RDN can initiate passive education by installing wildfire awareness signage and educational material in high-traffic locations, including trailheads, such as near the Nanaimo River Hatchery (south) entrance of Nanaimo River Regional Park or the Hemer Park access to the Morden Colliery Regional Trail. Popular recreational areas are high-visibility locations where people are already thinking about forests– this is a good opportunity to make connections between forests and fire in familiar environments.

Relatedly, provincial funding requirements specifically support education initiatives aimed at increasing public awareness of fire risk management activities within the other FireSmart disciplines. Planned fuel management or FireSmart landscaping could be used as a focus of education initiatives, with signage or self-guided tour routes developed to engage visitors to these park properties. This component of provincial funding is focused on proposed activities, so any activity-related education materials should be planned in advance and included as a part of an application for implementation funding.

Expanding access to FireSmart information and services

Currently, the ability to conduct FireSmart assessments for homeowners is limited by staff capacity at the RDN and local fire departments. The RDN should investigate ways to provide this service for residents of EA A. If no regional FireSmart Coordinator is hired, the RDN's Emergency Services department currently has certified Local FireSmart Representatives who could potentially undertake a limited number of assessments, perhaps in a targeted neighbourhood or on a specific day. Hiring a dedicated RDN FireSmart Coordinator drastically improves the capacity for these engagement initiatives and administrative work related to future grant applications. This position can be funded through grants and shared among other EAs.

Hosting a community wildfire preparedness or clean up day

Some initiatives that promote practical demonstrations of FireSmart are also eligible for provincial funding within the education discipline. The RDN can promote wildfire awareness while achieving FireSmart benefits simultaneously by organizing a community clean up or "Wildfire Community Preparedness Day" event. These are public events where members of the public are invited to come and conduct light work around a community park or facility while receiving information about FireSmart. Activities can include removing debris from the vicinity of buildings or pathways, pruning shrubs and bushes, removing invasive species, and raking leaves or needles. The RDN would be responsible for identifying target vegetation for the clean up and bagging and chipping or removing waste. The events can include an educational component, such as a presentation about FireSmart landscaping. Delivering these events could be part of the role of a new regional FireSmart Coordinator. Community clean ups can be a good way to create regular engagement with locals and may be a pipeline for future engagement by RDN parks managers on other initiatives related to broader stewardship of park properties.

Suitable locations for such an event depend on community interest as much as with identified fuel hazard concerns. In many cases, these areas are of marginal impact to landscape wildfire risk and should therefore be combined with a program of more comprehensive fuel management. Because clean up days are focused primarily on education and demonstration of FireSmart principles in a small area, they do not follow the stricter guidelines for locating areas for fuel management. High-use areas are often ideal locations because they allow for corresponding opportunities for passive outreach related to the project completion. Linear corridors, such as the Morden Colliery Regional Trail, are also often good locations for community clean up events because they contain easy-access areas and are frequently near homes.

Undeveloped park lands are often less suitable for these activities due to access, safety, and environmental concerns. One exception to this is areas where fuel management is planned or has occurred.

Encouraging neighbourhood FireSmart recognition

Through FireSmart Canada, groups of neighbours who follow the Community Recognition Program can access grant funding independently of the RDN for FireSmart activities. The RDN can support these initiatives by helping connect interested residents and providing information on the recognition process, its requirements, and benefits. This process is meant to be led by interested neighbours and not by the government. The process starts when a neighbourhood representative contacts FireSmart Canada to organize a site visit by a Local FireSmart Representative. The Local FireSmart Representative is someone who has completed FireSmart Canada training certification to assess wildfire hazard in the wildland-urban interface and can support the neighbourhood FireSmart planning process. Before and concurrent with hazard assessments, leading neighbours should be organizing in their community to increase participation and the number of home assessments. The end goal of this organization is the formation of a neighbourhood committee to receive the hazard assessments and steward the creation of a FireSmart Neighbourhood Plan on the advice of the Local FireSmart Representative. The Neighbourhood Plan will assess wildfire hazard on participating properties and identify actions specific to the area for improvement. Participating residents can schedule the implementation of the plan and apply for and maintain Community Recognition with the help of their Local FireSmart Representative.

The RDN can assist some parts of this process, such as by advertising a new neighbourhood initiative through its social media and online channels. There is also grant funding through the CRI program available to offer half-day FireSmart Neighbourhood Champion training for interested residents and/or distributing FireSmart material to households facing barriers to access this information. In areas where neighbourhood organization is underway, the RDN may be able to help facilitate a start-up event by including costs on its application to the Province for grant funding. Criteria for providing this support should be developed so that serious initiatives with widespread interest in the community are prioritized for resources.

firesmartcanada.ca/programs/neighbourhood-recognition-program

Identifying potential neighbourhoods for FireSmart planning

FireSmart planning and outreach to communities should reflect neighbourhoods of similar levels of risk and access. This plan did not reveal major differences in the risk profile throughout EA A. Most neighbourhoods are exposed to forests with a moderate threat of wildfire. Neighbourhoods that may make suitable sub-areas based on shared access, identity, and geographic profile are listed in Table 16.

Table 16. Potential sub-areas for FireSmart planning and neighbourhood initiatives.

Name	Wildfire Risk Rating*	Area Description	Fire Protection	Recommended FireSmart Activities
Cassidy – Interface	M	A mix of interface and intermix conditions in the area with small-lot development directly adjacent to contiguous forest land. The area has a higher proportion of lower-income households who may face barriers to accessing FireSmart programming and initiatives.	Cranberry Volunteer Fire Department	The creation of FireSmart neighbourhood plans is recommended for these areas. The RDN should liaise with representatives of the fire departments to assess interest in this initiative. The plans would include communications and engagement goals and a strategy for FireSmart assessments of private property and community park lands. The plan would be led by neighbourhood committees with the RDN acting as a local government representative and provide support such as coordination with the fire departments, BCWS, and other actors as applicable. The RDN may also include eligible neighbourhood FireSmart activities in its CRI grant applications.
Spruston Road -- Intermix	M	Intermix area of mainly large-lot rural properties with a single paved point of access via Spruston Road at Trans Canada Highway. Access to this area is limited to right-in-right-out traffic movements via the southbound lanes of the Trans Canada Highway. The area is contiguous with long-term forest lands.	Cranberry Volunteer Fire Department	
Yellow Point-Intermix	M	Intermix area of small subdivisions generally with single points of access on Yellow Point Road. Intermix conditions are most pronounced on Whiting Way, McGuire Way, DeCourcy Drive, and Ingram Rd. Development is adjacent to protected forest areas that are expected to remain forests in the long term.	North Cedar Volunteer Fire Department	

Name	Wildfire Risk Rating*	Area Description	Fire Protection	Recommended FireSmart Activities
Cedar-by-the-Sea – Interface	M	Interface conditions dominate small-lot residential development with single paved access via Barnes Road.	North Cedar Volunteer Fire Department	These neighbourhoods are of secondary priority for developing FireSmart neighbourhood plans because they border smaller forest areas than higher priority communities or contain agricultural land that can help buffer development from forest areas. The plan would be led by neighbourhood committees with the RDN acting as a local government representative and providing support such as coordination with the fire departments, BCWS, and other actors as applicable. The RDN may also include eligible neighbourhood FireSmart activities in its CRI grant applications.
Holden Corso – Intermix	M	Intermix conditions dominated large-lot development with single paved access via Holden Corso/Barnes Rd.	North Cedar Volunteer Fire Department	
Scotchtown Rd -- Interface	M	Interface conditions dominate the area with a mix of small- and large-lot development with single paved access via Scotchtown Road at Dick Ave	Cranberry Volunteer Fire Department	

*Ratings reflect modelled wildfire threat on public land in each area. Ratings are L(ow), M(oderate), H(igh), E(xtreme).

Expanding participation in Voyent Alert!

During a wildfire emergency, the RDN has several means by which it will publish an evacuation alert or order. The most direct of these is the free, sign-up based multi-platform Voyent-Alert! system. Voyent-Alert! lets registrants receive emergency notifications via app, SMS (text message), voice call, or email and opt-in to notifications for day-to-day announcements by the RDN concerning service notices, such as solid waste rescheduling or park closures. Because it allows messages directly to user devices or emails, Voyent-Alert! is a crucial piece of technology for advising residents about wildfire. Because it is an opt-in service, Voyent-Alert! is advertised by the RDN to improve participation. Placing invitations to join Voyent-Alert! should be part of any communications between the RDN and the public regarding this Community Wildfire Resiliency Plan. For more information on how to register for the Voyent-Alert! system, visit rdn.bc.ca/emergency-alerts

Collecting feedback from the community on an ongoing basis

The RDN can strive to match FireSmart initiatives with the level of interest shown by its communities. The *Get Involved* page for Wildfire Resiliency currently allows residents to contact a project representative to ask questions and provide feedback. In some cases, more structured feedback can be helpful, such as when evaluating the success of a FireSmart plan or community event such as a chipping day. It should be a clear part of any education initiative or communications that feedback on wildfire prevention and preparedness is welcome. Short surveys related to specific community activities or a generic survey with guides for response topics and content can be created using the *Get Involved* platform to collect and organize public feedback. The *Get Involved* platform allows a variety of survey tools, from simple to complex, and can also incorporate visual media into survey presentations. Advertising opportunities for feedback and identifying "who is listening" should be incorporated into the strategy for any education initiative.

Legislation and Planning

This discipline considers the bylaws, regulations, and policies or acts of higher levels of government that create the legal environment around wildfire risk. Idea development in this section aims to address how the Regional District of Nanaimo (RDN) conducts its own business, including management of parks, waste, and infrastructure, to mitigate wildfire risk. In this section of the plan, higher-level acts and policies providing important scope to the RDN's authority and ability to regulate are discussed, as are regulatory levers at the RDN's disposal.

Federal Acts and the Community Wildfire Resiliency Plan

The Government of Canada makes laws concerning matters of national interest. Natural resources, land management, and emergency response are generally the authority of the provinces, which means relatively few federal acts and policies are directly relevant to the recommendations of this Community Wildfire Resiliency Plan. The Government of Canada is not a significant forest landowner in Electoral Area A (EA A). The largest parcel in federal hands is the site of the Nanaimo Airport, which is dominated by non-fuel tarmac surfaces and other managed fuel environments.

The Federal legislation with the greatest implications on wildfire management are the acts that protect animals, plants, and ecosystems, including the *Fisheries Act* and *Species at Risk Act*. These acts confer protection by prohibiting damage and assessing penalties. Activities that remove vegetation, such as fuel management, may trigger reviews under either act if a protected species or habitat is compromised. Any fuel management prescription must consider whether federally protected species or habitats will be impacted and how these impacts can be avoided. These Acts also affect how local governments apply bylaws and development permit requirements.

Provincial Acts and the Community Wildfire Resiliency Plan

The Province has core authority over lands, natural resources, and municipalities, making it the source of local government jurisdiction and a primary influence on forest and land management, including wildfire. Provincial legislation that affects the other FireSmart disciplines includes the *Building Act* and *Building Code*, *Emergency Program Act*, *Environmental Management Act*, *Forest and Range Practices Act, Local Government Act,* and *Wildfire Act*. Regulations under each of these enactments, such as the Open Burning Smoke Control Regulation, provide legal guidance and objectives for aspects of community development, land management, wildfire prevention, and emergency response.

Role of the RDN

The RDN's role is to manage wildfires within its jurisdiction in unincorporated areas. Areas of authority in EA A include the provision of services for waste management, including green waste or vegetation debris, community planning functions and the regulation of development, the maintenance and management of community and regional parks, the administration of bylaw enforcement, and other key areas identified by the *Local Government Act*. The RDN works mainly under a special service model and provides only those services that the elected representatives of the unincorporated areas have determined are needed and can be funded by their communities. For this reason, delivering new bylaws or additional programming may require levies or taxes to be sustainable.

In EA A, some local government services are provided by Improvement Districts, namely fire protection in the Cranberry Fire Protection District and fire protection, water, and street lighting in the North Cedar Improvement District. The RDN works to coordinate its planning with the capacity of the improvement districts to provide these services.

Factors for Success

Ensuring public support and social equity

Changes in law or policy properly result from changes in public expectations over how the community governs itself. Therefore, education around wildfire risk and the benefits of FireSmart often precedes initiatives in other disciplines. Without public support, a change to policy or bylaw may not only fail but be unjust. Ideally, new bylaws or public policies will have widespread public support, so that policy changes reflect the whole community. It is important to consider the equity implications of new policies before they are enacted, including whether all groups impacted by a new policy have been adequately heard by the decision-making process.

Recognizing the RDN's jurisdiction

Another factor in the success of a policy initiative is recognizing the RDN's scope of authority. As discussed, the RDN operates on a special service basis within the unincorporated areas and some services are provided separately by the improvement districts. While promoting FireSmart design is a key principle of any Community Wildfire Resiliency Plan, the RDN's role will also rely on supporting neighbourhood and community involvement in FireSmart and leveraging RDN assets like the public park system. Policy changes within the scope of the RDN's authority include adjusting policies for community planning and development review, managing the use of RDN-owned park land, and developing the capacity for bylaw or policy enforcement.

Considering the need to enforce new bylaws or policies

The enforceability of a policy or bylaw is a major part of its effectiveness. While the average person follows the rules, many may not know of policy changes or mistakenly believe policy does not apply to them. Some may break rules intentionally if it is convenient or financially rewarding. New bylaws or policies can also result in a rise in the number of nuisance calls that do not have merit but drain the resources of local government. Conducting analysis before a policy change can help decision-makers think about whether contacts about non-compliance will be both manageable in terms of volume and feasible in terms of staff training and expertise. Policies that require additional investments in training or equipment to allow enforcement should be carefully considered to ensure they fit within the community's vision and goals.

Photo 10. Hemer Provincial Park.

Initiatives to Consider

Adopt restrictions on problematic activities or uses of regional park lands

The RDN may be able to reduce ignition likelihood on its public lands by adopting restrictions on use. Sources of ignition include cigarette butts, hot vehicles and motors, cooking fires, bonfires, firecrackers and fireworks, discarded items, and deliberate arson. It is important to collect information about problematic uses of park land to ensure appropriate targeting of prohibitions. The RDN's parks department should begin to identify in its service records where problematic uses occur within areas of higher wildfire threat. Improving reporting on social issues as they relate to wildfire risk is a key part of improving decision-making.

Restrictions could be developed to be:

- Time-dependent – in place only during periods of high or extreme fire danger
- Space-dependent – applying to locations with identified high or extreme fire risk
- Both

When designing a prohibition or ban it should be noted that the fire threat shown in this plan represents the potential fire behaviour during 90th percentile fire season weather conditions. These are the days that represent periods of high or extreme fire danger, typically at the peak of summer. While worrisome, ignitions during the cool and wet parts of the year are unlikely to result in spreading wildfires. The impacts of climate change have and will affect the 90th percentile weather values used to estimate potential fire behaviour, which is a reason to support cyclical review of this Community Wildfire Resiliency Plan and consider any growth in problematic uses.

Photo 11. Fairwinds (Nanoose Bay) area trails closed during extreme fire danger.

Assess wildfire hazard on RDN-owned properties

The RDN can adopt internal policies to make sure parks and RDN-owned property and facilities receive wildfire hazard assessment at an appropriate level of service.

The assessment tools for bare (forested) land and RDN facilities vary. For forested land and parks, the appropriate assessment tool is the most recent provincial standards for Wildfire Threat Assessment. These assessments constitute the practice of professional forestry and should be completed by a registered forest professional with the appropriate expertise. For facilities and infrastructure, the appropriate standard is likely the FireSmart Critical Infrastructure Assessment, which provides a hazard score to reflect vulnerability (risk) of the capital asset in the context of the immediately surrounding fuels. Critical infrastructure and permanent structures in parks should receive this assessment alongside stand-level wildfire threat assessment. While there is no legal requirement that FireSmart assessments be completed by accredited professionals, a Local FireSmart Representative or Wildfire Mitigation Specialist is recommended for these assessments.

An appropriate level of service for both kinds of assessment is the same cycle recommended for review and update of the Community Wildfire Resiliency Plan – once every five years. New assessments exceeding this schedule are advisable if changes in forest health or the environment are believed to have adversely affected the forest fuel components of wildfire threat and FireSmart.

The RDN is currently working towards an update of the Parks and Trails Strategy that will act as an overarching strategy for land acquisition in the ten-year timeframe. Regarding potential expansions of facilities or the park system, the RDN can adopt a policy that the wildfire hazard associated with new properties is assessed as part of the process to acquire or lease new land and facilities.

Conduct FireSmart assessments for publicly owned critical infrastructure

The RDN can complete FireSmart Home Ignition Zone or Critical Infrastructure assessments as appropriate for publicly owned buildings and pieces of critical infrastructure. This is supported by the Community Resiliency Investment program to allow local governments to develop a FireSmart program for their critical infrastructure. With assessments in place, the RDN could apply for implementation funding to complete re-landscaping or even exterior renovations of its facilities up to a per structure maximum of $50,000.

Update the building policies to incorporate FireSmart design principles in RDN facilities

As part of a FireSmart program for its properties and critical infrastructure, the RDN should require within its major departments that all projects involving building or landscaping be carried out in consideration of FireSmart design principles. Completed facilities are opportunities to educate members of the public about FireSmart building and landscaping techniques. FireSmart design principles are sometimes seen as conflicting with policies that support wood construction, such as the RDN's Wood First policy. However, FireSmart design need not restrict the use of wood as a structural member or architectural flourish in designs. FireSmart design focuses on reducing the use of small-piece wood in finishing applications, such as shakes, shingles, and facing boards. Wood products that have been permanently treated to achieve a certain level of fire performance can typically be used as facing materials with a minor impact on FireSmart hazard scoring. Similarly, large-diameter wood elements such as heavy timbers or modern innovations like glulam can also typically be used with minor impacts

on hazard scoring. FireSmart design avoids the use of unrated wood products or construction assemblies in the interface. Fire Halls No. 1 in the North Cedar and Cranberry Improvement Districts are existing examples of how FireSmart construction can be both beautiful and functional, while maintaining a connection to the landscape through the use of some wood elements.

The RDN's Green Building Policy establishes the 7 step Integrated Design Process for designated capital projects. This policy lays out how the largest projects in the RDN should address the multiple perspectives and concerns of the RDN and its communities throughout the life of the facility. The RDN's Hazard Risk and Vulnerability Analysis and this CWRP establish wildfire resiliency as one of these concerns. The RDN should consider whether the Green Building Policy should be updated so that wildfire hazard mitigation professionals are part of the core project team for facilities investments in the wildland-urban interface.

Create a program to reduce or eliminate green waste tipping fees for FireSmart projects

Many residents have informed the team behind the Community Wildfire Resiliency Plan that the biggest impediment for them to FireSmart their home's landscaping is the difficulty and expense of removing green waste. The RDN has supported "Red Bin" days in the past that bring green-waste bins to central community locations where disposal of debris is provided free of charge for eligible materials such as small conifers and dead branches. This kind of initiative is supported by the Community Resiliency Investment Program.

The RDN maintains the regional landfill (located in the City of Nanaimo), which receives green waste for a tipping fee. It is within the RDN's regulatory authority to facilitate access to the regional landfill to dispose of green waste from FireSmart activities. The Community Resiliency Investment Program supports this kind of application, which may involve rebating, reducing, or eliminating tipping fees for green waste. It is recommended that the RDN investigate this option to assess whether the landfill at Nanaimo can receive additional green waste. A further consideration is that the reduced tipping rate should be available only for waste generated by FireSmart activities. One way to promote this connection would be to require residents to present a FireSmart assessment for their property when dropping off waste. Another means could be to register residents for reduced tipping fees at the time of the FireSmart Assessment and allow free loads of green waste up to a weight maximum or until a predetermined date. In either case, the departments would need to collaborate to ensure attendants at the landfill are given clear instructions on the eligibility and quantity of green waste for reduced fees.

Development Considerations

Role of the Regional District of Nanaimo

The Regional District of Nanaimo (RDN) has the authority of the use of land, zoning, and official community planning in Electoral Area A (EA A). Community planning tools are important for building fire resiliency because they can be used to influence the design of interface and intermix areas on private property. This section discusses the community planning tools available to the RDN and describes how they could be employed to improve wildfire resiliency in EA A. Actions discussed in this section range from small procedural changes that the RDN can implement relatively quickly to large public processes nested within the Official Community Plan.

Bylaws that affect zoning, land use, subdivision, and construction have large impacts on the future fire safety of communities. This is why there have long been building codes in North America to ensure buildings are constructed to acceptable standards. In recent decades, attention has been placed on the design of development, buildings, and landscaping as they influence the risk of wildfire in the wildland-urban interface (WUI). The National Fire Protection Association (NFPA), a US-based international organization, has developed codes and standards for the recommended design of subdivisions and buildings in the WUI, NFPA 1141 and NFPA 1144. NFPA 1141 addresses the design of subdivisions and fire protection infrastructure at the neighbourhood scale, while NFPA 1144 considers the appropriate materials and requirements for building and landscaping on individual properties. These standards are updated from time to time and reissued in new editions. Several municipalities in British Columbia have used these standards to help bring FireSmart into planning review and enforce compliance. The Province may in the future develop regulations within the BC Building Code that address wildfire hazard in the WUI.

FireSmart principles in the Non-Combustible Zone (0-1.5 m) and Zone 1 (1.5-10m) are often the focus of regulations in municipalities which consider wildfire hazard in their subdivision (or relevant zoning and development) bylaws. This is because in many suburban municipalities, development in the interface is characterized by small-lot residential development in which the future management of off-site areas is impractical, unfeasible, or undesirable. Guidelines for subdivision in the interface often support the creation of a "fuel-free zone" within these zones, meaning vegetation and landscaping in this area are intended to be of low flammability and non-combustible building materials are preferred.

The Ministry of Transportation and Infrastructure is the authority responsible for subdivision approvals, referring applications for subdivision to local authorities like the RDN and Improvement Districts as part of its process. The RDN is empowered to place additional requirements on the subdivision of land through its bylaws, to better suit community circumstances. Subdivision and development control in rural residential areas can support FireSmart by ensuring developments have a buffer of 10 m between homes and coniferous vegetation, adequate fire design (including turnarounds, cisterns, or local hydrant networks where warranted), and lot layout that either provides or plans for future secondary access to neighbourhoods depending on size. In more rural areas with larger lot sizes, where portions of Priority Zones 2 (30m) and 3 (100m) are also located on-site, there are benefits to maintaining FireSmart guidance for landscaping and development in these areas in addition to Zone 1. NFPA 1141 contains industry-accepted guidance on the design of subdivisions in the WUI.

Zoning and Subdivision Bylaws

In EA A the RDN regulates land use and parcel size through the Land Use and Subdivision Bylaw[30]. The Bylaw is in force in EAs A, C, E, G, and H, acting as the zoning code (Part 3 – Land Use Regulations) for these areas, containing subdivision regulations (Part 4 – Subdivision Regulations) and also describing Development Permit Area (DPA) guidelines enabled by the Official Community Plan (Part 5).

Zoning

Zoning provisions relate to allowable land uses and buildable space on each parcel in the RDN. Zoning policies can influence the fire resilience of communities by setting rules for how development on each lot relates to the street and neighbouring parcels. Buildings are provided with minimum setbacks by zone. This effectively establishes the distance between buildings and forest vegetation on many properties. Setbacks of no less than 10 m between buildings and the outer limit of forest vegetation enable homeowners to take action within this crucial area. Currently, most commercial and residential zones in the Bylaw have minimum setbacks of between 2 and 8 m. The minimum setback for residential buildings in most rural zones is 8 m from the property line. In areas of high wildfire threat guiding building sitting away from adjacent forest vegetation can provide value to communities and support active landscape maintenance by homeowners.

Part 3 also regulates the landscaping or vegetation required within a zone. These provisions are limited, typically to reduce nuisance between different land uses by controlling the installation of vegetation buffers, such as between residential areas and adjacent highways or industry. The design of these buffers can influence wildfire risk, as common hedging species like cedar and yew are ignition hazard that should be kept at least 10 m away from building in interface areas.

Using Zoning to guide fire resilient community development can sometimes be inefficient. The geography of different zones may not align with an identifiable interface and is often specified more finely than guidelines for interface development need to be. This means that properties affected by a zoning amendment may not face an appreciable wildfire hazard. Even when appropriately targeted, using zoning to address community wildfire hazard can create a substantial burden of variance for non-conforming properties. This occurs where zoning amendments apply to existing developments. In new developments rezoning with new zones can reduce elements of unfairness but can lead to complicated bylaws.

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[30] Bylaw No. 500. (1987). Land Use and Subdivision Bylaw.

Development Permit Areas

Establishing a special DPA can help set development patterns while reducing the impacts of poor targeting and the regulatory burden of developing new zones for each land use in the interface. DPAs are areas within a community where a local government can establish additional information needs or regulatory requirements on new development applications. In these areas, construction projects must receive a Development Permit showing that the project will meet guidelines established for the area before they can be issued a Building Permit to begin construction. DPAs can be used for a variety of purposes established by the *Local Government Act*. To be in effect, DPAs must be adopted as part of an Official Community Plan. The RDN has adopted several DPAs in the Official Community Plan for EA A and sets out guidelines for each in the Land and Subdivision Bylaw. DPAs exist in EA A for environmental protection, community design, and the protection of development from floodplain hazard. The RDN does not currently have a DPA for wildfire hazard. Considerations for such a tool are found in a following section regarding the Official Community Plan.

Subdivision Regulations

Subdivision Regulations (Part 4) are used to affect the number, size, and shape of parcels in a new development as well as control the standard for community services like fire hydrants. For this reason, subdivision control is a highly effective tool for ensuring new neighbourhoods or developments are set up to be FireSmart. The RDN's regulations are limited in scope to the regulation of minimum parcel sizes and shapes, establishing additional requirements to the Ministry of Transportation and Infrastructure's highway standards, and the delivery of community water and sewerage services. In areas with hydrants provided as part of a community water system, the delivery of sufficient fire flows is also regulated. Amending rules around subdivision may also be more acceptable to the public than zoning changes or development permit systems (discussed below) because subdivision approvals are typically tied to new multi-lot development and not all new construction.

Subdivision review is a secondary role for the RDN. In unincorporated areas, the provincial Ministry of Transportation and Infrastructure is responsible for subdivision approvals, and reviews proposals in consultation with local governments. During this process, the RDN can provide comments on the suitability of subdivision applications and make recommendations for amendments to subdivision design to better meet community expectations from the Official Community Plan and legal requirements in the Land Use and Subdivision Bylaw. Applying FireSmart principles to subdivision design requires better advocacy between the RDN Emergency Services and Planning departments. Where possible, it may make sense to request the design of more effective fuel-free areas on the edges of new developments. Having good communications with the development community is an important part of this advocacy. Improvement District fire departments are also consulted by the Ministry of Transportation and Infrastructure and provide separate comments on subdivision applications. Liaising with the improvement districts to present a consistent voice calling for more FireSmart design can help improve the level of hazard in neighbourhoods over time.

Development Information, Development Permits, and the Official Community Plan

Development Approval Information

The BC Building Code sets the minimum acceptable standards for structures. However, the code does not contain guidance special to the development of homes and buildings in the WUI. For this reason, the

Local Government Act provides that Official Community Plans can contain special areas where additional regulations on development apply. There are two mechanisms available to local government under these powers. The first is "development approval information" (S. 484-487), which allows local governments to delineate areas where applicants for rezoning, development permits, and temporary use permits may be required to provide supplementary information. This can include wildfire hazard information, such as a wildfire hazard assessment of the subject property. This is one way for local governments to collect information about wildfire hazard on private land which is not available in this Community Wildfire Resiliency Plan. The RDN has established all of EA A as a Development Approval Information Area, meaning that a development application may be required to provide an "impact report" containing information pertinent to the approval. Details on the contents of the impact report are provided in the Impact Assessment Bylaw (No. 1165, 1999). The RDN can request additional information relevant to any policy within the Official Community Plan or in accord with any adopted bylaw. This may enable the RDN to request information about wildfire threat or hazard on private property. This information can be extremely valuable to the RDN's administrators in strategic planning for community wildfire resiliency across departments.

Development Permit Areas

The second mechanism goes beyond development approval information and allows local government to designate DPAs within the Official Community Plan (S. 488-491). Because DPAs are used to enforce special standards on design and construction, the purposes of the DPA must be justified. Many local governments in British Columbia have used these provisions to establish "Wildfire Hazard" DPAs which rely on the accepted purpose of "protecti[ng] development from hazardous conditions" stated in the *Act*.

A DPA has two core components: a map, indicating the properties to which the DPA applies, and guidelines that describe the requirements that must be met during development. Like development approval information areas, local government can also require wildfire hazard assessments on private land as a required submission for a development permit. This introduces an optional third component, professional reliance, whereby local government relies on professional hazard assessment and recommendations to adapt DPA guidelines to the circumstances of a specific property.

The DPA map will be adopted by amendment to the Official Community Plan and must show the properties within the DPA. Many communities with existing wildfire hazard DPAs distinguish their mapping between areas of high and extreme risk and provide guidance tailored to this risk. While this approach is made possible by the mapping prepared for the Community Wildfire Resiliency Plan, it is unlikely to provide fair or effective results in a landscape dominated by intermix conditions on private land. Another approach to mapping a wildfire hazard DPA is to identify all properties within a buffer distance of the forest interface. Buffer distances of 100 or 200 m are commonly used to help address the risk of ember-spotting from a nearby wildfire into a neighbourhood. When designing a DPA map for wildfire risk, it is important to recognize that the level of wildfire threat changes over time as forests grow and die or land uses change. For this reason, it is desirable to commission specific mapping that identifies the long-term interface of the community based on the vision in the Official Community Plan.

Photo 12. Example of properties in a wildfire DPA.

Guidelines for development in the DPA must be adopted as a schedule to the Official Community Plan. Local government can set basic requirements concerning wildfire risk while respecting the character of the development, including landscaping, the siting, form, exterior design, and finish of buildings and other structures as well as restrict the type and placement of trees and other vegetation in proximity to the development. Guidelines are often based on NFPA 1144, with elements of NFPA 1141 and FireSmart adapted as needed to address outstanding issues with subdivision design and vegetation management.

If desired, local governments may require a professional wildfire risk assessment that provides site context and advice to local government on appropriate standards for design and construction, which may vary the guidelines. Codified guidelines are less flexible to site circumstances but provide greater certainty to applicants within the DPA and may be administered without requiring a professional report. Risk assessments reports can help to establish wildfire threat on private land and may improve the public acceptance of any change to development control by allowing for more consideration of individual circumstances.

DPAs, unlike subdivision control, apply to new construction as well as subdivision application. While their purpose is the same – to improve the physical environment of homes in the community as it relates to wildfire risk – DPAs allow established neighbourhoods to be renewed with FireSmart construction over time. This strategy of gradually transitioning existing communities toward FireSmart through the permitting of new construction should be carefully explained if it is promoted as a solution to long-term fire risk. Any amendment to an Official Community Plan requires a broad base of public support.

Initiatives to Consider

Provide FireSmart information as standard issue within all DP or building permit application packages.

The RDN can ensure homeowners in the interface have the information they need to develop a fire resilient design for their properties. The permit application process is the primary means for RDN to disseminate FireSmart information and occurs at a significant time in the design process. To maximize the effect of this information the RDN could prepare a brief handout explaining the WUI and the importance of considering fire risk, with links to this report, the FireSmart homeowner's guide, and the contact information for the proposed RDN FireSmart Coordinator. Emergency Services should work with Planning staff to provide all materials needed for this initiative and could also provide basic internal training to planners and front-counter staff to promote FireSmart as an "all department" initiative.

Ensure a FireSmart perspective is applied to development referrals and review.

The RDN reviews building, zoning, and OCP amendment applications internally to determine the suitability of new development activity in different parts of EA A. While the RDN does not have the final responsibility for subdivision approvals, subdivision applications are referred to the RDN as part of the provincial approval process led by the Ministry of Transportation and Infrastructure. The RDN can change referral protocol to ensure that representatives of the Cranberry and/or North Cedar Fire Departments and/or the proposed regional FireSmart Coordinator are present on the referral team for any land development application with a focus on major developments and land subdivision. Increasing communications between Fire professionals and the planning department will build awareness of wildfire resilient design and identify issues with the existing Land Development and Subdivision Bylaw, such as landscape review focused on vegetation as a land-use buffer rather than a WUI risk factor.

Investigate using Development Approval Information provisions to request wildfire threat assessment on private lands.

A key message of this CWRP is that wildfire threat does not stop at the border between public and private land. To improve the RDN's understanding of wildfire risk on private land, Development Approval Information provisions of the *Local Government Act* can be used in conjunction with the RDN's Impact Assessment Bylaw to begin requesting assessments of wildfire threat as key parts of the information required to approve major developments. There are concerns with a sudden increase in the number of reports required of development. These include ensuring there is sufficient capacity to review the resulting reports internally within reasonable timeframes, setting standards for a potential "wildfire hazard information report" such as desired content, methods, and professional qualifications, and working to promote the program as a reasonable and acceptable step to the development community and the general public. Development Approval Information provisions do not immediately allow for the RDN to begin mandating FireSmart design on affected properties – this requires the creation of a DPA where additional guidelines for design and construction in the WUI apply. However, the "wildfire hazard information report" would symbolize the commitment of the RDN to increasing its understanding of wildfire risk on private land and could help build awareness of hazard mitigation for property owners in the interface.

Consider how the future introduction of a DPA for wildfire hazard could support community safety and resiliency.

Wildfire hazard is increasing as climate change progresses. The widespread interface and intermix conditions in EA A place the community at an inherent risk of wildfire damage or loss. It would be valuable to adopt guidance for development in the WUI so that only resilient designs are permitted via the structure of a DPA for natural hazards. Moving to require new building materials, landscaping, and site servicing standards to address the natural hazard of wildfire is a multi-year process that should involve comprehensive community engagement and be started before it is needed. Introducing a new DPA to address wildfire hazard requires public confidence and widespread awareness of the condition and sources of that hazard. This is why education and voluntary FireSmart initiatives are prioritized by this CWRP, along with initiatives to improve the RDN's understanding of wildfire risk on private property.

Some residents are motivated to live in unincorporated areas because they are attracted to a limited local government with fewer "rules" around development. However, most residents are motivated simply by beautiful landscapes and vibrant communities; they may be more open to arguments for changing planning processes and approvals. A DPA for natural hazard should be seen as a tool that conserves a community's character by protecting it from catastrophic loss, rather than as an example of local government overreach. Attitudes toward new regulations may rapidly change as wildfire events alter the public perception of risk.

Photo 13. Homes in Cedar-by-the-Sea.

Interagency Cooperation

The Regional District of Nanaimo (RDN) is not the only actor in wildfire management within the project area; several agencies and authorities influence wildfire in the community and work to protect Electoral Area A (EA A) from catastrophic loss. It takes the collaborative efforts of multiple stakeholders working together to achieve a fire-resilient community.

Actors include the range of local firefighters, representatives of the BC Wildfire Service (BCWS), First Nations, RDN departments in addition to Emergency Services, and land managers like BC Parks. In many cases, these organizations already have extensive contact with each other, though not in the frame of strategic planning to manage community wildfire risk. The RDN's role as the provider of emergency management and planning services to EA A means that it can act as an intermediary between different agencies and groups that together prepare EA A for wildfire.

Factors for Success

Identifying Actors and Roles

Emergency response responsibilities are divided in the province. Recognizing who needs to be present during conversations about wildfire preparedness is critical. The following agencies and groups have important roles in preparing and responding to a wildfire in EA A:

- **The RDN** – conducts emergency and evacuation planning, initiates and staffs Emergency Operations Center during a wildfire, declares local states of emergency and exercises local emergency powers to direct residents out of a fire zone. The RDN also manages properties in the community and regional parks system.
- **BCWS** – before a wildfire, supports wildfire risk reduction through projects on provincial crown land and joint training; collaborates with local fire departments and local governments on FireSmart projects. During a wildfire, acts as the official first suppression response to a wildfire in areas of EA A without local fire protection districts.
- **North Cedar Volunteer Fire Department and Cranberry Volunteer Fire Department** – provide first suppression response within their fire protection areas (almost all of EA A). Conduct outreach within their communities to promote responsible fire use and control.
- **Snuneymuxw Nation** – EA A is within their traditional territory and have members living both on and off-reserve in the area. Provide strategic emergency planning to their Nation and reserves. Before and during a wildfire can consult BCWS and emergency responders on social, economic, and cultural values threatened by fire or suppression activities.
- **BC Parks** – before a wildfire, supports hazard assessment and abatement as appropriate in park properties, regulates sources of ignition associated with recreation. Maintains fire bans during periods of higher fire danger.
- **Emergency Management BC** – before, during, and after a wildfire supports local government response.
- **Ministry of Forests, Lands, Natural Resource Operations and Rural Development** – provides review and issues tenures to fuel management projects located on crown land.
- **Ministry of Transportation and Infrastructure** – maintain public roads in unincorporated areas, responsible for subdivision application approval.

Not all of these actors will be relevant to every discussion in a community about fire resiliency. The RDN should strive to maintain positive relationships with representatives of these organizations and more. Matching issues and interested parties can be part of any communications plan for FireSmart initiatives led by the RDN.

Regular Communications Through a Semi-Annual or Annual Meeting

While most of these organizations communicate with each other to different degrees, there is not currently a schedule for these communications or a shared sense of strategic planning for wildfire among all organizations. FireSmart and the BCWS recommend the organization of a working group or committee for fire resiliency which means on at least an annual basis, such as in advance of the wildfire season. Establishing regularity to communications builds trust among organizations and helps promote momentum for fire preparedness planning.

Setting Expectations for Interagency Cooperation

With so many actors involved in emergency response, it is important to set goals, scope, and limitations on any regular communications. This is largely the goal of any regular committee or working group established to bring representatives of the different emergency responders and land managers together. A committee charter can be used to establish the rules and organization of a working group's activities and acts as a contract between partners to build trust and promote coordination of emergency planning functions.

Initiatives to Consider

Advocate for an Interagency Fire Response and Preparedness Working Group

Currently, there is no event that brings together all the relevant authorities and organizations for planning fire response and preparedness. Because of the development of mutual aid agreements and good working relationships between the fire departments in the RDN, it may be valuable for the RDN to bring together departments with the BCWS and other key actors to discuss response needs in the different EAs and major preparedness activities, such as proposed or ongoing fuel management. This could also be a forum for the RDN and local fire departments to learn from one another about ongoing FireSmart initiatives. This would be an event primarily for designated first responders and organizations running FireSmart programming across the region and support strategic decision-making by presenting a coordinated front on FireSmart and fuel management priorities. This group could also develop tabletop planning exercises for a major wildfire event.

The RDN is well-positioned to coordinate such a meeting because of its existing relationships with the fire departments and role as the primary local government for unincorporated areas. Recommended timing for this event would be annual, with meetings taking place in November or April. These dates are suggested to correspond with the period after the typical funding application deadline for the Community Resiliency Investment (October) when the RDN will have an idea of which fuel management projects and other initiatives it intends to pursue, or the period when CRI funding announcements are generally made (March). These dates are also immediately before and after wildfire season, and are a forum to share preparedness strategies, and debrief the previous wildfire season.

Develop a Community FireSmart and Resiliency Committee

A Community FireSmart and Resiliency Committee, in contrast to a working group for fire response and preparedness, would be locally focused on EA A and bring together emergency responders with community representatives and the RDN to plan and implement FireSmart initiatives in areas of identified need. FireSmart BC proposes that these committees represent a missing link for fire preparedness in British Columbia between emergency planners and fire suppression staff and the communities they serve. The intent of developing a Community FireSmart and Resiliency Committee is to ensure that planners and emergency staff are building resiliency in the community in line with local expectations and interests. The Community Resiliency Investment program has made funding available for this initiative through its FireSmart Community Funding and Supports stream.

Like the working group, the committee can be an annual or semi-annual body. Its purpose would be to act as a sounding board for the initiatives planned by the RDN with support from the BCWS and local fire departments. It may be valuable to have some or all representatives from the authorities identified in the Factors for Success (p.88), as well as additional representatives of stakeholder groups as the RDN sees fit. Additional members could include representatives of specific neighbourhoods, industries or businesses, or demographic groups.

The tasks of such a committee could include:

- Adopt terms of reference for the committee.
- Provide a review of the RDN's CRI funding applications.
- Suggest initiatives for inclusion in the funding applications.

- Coordinate Community FireSmart Days and advocate for FireSmart planning in priority neighbourhoods.
- Research alternate funding sources for priority projects not supported by CRI.
- Advocate for FireSmart and proposed activities among members' communities and organizations.
- Provide feedback on the implementation of FireSmart initiatives in the spirit of continuous learning.
- Represent the interests of a diverse community in advancing FireSmart locally.
- Liaise with the BC FireSmart Committee to provide learning and feedback on program design and availability.

The RDN's role would be to convene the committee and support its operation by providing start-up support (administration time and initial grant application) and to develop a draft Terms of Reference to be discussed during the first meeting. The structure of the committee may be served by having a multi-member executive to share responsibilities after the first meeting and avoid capacity issues in participating organizations. An executive composed of one representative from each of the RDN, NCFD, and CVFD may provide sufficient representation and distribution of effort. The scheduling of an annual meeting would logically occur in August before applications for CRI funding are being prepared.

Photo 14. North Cedar Improvement District offices.

Provide cultural sensitivity training to better partner with Indigenous communities

Ensuring that all communities receive an equitable standard of service and care during a wildfire is an important public duty. 8.5% of the population of EA A self-identified as indigenous ("aboriginal identity") on the 2016 Census[31]. This rate exceeds the average rate of individuals expressing indigenous heritage in the RDN as a whole or the rest of British Columbia. The Snuneymuxw Nation has a core interest in these lands and waters, which are part of their traditional territory and include their Nanaimo River reserves. As a discipline involving land management, wildfire prevention can affect indigenous cultural values, and Snuneymuxw Nation should be involved in the planning of vegetation management. EA A contains several known sites of archaeological value and many dozens more of continuing cultural significance. Ensuring emergency responders are trained to provide culturally sensitive assistance to indigenous residents during a wildfire and to have positive proactive relationships with representatives of Indigenous nations is an important aspect of reconciliation.

For these reasons, CRI supports providing cultural safety and humility training to emergency management personnel involved in both wildfire prevention and suppression. The RDN could provide staff members in its Emergency Operations Centre with this cultural training any time the services of the Emergency Operations Centre are required. Similarly, it is important that RDN's representative to any community committee or working group have this training.

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[31] Statistics Canada. 2017. Nanaimo A, RDA [Census subdivision], British Columbia and Canada [Country] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed December 3, 2021).

Cross-Training

This discipline is intended to develop the level of ability and knowledge among emergency managers and first responders in Electoral Area A (EA A) so that all actors can understand additional roles in wildfire management. Cross-training means bringing the knowledge of one role together with the knowledge of another and is a major component of facilitating FireSmart programming and interagency cooperation. The Community Resiliency Investment program recognizes the value of a variety of training for emergency responders but focuses investment on a set of selected courses dealing with suppression training and FireSmart implementation.

More broadly, the spirit of cross-training applies to parts of local government that are not directly responsible for emergency management or wildfire response. For example, the Regional District of Nanaimo (RDN) is fortunate to have park operators with experience in wildland fire and fuel management. This facilitates the implementation of FireSmart initiatives in parks because emergency managers and RDN parks staff can come to the table with a shared understanding of basic project goals and objectives. Identifying opportunities to increase the awareness of FireSmart and wildfire preparedness across RDN departments is an objective of this section.

Cross-training can also describe initiatives to extend FireSmart training and certifications to the backbone of community wildfire resiliency – community members. Residents are able, through FireSmart BC or FireSmart Canada programming, to attain training to become recognized Neighbourhood Champions. These are roles that are embedded in communities and provide advocacy for wildfire preparedness at a grassroots level.

Factors for Success

Identify Needs

Because of the dedication of community members, EA A's communities have an existing base of knowledge and training in wildfire preparedness and response. Both North Cedar and Cranberry fire departments have robust training to meet provincial requirements for registered departments. Both departments have also taken steps to train members to respond to wildfire interface events, and within EA A there is knowledge of structural protection unit deployment and incident command system. Members of each department formed a joint crew for a contract to the BC Wildfire Service (BCWS) in the summer of 2021 and served in the BC interior on interface fires there. Having additional members access training and experience can help build resilience in EA A.

Identify Funding Eligibility

Local fire departments can refer to this document and the annual updated CRI program information to understand which courses or opportunities are covered by grant funding. Currently, direct funding opportunities for training within CRI are limited to certain courses and professional roles for enrolment. For example, only volunteers with Fire Departments registered with the Office of the Fire Commissioner can access the suite of courses related to fire suppression. The following courses can be funded for members of the NCFD and CVFD.

- **SPP-WFF1 Wildland Firefighter Level 1** – This course, designed by the Office of the Fire Commissioner, provides training to structural firefighters in the specifics of wildland firefighting and enables structural firefighters to participate in the Province's Structural Protection Program, or field deployments during the fire season. This course replaces S-100 and S-185 for structural firefighters participating in wildland deployments with the BCWS.
- **S-100 Basic Fire Suppression and Safety** – This course, designed by the BCWS, is the minimum basic standard for any person to participate as a wildland firefighter in British Columbia.
- **S-185 Fire Entrapment Avoidance and Safety** – This course, designed by the BCWS, provides basic knowledge of entrapment avoidance and survival techniques during a wildfire.
- **S-231 Engine Boss** – This course, designed by the BCWS, trains firefighters with wildland experience to lead an engine and crew during an interface event and allows contract firefighters to act in higher capacities while on deployment.
- **ICS 100 Incident Command System Level 100** – This course, offered by the Justice Institute, introduces the Canadian Incident Command System to emergency management staff and local first responders. This training is only available to members of volunteer fire departments and certain emergency management personnel.

Having both firefighters and RDN staff complete ICS-100 ensures that emergency responders and staff participating in an Emergency Operations Centre have the same language of site and scene control. Emergency management staff can also receive training in the Province's Wildfire Risk Reduction Basics Course, which supports interagency cooperation between local government and the BCWS on fuel management projects outside the designated wildland-urban interface (WUI).

Emphasize community preparedness

Through CRI, community members have access to preparedness training within the FireSmart frame. Residents throughout EA A can access training as Neighbourhood Champions, which provides them with the knowledge to engage with their communities on preparedness issues and potentially take a leading role in establishing a neighbourhood FireSmart committee for developing a FireSmart neighbourhood plan (discussed under *Education*, p.63). To offer support to grassroots efforts, training local government staff as Local FireSmart Representatives is possible through the funding program. A FireSmart Coordinator hired by the RDN to implement wildfire resiliency initiatives should ideally have this training or Wildfire Mitigation Specialist training. All three staff in the RDN's Emergency Services Department are currently certified Local FireSmart Representatives, though staff have a limited capacity to run new programming. Internally, the RDN can also ensure its parks and planning departments receive basic training in FireSmart so that they can support resiliency initiatives.

Initiatives to Consider

Collaborate with the North Cedar and Cranberry volunteer fire departments to access additional training for members

Verify that all members have received S-100 and S-185 training or equivalent SPP-WFF1, and support the Fire Department to nominate members for S-231 Engine Boss training. This would ensure all members, who will be the first responders to a wildfire in EA A, have the same knowledge of wildland suppression and enable all members to participate in structural protection deployments with the BCWS if desired. Engine Boss training supports higher roles for contract members in the Province's Structural Protection Program, valuable interface firefighting experience that can be brought back to EA A.

Support RDN Emergency Services staff to become Local FireSmart Representatives or facilitators

Currently, three staff members of the RDN's Emergency Services department are certified Local FireSmart Representatives. As staff are added to the department, or as outreach is conducted within communities, it could be valuable for a staff member to be a designated facilitator for the LFR workshop. This would enable RDN to use in-house talent to build up FireSmart awareness and capacity in its unincorporated communities. Alternately, the RDN could seek this qualification when hiring for additional emergency staff or the role of a regional FireSmart Coordinator.

Help interested community members access Neighbourhood/Community Champion training

Every member of the public who contacts the local government or their local fire department looking for information about wildfire resiliency is a potential neighbourhood champion. This role is for self-directed leaders who want to learn more about the principles of FireSmart and the Neighbourhood Recognition process so that they can organize in their communities for fire preparedness. The RDN can help direct people to this program. One community in the RDN, Spider Lake (EA H) achieved Neighbourhood Recognition in 2019. There are opportunities for the RDN to connect interested residents of EA A with residents in Spider Lake, as well as support potential champions to participate in an introductory workshop. These workshops are given by Local FireSmart Representatives and could be held by the RDN if sufficient interest is present in several communities.

Assess the future potential for a Home Partners Program approach to FireSmart assessment

The Home Partners Program is another means to provide homeowners with personalized property assessments. While Local FireSmart Representatives are trained to develop neighbourhood recognition, the Home Partners Program is focused on delivering targeted assessments to individual properties within an area, regardless of neighbourhood FireSmart activity. The focus on an individual property rather than reducing neighbourhood level fire risk means delivery of the program depends on FireSmart certified "Wildfire Mitigation Specialists". Specialists conduct home assessments in the program, providing a personalized report to property owners that contains specific discussion about the features of their home and how the fuel environment on their property is likely to behave during a wildfire event. The Home Partners Program is a suitable alternative to neighbourhood level programming where there is widely distributed interest in FireSmart among property owners.

Training for the Wildfire Mitigation Specialist role can be funded through the Community Resiliency Investment program. Due to the limited application of this credential outside the Home Partners Program and high workshop fee, it may be reasonable to enhance the RDN's offerings of neighbourhood-focused FireSmart services before considering developing or hiring a qualified Wildfire Mitigation Specialist.

Photo 15. Residence in the WUI.

Emergency Planning

This FireSmart discipline addresses the Regional District of Nanaimo's (RDN) own preparedness and examines connections between the Community Wildfire Resiliency Plan and the RDN's emergency planning mandate. The primary purpose of this section is to consider how wildfire can be incorporated into emergency planning conducted by the RDN and appropriate levels of readiness during the fire season. This discipline also includes related interagency actions such as coordinating joint training and scenario exercises.

Wildfires are complex and dynamic events that have the potential to combine multiple emergencies within communities. Wildfires rapidly change behaviour depending on winds, weather, the fuel environment, and topography. Respecting the dynamism of wildfire is the first step to making a successful plan.

The RDN prepares emergency plans for its Electoral Areas, declares states of local emergency (SoLE) and issues evacuation alerts, orders and rescinds, and coordinates an Emergency Operations Centre during periods of need. Emergency planning, including evacuation planning, by the RDN focuses on an all hazards approach, rather than prescriptive plans that may quickly be overcome by situational uncertainty. For example, the RDN's evacuation planning relies on remote sensing data and field assessments to understand all possible routes, rather than focusing on a single preferred route that may be non-functional in a large emergency. During a wildfire emergency, multiple routes and resources may quickly become unpassable or unsafe or need to be reserved for emergency responders.

Local emergency and evacuation plans cover the general initiation of an Emergency Operations Centre, the declaration of orders and alerts affecting residents and properties, and the RDN's relationship with supporting organizations like Emergency Management BC. The role of the Community Wildfire Resiliency Plan is to provide wildfire-related guidance for emergency planning by the RDN, pre-incident planning by local firefighters, and to propose levels of service for emergency readiness, called "Wildfire Preparedness Condition Level" by the Province.

Factors for Success

Wildfire Preparedness Condition Level

Within the RDN's Emergency Services department, adopting a guide to emergency preparedness levels in relation to wildfire danger can help prioritize limited departmental resources during fire season. This guide will associate RDN staffing and activities with the levels of fire danger, with more action to prepare for wildfire being appropriate whenever fire danger rises above low. Fire danger can be monitored daily on the BC Wildfire Service (BCWS) website. Developing an appropriate guide to Community Wildfire Response Condition Level has not been undertaken as part of this Community Wildfire Resiliency Plan, but the RDN can work towards implementing a level of service based on the example below, adapted from the BCWS's guidance.

Table 17. Sample Guide to Wildfire Response Condition Level.

Preparedness Level/ Fire Danger Rating	Action Guidelines
I Low	• Staff monitor fire danger rating weekly
II Moderate	• Staff monitor fire danger rating daily
III High	• Staff on normal shifts • Notify the proposed Community FireSmart and Resiliency Committee of preparedness level. • Establish weekly communications with local fire responders regarding preparedness concerns. • Promote wildfire awareness and reporting mechanisms on social media channels. • Publish fire danger rating on RDN website. • Consult with RDN Parks on potential area closures in zones of high and extreme wildfire threat.
IV Extreme	• EOC and parks staff on standby. • Notify the proposed Community FireSmart and Resiliency Committee of preparedness level. • Weekly communications with local fire responders regarding preparedness concerns. • Weekly communications with parks department staff over internal preparedness. • Promote wildfire awareness and reporting mechanisms on social media channels. • Publish fire danger rating on RDN website. • Consider area closure notices in park zones of high and extreme wildfire threat. Prepare area closure notices.
V Ongoing fire(s)	• Issue area closures in all parks and publicize with media release and RDN website. • Mobilize EOC if evacuation is needed, or if fire requires additional support from Emergency Management BC. • Issue Evacuation Alerts and Orders based on fire behaviour prediction as appropriate in consultation with BCWS and publicize with media release and RDN website. • Assist evacuated residents with support access and emergency lodging. • Daily communications with local fire responders, BCWS, and parks department. • Daily public updates via social media and public release.

Initiatives to Consider

Coordinate a tabletop scenario exercise with the members of the proposed Fire Response and Preparedness Working Group

The RDN may be able to facilitate a joint training exercise between members of local fire departments, RDN Emergency Services staff, and the BCWS. This exercise would gather participants and present a wildfire scenario, which then allows all participants to confirm their roles and follow through a chain of action during the hypothetical wildfire event. Although the RDN is not responsible for fire suppression in Electoral Area A (EA A), it can take the lead in coordinating this exercise, which should include details about the scenario's location, time, and context. This working group is an opportunity for the primary fire responders, the local fire departments, to share their knowledge and suppression capacity with emergency planners.

Request local fire departments to prepare an inventory of structural protection capacity and deployment

To support pre-incident planning, the local fire departments can access funding to prepare a joint inventory of structural protection equipment in EA A. Structural protection units refer to mobile sprinkler systems that can be quickly set up to douse a home in water, thus reducing the likelihood of ember ignition. Structural protection units are only able to cover a limited area and are limited in number in EA A. Concerns with summer water supply also contribute to concerns about the scalability of this kind of equipment; however, these units can play an important role in protecting homes that are not in the direct path of the flame.

Conduct a community info session about emergency preparedness before a wildfire

The purpose of this event would be to introduce the community to emergency planning concepts based on the Emergency Management BC Wildfire Preparedness Guide. Promoting the guide is supported by the Community Resiliency Investment program. This event could be a way to encourage residents to prepare for a major wildfire event by having a household or family plan for communications, evacuation, and provisions. The event could naturally address questions about logistics or evacuation planning from the public.

Establish a guide for Emergency Services preparedness levels during wildfire season

The RDN can help allocate the limited resources of the Emergency Services department during fire season by developing and following a guide to Wildfire Response Condition Levels (Table 17), tied to fire danger reporting updated daily by the Province. The table presented previously in this section can be used as a sample of the content and actions to be considered by the Emergency Services department in defining its level of service for different fire danger ratings. Actions should be refined in consultation with emergency response partners from the EA A community.

Identify "Clean Air Refuges" for use by vulnerable populations during periods of heavy smoke

While the focus of the Community Wildfire Resiliency Plan is on preparing for a wildfire within the boundaries of EA A, wildfire smoke impacts can range far and wide and have impacted the community during past fire seasons. Sustained heavy smoke has adverse health effects and presents a different kind of wildfire emergency. The RDN can seek to identify potential partners in EA A, such as commercial centres or community buildings with suitable HVAC systems, where residents who need a breath of fresh air can find it. Identifying community partners for such a program and alerting them to expected smoke conditions could be incorporated into the wildfire emergency preparedness condition guide, along with guidelines for monitoring expected smoke weather.

Pre-Incident Planning

The pre-incident plan is a body of knowledge prepared by fire suppression personnel about the resources and risk of a wildfire event in their communities. During a wildfire, local fire departments will provide the suppression response and incident control while the RDN declares a state of emergency as necessary and directs communities to evacuate affected areas. All partners in fire suppression and emergency response should know where fire suppression resources are located in the community, including water sources and resources, vehicles, structural protection units, and even stores of small equipment. The RDN has compiled some of this information in its internal protocol for emergency response. This section is mainly provided as guidance for local fire departments who lead the first response to a wildfire and provide incident control at the scene. A pre-incident plan should also address the following issues for wildland fire suppression:

Command
- First responder
- Incident command and delegation
- Management constraints
- Area closure procedures
- Interagency agreements

Logistics
- Alert/Order publication and notification
- Location of utilities and de-energization
- Communications protocols
- Roads, trails, and access
- Emergency Operation Center location

Operations
- Air and water access
- Control line locations
- Natural barriers
- Safety zone options
- Staging area locations
- GPS locations for key points

Planning
- Topographic maps
- Vegetation and fuel maps
- Community base map
- Hazardous values
- Archaeological/cultural values
- Protected or rare environmental features
- Land ownership
- Access control

Preparing a pre-incident plan is logically an opportunity to simulate a wildfire response effort. Developing the plan can be part of joint training exercises coordinated between the RDN, BCWS, and local fire departments. Such a meeting would be within the scope and core purpose of a proposed Fire Response and Preparedness Working Group, as discussed in *Interagency Cooperation*.

Vegetation Management

In the context of a wildfire, manipulating the fuel environment is often an effective way to reduce wildfire threat or risk. This is what vegetation (fuel) management does, from the small-scale of FireSmart on an individual property to the large-scale of fuel management on the forest land base.

This discipline addresses opportunities to mitigate wildfire risk by altering both natural forest vegetation and the cultivated landscaping around homes and critical infrastructure. Considerations for this section are divided into two categories corresponding to the common forms of implementation: FireSmart landscaping focused closely on homes and infrastructure, and broader fuel management in forest areas. This is done partly to reflect the real difference in approach between the two scales.

Managing Vegetation through FireSmart

FireSmart vegetation management is intended to reduce the risk of ignition to a specific building or piece of infrastructure, assuming a fire has occurred in the area. Accordingly, FireSmart vegetation management focuses heavily on achieving guidelines in the Non-Combustible Zone (0-1.5m) and Zones 1 (1.5-10m), 2 (10-30m) and 3 (30-100m) around a home or piece of infrastructure. Goals for management vary with the distance from the structure. In the Non-Combustible Zone, the emphasis is placed on using non-combustible or fire-resistant building materials and covers to reduce the likelihood of ignition by direct flame. Within Zone 1, emphasis is placed on creating an area free of hazardous fuels like coniferous trees and woody debris and using fire-resistant landscape construction (decks and outbuildings), while goals for Zones 2 and 3 emphasize proper spacing, pruning, and removal of some underbrush. The goal is to prevent a structure ignition and create defensible space around the home which firefighters can work in. Vegetation management for FireSmart is often guided by an assessment report prepared by a Local FireSmart Representative or Wildfire Mitigation Specialist, though some homeowners may wish to undertake FireSmart treatments on their own. The expertise of a Registered Professional Forester is recommended for projects where management includes areas of native forest vegetation.

Supports are available through the Community Resiliency Investment program for FireSmart activities on private land in residential areas and publicly owned critical infrastructure. On private land, only planning and assessment program costs are covered, with the homeowner expected to cover the cost of implementing recommendations. While this can seem daunting, the Local FireSmart Representative can help homeowners understand which actions may be "quick starts" to improve resiliency, and which are appropriate to save until funding or time are available. To help, the Regional District of Nanaimo (RDN) can apply for funding to offer limited rebates to homeowners who complete activities. Piloting a rebate program with a limited request for funding may help assess the general level of interest and administrative workloads for this in the community. Development of other FireSmart initiatives for private land are discussed in the *Education* (p.63) and *Planning* (p.74) sections.

A FireSmart Assessment Program for RDN Critical Infrastructure

Local governments can apply for funding to implement the recommendations from a FireSmart assessment for publicly owned critical infrastructure up to a maximum of $50,000 per eligible structure. FireSmart assessments often identify a need for vegetation management to mitigate wildfire vulnerability. This is available only for structures critical to wildfire response (such as a reception center, water infrastructure, communications towers, electrical infrastructure) having a completed FireSmart assessment scorecard at the time of application. Reassessment with the appropriate scorecard following the mitigation works is also a covered cost for publicly owned critical infrastructure. Although none of the pieces of critical infrastructure identified in the RDN's Hazard Risk and Vulnerability Analysis are owned directly by the RDN, local government organizations are eligible to apply to CRI for funding to conduct these assessments where identified as critical.

Fuel Management for Forest Landscapes

Fuel management in the wider landscape is not focused on preventing the ignition of specific homes or structures; instead, fuel management is about strategically altering the characteristics of a forest to transition it towards lower wildfire threat and improve the effectiveness of fire suppression efforts, thereby reducing the general risk to the community. Sometimes, fuel management is used to produce future fire suppression opportunities such as anchor points or safety zones, locations to initiate defensive back-burns, or improved access to remote areas of a community. Directions for how many trees to remove and retain, as well as how to protect other values in the forest landscape, are contained in a fuel management prescription prepared by a Registered Professional Forester and reviewed by the BC Wildfire Service (BCWS). The intent of fuel management is generally to support healthy forest development while reducing wildfire risk. Fuel management is only supported through CRI on public land.

Fuel management is completed through three phases:

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

This Community Wildfire Resiliency Plan is the first step in identifying and prioritizing candidate areas for fuel management prescription development. Fuel management is a process of starting wide and narrowing down potential treatment areas as constraints are identified and areas are further ground-truthed. The areas shown on the map in this section form a discussion piece to be used in pursuing a fuel management program and do not compel or imply fuel management to occur. The process from the initial identification of a treatment area to implementation on the ground typically takes several years.

Photo 16. Example of a forest before fuel management. (Example from outside the RDN)

Photo 17. The same forest as above, following fuel treatment. (Example from outside the RDN)

Methods for identifying potential fuel treatment areas

Areas on public lands that were identified as having potentially high wildfire risk within 100m of densely populated areas or critical infrastructure were visited in the field. Fuel plots were established in representative areas of the forest stands to determine wildfire threat. Assessments of the fuel condition were completed following the provincial assessment system using the 2020 Wildfire Threat Assessment Guide. This is the provincial standard for field assessments of fuel hazard in the wildland-urban interface (WUI) and is used to plan fuel hazard mitigation works. Fuel types are scored under this system which is used to help prioritize the areas for fuel hazard mitigation funding under the Community Resilience Investment Program.

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

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

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

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

Figure 17. Comparison of surface and crown fire behaviour.

Potential Treatment Areas

The opportunities for forest fuel management on public land in Electoral Area A (EA A) are extremely limited. This is because of several factors, including:

- The small amount of public land in EA A.
- The limited area of contiguous forests with high or extreme wildfire threat.
- High environmental values of remaining forest cover, such as in provincial and regional parks.
- Low feasibility, primarily due to public land isolated by private land parcels and lack of roads into contiguous forested public land areas.

The RDN is a minor landowner in EA A. While all forms of public land ownership within the WUI are potential fuel treatment areas in this Community Wildfire Resiliency Plan, the RDN only has the authority to advance treatments that occur solely on its own property. Fuel management on other forms of public land ownership must be advanced through a partnership with the agency having authority and the BCWS.

Only one area on the border of EA A and EA C was identified as being a suitable candidate for fuel management. This is a relatively small area of contiguous forest centred within Kipp Road Community Park in the northwestern extremity of EA A. Most of this potential treatment area is located within the adjacent portion of EA C, however, access to this area is primarily dependent on the road connection via Plecas Road to South Wellington. This treatment was designated a low priority for implementation due to a relatively far distance from values and current moderate wildfire threat/risk rating. However, the treatment area is quite close to residential homes within the Cinnabar Valley neighbourhood of the adjacent City of Nanaimo.

Figure 18 shows the location of potential treatment areas identified by this CWRP. The area is described in more detail in Table 18.
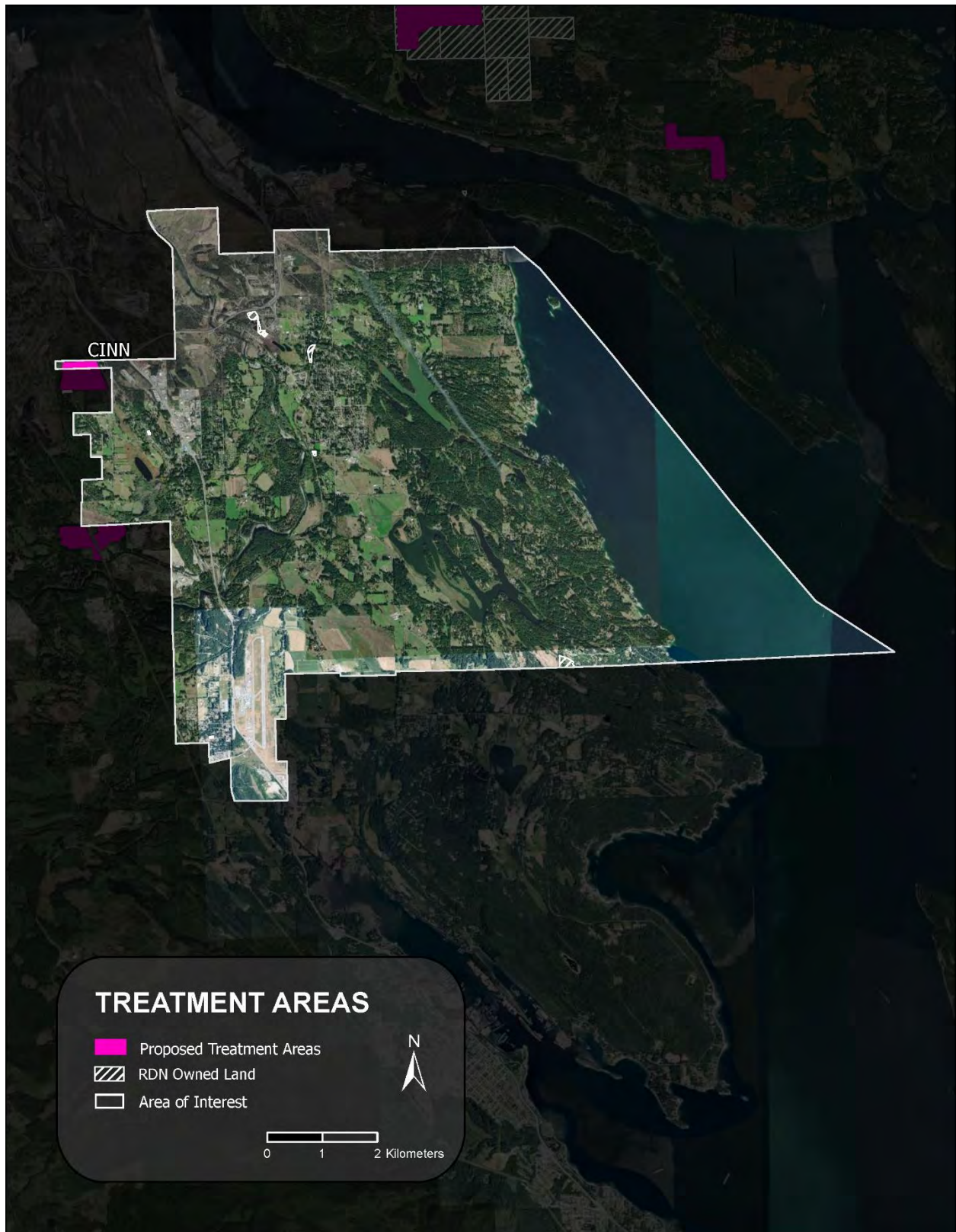
Figure 18. Map of potential fuel management areas in EA A.

Table 18. Areas with the highest potential for fuel management in EA A.

Treatment Polygon ID	General Location	Jurisdiction	Local Fuel Threat (Ha)			Total Area (ha)	Priority	Treatment Rationale / Constraints
			Moderate	High	Extreme			
CINN	Kipp Rd Community Park (Shared EA A/C)	RDN/Crown Provincial (minor)	29.2	7.4	0	36.6	Low	This is one of the few areas in EA A where public land owned by the RDN has pockets of high predicted wildfire threat. This area is located within 100m of extensive suburban residential development in the Cinnabar Valley neighbourhood of the City of Nanaimo and several rural homes within EA C. Values within EA A are located > 100 m from the proposed treatment area in the South Wellington neighbourhood. This area is within Kipp Road Community Park and is characterized by C-5 stands at moderate densities. M-2 fuel types may occupy stand edges. Preliminary constraints: Area has level to gently rolling ground, though steeper slopes of up to 45% are found on the western and eastern edges of the proposed area and result in the limited area of high wildfire threat. There is an informal network of trails within the treatment area that would need to be rehabilitated or conserved during treatment. Treatment could present an opportunity to enhance the recreation potential of this property. There are no known archaeological or cultural sites within the treatment area. Fuel management prescription must consult with First Nations on cultural feature identification. A wetland is present downslope of the treatment area to the east. This feature would need to be assessed and appropriate riparian management guidance applied.

DIAMOND HEAD

Action Plan & Implementation

This section takes discussion from the preceding sections on FireSmart Disciplines and summarizes recommendations for the Regional District of Nanaimo (RDN) to consider pursuing. Successful implementation of the Community Wildfire Resiliency Plan requires a strategy for implementation, tracking mechanisms for success, and a schedule for revisiting issues left unresolved. The Action Plan follows the SMART criteria for outlining potential initiatives:

- **Specific**: Target exactly what is to be achieved
- **Measurable**: quantify or suggest an indicator of progress
- **Assignable** – specify who will be responsible for implementation
- **Realistic**: state what results can reasonably be achieved
- **Time-Bound**: state expected time for completion. Note that some recommendations must be implemented on a recurring basis annually or biannually. For example, an annual social media campaign to raise awareness.

Plan monitoring and updates

While priorities and timelines are assigned below, the RDN may, with feedback from its community, decide some initiatives are of greater importance than others. The risk environment will continue to change beyond the completion of the plan and require adjusting expectations and resource allocation for building wildfire resiliency programming. This is a natural part of the implementation process of any plan. For these reasons, the Community Wildfire Resiliency Plan and this Action Plan should be revisited from time to time to ensure they are meeting the needs of EA A. A formal review after five years is recommended, with at least annual reviews of the Action Plan.

Tracking and Reporting

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

Initiatives pursued by the RDN in the Action Plan should become part of the Emergency Service department's annual progress review. The Action Plan can be recreated and modified to add columns for noting whether items are in progress or have been completed, as well as capture specific measurable outcomes that can help justify the Region's wildfire resiliency initiative.

Following the Action Plan, Table 20 provides a sample tracking and reporting tool.

Table 19. Action Plan.

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
Renewing the Plan and Building Resiliency							
Objective: View the Community Wildfire Resiliency Plan as a Living Document and incorporate wildfire resiliency into strategic decisions							
1.	Conduct a formal review of the CWRP contents every five years. Review the Action Plan every year.	RDN Emergency Services	High	$30,000 per update	Continuing program capacity for wildfire preparedness within the Emergency Services department.	Maintain annual tracking and monitoring information on initiatives in the Action Plan	CRI funding eligible (CWRP updates)
2.	Advocate for wildfire resiliency to be incorporated in RDN's plans and processes	RDN Emergency Services	High	staff time	Good relationships between Emergency Services and other units of the regional government.	Acknowledgement of wildfire hazard and resiliency issues in new corporate documents	
3.	Establish a FireSmart Coordinator position within RDN Emergency Services	RDN Emergency Services	High	$60,000-$70,000 per year (one year contract)	Develop a job plan (title, responsibilities, priority initiatives, manager, term) Funding for this position can be supported by CRI up to 100% of salary.	Fill this position and establish a job plan for the first contract year	CRI funding eligible
Education							
Objective: Promote FireSmart as a strategy for wildfire preparedness and demonstrate the Region's commitment to wildfire resiliency in the community							
4.	Publish the CWRP, risk maps, and highlights on the RDN's website	RDN Emergency Services	High	Staff time	IT support	Successful publication no more than one month after receipt by the Board of Directors	
5.	Create a FireSmart assessment program for residents in Electoral Area A (EA A)	Local FireSmart Representative / FireSmart Coordinator	High	See Item 3. Incidental expenses beyond FS Coordinator salary.	Coordination with NCFD and CVFD is recommended. Trained LFR within RDN	Offer an annual opportunity to residents to have their property assessed	CRI funding eligible
6.	Expand participation in Voyent Alert!	RDN Emergency Services	High	Staff time	IT Support Outreach with local organizations Community advertising	Registrations as a percent of the population.	

DIAMOND HEAD

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
7.	**Promote FireSmart Neighbourhood Planning in priority neighbourhoods**	Local FireSmart Representative / FireSmart Coordinator	Medium	$3,000-$5,000	Coordination with NCFD and CVFD is recommended.	Number of households represented, participating Offer neighbourhood champion workshop to regional residents.	CRI funding eligible
8.	**Host a Community Clean Up Day in Morden Colliery Community Park/Trail as a demonstration of FireSmart principles.**	Local FireSmart Representative / FireSmart Coordinator RDN Parks	Medium	$5,000	Coordination with RDN Parks to designate clean up areas, desired outcomes	Number of participants Weight of vegetation/debris removed Reduce surface fuel loading near homes.	CRI funding eligible
9.	**Collect feedback from the community on an ongoing basis via advertising the Wildfire Resiliency Initiative and Get Involved page**	RDN Emergency Services	Medium	Staff time	IT support Coordination with social media	Number of questions asked Number of contacts with residents Number of survey responses (Get Involved)	
Legislation and Planning							
Objective: Ensure RDN bylaws and policies support wildfire resiliency							
10.	**Explore a program to reduce or eliminate green waste tipping fees for FireSmart projects at the regional landfill**	RDN Engineering and Utilities RDN Emergency Services	High	Cost to be estimated by further study	Coordination between departments Baseline studies Forecast demand by price. Operational capacity and training	Green waste by weight associated with a completed FireSmart assessment Fees deferred	Tipping fees: CRI funding eligible.
11.	**Create a FireSmart Assessment program for publicly owned critical infrastructure.**	RDN Emergency Services RDN Engineering and Utilities	High	$25,000-$30,000	Coordination between departments	Completed FireSmart Assessment Score Cards for all RDN-owned critical infrastructure.	CRI funding eligible.
12.	**Support authorities having jurisdiction to conduct FireSmart Assessments of non-RDN critical public infrastructure, such as by completing joint CRI application for this purpose**	RDN Emergency Services Improvement Districts School District Snuneymuxw First Nation	Medium	Incidental	Coordination between RDN ES and authorities having jurisdiction.	Completed FireSmart Assessment Score Cards for all critical infrastructure identified by HRVA in EA A.	CRI funding eligible.

DIAMOND HEAD

Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
13. **Harmonize the existing Wood First and Green Building policies with FireSmart principles, such as supporting fire-rated wood products.**	RDN Engineering and Utilities RDN Emergency Services RDN Planning and Development	Medium	Staff time	Coordination between departments	Adapted policies reflect recognition of FireSmart building design and principles, and recognize that fire-rated wood building elements have their place in FireSmart design.	Review and revision may be CRI funding eligible depending on scope.
14. **Adopt a target level of service for wildfire hazard assessment in regional and community parks**	RDN Parks	Medium	Staff time	Coordination between Parks and Emergency Services Operational capacity	Level of service for wildfire hazard assessment of park lands established in new Parks and Trails Strategy	
15. **Begin recording wildfire threat information on park service request records and calls.**	RDN Parks	Medium	Staff time	Emergency Services to provide wildfire threat mapping. Parks to orient staff to mapping.	>90% of relevant service requests on park land attached to a wildfire threat rating for the area.	
Development Considerations						
Objective: Consider FireSmart design principles in planning and development bylaws.						
16. **Provide FireSmart information (bulletins, brochures, web resources) with development application materials**	RDN Planning	High	Staff time	Coordination between Emergency Services and Planning Department	FireSmart information is provided with all development permit application templates.	CRI funding eligible, to a pre-determined maximum (physical materials); web resources free
17. **Work with RDN Planning Department to consider FireSmart principles during provincial subdivision referrals**	RDN Emergency Services RDN Planning	High	Staff time	Coordination between Emergency Services and Planning Department	Host an interdepartmental workshop to go over FireSmart principles and design elements respecting land subdivision, including fuel setbacks and potential vegetation management.	CRI funding is eligible to adopt, revise or review referral protocol.

DIAMOND HEAD

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
18.	**Investigate the use of the Development Approval Information Area to request and collect information on wildfire hazard on private property, particularly during land subdivision.**	RDN Planning RDN Legal RDN Emergency Services	Medium	Staff time	Research capacity in the responsible RDN departments.	Bring a workable pathway to request wildfire hazard assessment reports for development applications on private land to the RDN EA Services Committee.	CRI funding eligible, subject to scope limitations around the bylaw review. Pursuing wildfire hazard information on private land through the DAI mechanism helps establish wildfire risk on private land in EA A. This information need not be requested from every application. Designating a DAI zone for wildfire hazard can be part of the investigation process. Currently, the Official Community Plan for EA A identifies "forest fire" as a natural hazard within the community but contains no policy to direct development regarding this hazard.
19.	**Consider preparing mapping of a designated wildfire hazard area for a future OCP update.**	RDN Planning	High	$10,000-15,000	Potentially significant investment in methodology, mapping, and community engagement if DPA pursued.	Map community-supported zones for wildfire interface hazard. Incorporate mapping at next OCP renewal.	CRI funding eligible, subject to scope limitations. If incorporated into the OCP, mapping can be used for future DPA mechanisms to gather information on wildfire hazard on private land and/or guide development toward FireSmart principles.
Interagency Cooperation							
Objective: Ensuring wildfire response is effective							
20.	**Initiate a region-wide Interagency Fire Response and Preparedness Working Group**	RDN Emergency Services BC Wildfire Service (BCWS)	High	$2,000 per meeting	Participation of local fire depts, BCWS, regional emergency responders	Host initial meeting Host tabletop exercise for incident planning	CRI funding eligible

DIAMOND HEAD

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
21.	**Develop an EA A-specific Community FireSmart and Resiliency Committee**	FireSmart Coordinator	High	$2,000 per meeting	Develop terms of reference, network participants, support participation	Host initial meeting Approve draft terms of reference	CRI funding eligible
22.	**Provide cultural sensitivity training to Emergency Services staff to support positive partnerships with indigenous people and communities**	RDN Emergency Services	Medium	Staff time & facilitation fee		one on duty or on call EOC staffer with cultural sensitivity training at all times during an emergency	CRI funding eligible
Cross-training							
Objective: Ensuring emergency responders have a variety of training and experience							
23.	**Support local fire departments to access additional training on future CRI funding applications.**	FireSmart Coordinator	Medium	Incidental	Identify training needs for new recruits, transfers NCFD, CVFD to identify candidates for training and desired courses.	Full participation in training by members who want it	CRI funding eligible
24.	**Support additional RDN staff to become Local FireSmart Representatives**	RDN Emergency Services	Medium	Staff time		At least two people in RDN Emergency Services to have active LFR certification.	CRI funding eligible. Support this training for new FireSmart Coordinator or hire with credential
25.	**Host a neighbourhood champion training workshop for interested community members**	RDN Emergency Services	Medium	$5,000 per event	Successful fostering of a FireSmart neighbourhood planning program	Two new neighbourhood champions trained in priority identified areas.	CRI funding eligible
26.	**Train RDN staff or Local FireSmart Representatives to be Wildfire Mitigation Specialists**	RDN Emergency Services	Low	$8,500 - $10,000	Expression of interest in WMS programming from NCFD, CVFD, or sufficient public interest.	Certification of a WMS within the RDN ES department.	CRI funding eligible
Emergency Planning							
Objective: Enhance emergency response capacity							
27.	**Establish a guide for Emergency Services EOC preparedness levels during wildfire season**	RDN Emergency Services	High	Staff time	Administrative capacity in ES.	Adopt as policy a Guide to Wildfire Preparedness Condition Levels	Sample for development provided in Emergency Planning section

DIAMOND HEAD

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
28.	**Participate in pre-incident planning for wildfire events with local suppression experts**	Regional Fire Response and Preparedness Working Group	High	Staff time.	Participation of emergency responders and suppression authorities	Complete annual pre-incident plan and discuss with the regional working group for fire response in a pre-season meeting	CRI funding is eligible when developed as part of a working group of Community FireSmart and Resiliency committee
29.	**Conduct a community information session about emergency preparedness and evacuation during a wildfire**	RDN Emergency Services	Medium	$5,000 per event	Administrative capacity in RDN Emergency Services	Host event Number of attendees	CRI funding eligible
30.	**Identify "Clean Air Refuges" for use by the public during smoke events**	RDN Emergency Services	Low	Staff time	Partnership with community businesses and facilities. Identification of suitable buildings.	Identify locations that the public can visit for clean air during periods of heavy smoke	

Vegetation Management

Objective: Modify fuel environments to reduce risk around infrastructure and communities

	Recommendation/Action	Lead(s)	Priority	Cost (Est.)	Resources Required	Metric for Success	Notes
31.	**Implement FireSmart Assessment recommendations for critical infrastructure.**	RDN Emergency Services Improvement Districts Snuneymuxw First Nation	High	TBD based on assessment outcomes.	Administrative capacity in RDN. Partnership with Engineering to allocate and prioritize assets for implementation	Completed FireSmart activities and updated scorecards	CRI funding is eligible when the initial FireSmart assessment has been completed. Up to $50,000 per structure.
32.	**Liaise with BC Parks to request regular hazard assessment and abatement in Hemer and Roberts Memorial Provincial Parks.**	RDN Emergency Services	Medium	Staff time	Correspondence with BC Parks	A positive response from BC Parks	
33.	**Consider potential fuel treatment in Kipp Rd Community Park (CINN)**	RDN Parks RDN Emergency Services BCWS	Low	$25,000-$30,000	Coordination with BCWS	Maintain options to pursue fuel treatment in identified areas.	

Table 20. Sample tracking and reporting tool.

Recommendation/Action	Lead	Date Completed	Cost	Successes, challenges, and lessons learned	Follow up – provide description
Action	Who lead this implementation?	When was the implementation completed? Or is this an annual project?	What was the cost? Include Tribe manpower hours here	Was the metric for success achieved? If not, why? Was the metric unrealistic? What unexpected challenges were encountered?	How does implementation or failure to implement impact other actions? Did the implementation of this action lead to new required actions?

Appendices

Appendix A: Glossary of Terms

Term	Definition
Area of Interest (AOI)	The geographic study area for a Community Wildfire Protection Plan, within which the extent of the boundaries of the Wildland Urban Interface are determined.
Community Wildfire Resiliency Plan	A plan adopted by a local government or First Nation to identify wildfire threat and risk throughout the study area, examine policy and planning responses, and assess emergency response capacity while providing action item recommendations for building community resilience, supported by the Province through the Community Resiliency Investment Program.
Critical Infrastructure	Assets, structures, or features that underpin the health and safety of the community and allow governance to take place
Crown fuels	Forest fuels occurring above the level of the ground, on tree stems or in tree canopies, including live and dead branches attached to trees, bark, and foliage.
Fire Return Interval	The time between fires in a defined area, typically measured at the landscape scale.
FireSmart	A term for that describes living with the risk of wildfire while reducing the adverse affects of wildfire. Also refers to a program of disciplines for mitigating the risks of wildfire
Fuels	Those elements of a forest that can burn, including organic material on the forest floor, logs, dead branches and needles, shrubs and herbs, and the bark, wood, and foliage of live trees.
Fuel management	Coordinated action to reduce wildfire risk by modifying the structure and density of forest fuels.
Fuel management prescription	A document that identifies fuel management strategies to reduce wildfire risk in a defined area, while also ensuring other values are protected.
Fuel treatment	The implementation of a fuel management prescription that may involve the physical modification of fuels by heavy machinery or ground workers.
Interface	A pattern of urban development where contiguous development directly abuts native vegetation.
Intermix	A pattern of urban development where buildings are closely placed within and among trees.

|	
Landscape Unit Plan	A plan prepared by the Province that provides objectives for resource management within a defined area, including policies related to forest biodiversity and wildlife habitat.
Official Community Plan	A local government plan for an electoral area(s) or municipality, mandated by provincial legislation, that shows how land use will be planned and how local government will meet other provincial policy objectives. Official Community Plans may also include additional policies based on local needs and interests.
Suppression	Actions taken in response to fire to control the spread of the fire or reduce it in area or severity.
Surface fuels	Forest fuels found on top of the organic layer of the soil and below the crowns of trees, typically including understory vegetation, dead branches, needles, and logs.
Wildfire	A form of natural landscape disturbance involving the combustion of vegetation.
Wildfire risk	The probability of a wildfire occurring combined with the consequences or impacts it would cause.
Wildfire season	The period of the year during which wildfires generally take place due to weather and fuel conditions. In BC, this is typically April – September.
Wildfire threat	A classification of potential fire behaviour based on fuel conditions, weather conditions, slope, aspect, and other biophysical factors.
Wildland Urban Interface (WUI)	The geographic area where homes and buildings meet continuous areas of natural vegetation.

Appendix B: Public Engagement

Public engagement for the plan consisted of information and feedback solicited via the Regional District of Nanaimo's (RDN) Wildfire Resiliency Initiative Get Involved webpage, as well as two community events hosted online via Zoom on August 26th 2021 and November 8nd 2021. Because of the COVID-19 pandemic, engagement for the plan was strictly online only. Webinar presentations included an open-ended Q & A with attendees. Presentations were recorded and published on the RDN's Get Involved page for the project via YouTube. An interactive web-based "StoryMap" was also prepared and shared via the Get Involved page to introduce community members to the project.

Advertisements for the Get Involved page and the web events were prepared and published by the RDN several times during the life of the project. Web events were also advertised in community newspapers and radio in the Oceanside area.

Engagement with the public revealed several common concerns across the RDN's electoral areas, particularly regarding the implementation of FireSmart landscaping. Several recommendations regarding the development of FireSmart programming for neighbourhoods of higher relative risk, reducing barriers to green waste disposal, and providing more capacity for FireSmart assessment programs reflect this feedback.

The following images are sample presentation slides from the web event of November 8, 2021, which provided an "interim update" to the community on the findings of the local wildfire threat assessment.
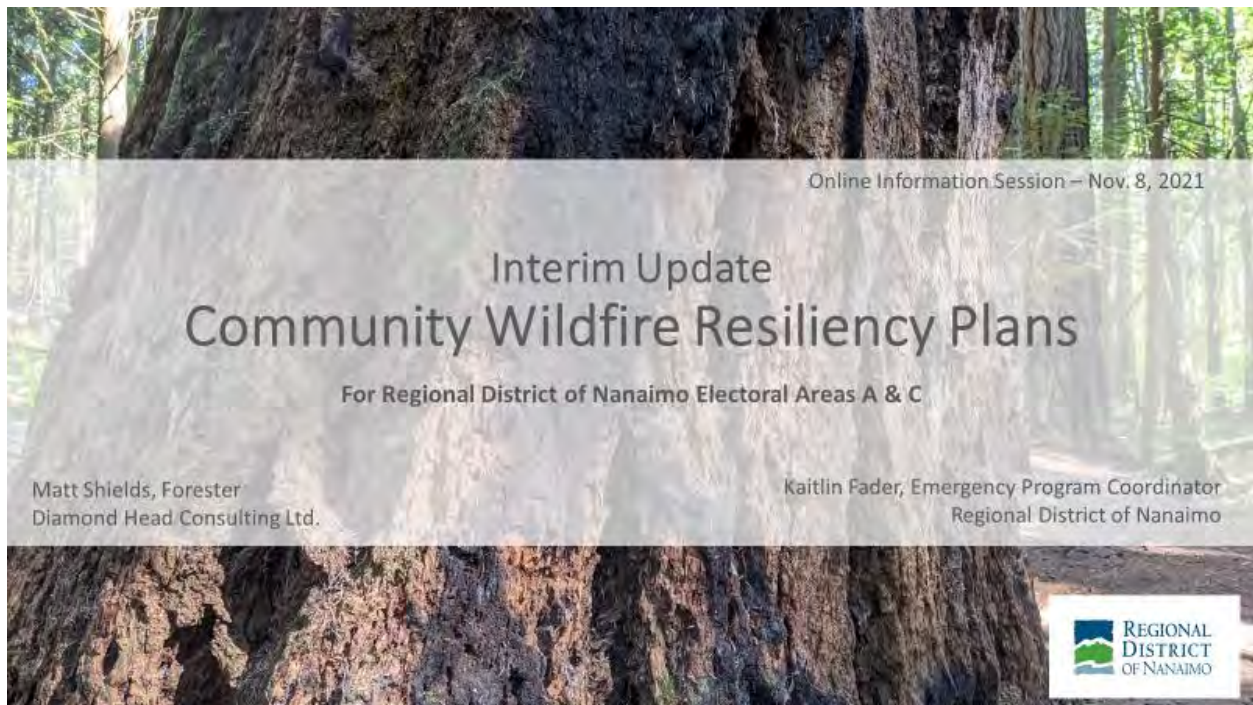
Wildfire Risk in Electoral Area A
Light green/blue = Very low
Light yellow = Low
Yellow = Moderate
Orange = High
Red = Extreme

- Almost all areas of public land in Electoral Area A have moderate wildfire risk.
- The very low areas are either water or extensive non-fuel (tarmac at Nanaimo Airport)
- Very small areas of High wildfire risk are associated with coniferous fuels on steeper slopes.
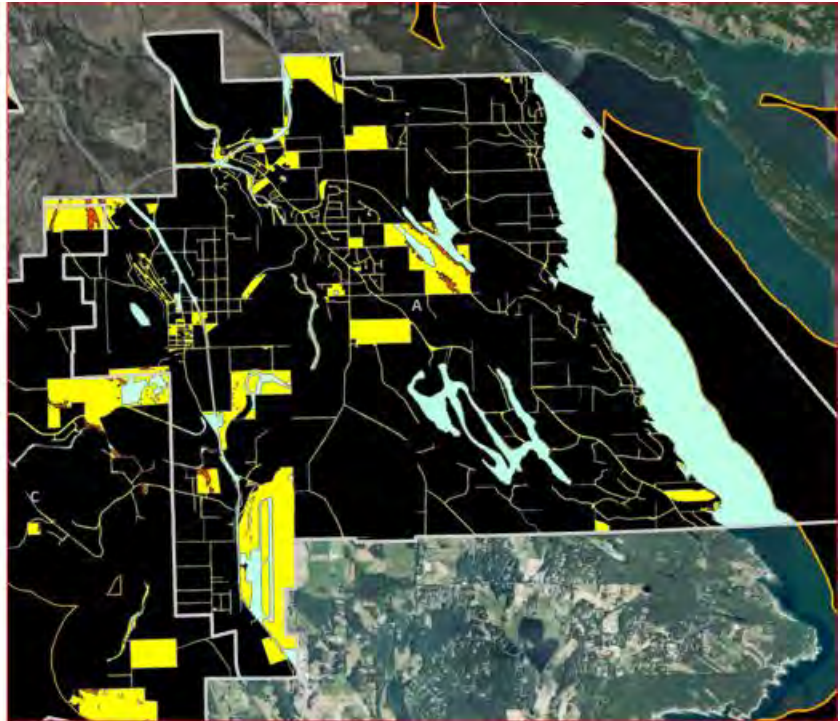
Forest Fuels Glossary
1. Surface fuel
2. Ladder fuel
3. Crown fuel
4. Down woody
5. Fine fuels
6. Understory
7. Overstory
8. Deciduous
9. Coniferous
10. Overstory
11. Fuel type

Overhead view

Side view

Appendix C: Local Wildfire Threat and Risk Process

This section provides a summary of the local wildfire threat and risk assessment, including field reviewed fuel characteristics, local fire spread patterns, topographical considerations, and proximity of fuel to the community. This appendix describes the methodology used to determine wildfire risk. The findings of this analysis have been integrated into the main body of the report in the Wildfire Risk Assessment section.
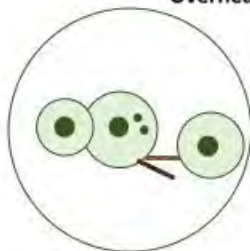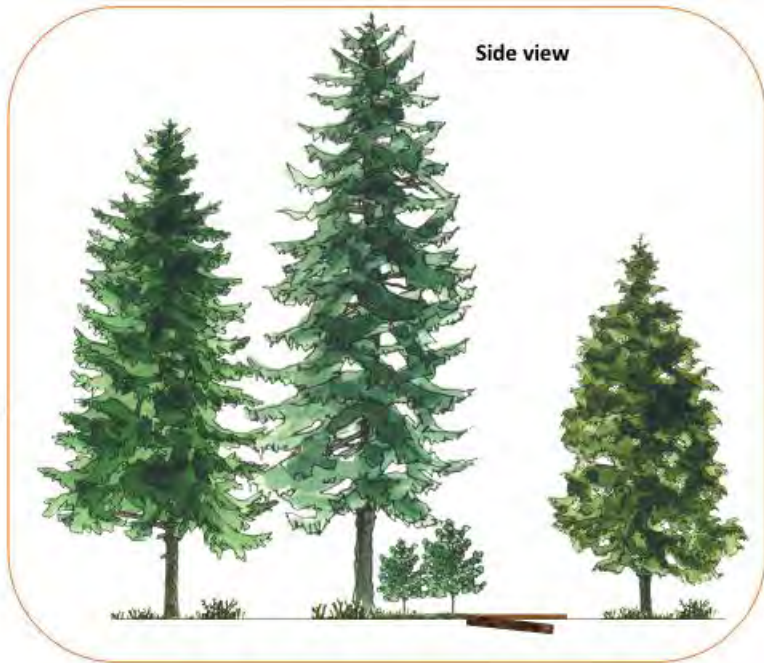
The local wildfire risk assessment process involves:

1. Verification of local fuel types to develop a fuel type map

2. Assessment of fire spread patterns

3. Consideration of topography

4. Stratification of the WUI based on relative wildfire threat

5. Classification of wildfire risk areas

Fuel Type Attribute Assessment

Fuel typing falls into sixteen national benchmark fuel types that are used by the Canadian Fire Behaviour Prediction System[32]. This system divides fuels into five major groups and 16 more specific fuel types. These groups are used to describe fuels according to stand structure, species composition, surface, and ladder fuels, and the organic (duff) layer. The current Canadian Forest Fire Behavior Prediction (FBP) System does not include coastal forests in their fuel type descriptions[33], therefore the fuel type that most closely represents forest stand structure was identified.

Different fuel types are associated with different levels of wildfire threat (wildfire behaviour potential). Therefore, accurate fuel typing is a critical input to the wildfire behaviour and threat assessment mapping. Conifer fuel types typically have the highest wildfire behaviour potential and are the most likely to support continuous crown fire and spotting potential. Different conifer fuel types have different crown fire and spot fire potential.

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[32] Natural Resources Canada. (April 2021) FBP Fuel Type Descriptions. https://cwfis.cfs.nrcan.gc.ca/background/fueltypes/

[33] Perrakis, Daniel D.B., Eade, George. (2018). British Columbia Wildfire Fuel Typing and Fuel Type Layer Description. Victoria, B.C. Candian Forest Service, Pacific Forestry Centre.

C-3 and C-5 - Conifer Fuel Types

There are seven possible conifer-dominated fuel types (Figure 19), only five of which are typically encountered in British Columbia. Two of these fuel types, C-3 and C-5, are commonly found in the AOI. Both characterize second-growth conifer stands. C-3 includes a higher density stand with lower crown heights, while C-5 is lower in density and has higher crown heights.

C2 Dense Conifer
- *Young conifer, <10m height*
- *High density (>2000 stems per ha)*
- *80-100% crown closure*
- *High vertical and horizontal fuel continuity*
- *Crown base height of 2 metres or less*

C3 Mature Conifer
- *Common mature conifer fuel type in BC interior, semi-mature on coast*
- *Moderate density (700-1200 stems per ha)*
- *Crown base height of 4-8 metres*

C4 Semi-Mature Conifer
- *Pole sapling structure*
- *Moderate-high density (700-2000 stems per ha)*
- *Crown base height approximately 4 metres*
- *High amounts of standing dead and downed fuels*

C5 Mature Conifer
- *Common mature conifer fuel type on BC coast, also common in moist, mild interior forests*
- *Lower density (600-900 stems per ha)*
- *Crown base height of 10 metres or more*
- *Low vertical continuity*

C7 Open, Mature Conifer
- *Typically open stands on drier sites in the southern interior*
- *Variable density, generally below 600 stems per ha*
- *Crown base height of 4 metres or less*
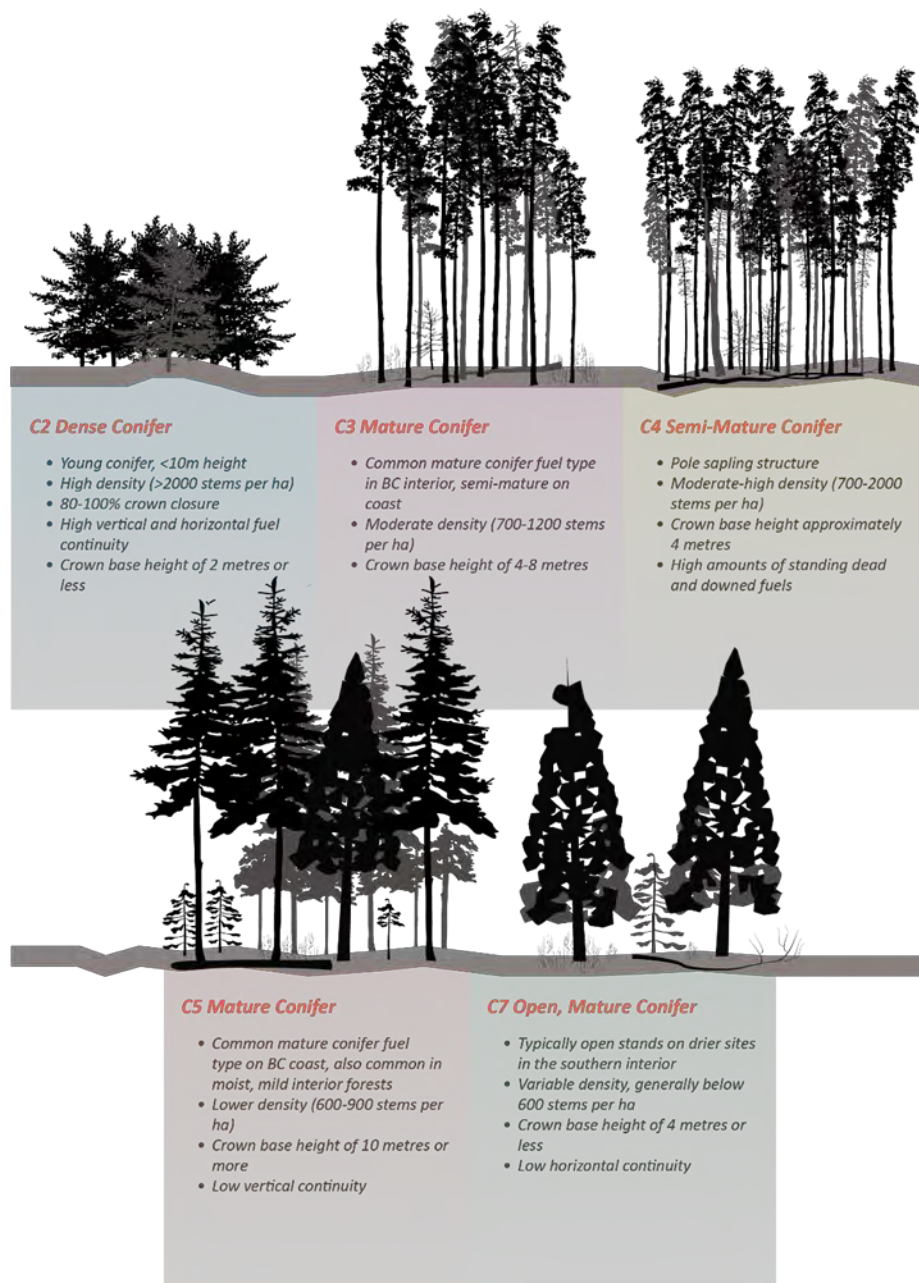- *Low horizontal continuity*

Figure 19. Characteristics of the five most-common conifer fuel types in BC. C-3 and C-5 are prevalent within the AOI.

Photo 18. Example of a stand classified as C-3 fuel type.

Photo 19. Example of a stand classified as C-5 fuel type.

Fuel type M-1/2 – Mixed stands

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

Photo 20. Example of a stand classified as M-2 fuel type

Fuel type D-1/2 - Deciduous

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

Photo 21. Example of a stand classified as D-1/2 fuel type

Fuel type O-1a/b– Grass

This fuel type consists of grass cover with minimal tree cover. This fuel type is applied to unmaintained, native grasses, rather than large maintained lawns or irrigated crops which are much less flammable. Grass fuels are dominated by fine fuels and are very responsive to moisture inputs or deficits. As such, wildfire behaviour varies widely based on recent weather conditions. Under dry and windy conditions, grass fuels can support extreme rates of spread and fire intensity. However, small amounts of moisture can drastically limit wildfire spread or behaviour. Therefore, the wildfire behaviour potential in these areas is dependent on the degree of curing, which is typically quite high during the wildfire season.

Photo 22. O-1a/b fuels in the foreground. Note the contrast with irrigated, maintained grass in the rear.

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

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

1. DHC reviewed the fuel type layer with the latest ortho imagery. Identified obvious errors at this scale. This included areas identified as forest but have recently been cleared. In some areas, the VRI-derived fuel type was classified as grass or slash, but the polygon in the aerial imagery is clearly treed. These were classified using air photo interpretation and referencing the nearest treed polygons.

2. Areas were identified for ground-truthing. This focuses on areas adjacent values and communities as priorities.

3. Fieldwork was conducted to ground-truth the fuels layers. Polygons adjacent to values were visited by the forester and the accuracy of the fuel typing layer was confirmed. Where errors were encountered, the fuel layer was updated and representative photos were taken.

4. Finalize the spatial fuels layer.

Fire Spread Patterns

Initial Spread Index (ISI) is a rating of the expected rate of spread of a fire. ISI is derived from combining wind speed with the Fine Fuel Moisture Index (FFMC), which measures the moisture content of the most easily ignited fuels. High winds, FFMC, and ISI will result in an increased rate of spread and wildfire intensity and are therefore reviewed together. Data for FFMC and ISI is recorded at local BCWS weather stations. In addition, local weather stations record wind speed and direction. This data is then assessed under typical wildfire conditions to determine rates of spread potential, potential wildfire intensity, and spread direction.

Topography

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

Table 21 Slope percentage and fire behaviour implications.

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

Table 22 Slope position of value and fire behaviour implications.

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

Local Wildfire Threat Classification

Integrating fuels, fire spread patterns, and topography provides an assessment of local wildfire threat, or the wildfire behaviour potential under severe wildfire conditions. Severe wildfire conditions are defined as the 90th percentile weather conditions over the last 10 years. These are the times when wildfire is most likely, and suppression conditions are most challenging. This analysis highlights the locations most likely to support high or extreme wildfire behaviour that may be beyond the suppression capability of BCWS or local fire departments.

Proximity of Fuel to the Community

Fuel closest to the community usually represents the highest hazard. To capture the importance of fuel proximity, the wildland-urban interface (WUI) is weighted more heavily from the value or structure outwards. Fuels adjacent to the values and/or structures at risk receive the highest rating followed by progressively lower ratings moving out.

The local wildfire threat assessment process subdivides the WUI into 3 areas (Table 23):

1. Areas within 100 meters of the WUI (WUI 100)

2. Areas from 101 to 500 meters from the WUI (the WUI 500)

3. Areas 501 to 2000 meters from the WUI (the WUI 2000).

Table 23 Proximity to the Interface

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

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

WUI threat classes of High or Extreme are depicted in Figure 14. These are identified through a combination of both wildfire behaviour and proximity to communities or values. High WUI Threat Class areas are those with High or Extreme wildfire behaviour and are within 500 m of a value or community. Extreme WUI Threat Class areas are those with High or Extreme wildfire behaviour and are directly adjacent to a value or community.

Local Wildfire Risk Classification

The 2012 wildfire risk methodology was used to determine wildfire risk. This method intersects the updated wildfire threat with the proximity to values to determine the WUI threat class, which represents wildfire risk. This highlights areas of high or extreme wildfire threat and classifies their risk based on stratified distances. Areas of very low, low, or moderate wildfire threat are dropped from this analysis, as these areas have a high likelihood of successful suppression by the BCWS and/or local fire department. Areas of high wildfire risk are within 500 m of a value and pose a high or extreme wildfire threat. Areas of extreme risk are directly adjacent to a value and pose a high or extreme wildfire threat. Area summaries and maps are provided in the Wildfire Risk Assessment section of this document.

Appendix D: CRI Map Submissions
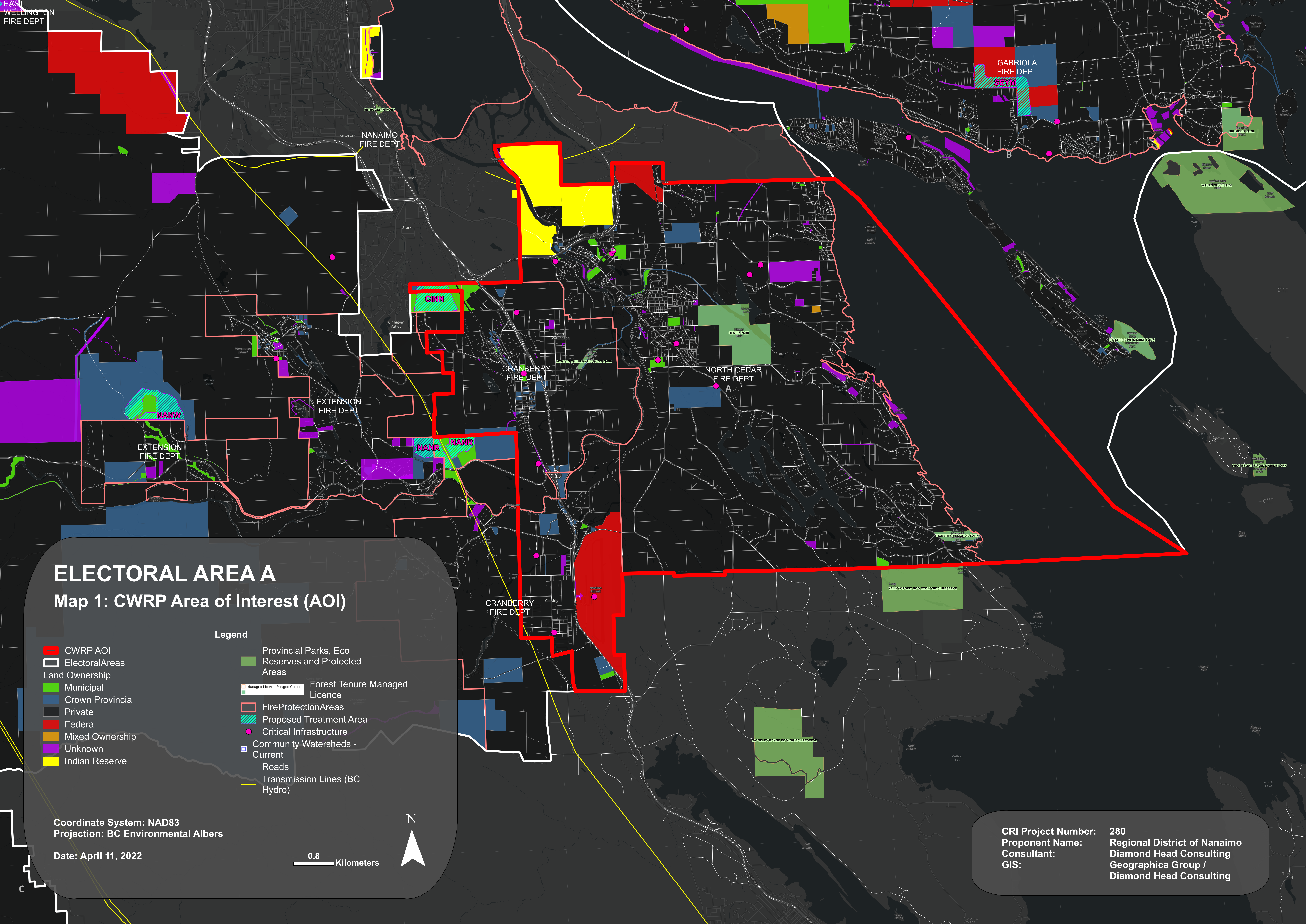
ELECTORAL AREA A

Map 1: CWRP Area of Interest (AOI)

Legend

CWRP AOI
ElectoralAreas
Land Ownership
- Municipal
- Crown Provincial
- Private
- Federal
- Mixed Ownership
- Unknown
- Indian Reserve

Provincial Parks, Eco Reserves and Protected Areas

Managed Licence Polygon Outlines — Forest Tenure Managed Licence

FireProtectionAreas
Proposed Treatment Area
Critical Infrastructure
Community Watersheds - Current
Roads
Transmission Lines (BC Hydro)

Coordinate System: NAD83
Projection: BC Environmental Albers

Date: April 11, 2022

0.8 Kilometers

N

CRI Project Number: 280
Proponent Name: Regional District of Nanaimo
Consultant: Diamond Head Consulting
GIS: Geographica Group / Diamond Head Consulting

EAST WELLINGTON FIRE DEPT
NANAIMO FIRE DEPT
GABRIOLA FIRE DEPT
CRANBERRY FIRE DEPT
NORTH CEDAR FIRE DEPT
EXTENSION FIRE DEPT
CRANBERRY FIRE DEPT

CNN
NANN
NANR
NANR
SETN

Stockett
Chase River
Starks
Cinnabar Valley
South Wellington
Whisky Lake
Extension
Cassidy
Ladysmith

PETROGLYPH PARK
MORDEN COLLIERY HISTORIC PARK
HEMER PARK
ROBERTS MEMORIAL PARK
YELLOW POINT BOG ECOLOGICAL RESERVE
WOODLEY RANGE ECOLOGICAL RESERVE
WAKES COVE PARK
DRUMBEG PARK
PIRATES COVE MARINE PARK
WHALEBOAT ISLAND MARINE PARK

A
B
C

ELECTORAL AREA A

Map 2: Local Fire Risk

Legend

Local Wildfire Threat Rating

— Transmission_Lines

— Roads

▭ ElectoralAreas

▭ FCFS WUI 1-km buffer

▬ CWRP AOI

Local Wildfire Risk Rating

▨ Extreme

▦ High

- 🟦 Very Low
- 🟩 Low
- 🟨 Moderate
- 🟧 High
- 🟥 Extreme
- ⬛ NO DATA

Coordinate System: NAD83
Projection: BC Environmental Albers

Date: April 11, 2022

0.65 ___ Kilometers

N

Wildfire Threat Rating	Area (ha)	Wildfire Risk Rating	Area (ha)
Extreme	0	Extreme	11.3
High	31	High	18.8
Moderate	862.3		
Low	10.4		
Very Low	1070.5		
No Data	5198.6	No Data	5198.6

ELECTORAL AREA A

Map 3: Proposed Fuel Treatment Units

Legend

CWRP AOI
Wildland Urban Interface
Electoral Areas
Proposed Treatment Area

Land Ownership
Municipal
Crown Provincial
Private
Federal
Mixed Ownership
Unknown
Indian Reserve
Provincial Parks, Eco Reserves and Protected Areas
Managed Licence Polygon Outlines — Forest Tenure Managed Licence
Transmission_Lines
Roads
PRPTRTtable

Coordinate System: NAD83
Projection: BC Environmental Albers

Date: April 11, 2022

0.55 Kilometers

N

PROPOSED_TREATMENT_ID	AREAHA
CINN	36.6

CRI Project Number: 280
Proponent Name: Regional District of Nanaimo
Consultant: Diamond Head Consulting
GIS: Geographica Group / Diamond Head Consulting