

District of North Saanich Community Wildfire Protection Plan 2021



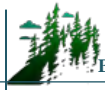
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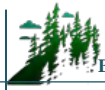
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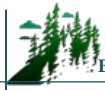
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*Cover photo: Stefana Dranga



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EXECUTIVE SUMMARY/ SUMMARY OF CWPP RECOMMENDATIONS

The Community Wildfire Protection Plan (CWPP) process was created in British Columbia (BC) as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Strategic Wildfire Prevention Initiative (SWPI), managed and funded through the Strategic Wildfire Prevention Working Group, CWPPs aim to develop strategic recommendations to assist in improving safety and to reduce the risk of damage to property from wildfires.

This CWPP will provide the District of North Saanich (DNS) with a framework that can be used to review and assess areas of identified high fire risk within the DNS. Additionally, the information contained in this report should help to guide the improvement and/or development of emergency plans, emergency response, evacuation plans, communication and education programs (including FireSmart), bylaw development in areas of fire risk, and the management of potentially hazardous forest lands adjacent to the community.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. A total of 39 strategic recommendations are organized by priority in a tabularized format within this Executive Summary. In addition, these recommendations are more thoroughly discussed in their appropriate sections within the document and are found in written format. Because the majority of the area of interest includes private land, the DNS's role may be limited to the role of an influencer in some instances, while other recommendations can be directly implemented by the DNS. The recommendations are displayed in totality in Table 1. Ultimately, the recommendations within this strategy should be considered a toolbox of options to help reduce the wildfire threat to the community. There is not one combination or course of action which is the answer; the DNS will have to further prioritize based on resources, strengths, constraints, and availability of funding and regularly update the prioritization and course of action as variables change through time.

**Table 1. Summary of CWPP recommendations by priority**

Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
Objective: Review and amend the current regulatory framework to incorporate wildfire mitigation and preparedness considerations.				
2	11	High	As part of the OCP review, update Schedule I (Wildfire Hazard Areas) and update the wildfire threat rating map within the District of North Saanich in alignment with findings from this CWPP update.	~20-40 in-house or consultant hours (local government funding or CRI Program Funding).
4	12	High	Review Unsightly Premises Bylaw No. 1400, 2015 and consider including wording that specifically prohibits the accumulation of combustible materials on the property (including on and under exterior projections, such as decks and patios, near the home, and in gutters and roofs). The revised bylaw should provide the District the authority to require removal/clean-up of combustible materials or to complete removal and recoup costs from the owner.	~30 in-house hours (local government funding). May be eligible for UBCM CRI Program Funding
6	13	High	Work with the Capital Regional District (CRD) to incorporate wildfire risk considerations (i.e., placement, type, width, and objective of trails) during future updates to the Regional Trails Management Plan. Consideration should also be given to trail building and maintenance as these activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (though proper placement, clean-up of combustible fuels trailside and work practices which adhere to <i>Wildfire Act</i> and Regulations).	~30-60 in-house hours (local government funding). May be eligible for UBCM CRI Program Funding
7	17	High	The use of fire-resistant construction materials, building design and landscaping should be considered for all critical infrastructure (CI) when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart guidelines. Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which cuts power for days, or even weeks.	Negligible in-house cost
9	44	High	Proceed with detailed assessment, prescription development and treatment of hazardous fuel units and FireSmart fuel treatment demonstration treatment areas identified and prioritized in this CWPP.	UBCM CRI Program Funding/Local Government Funding
12	57	High	Ensure that wildfire hazard development permit applications are referred to the fire department for opportunity for input prior to approval.	Dependent on the number of DP applications



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
13	58	High	Consider developing a landscaping standard which lists flammable non-compliant vegetation and landscaping materials, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Consider including the landscaping standard as a development permit requirement within the applicable area, as well as making it publicly available for residents and homeowners outside of the DPA (can be provided at issue of building permit and made available at the District Office or other strategic locations).	\$2,000 - \$3,000 to outsource. Alternatively, general FireSmart landscaping information is available free of charge, but is not climate/ plant hardiness zone specific
14	59	High	Develop and implement a community chipper program with the help of neighbourhood representatives. As a demonstration, this program can begin as a bi-annual initiative in two separate neighbourhoods.	Time dependent upon program. Eligible for UBCM CRI Program Funding. Additional time for advertisement of program availability will be required.
16	61	High	The DNS should apply for funding from the UBCM CRI Program to develop a local FireSmart rebate program. This will allow homeowners to access partial rebates for FireSmart activities on their properties, if rated as moderate or high risk in a FireSmart home and property assessment. The rebate program must adhere to the goals of FireSmart, as outlined in Section 5.2.1.	20-35 DNS staff hours
17	63	High	This report and associated maps should be made publicly available through webpage, social media, and public FireSmart meetings.	3-6 hours depending on method of distribution
26	64	High	Develop and work with staff from the DNS, Tseycum First Nation and Pauquachin Nation, as well as all key stakeholders (BC Parks, BCWS, agricultural groups/representatives, and neighborhood associations) to formalize an Interface Steering Committee. The purpose of the steering committee would be to identify wildfire related issues in the area and to develop collaborative solutions to minimize wildfire risks. The following subject areas are recommended for the group to explore: 1) Public education and awareness needs; 2) Multi-disciplinary, multi-jurisdictional fuel treatment projects/hazard abatement projects; 3) Development of a funding strategy; and 4) Reduction of human-caused fires, fire prevention and right of way management.	~ 40 hours to initiate group; an additional ~50 hours/year to plan, advertise/ communicate, attend, and debrief meetings; additional hours required depending on implementable actions and potential sub-committees developed



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
30	66	High	Complete the development of formal fire services agreements with the Tseycum and Pauquachin First Nations. Use the negotiation of these agreement as an opportunity to develop relationships with Tseycum and Pauquachin governments, and consider collaborating to extend FireSmart and wildfire risk reduction initiatives to these communities.	Ongoing in-house hours
31	68	High	All new development should have a water system which meets or exceeds minimum standards of NFPA 1142, <i>Standard on Water Supplies for Suburban and Rural Fire Fighting</i> . NSFD should review the water supply to ensure it provides sufficient placement, flow, and reliability for suppression needs and that secondary power is available in the event of power outages.	~5-10 hours per development
32	68	High	Complete and participate in regular testing of, and updates to, the evacuation plan.	~30-40 hours to plan and stage; 8 hours to complete testing
36	70	High	Ensure that NSFD maintains the capability to effectively suppress wildland fires, through wildfire-specific training sessions. Maintain a high level of member education and training specific to interface and wildland fires by including S-100 and S-185 (combined) or SPP-WFF1, at a minimum. Consider expanding the training program to maintain a high level of member education and training specific to interface and wildland fires. SPP-115 provides training to structural firefighters on the use of wildfire pumps and hose (and fire service hose and hydrants) in the application of structural protection units (SPUs). The NSFD should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources allow.	Current NSFD training budget and UBCM CRI Program Funding
38	71	High	Consider promoting or expanding programs which serve to remove barriers to action for homeowners by providing methods for them to cheaply and easily dispose of wood waste removed from their property. Programs may include scheduled community chipping opportunities, or yard waste dumpsters available by month in neighbourhoods. Programs should be available during times of greatest resident activity (likely spring and fall).	Time dependent upon program. UBCM/CRI Program funding. Additional time for advertisement of program availability will be required.



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
1	11	Moderate	As part of the OCP Review, consider parks acquisition and maintenance through a wildfire risk lens, including consideration for long-term maintenance costs and access. Consider amendments where needed, including the following: 1) require the use of a QP in review, assessment, and siting of parks and park access prior to acceptance; and 2) ensure that bylaws provide the DNS authority to request modification (either fuels, access, or siting) based upon QP recommendation and prior to acceptance to ensure that the park is received in, and able to be maintained in, an acceptable range of risk. (See Section 6.1.3 for related recommendations specific to access).	~30-45 in-house hours (local government funding). May be eligible for UBCM CRI Program Funding ¹
3	11	Moderate	As part of the Tree Protection Bylaw review consider: 1) inclusion of language which allows the issuance of a permit for cutting of trees if it is required to reduce wildfire hazard within the wildland urban interface, as determined by a qualified professional (QP); 2) the bylaw does not limit the ability of homeowners to address wildfire hazards associated with trees on private property immediately adjacent to homes; and 3) amend language regarding Safety Measures for Development Permit Area 3- Wildfire Hazard Development, to ensure bylaw references appropriate Development Permit Area.	~30-45 in-house hours (local government funding). May be eligible for UBCM CRI Program Funding
5	12	Moderate	The Planning and Community Services department (i.e., building inspectors) should continue to ensure that house numbering is posted prior to occupancy of new development, in accordance with the existing Building and Fire Prevention bylaws, and to provide instructions on how and where best to affix numbering to facilitate emergency response and evacuation efforts. Consider encouraging home owner participation via a DNS-wide engagement campaign and providing incentives such as the opportunity to acquire/purchase discounted address signs.	4-6 DNS staff hours (Planning and Community Services Department, and Communications staff) required for internal work. Additional 16 hours for material development and distribution for incentive/engagement campaign)
8	17	Moderate	Complete formal FireSmart assessments (by a Qualified Professional) for CI such as the fire halls, emergency operations centre, water infrastructure, and others as identified in this CWPP (Table 3) and by the DNS.	~\$1,500-2,000 per location (consultant cost)

¹ Note that the UBCM SWPI funding stream has transitioned into a new Community Resiliency Investment (CRI) Program. Refer to the Union of BC Municipality's website (<https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html>) for further information.



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
10	50	Moderate	As treatments are implemented, treatment monitoring should be completed by a qualified professional to schedule next set of maintenance activities (5 – 10 years out). This can be completed as part of a CWPP update or as a stand-alone exercise.	UBCM CRI Program Funding/Local Government Funding
11	57	Moderate	As part of the Official Community Plan (OCP) review, consider including wildfire as a natural hazard development permit area (DPA). A recommended development permit area for the DNS would include all areas that are located within 200 m of moderate or high wildfire behaviour threat class areas. This is a suggested distance which should be validated and defined through a more comprehensive GIS analysis of hazardous fuels and their proximity to the interface. Review similar wildfire hazard DPAs established in other jurisdictions and consider their use as models for various aspects of the DPA process.	40-80 in-house hours and \$5,000 for consultant analysis and support (Local Government Funding/ CRI Funding)
15	60	Moderate	DNS should continue to train local fire services staff members as Local FireSmart Representatives to assist the various neighbourhoods in the DNS in complying with FireSmart principles at the neighbourhood and individual home-level.	~25 in-house hours (Consultant and/or Fire Department, DNS Emergency Management staff)
18	63	Moderate	Complete or schedule periodic updates of the CWPP to gauge progress and update the threat assessment (hazard mapping) for changes in fuels, forest health, land planning, stand structure or changes to infrastructure in the interface. The frequency of updates is highly dependent upon major changes which would impact the DNS's wildfire threat assessment or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding program changes that may lead to new opportunities) and the potential need for a CWPP update should be initiated every 5 - 7 years.	UBCM/CRI Program funding/Local Government funding
20	63	Moderate	Promote FireSmart approaches for wildfire risk reduction to DNS residents through Town Hall meetings, workshops and/or presentations. Continue working with neighborhood associations, especially in interface and intermix locations throughout the DNS, to deliver information to residents. Aim to conduct the engagement/promotion campaign prior and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns.	~60+ hours. May be eligible for UBCM/CRI Program grant



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
21	63	Moderate	Promote improved planning and preparedness of agriculture producers in the DNS and encourage FireSmart practices on private farm land through distribution or sharing of wildfire action planning resources prepared specifically for the agriculture sector by the BC Agriculture & Food Climate Action Initiative (i.e., on DNS website, mailouts). Resources include a Wildfire Preparedness and Mitigation Plan - Guide and Workbook. ²	~30-40 hours
23	64	Moderate	Facilitate the FSCCRP uptake within the DNS and enhance its applications by including the following: 1) inviting BCWS crews to participate in and support the annual FireSmart events set up by participating neighbourhoods. 2) Encourage individual homeowner participants to complete the self-administered FireSmart home assessment tool. 3) Include within the FireSmart Canada Community Assessment Report the standard recommendation that participating neighbourhoods hold a home hazard assessment workshop as one of their FireSmart events.	\$5,000/neighbourhood and an additional 40 hours/initiative UBCM/CRI Program grant(s) available
29	65	Moderate	Work with industrial operators (i.e., BC Hydro) to ensure that right-of-ways do not contain fine fuel accumulations (easily cured) or high conifer regeneration prior to and during the fire season and are maintained in a low hazard state (to serve as fuel breaks).	4-6 hours
33	69	Moderate	Include a qualified professional with experience in operational wildland/interface fire suppression in the planning and strategic siting of future trails and parks.	10-20 hours to review current trails/map, provide recommendations
34	69	Moderate	The NSFD should work with BCWS to maintain an annual structural and interface training program. As part of the training, it is recommended to conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well-versed in their set-up and use. It is recommended the NSFD engage in yearly practical wildland fire training with BCWS that covers at a minimum: pump, hose, hydrant, air tanker awareness, and employment of SPUs. Interface training should include completion of a joint wildfire simulation exercise and safety training specific to wildland fire and risks inherent with natural areas. Consider coordinating with fire departments from other municipalities throughout the Capital Regional District to complete annual cross-training events together.	Cost and time dependent upon training exercise (scope, number of participating members etc.)

² <https://www.bcagclimateaction.ca/library/wildfire-preparedness/>



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
35	70	Moderate	NSFD should engage in regular communication with the BCWS South Island Fire Zone/Cobble Hill Fire Base to foster a strong relationship and identify potential cooperative wildfire risk reduction opportunities.	~4 hours/year
39	71	Moderate	Complete a vulnerability assessment of all critical infrastructure, secondary power sources, and fuel availability. Seek contributions and information from Tseycum First Nation and Pauquachin First Nation about critical infrastructure for which ignition potential is high, or for which FireSmart best practices might be strengthened. Review current capability of secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.	~ 20 hours to complete vulnerability assessment and upgrading dependent on project(s) chosen
19	63	Low	Develop a social media strategy and ensure that its full power is leveraged to communicate fire bans, high or extreme Fire Danger days, wildfire prevention initiatives and programs, easily implementable FireSmart activities, updates on current fires and associated air quality, road closures, and other real-time information in an accurate and timely manner.	~40 hours to create strategy. ~20 hours to identify partners, initiate relationship and gain strategy support. Additional daily/weekly hours to implement and update depending on strategy
22	63	Low	Work towards FireSmart community recognition, at the neighbourhood level and facilitate uptake into the FireSmart Canada Community Recognition Program (FSCCRP). This will help reduce fire risk and aid in further funding applications.	FireSmart grant (when funding is available)
24	64	Low	Continue engaging with DNS residents, and further promote the use of the FireSmart Home Partners Program offered by the Partners in Protection Association, which facilitates voluntary FireSmart assessments on private property. Use the opportunity to educate the home or business owner about the hazards which exist on their property and provide easy improvements to reduce their risk.	~1.5 hours/assessment



Item	Page No.	Priority	Recommendation / Next Steps	Estimated Cost (\$) or Person hours
25	64	Low	Encourage schools to adopt and deploy existing school education programs (e.g., FireSmart BC Education Package) to engage youth in wildfire management and risk reduction. There is emergency preparedness curriculum available provincially, which includes preparedness for a variety of natural hazards, including wildfire (Master of Disaster). Other options/value-added activities include consulting with Association of BC Forest Professionals (ABCFP) and BC Wildfire Service (BCWS) (South Island Fire Zone), as well as local fire department and FireSmart representatives to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in elementary and/or secondary schools (field trips, guest speakers, etc.).	~30-40 hours
27	64	Low	Promote and provide information to private landowners related to residential sprinklers as a FireSmart prevention measure.	10-20 hours to prepare materials and disseminate information to landowners
28	65	Low	Work with industrial operators such as BC Hydro to ensure that high risk activities, such as grubbing/brushing and right-of-way mowing work do not occur during high fire danger times to reduce chance of ignitions as per the <i>Wildfire Act</i> .	4-6 hours
37	71	Low	Work with local distributors (i.e., hardware stores, garden centers, and aggregate providers) and homeowners within the District to improve education of homeowners and remove some barriers to FireSmart action. For additional detail see Section 6.2.	~60 hours



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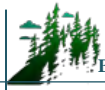


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COMMONLY USED ACRONYMS

BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CDC	Conservation Data Centre
CFFDRS	Canadian Forest Fire Danger Rating System
CRD	Capital Regional District
CRI	Community Resiliency Investment Program
CWPP	Community Wildfire Protection Plan
DP	Development Permit
DPA	Development Permit Area
DNS	District of North Saanich
DCS	District of Central Saanich
FBP	Fire Behaviour Prediction System
FD	Fire Department
FMP	Fire Management Plan
FRS	Fire Rescue Services
FSCCRP	FireSmart Canada Community Recognition Program
HIZ	Home Ignition Zone
LRMP	Land and Resource Management Plan
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
MOTI	Ministry of Transportation and Infrastructure
NFPA	National Fire Protection Agency
NSFD	North Saanich Fire Department
OFC	Office of the Fire Commissioner
PSTA	Provincial Strategic Threat Analysis
PTU	Proposed Treatment Unit
SWPI	Strategic Wildfire Prevention Initiative
TSA	Timber Supply Area
UBCM	Union of British Columbian Municipalities
WUI	Wildland Urban Interface

SECTION 1: INTRODUCTION

The District of North Saanich (District or DNS) staff have recognized wildfire mitigation and planning to be a foundational component of emergency planning and preparedness. In 2019, B.A. Blackwell and Associates Ltd. was retained to assist the District of North Saanich (DNS) in developing a Community Wildfire Protection Plan (CWPP). This CWPP document focuses on integrating the updated Provincial Strategic Threat Analysis (PSTA), updated BC Wildfire Service (BCWS) Fuel Type mapping, and the updated and improved wildfire threat analysis methodology. Furthermore, DNS staff have recognized that wildfire mitigation and planning is an important component of emergency planning and preparedness for the community.

Although forest fires are both inevitable and essential to the health of forested ecosystems, the 2003, 2004, 2009, 2010, 2015, 2017 and 2018 wildfire seasons resulted in significant economic, social and environmental losses in British Columbia (BC). The 2018 fire season was the most extensive in terms of area burned, surpassing the 2017 fire season. The total suppression costs for the 2018 season are estimated at \$615 million and the 2017 fire costs were estimated at over \$568 million³. Recent wildfire disasters like those experienced in Slave Lake, Alberta (2011), Washington State (2014 and 2015), Fort McMurray, Alberta (2016) and BC and California (2017, 2018) all display the vulnerability of communities and the potential toll of wildfires on families, neighbourhoods and the economy of entire regions. These events, along with critical lessons learned and important advances in knowledge and loss prevention programs have spurred the need for greater consideration and due diligence with respect to fire risk in the wildland urban interface⁴ (WUI).

1.1 PURPOSE

The purpose of this CWPP is to identify and update the wildfire risks within and surrounding the DNS, to describe the potential consequences if a wildfire were to impact the community, and to examine options and strategies to reduce the wildfire risks. Each community has a unique risk profile. This CWPP provides an assessment of the level of risk with respect to changes in the area that have occurred recently and gives the DNS a current and accurate understanding of the threats to human life, property and critical infrastructure faced by their communities from wildfires. The goal of this CWPP, in addition to defining the threats, is to identify measures necessary to mitigate these threats, and outline a plan of action for implementing these measures. Specifically, this CWPP is intended to serve as a framework to inform the implementation of specific actions and strategies that will serve to:

- 1) reduce the likelihood of wildfire entering the community,
- 2) reduce the impacts and losses to property and critical infrastructure if wildfire were to enter, and

³ BC Wildfire Service. Wildfire Season Summary. Available online at: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary>

⁴ Wildland/urban interface is defined as the presence of structures in locations in which conditions result in the potential for their ignition from flames and firebrands/embers of a wildland fire (National Fire Protection Association). See Appendix E for a more detailed discussion.

3) reduce the negative economic and social impacts of wildfire to the community.

1.2 CWPP PLANNING PROCESS

This CWPP is a review and synthesis of the background information and current data related to the Area of Interest (AOI) which represents a two-kilometer spotting buffer around values at risk (structures) within the DNS. The CWPP process consists of four general phases:

- 1) **Consultation involving key local government representatives, structural and wildfire specialists, and stakeholders.** Information sharing with First Nations at various stages of the Plan development and ensuring linkages with relevant existing land use plans, legislation, and policy currently in place.
- 2) **Identification of values at risk and assessment of the local wildfire threat.** Wildfire threat assessment takes into consideration Natural Fire Regime and Ecology, Provincial Strategic Threat Analysis (2019), and field work, fuel type verification, completion of WUI Threat Forms and GIS wildfire threat analyses.
- 3) **Development of a risk mitigation strategy.** A guide for the DNS to implement mitigation and risk reduction activities. The risk mitigation strategy accounts for prioritization of fuel treatments, FireSmart Activities, and wildfire response recommendations that will reduce wildfire risk locally.
- 4) **Building a community engagement and education strategy.** This phase includes presentation of the CWPP to the Board or Council, the formation of a Wildfire Working Group as well as comprehensive outside consultation with First Nations, government and non-governmental agencies (See Section 1.2.1 for specifics).

1.2.1 Consultation

Broad engagement with local government, Provincial government landowner representatives, stakeholders and First Nations played a key role in developing this CWPP.

The first step in the consultation process was to assemble the key players in the 'Wildfire Working Group'. This group was composed of key internal DNS staff, which included: Emergency Services Director/Fire Chief, Planning & Community Services Director, Financial Services Director and Infrastructure Services Director. At the initial meeting of the Wildfire Working Group, the objectives were to obtain information on wildfire risk mitigation initiatives currently in place or completed, existing plans and policies, current resources, identify areas of concern, identify DNS vulnerabilities, and to determine priorities and potential mitigation strategies. Members of the Working Group were consulted on an ongoing basis throughout plan development and were integral in providing Plan review and approval. The Wildfire Working Group was integral in the review of the draft of this CWPP and provided ongoing support throughout the CWPP process.

BCWS representatives from the Coastal Fire Centre (Wildfire Prevention Officer and Wildfire Technician) were consulted as follows: 1) at the onset of the project planning phase and 2) throughout the CWPP development process, both via the submission of Fuel Type Change Rationales and questionnaire

regarding concerns and priorities of BCWS with respect to wildfire and emergency planning in the DNS; and 3) revision of draft document upon plan completion.

Information sharing took place with thirteen First Nations and Tribes as identified through the Consultative Areas Database and in consultation with MFLNRORD and the DNS, regarding the CWPP and locations or potential for possible cultural values at risk requiring protection consideration. Information sharing consisted of an initial phone call, and subsequent distribution of a referral letter and information package (maps, explanation of CWPP, and CWPP draft).

Additional stakeholders were consulted to identify synergies, opportunities for collaboration, and ensure linkages with adjacent and overlapping planning. These stakeholders included the Capital Regional District, BCWS Coast Fire Centre - Wildfire Officer, and the BC Parks Cowichan Area Supervisor. Combined, these various consultation and engagement opportunities have generated a shared understanding of the CWPP objectives and expected outcomes among local government, stakeholders, residents, and land managers.

1.2.2 Identification of Values at Risk and Local Wildfire Threat Assessment

The risks associated with wildfire must be clearly identified and understood before a CWPP can define strategies or actions to mitigate risks. The identified values at risk are described in Section 3 and concepts of wildfire threat and risk are elaborated on in Section 4. The wildfire threat in the DNS was assessed through a combination of the following approaches:

- Fire Regime, Fire Weather and Climate Change (Section 4.1);
- Provincial Strategic Threat Analysis (Section 4.2); and
- Local Wildfire Threat Analysis (Section 4.3).

1.2.3 Development of a Risk Management Strategy

An effective risk management strategy was developed considering a full range of activities relating to the following:

- Fuel management;
- FireSmart planning and activities;
- Community communication and education;
- Other prevention measures;
- Structure protection and planning (i.e., FireSmart activities);
- Emergency response and preparedness;
- Evacuation and access; and
- Planning and development.

1.2.4 Building Community Engagement and Education Strategy

Engaging the community from local government staff and officials, to key stakeholders and residents in wildfire protection planning activities is key to ensuring successful implementation. A community engagement and education strategy is described in Section 5.3.

A presentation to DNS Council will ensure high level approval and support for this CWPP.

SECTION 2: LOCAL AREA DESCRIPTION

This section defines the Area of Interest (AOI) and describes the District of North Saanich AOI. It also summarizes the current community engagement in wildfire prevention and mitigation and identifies linkages to other plans and policies with relevance to wildfire planning.

2.1 AREA OF INTEREST

The District of North Saanich is located in southern Vancouver Island, at the north end of the Saanich peninsula approximately 25 kilometers (km) north of Victoria. The AOI for the CWPP is illustrated below in Map 1. The AOI encompasses the municipal boundary of the District of North Saanich as well as the Pauquachin and Tseycum First Nations Indian Reserves (IRs Cole Bay 3 and Union Bay 4, respectively). The AOI is comprised of multiple neighbourhoods, including Ardmere, Deep Cove, Curteis Point, Cloake Hill/Green Park, Dean Park and the South East Quadrant. The AOI overlaps with two First Nations communities: Tseycum First Nation and Pauquachin First Nation.

The total land area of the DNS is roughly 37 km², and the population, as of 2016, is 11,249.⁵ A breakdown of land ownership within the AOI is provided in Table 2.

Table 2. Summary of AOI by land ownership.

Land Ownership	Hectares
Crown Agency	25
Crown Provincial	1,464
Federal	809
Mixed Ownership	3
Municipal	137
Private	2,445
Unknown	109
TOTAL	4,992

⁵ Statistics Canada. 2016 Census. Retrieved online from: <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=5917005&Geo2=POPC&Code2=0984&Data=Count&SearchText=Victoria&SearchType=Begin&SearchPR=01&B1=All>



Map 1. Area of Interest (AOI).

2.2 COMMUNITY DESCRIPTION

The South Island region has been inhabited by the Coast Salish peoples since time immemorial. The Tsartlip (WJOLELP), Tsawout (SʔÁUTW), Pauquachin (BOKÉĆEN), Tseycum (WSIKEM) and Malahat (MÁLEXEŁ), are the five First Nations which together constitute the Saanich (WSÁNEĆ) Nation.⁶ These First Nations have occupied the region for tens of thousands of years and some continue to live within the AOI today. The Tseycum First Nation main community is located within the AOI on Union Bay IR 4 and the Pauquachin First Nation main community is located within the AOI on Cole Bay IR 3.

The North Saanich AOI represents the northernmost developed portion of the Saanich peninsula and encompasses North Saanich and Swartz Bay. The District of North Saanich (DNS) in its entirety has a population of more than 11,000 residents and covers approximately 37 square km.⁵ Services to residents of the DNS are provided at the municipal level. The municipal government provides administrative and legislative services, mapping, bylaw services, emergency services, and water, sewer and drainage services. As a member of the Capital Regional District, the regional government supplies water and waste and recycling services.

The DNC is relatively uniform in topography, with low lying agriculturally productive lands, rolling hills and rocky shorelines. Due to this homogeneous topography, the elevation varies minimally within the AOI, from sea level to about 200 m. Mount Newton is the highest elevation point within the AOI, with an elevation of 306 m. The AOI also includes many streams and waterways, flatlands and beaches.

The DNS economy was historically driven by agriculture, fishing and the presence of a large number of military forces.⁷ Although these industries remain important to the communities within the AOI, the economic focus has shifted in recent decades to tourism, residential development, and agriculture; specifically, food production and vineyards.

Fire protection within the AOI is the responsibility of the North Saanich Fire Department which is serviced by two fire halls including three career fire fighters and 35 volunteer fire fighters. The Fire Service Area for the North Saanich Fire Department encompasses the entirety of the AOI. BCWS is responsible for responding to wildfire incidents that exceed the response capacity of North Saanich Fire Department.

In the event of a wildfire, the DNS has limited emergency egress routes. West Saanich Road (Highway 17A) and Patricia Bay Highway (Highway 17), which run north to south through the AOI, are reliable, paved roads. Many developments within the DNS are located on single access roads which branch off West Saanich Road and Patricia Bay Highway. This not only presents a challenge for emergency egress, but also limits the ability of fire crews to respond to fires and safely evacuate residents.

⁶District of Saanich. *Indigenous Relations*. Retrieved from: <https://www.saanich.ca/EN/main/community/Indigenous-Relations.html>

⁷District of North Saanich. *History and Heritage*. 2020. Retrieved online from: <https://northsaanich.ca/your-community/about-north-saanich/history-heritage/>

2.3 PAST WILDFIRES, EVACUATIONS AND IMPACTS

BCWS South Island Fire Zone staff (Dave Moon) communicated that although wildfires are not that common within the AOI, a large percentage of the past wildfire activity was human-caused. This is likely due to the fact that populations are concentrated, and in the coastal ecosystems within the AOI, lightning-caused fires are rare. In the last 15 years, BCWS has responded to very few fires within the DNS. It is likely that other wildfires have occurred in the past, but did not require BCWS assistance. BCWS staff have identified slash and standing grass as volatile fuel types in the South Vancouver Island Zone (SIFZ); however, slash burning has not been a significant issue as the DNS has bylaws in place to regulate open burning.

Based on the BCWS historical wildfire dataset, the largest fire to have burned within the AOI occurred in 1925, with an estimated area of 35 hectares. The previous year, two smaller fires burned within the AOI. Both were less than 11 hectares total in size. BCWS staff report that they have responded to only one fire in the DNS in recent years, which burned approximately 0.1 hectare. In July 2019 a small wildfire occurred near Durrance Lake on federal land. Firefighters from Saanich, Central Saanich, Willis Point, Highlands, Canadian Forces Base Esquimalt and the BCWS cooperated to contain the fire, which burned approximately three hectares.⁸ In early August 2018, 34 new fires were ignited on Vancouver Island, primarily due to lightning events. Several fires on northern Vancouver Island and near Nanaimo Lakes which burned a total area of 182 hectares resulted in evacuation alerts and orders. The Lizard Lake wildfire that burned near Port Renfrew in 2015, the Vancouver Island wildfires of 2018, and the 2017 and 2018 province-wide wildfires have alerted BCWS to the potential for large, catastrophic wildfires occurring within and surrounding the present AOI.

The BCWS historical ignition dataset demonstrates that the proportion of human-caused fires within the AOI is substantially greater than that of the province as a whole.⁹ This ignition data shows that within the AOI, close to 100% of reported ignitions since 1950 have been human-caused, versus 40% in the province of BC.¹⁰ This statistic may be explained by the lower proportion and occurrence of lightning strikes on Vancouver Island relative to other areas in the province. Additionally, centers of concentrated population, high recreational use in some areas, and the presence of industrial activity within the AOI also contribute to this statistic.

2.4 CURRENT COMMUNITY ENGAGEMENT

There is widespread recognition from the District of North Saanich staff of the threat posed to the community by wildfire; however, awareness and preparation amongst residents and community members varies. The DNS has been promoting FireSmart and organizing community outreach since 2017. Previous initiatives conducted by the DNS have included: distributing FireSmart educational materials at high-traffic community locations (e.g., Deep Cove Market, gas stations); promoting

⁸ *Crews contain wildfire on Saanich Peninsula rifle range*. CTV Vancouver Island. 2019. Retrieved from: <https://vancouverisland.ctvnews.ca/crews-contain-wildfire-on-saanich-peninsula-rifle-range-1.4490629>

⁹ BC Wildfire Service: Fire Incident Locations - Historical

¹⁰ BCWS. 2019

FireSmart practices and information on social media; conducting open houses; and installing FireSmart and wildfire hazard awareness signage. More than fifty FireSmart home and property assessments have been completed, and two internal volunteer staff have been trained as Local FireSmart Representatives. However, WWG members report that FireSmart outreach has produced mixed results. WWG members report that many community members, especially in interface or intermix neighborhoods, have expressed significant concerns about wildfire hazard within the DNS. From many other residents, there has been less interest and uptake on wildfire preparedness initiatives. WWG members reported that generally, resident engagement with general emergency and earthquake preparedness initiatives has been greater than engagement with wildfire preparedness initiatives.

There are multiple courses of action available to the DNS to increase the level of resident engagement and awareness with wildfire preparedness and FireSmart planning. Examples of potential community initiatives for the future include: establishing a local FireSmart representative; continuing to conduct FireSmart presentations and workshops and distribute educational materials; attending school information days; and using social media platforms to engage the public with fire danger rating and threat information. To increase public uptake and participation with future FireSmart initiatives, engagement efforts should be focused during or following an active fire season, to maximize the impact of resources available for community engagement. Recommendations for further education and communication initiatives that may be undertaken by the District are provided in Section 5.3.

Within municipal policy, several bylaws that relate to wildfire have been adopted by the District. These include the *Fire Prevention and Regulation Bylaw (No. 962)* and the *Parks Bylaw (No. 1479)*, and they enable the District to control the use of fire within the District boundary and in District parks. The DNS does not; however, currently have a wildfire development permit area in place to set standards based on FireSmart principles for building material use, for landscaping and to enforce appropriate setbacks from forested areas. For further detail and recommendations relating to planning and development considerations, see Section 5.2.2.

2.5 LINKAGES TO OTHER PLANS AND POLICIES

The following is a summary of DNS and provincial policies and guidelines that relate to strategic wildfire management, wildfire threat reduction, operational fuel treatments and emergency planning.

2.5.1 Local Authority Emergency Plan

Emergency preparedness and response is managed by the DNS. The DNS has an official emergency management plan and corresponding emergency management program. The DNS emergency program website includes a comprehensive list of resources and links to serve the District. This list includes the Capital Regional District (CRD) Guide to Emergency Preparedness, the Saanich Peninsula Alert System (SPAS), and the Peninsula Emergency Measures Organization (PEMO). The emergency program is a division of the North Saanich Fire Department (NSFD), and was developed to optimize the response, resources and planning for incidents that may occur within the DNS. More specifically, the program ensures continuity in government; provides a plan for preserving life and property; and coordinates

response from elected officials, municipal departments, volunteer services, outside agencies, Emergency Operations Center (EOC) functions, and services such as the Saanich Peninsula Alert System.

The Guide to Emergency Preparedness provided by the CRD gives important information about jurisdiction and priority setting, as well as information on local emergency programs and how residents can prepare for emergencies. Other emergency services like SPAS are designed to deliver real time, public safety alerts to all registered residents and stakeholders in the Saanich Peninsula, which includes the municipalities of North and Central Saanich and the town of Sidney. PEMO is another emergency service supported by the DNS that is run by volunteers and provides emergency support services, search and rescue, emergency communications and develops neighbourhood emergency preparedness programs.

2.5.2 Affiliated CWPPs

CWPPs have been developed for the Cowichan Valley Regional District (for four Zones – South, Central, West, and North – in 2017) and Capital Regional District (for Salt Spring Island; Mayne Island; Galiano Island; North and South Pender and Saturna Islands; and Juan de Fuca Electoral Area and District of Sooke between 2005 and 2010). These documents, when available were reviewed for relevance (i.e., synergistic project opportunities, as well as to confirm that there are no contradicting recommendations). Furthermore, CWPP updates are currently under development for the District of Central Saanich (DCS). The CWPP for the DCS is being developed by the same consultant ensuring consistency in recommendations and synergies within proposed future fuel treatment works.

2.5.3 Local Government/First Nation Policies and Recommendations

The intent of this section is to review all relevant local government plans, policies and bylaws and identify sections within that are relevant to the CWPP update. The following municipal bylaws, strategies and policies are relevant to wildfire planning in the AOI.

Bylaw No. 1130 (2007): District of North Saanich Official Community Plan

The District of North Saanich Official Community Plan (OCP) provides guidance for land use, development, and community evolution within the District. Some sections contain objectives and policies which are directly relevant to wildfire risk reduction and emergency response as described below.

2007 OCP Section 3: Environmentally Sensitive Areas

Section 3 recognizes that development consistent with the protection of watercourses, wetlands, riparian areas, and sensitive ecosystems is a key priority for the District. Policies to do so include protecting vegetation, promoting the use and retention of hedges, and implementing buffer zones on riparian areas. Erosion is a concern in the District, and Section 3 of the OCP outlines that mature tree cover on slopes is not to be removed, and natural features are to be preserved. Any fuel management prescriptions as a result of this CWPP Update must be consistent with these objectives.

2007 OCP Section 6: Residential

Section 6 specifies that the District has a positive attitude towards larger lots and towards maintaining the rural nature of neighbourhoods by limiting densification. Two areas, McTavish and Tsehum, have been identified as areas with enough lots to satisfy growth in housing demand in the near future. Policy 6.1 is to retain trees and hedges in landscaped buffer areas between residential development and other land uses. Policy 6.8 requires new development on residentially zoned land to have an adequate water supply for fire protection.

2007 OCP Section 12: General Development Policies

Section 12 outlines policies governing development in the District as a whole that take into account community values and safety. Policy 12.3 states that visual quality is an important value in the District, especially near the waterfront and on hilltops and ridgetops. Policy 12.4 states that development must limit the removal of, or damage to, any of the existing vegetation cover. Policy 12.10 notes that there are various archeological sites throughout the District. Policy 12.11 dictates that development proposals should address standards from the National Fire Protection Association 1142 (Supplies for Suburban and Rural Firefighting).

2007 OCP Section 13: Special Development Areas

Section 13 governs development in each of Districts' Special Development Areas. In environmentally sensitive areas and/or areas with steep slopes, the policy is to avoid tree clearing, and retain as much vegetation as possible. These areas include East Saanich/Cresswell, Deep Cove Chalet, Queen Mary Bay, and Baldwin Property. Baldwin Property is identified as a special area because of unique vegetation and many informal recreation trails.

2007 OCP Section 14: Development Permit Areas

Section 14 divides the District into geographic areas that share similar concerns and guidelines surrounding development. Of special consideration is DPA No. 4 which comprises all areas with slopes over 30%. Steep, forested slopes represent an increased risk of hazardous fire behavior, erosion, and slope destabilization. Development in this area requires a Slope Stability Plan certified by a Qualified Professional. The disturbance of vegetation and soil is prohibited outside of the allowances of a development permit. In addition, there is a requirement that any new development provide access for fire protection vehicles at a grade of not more than 10%. See Section 5.2.2 for recommendations related to a development permit area for wildfire hazard.

2007 OCP Section 18: Additional Community Objectives and Policies

Subsection 18.4 outlines the water systems of the District. The District obtains water from both private wells, and from piped water purchased from the Capital Regional District (CRD) Water Department by the Saanich Peninsula Water Commission. Agricultural water users rely on a combination of groundwater, piped water and surface water.

2007 OCP Schedule I: Wildfire Hazard Areas

Schedule I of the OCP (not referenced in the consolidated OCP document) maps the District in terms of high and extreme wildfire hazard areas. See Section 5.2.2 for related recommendations.



RECOMMENDATION #1: As part of the OCP review, consider parks acquisition and maintenance through a wildfire risk lens, including consideration for long-term maintenance costs and access. Consider amendments where needed, including the following: 1) require the use of a QP in review, assessment, and siting of parks and park access prior to acceptance; and 2) ensure that bylaws provide the DNS authority to request modification (either fuels, access, or siting) based upon QP recommendation and prior to acceptance to ensure that the park is received in, and able to be maintained in, an acceptable range of risk. (See Section 6.1.3 for related recommendations specific to access).

RECOMMENDATION #2: As part of the OCP review, update Schedule I (Wildfire Hazard Areas) and update the wildfire threat rating of neighborhoods within the District of North Saanich in alignment with findings from this CWPP update.

DNS Bylaw No. 1324 (2015): Development Application Procedures Bylaw

This bylaw establishes application fees and information requirements for development permit approval. In Section 9 it is noted that the Director of Planning and Community Services for the DNS may require a development application to provide an assessment of hazards, including risk of wildfire, that is certified by a qualified professional.

DNS Bylaw No. 962 (2000): Fire Prevention and Regulation Bylaw

This bylaw outlines the rights of the District Fire Chief with regards to fire prevention and control. Section 14 states that when the safety of forest or property is endangered by debris caused by land clearing, logging, or other industrial operations, the owner or operations overseer must dispose of the debris and any dead trees or stumps by burning or removal in accordance with the direction of the Fire Chief. The Fire Chief may require the owner of any property to remedy conditions that are deemed as posing a fire hazard. In addition, under Section 15, all outdoor fires require a permit from the Fire Chief, except the occasional burning of domestic waste during specified times. The deposition of burnable material within the municipality also requires the approval of the Fire Chief.

DNS Bylaw No. 935 (2002): Tree Protection Bylaw

This bylaw is currently under review. This bylaw prevents any tree (>10 cm in diameter at breast height) from being cut down without a permit. Exceptions under this bylaw include but are not limited to normal pruning of roots or branches, development by the District to provide a public service, or any tree that needs to be removed to satisfy the Safety Measures for Development Permit Area 3- "Wildfire Hazard." However; it must be noted that Development Permit Area 3 is actually designated as a "Sensitive Ecosystems" DPA (as per section 14.5 of the OCP).

RECOMMENDATION #3: As part of the Tree Protection Bylaw review consider: 1) inclusion of language which allows the issuance of a permit for cutting of trees if it is required to reduce wildfire hazard within the wildland urban interface, as determined by a qualified professional (QP); 2) the bylaw does not limit the ability of homeowners to address wildfire hazards associated with trees on private property immediately adjacent to homes; and 3) amend language regarding Safety Measures for Development Permit Area 3- Wildfire Hazard Development, to ensure bylaw references appropriate Development Permit Area.



DNS Bylaw No. 1479 (2018): Parks Bylaw

This bylaw governs conduct in parks and open spaces. Vegetation may not be damaged or modified in any way. Permits are required for fires. The generation of disturbing noise, dust, or odors is also prohibited.

DNS Bylaw No. 1400 (2015): Unsightly Premises Bylaw

The bylaw states that the owner or occupier of a property must not have any accumulation of filth, discarded material, building material, or garbage of any kind. This extends to untended grass, brush, and weeds and is relevant for both aesthetic and safety purposes.

RECOMMENDATION #4: Review Unsightly Premises Bylaw No. 1400, 2015 and consider including wording that specifically prohibits the accumulation of combustible materials on the property (including on and under exterior projections, such as decks and patios, near the home, and in gutters and roofs). The revised bylaw should provide the District the authority to require removal/clean-up of combustible materials or to complete removal and recoup costs from the owner.

DNS Bylaw No. 246 (1977): Subdivision and Development Control Bylaw

The bylaw provides boundaries for the subdivisions of the District. Easements for the provision of utilities that must be provided if required are specified. It is within the power of the Approving Officer to refuse a subdivision application if it is deemed to negatively impact water quality of adjacent properties. Fire hydrants must also be installed according to standards from the Fire Underwriters' Association.

DNS Bylaw No. 1255 (2011): Zoning Bylaw

The bylaw divides the District into zones with permitted land use categories and associated regulations. The bylaw outlines regulations for lot sizes, building sizes, parking, and landscaping/screening.

RECOMMENDATION #5: The Planning and Community Services department (i.e., building inspectors) should continue to ensure that house numbering is posted prior to occupancy of new development, in accordance with the existing Building and Fire Prevention bylaws, and to provide instructions on how and where best to affix numbering to facilitate emergency response and evacuation efforts. Consider encouraging home owner participation via a DNS-wide engagement campaign and providing incentives such as the opportunity to acquire/purchase discounted address signs.

Regional Green/Blue Spaces Strategy, 1997

This document is referenced in the District OCP but more updated information is contained in the Regional Parks Strategic Plan (2012) and the Regional Trails Management Plan (2016). It proposes a network of parks, unprotected green space and waterways, agricultural land and managed forest land in the Capital Regional District. The primary goal of the strategy is to enable environmental protection and provision of ecological services across municipal boundaries. Southern Gulf Islands National Park Reserve and LÁU, WELNEW/John Dean Provincial Park, which are included in this plan, are located within the AOI.

Regional Parks Strategic Plan, 2012

This is a ten-year strategic plan for Regional Parks, from 2012 to 2021. It is partly in response to rapid growth in population and tourism in the region. As visits to parks in the CRD increase, so do opportunities for human-caused ignition of wildfires. Increased park popularity and associated facility development also increases the chances that humans or valuable park assets will be impacted by wildfire.

Regional Trails Management Plan, 2016

This plan is intended to guide development and management decisions for regional trails in the CRD. One overall goal is increased connectivity of regional trails. Increasing trail connectivity and trail usage facilitates human access to forest land. One positive outcome of this is that fuel management prescriptions in these areas may be easier to implement, and fire suppression crews will be able to gain access to render emergency services quicker. A negative outcome of increased access is increased risk for wildfire ignition and human entrapment.

RECOMMENDATION #6: Work with the CRD to incorporate wildfire risk considerations (i.e., placement, type, width, and objective of trails) during future updates to the Regional Trails Management Plan. Consideration should also be given to trail building and maintenance as these activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (though proper placement, clean-up of combustible fuels trailside and work practices which adhere to *Wildfire Act* and Regulations).

2.5.4 Higher Level Plans and Relevant Legislation

Land use objectives, ministerial orders, and non-legal planning objectives outlined in the plans below should be reviewed, considered, and addressed during the fuel management prescription phase. Fuel management on Crown land within the AOI should aim to enhance these values, whenever possible, and the land manager (BC Parks) must be consulted during prescription development regarding any overlapping values at risk, spatially explicit ministerial orders, or other notable values on the land base.

Vancouver Island Land Use Plan (VLUP)¹¹

The Vancouver Island Land Use Plan (VLUP) is the higher-level planning document for all of Vancouver Island, including the DNS. The plan provides strategic direction for the following categories: 1) Protected Areas Network; 2) Forest Land Base; 3) Regional Biodiversity Direction; 4) Food Production Activities; 5) Settlement Lands; 6) Energy and Mining Opportunities; 7) Integrated Coastal Management; and 8) Community Stability. The plan also identifies Land Use Zones, which are used to delineate areas which require specific management.

Relevant Legislation

There are no spatially explicit ministerial orders pertaining to the AOI; however, there are sensitive ecosystem occurrences, provincial parks, settlement areas and Agriculture Land Reserve (ALR) areas that overlap with the AOI which may impact potential fuel treatment activities. Fuel management within these areas should aim to enhance these values, whenever possible, and the land manager and/or BC

¹¹ The Province of BC, 2000.

Parks should be consulted regarding any overlapping values at risk, or other notable values, during prescription development.

2.5.5 Ministry or Industry Plans

Reviewing and incorporating other important forest management planning initiatives into the CWPP planning process is a critical step in ensuring a proactive and effective wildfire mitigation approach in the AOI.

The Vancouver Island Central Coast Response Fire Management Plan (FMP)¹² that encompasses the DNS was reviewed to identify future landscape level fire management planning at the Natural Resource District level. The FMP was completed in 2018 for the Coastal Fire Centre and three Natural Resource Districts, including the South Island District which overlaps the AOI. The FMP identifies values at risk and prioritizes broad categories of values as ‘themes’ for categorizing response through the Resource Strategic Wildfire Allocation Protocol (RSWAP). The FMP briefly speaks to the concept of wildfire prevention engineering within the region, which includes fuel management such as locally identified fuel breaks, proposed treatment areas, or demonstration and operational treatment areas. The FMP does not identify potential fuel breaks around the municipalities within the AOI. To address this gap, interface fuel break treatment opportunities have been identified as part of this CWPP.

ŁÁU,WELNEW/John Dean Provincial Park is the only provincial park within the AOI and is managed by a Purpose Statement and Zoning Plans (PSZP 2003). The PSZP does not describe management considerations with respect to reducing wildfire hazard.

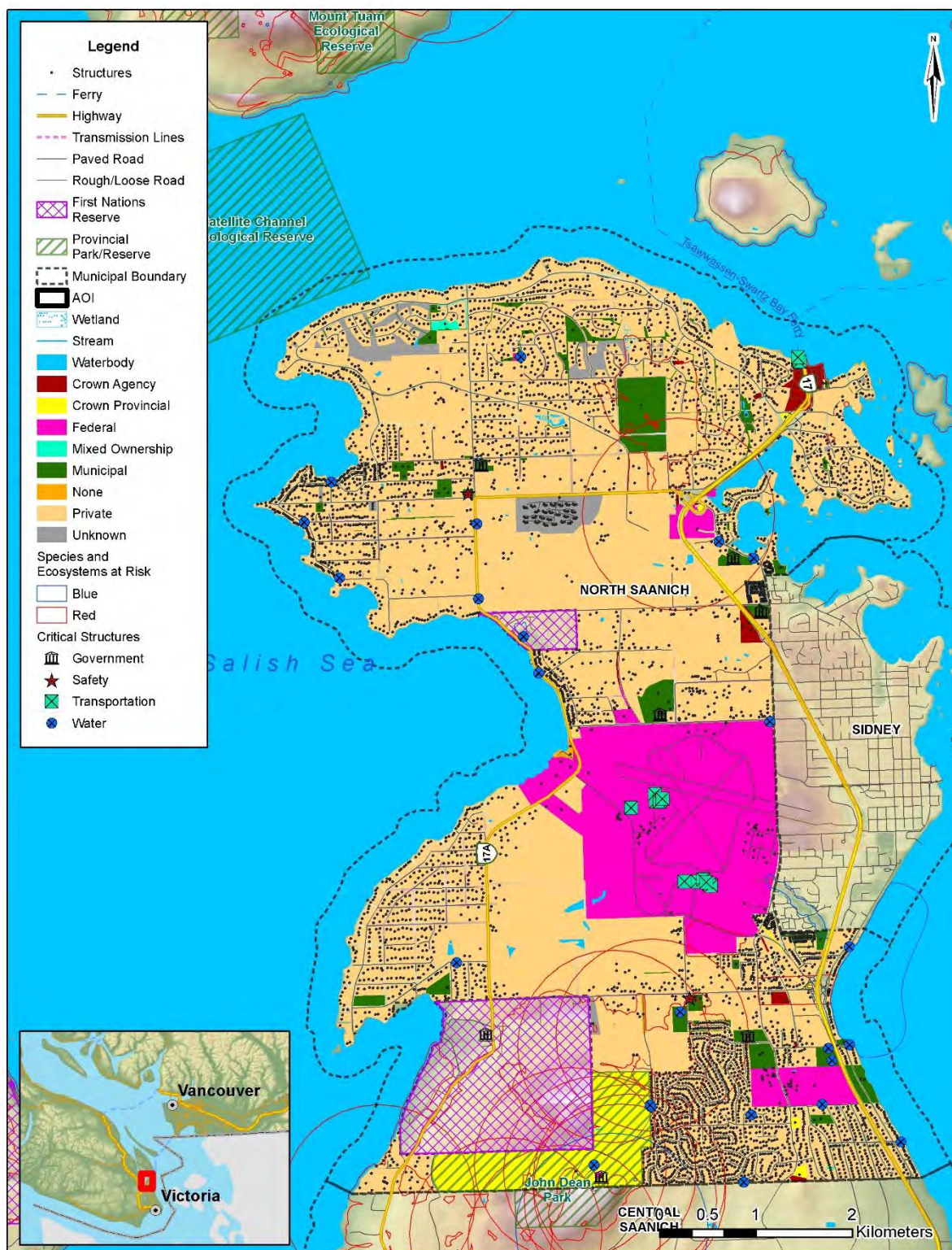
Forest health management and associated initiatives within the Arrowsmith Timber Supply Area (TSA) are guided by the Coast Area 2015-17 Coastal Timber Supply Areas Forest Health Overview¹³. This plan must be reviewed, considered, and addressed during the prescription-level phase. Fuel management and prescriptions aimed at reducing wildfire hazard within the AOI should aim to incorporate the guiding principles and best management practices (BMPs) presented within this aforementioned plan.

SECTION 3: VALUES AT RISK

The following is a description of the extent to which wildfire has the potential to impact the values at risk (VAR) within the AOI. VAR or the human and natural resources that may be impacted by wildfire include human life and property, critical infrastructure, high environmental and cultural values, and other resource values. Furthermore, updating VAR data is critical for effective mitigation planning. This can be achieved through the Critical Infrastructure Assessments process during the development of the local Authority Emergency Plan, or by utilizing data sets for values that have already been identified. VAR also include hazardous values that pose a safety hazard. Key identified VAR are illustrated below in Map 2.

¹² Ministry of Forests, Lands, Natural Resource Operations and Rural Development, 2018.

¹³ Ministry of Forests, Lands and Natural Resource Operations. 2015



Map 2. Values at Risk within the AOI.



3.1 HUMAN LIFE AND SAFETY

One of the primary goals of the BC Wildfire Service is to support emergency response and provide efficient wildfire management on behalf of the BC government. The BCWS aims to protect life and values at risk, while ensuring the maintenance and enhancing the sustainability, health and resilience of BC ecosystems.¹⁴

Human life and safety are the first priority in the event of a wildfire. A key consideration is the evacuation of at-risk areas and safe egress. Evacuation can be complicated by the unpredictable and dynamic nature of wildfire, which can move quickly. Evacuation takes time and safe egress routes can be compromised by wildfire causing limited visibility, or by traffic congestion and/or accidents.

The population distribution (both people and structures) within the AOI is important in determining the wildfire risk and identifying mitigation activities. According to the 2016 Statistics Canada Census, the population of the DNS has slightly increased in the last decade. Between 2011 and 2016 the population rose by 1.4 percent, and the average age of the population was 50 years old. The total population in 2016 was roughly 11,249 people and the total number of private dwellings within the AOI was 4,936 homes, resulting in an average population density of 302 people per km².

The DNS attracts visitors for sightseeing, hiking, biking, sailing and boating and other recreational endeavors year-round, but particularly during the fire season (May-October). Several parks and one recreation site throughout the AOI are highly used during the summer months, including ŁÁU,WELNEW/John Dean Provincial Park, Horth Hill Regional Park, Coles Bay Regional Park, and many other municipal parks. Furthermore, the Patricia Bay Highway (Highway 17), is frequently used as an access corridor between Swartz Bay and Victoria, and is a main tourist corridor during the summer months and therefore increases the number of people to evacuate in the event of a wildfire.

Knowledge of and access to updated structure locations within an area is a critical step in efficient and successful emergency response planning and the development of mitigation strategies and recommendations. Field visits to the DNS and access to recent orthophotography and spatial data from the DNS has enabled the development of a spatial layer with structure locations that accounts for the most recent developments.

3.2 CRITICAL INFRASTRUCTURE

Protection of critical infrastructure (CI) during a wildfire event is an important consideration for emergency response effectiveness, ensuring that coordinated evacuation can occur if necessary, and that essential services can be maintained and/or restored quickly in the case of an emergency. Critical infrastructure includes emergency and medical services, electrical and gas services, transportation, water, social services, and communications infrastructure. A critical infrastructure dataset was provided

¹⁴ BC Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf

by the DNS's GIS staff and this data was included in Map 2. Table 3 details an inventory of critical infrastructure identified by the DNS and via field visits.

Protection of critical infrastructure has shown itself to be an essential wildfire preparedness function. Survival and continued functionality of these facilities not only support the community during an emergency but also determine, to a great degree, the extent and cost of wildfire recovery and economic and public disruption during post wildfire reconstruction. Critical infrastructure provides important services that may be required during a wildfire event or may require additional considerations or protection. As outlined in Section 5.2, FireSmart principles are important when reducing wildfire risk to both classes of structure and are reflected in the outlined recommendations. During field visits, it was observed that critical infrastructure in the DNS (i.e., fire halls, community centres, etc.) is in various levels of compliance with FireSmart principles.

RECOMMENDATION #7: The use of fire-resistant construction materials, building design and landscaping should be considered for all CI when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart guidelines. Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which cuts power for days, or even weeks.

RECOMMENDATION #8: Complete formal FireSmart assessments (by a Qualified Professional) for CI such as the fire halls, emergency operations centre, water infrastructure, and others as identified in this CWPP (Table 3) and by the DNS.

3.2.1 Electrical Power

Electrical services for the DNS are received through a variety of distribution methods, including an above ground network of wooden pole transmission lines and generating systems. All distribution infrastructure is supplied by BC Hydro. Neighbourhoods with small, street-side wooden poles that connect to homes are particularly vulnerable to fire.

Within the AOI there is one transmission line that overlaps the DNS municipal boundary. This transmission line (60L087) connects the Keating substation with the Sidney substation on Mainwaring Road between Bazan Bay Road and McTavish Road. This system is well-mapped and BC Hydro states that staff will work with local fire departments and BCWS to mitigate impacts to this infrastructure in the event of a wildfire.¹⁵ It is recommended that utility right-of-way best management practices such as regular brushing and clearing of woody debris and shrubs be employed to help reduce fire risk, utility pole damage and subsequent outages. Detailed recommendations regarding other prevention measures for industrial operations are provided in Section 5.4.

A large fire has the potential to impact electrical service by causing disruption in network distribution through direct or indirect means. For example, heat from flames or fallen trees associated with a fire

¹⁵ <https://www.bchydro.com/safety-outages/emergency-preparation/natural-disasters.html>

event may cause power outages. Consideration must be given to protecting this critical service and providing power back up at key facilities to ensure that the emergency response functions are reliable.

Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which cuts power for days, or even weeks. Secondary power is available for some critical infrastructure within the AOI such as the DNS municipal hall (the designated EOC), the North Saanich Fire Department (NSFD), and all lift stations located within the AOI. The municipality also has access to portable generators for use in the event of an emergency. The drinking water system is serviced by gravity from storage reservoirs, and does not require electrical power to maintain essential functioning. Vulnerabilities for secondary power sources include mechanical failure, potentially insufficient power sources should a wide-scale outage occur, and fuel shortage in the event of very long outages. Refer to Section 6.1 for discussion and recommendations related to backup power and water availability for fire suppression.

3.2.2 Communications, Pipelines and Municipal Buildings

Residents within the DNS are serviced by the Saanich Peninsula Hospital, which is in the District of Central Saanich, and the Victoria International Airport which is located within the AOI. There is an RCMP station and BC Ambulance station located in the town of Sidney outside of the AOI. There are multiple underwater utility electric power lines and telecommunication lines that pass through the AOI and connect to other islands surrounding the DNS. A full inventory of critical infrastructure for communications and municipal buildings with updated locations is presented in Table 3, below.

Table 3. Critical infrastructure identified in CWPP field visits.

Critical Infrastructure Type	Location
BC Ferries Swartz Bay (Victoria) Terminal	11300 Patricia Bay Hwy, Sidney
Communications tower	Adjacent to BC Ferries terminal at intersection of Dolphin Road and Canoe Cove Road, North Saanich
Deep Cove Elementary School	10975 W Saanich Rd, North Saanich
Kelset Elementary School	1800 Forest Park Dr, North Saanich
Marine Communications and Operations Centre (Department of National Defense)	Dean Park Road, northeast of radar dome, ŁÁU,WELNEW/John Dean Provincial Park, North Saanich
McTavish Fire Hall – Fire Hall #2	1665 McTavish Rd, North Saanich
North Saanich Municipal Hall (designated Emergency Operations Centre)	1620 Mills Rd, North Saanich
North Saanich Middle School	10400 McDonald Park Rd, North Saanich
Parkland Senior Secondary School	10640 McDonald Park Rd, North Saanich
Pauquachin Band Council Office	9010 West Saanich Road, Cole Bay IR 3
Mount Newton radar dome	Terminus of Dean Park Road at ŁÁU,WELNEW/ John Dean Provincial Park, North Saanich
Wain Rd Fire Hall – Fire Hall #1	986 Wain Rd, North Saanich
Victoria Airport Authority	1640 Electra Blvd #201, North Saanich

3.2.3 Water and Sewage

The District's water system is part of the Saanich Peninsula water system which falls within the Capital Regional District (CRD) integrated water system. The main CRD water system components which provide service to the DNS are Transmission Main #4, the Lowe Road Pump Station, the Deep Cove Pump Station, the Upper, Middle, and Lower Dean Park Reservoirs, the McTavish Reservoir, and the Cloake Hill Reservoir. These storage reservoirs are all gravity fed and can maintain essential functioning in the event of the loss of electrical power. These water utilities are supplied by surface water sources in the Sooke, Goldstream and Council watersheds. Drinking water in the Greater Victoria area is treated in a two-step (primary and secondary) process. Much of the water is disinfected at the Japan Gulch treatment facilities near Langford, outside of the AOI.

Within the AOI, summer dry spells and drought periods are common. Since first being implemented in 1993, seasonal water use restrictions have become a fact of life for residents throughout the CRD.¹⁶ It is projected that these dry spells will lengthen in duration as the climate changes in the DNS (see Section 4.1.2). Municipal and regional water restriction bylaws are enforced during this time and public education efforts have been made to manage demand.¹⁷ The CRD also purchased 9,623 hectares of land around the Leech River, west of the Sooke Lake Reservoir, in 2007 and 2010, as a future water supply area.¹⁸ It was acquired in anticipation of increasing demand pressures on the CRD water system. For more details on water availability for firefighting, see Section 6.1.2.

The DNS sewer collection system operates in five core areas, including the Dean Park Estates, South East Quadrant, Patricia Bay, Deep Cove and MacDonald Park communities. In total, the sewer system within the DNS consists of 90 kilometers of sanitary sewer pipe system and 13 sewer pump stations.¹⁹ The effluent from this sewer system is transferred to the Saanich Peninsula Wastewater Treatment Plant which is also operated by the Capital Regional District. The wastewater treatment plant also serves Pauquachin First Nation and Tseycum First Nation. In the event of an emergency, or a loss of power, all lift stations within the DNS have backup generators. Furthermore, both the sewer and water systems have been mapped by DNS staff. The locations of water and sewage critical infrastructure are detailed below in Table 4.

Table 4. Critical water and sewage infrastructure identified in CWPP field visits.

Critical Infrastructure Type	Location
Cloake Hill Reservoir	Western end of Redbud Place
Dean Park Lower Reservoir	Behind the western cul-de-sac of Chinook PI

¹⁶ Kenney, Sylvia. *Aquifers of the Capital Regional District*. December 2004. Retrieved from:

http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/aquifers_crd/pdfs/aquif_crd.pdf

¹⁷ Capital Regional District. Watering Conservation. Retrieved from: <https://www.crd.bc.ca/education/water-conservation/at-home/water-conservation-faq>

¹⁸ Bell, Jeff. *CRD considers limiting access to Leech Water Supply Area*. Victoria Times Colonist.

<https://www.timescolonist.com/news/local/crd-considers-limiting-access-to-leech-water-supply-area-1.1821348>

¹⁹ District of North Saanich. Retrieved from: <https://northsaanich.ca/services/water-sewer-drainage/>



Critical Infrastructure Type	Location
Dean Park Upper Reservoir	Adjacent to western end of Dean Park Rd, within LAU, WELNEW/John Dean Park
Dean Park Middle Reservoir	Carmanah Terrace at Dean Park Road
Deep Cove Pump Station (water)	Eastern side of the West Saanich Rd, north of Downey Rd and West Saanich Rd intersection
Lowe Pump Station (water)	Lowe Road at Aldous Terrace
McTavish Reservoir	Cresswell Road, between McTavish Road and Texada Terrace
Saanich Wastewater Treatment Plant	9055 Mainwaring Road
Control valve	West Saanich Road at Towner Park Road
Deep Cove Pump Station (sewer)	10988 Madrona Drive
West Saanich Pump Station (sewer)	10206 West Saanich Road
Mills Pump Station (sewer)	1987 Mills Road
McDonald Park Pump Station (sewer)	10712 McDonald Park Road
Reay Creek Pump Station (sewer)	9269 Lochside Drive
Bazan Bay Pump Station (sewer)	8929 Lochside Drive
Amity Bay Pump Station (sewer)	8599 Lochside Drive
Trincomali Pump Station (sewer)	1845 Trincomali Terrace
Pauquachin Pump Station (sewer)	Terminus of Pauquachin Lane at waterfront
Towner Pump Station (sewer)	10605 Madrona Drive
Cromar Pump Station (sewer)	10801 Madrona Drive
Parkland Pump Station (sewer)	McDonald Park Road at Blue Heron Road
Tseycum Pump Station (sewer)	West Saanich Road, south of Totem Lane
Control valve	930 Ardmore Drive

3.3 HIGH ENVIRONMENTAL AND CULTURAL VALUES

The following section identifies high environmental and cultural values and where they are located. Environmental, cultural and recreational values are high throughout the AOI. A more detailed account of environmental and biodiversity aspects of this region is presented in Section 3.3.3.

3.3.1 Drinking Water Supply Area

The DNS draws its water from the Saanich Peninsula Water system, which is a part of the larger CRD Regional Water Supply System. Water for the CRD Regional Water Supply System is provided from the Sooke, Goldstream, and Council watersheds. The Sooke Reservoir is the primary reservoir for the Greater Victoria Water Supply Area, which includes the District of North Saanich, and provides about 90% of the total water storage in the supply system. The CRD owns approximately 98% of the catchment area for the Sooke and Goldstream water supply reservoirs,²⁰ which are located west of the Saanich Peninsula, across the Saanich Inlet, and north of the District of Sooke. The Sooke and Goldstream watersheds are also legally categorized as ‘community watersheds’, a designation which restricts their potential usages.

Within the DNS water system testing occurs regularly to ensure that drinking water supplied to residents meets public health regulations. The CRD also releases a weekly water watch report which outlines the water supply system in terms of useable volume in storage, average daily and 5-year demand, monthly rainfall amounts, and any water conservation advisories. The objective of these weekly reports is to inform the public on matters regarding drinking water supply and provide key contact information. Furthermore, the water quality reports provide reassurance to the public that the region’s drinking water quality standards are met to ensure continued public health and safety. These drinking water reports include date of receipt of sample, the date of testing, the method used, deviations from the method, original data if the data is flagged as amended and the identification of persons authorizing the tests. Drinking water levels in the CRD Sooke Reservoir have recently receded in the summer due to prolonged drought conditions and dry spells.^{21,22} In the future, regional drinking water levels are anticipated to be impacted by growing demand and climate change impacts.

CRD water services staff have expressed awareness about and concern for the risk wildfire poses for drinking water quality in the region, specifically relating to ash and sediment deposition in the Sooke and Goldstream reservoirs. Staff have stated that fire prevention efforts, including ground and aerial patrols, are in place. These monitoring efforts are concentrated during the fire season, from April to October. The most recent incident where wildfire burned inside watershed boundaries occurred in 2006, and was a relatively minor event. However, in 2012, a large fire which burned near Shawnigan Lake

²⁰ Capital Regional District. *Regional Water Supply System*. Retrieved from: <https://www.crd.bc.ca/service/drinking-water/systems/regional-water-supply-system>

²¹ Time Colonist, 2018. Retrieved online at: <https://www.timescolonist.com/news/local/sooke-lake-reservoir-filling-slowly-after-california-summer-1.23536432>

²² CRD Integrated Water Services, December 2018. Retrieved online at: https://www.crd.bc.ca/docs/default-source/water-pdf/sooke-reservoir/water-watch/2018/dec-9.pdf?sfvrsn=70b5f8ca_2

posed a much more significant potential threat. Staff have stated that fires often burn adjacent to watershed boundaries during the summer.²³

The potential impacts of wildfire extend past the time a fire is extinguished. Depending on fire size and severity, there is the potential for significant hydrological impacts, extending for years post-burn.²⁴ In the event of a catastrophic wildfire in proximity to the CRD Sooke reservoir, the CRD will likely implement a region-wide boil water advisory to ensure the health and safety of its residents.

3.3.2 Cultural Values

The AOI of this CWPP overlaps with the traditional and unceded territories of several First Nations. The following First Nations, Nations, Tribes, and Treaty Associations with Aboriginal interests recorded in the BC Consultative Areas Database were identified: Lake Cowichan First Nation, Lyackson First Nation, Malahat Nation, Pauquachin Nation, Semiahmoo First Nation, Stz'uminus First Nation, Tsartlip First Nation, Tsawout First Nation, Tseycum First Nation, Cowichan Tribes, Penelakut Tribe, Halalt First Nation, and Te'mexw Treaty Association. All of the aforementioned First Nations, Nations, Tribes and Treaty Associations were consulted with throughout the CWPP development process.

The Lake Cowichan First Nation, Cowichan Tribes, Stz'uminus First Nation, Lyackson First Nation and the Penelakut Tribe are part of the Hul'qumi'num Treaty Group. The Hul'qumi'num treaty group is currently in the final agreement negotiations (Stage 5) to conclude the treaty process. The Malahat Nation is part of the Te'mexw Treaty Association, which is currently in final agreement negotiations (Stage 5) of the treaty process. Pauquachin Nation, Semiahmoo First Nation, and Tsawout First Nation are not currently participating in the BC treaty process. Tseycum First Nation and Tsartlip First Nation are pursuing negotiations or alternate agreements with the Province outside of the BC treaty process.²⁵ Several First Nations whose traditional territory overlaps with the AOI of this CWPP, were also signatories to Douglas Treaties, a series of 14 land purchases from Indigenous people around southern Vancouver Island in the late 1800's. These include Pauquachin Nation, Tsartlip First Nation, Tsawout First Nation, and Tseycum First Nation.²⁶

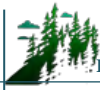
Archaeological sites and remains in BC that pre-date 1846 are protected from disturbance, intentional and inadvertent, by the *Heritage Conservation Act* (HCA), which applies on both private and public lands. Sites that are of an unknown age that have a likely probability of dating prior to 1846 (i.e., lithic scatters) as well as Aboriginal pictographs, petroglyphs, and burials (which are likely not as old but are still considered to have historical or archaeological value) are also protected. Under the HCA, protected sites

²³ Bell, J. *So where does our drinking water come from?* (2014, May 16) Times Colonist. Retrieved from: <https://www.timescolonist.com/so-where-does-our-drinking-water-come-from-1.1065010>.

²⁴ Jordan, P., K. Turner, D. Nicol, D. Boyer. 2006. Developing a Risk Analysis Procedure for Post-Wildfire Mass Movement and Flooding in British Columbia. Part of the 1st Specialty Conference on Disaster Mitigation. Calgary, AB May 23 -26, 2006.

²⁵ Province of British Columbia. *First Nations Negotiations*. Retrieved from: <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations>

²⁶ Capital Regional District. *First Nations in the Capital Regional District*. 2013. Retrieved from: <https://pub-victoria.escribemeetings.com/filestream.ashx?documentid=14719>



may not be damaged, altered or moved in any way without a permit. It is a best practice that cultural heritage resources such as culturally modified tree (CMT) sites be inventoried and considered in both operational and strategic planning.

Due to site sensitivity, the locations of archaeological sites may not be made publicly available. However, data provided by the MFLNRORD Archaeology Branch confirms that multiple sites overlap with the AOI. Prior to stand modification for fire hazard reduction, and depending on treatment location, preliminary reconnaissance surveys may be undertaken to ensure that cultural heritage features are not inadvertently damaged or destroyed.

Pile burning and the use of machinery have the potential to damage artifacts that may be buried in the upper soil horizons. Above ground archaeological resources may include features such as CMTs, which could be damaged or accidentally harvested during fire hazard reduction activities. Fuel treatment activities should include consultation with all identified First Nations at the site level and with sufficient time for review and input regarding their rights and interests prior to prescription finalization or implementation.

3.3.3 High Environmental Values

The Conservation Data Centre (CDC), which is part of the Environmental Stewardship Division of the Ministry of Environment and Climate Change Strategy, is the repository for information related to plants, animals and ecosystems at risk in BC. To identify species and ecosystems at risk within the AOI, the CDC database was referenced. Two classes of data are kept by the CDC: non-sensitive occurrences for which all information is available (species or ecosystems at risk and location); and masked, or sensitive, occurrences where only generalized location information is available.

There are 17 occurrences of red-listed species and/or ecological communities, four occurrences of blue-listed species and one blue-listed ecological community, and one yellow listed species (Table 5). There are multiple overlaps with masked occurrences. Through consultation with the CDC and a biologist or qualified professional, all site level operational plans must determine if these occurrences will be impacted by fuel management or other wildfire mitigation activities. All future fuel treatment activities or those associated with recommendations made in this plan should consider the presence of, and impact upon, potentially affected species. Additionally, all site level operational plans should consult the most recent data available to ensure that any new occurrences or relevant masked occurrences are known and considered in the operational plan to mitigate any potential impacts on species at risk. The BC Species & Ecosystems Explorer, which allows combined searches for species and ecological communities, should also be consulted at the prescription phase. Due to potential limitations of existing databases, consultation with a QP with local knowledge may also be recommended at the prescription phase.

Table 5. Publicly available occurrences of Red and Blue-listed species recorded within the AOI.

Scientific Name	Common Name	Category	BC List	Habitat Type
<i>Abies grandis/Berberis nervosa</i>	Grand fir/dull Oregon-grape	Ecological Community	Red	Terrestrial; forest needleleaf
<i>Abies grandis/Tiarella trifoliata</i>	Grand fir/three-leaved foamflower	Ecological Community	Red	Terrestrial; forest needleleaf
<i>Allium amplexans</i>	Slimleaf Onion	Vascular Plant	Blue	Terrestrial: rock outcrop
<i>Alnus rubra/Carex obnupta [Populus trichocarpa]</i>	Red alder/slough sedge [Black Cottonwood]	Ecological Community	Red	Palustrine; forested wetland
<i>Branta bernicla</i>	Brant	Vertebrate Animal	Blue	Marine; nearshore; bay
<i>Cephalanthera austiniiae</i>	Phantom orchid	Vascular Plant	Red	Terrestrial: forest mixed
<i>Coenonympha tullia insulana</i>	Common ringlet, <i>insulana</i> subspecies	Invertebrate Animal	Red	Terrestrial: old field, cropland/hedgerow
<i>Epilobium densiflorum</i>	Dense spike-primrose	Vascular Plant	Red	Terrestrial: roadside; temporary pool
<i>Epilobium torreyi</i>	Brook spike-primrose	Vascular Plant	Red	Terrestrial: grassland/herbaceous
<i>Leptogium polycarpum</i>	Peacock vinyl	Fungus	Yellow	Terrestrial: forest mixed
<i>Lomatium dissectum var. dissectum</i>	Fern-leaved desert-parsley	Vascular Plant	Red	Terrestrial: woodland broadleaf, forest mixed
<i>Marah oregana</i>	Coast manroot	Vascular Plant	Red	Marine; beach; vegetated
<i>Nearctula sp. 1</i>	Threaded vertigo	Invertebrate Animal	Blue	Terrestrial: forest mixed
<i>Populus trichocarpa - Alnus rubra/Rubus spectabilis</i>	Black cottonwood - Red alder/salmonberry	Ecological Community	Blue	n/a
<i>Pseudotsuga menziesii - Arbutus menziesii</i>	Douglas-fir - arbutus	Ecological Community	Red	Terrestrial; forest mixed
<i>Pseudotsuga menziesii/Berberis nervosa</i>	Douglas-fir/dull Oregon-grape	Ecological Community	Red	n/a
<i>Pseudotsuga menziesii/Melica subulata</i>	Douglas-fir/Alaska oniongrass	Ecological Community	Red	Terrestrial; forest mixed
<i>Quercus garryana/Holodiscus discolor</i>	Garry oak/oceanspray	Ecological Community	Red	Terrestrial; forest broadleaf
<i>Syntrichia laevipila</i>	Twisted oak moss	Nonvascular Plant	Blue	Terrestrial: grassland/herbaceous; epiphytic
<i>Thuja plicata/Achlys triphylla</i>	Western redcedar/vanilla-leaf	Ecological Community	Red	Terrestrial; forest needleleaf
<i>Thuja plicata/Oemleria cerasiformis</i>	Western redcedar/Indian-plum	Ecological Community	Red	Terrestrial; forest mixed
<i>Triteleia howellii</i>	Howell's triteleia	Vascular Plant	Red	Terrestrial: rock outcrop; woodland mixed



Scientific Name	Common Name	Category	BC List	Habitat Type
<i>Tyto alba</i>	Barn owl	Vertebrate Animal	Red	Terrestrial: cropland/hedgerow, building

3.4 OTHER RESOURCE VALUES

There are multiple resources values associated with the land base, including large scale and hobby agriculture, recreation, tourism and wildlife habitat.

The Arrowsmith Timber Supply Area (TSA) encompasses the DNS, although no primary forestry activities occur within the District. Thus, higher level planning documents associated with the TSA do not apply and fuel reduction treatments will not have an effect on the timber harvesting land base.

3.5 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders. Generally, the DNS does not have a significant number of industrial sites and facilities that can be considered hazardous values. The CRD provides bi-weekly pickup of certain recycling materials. Garbage collection services are not offered by the DNS, and residents have to arrange garbage collection through local private companies, or drop off residential garbage at the Hartland landfill (located outside of the AOI).

The management and treatment of fuels in proximity to hazardous infrastructure is critical in order to reduce the risks associated with both structural fire and wildfire. Specifically, best management practices recommended for management of hazardous values include: 1) incorporating FireSmart planning and setback requirements for all infrastructure in this category; and 2) maintaining emergency fuel/propane emergency shut off procedures to be enacted immediately and efficiently in the event of an approaching wildfire or ember shower.

SECTION 4: WILDFIRE THREAT AND RISK

This section summarizes the factors that contribute to and were assessed in the determination of wildfire threat around the community. These factors include the natural fire regime and ecology, the Provincial Strategic Threat Analysis, and the local wildfire risk analysis completed for the AOI.

The relationship between wildfire hazard, threat and risk is defined as follows:

$$\text{Wildfire risk} = \text{Probability} \times \text{Consequence}$$

Where:

- Wildfire risk is defined as the potential losses incurred to human life, property and critical infrastructure within a community in the event of a wildfire;
- Probability is the likelihood of fire occurring in an area and is related to the susceptibility of an area to fire (fuel type, climate, probability of ignition etc.); and

- Consequences refer to the repercussions associated with fire occurrence in a given area (higher consequences are associated with densely populated areas, or areas of high biodiversity etc.).

4.1 FIRE REGIME, FIRE WEATHER AND CLIMATE CHANGE

The ecological context of wildfire and the role of fire in the local ecosystem under historical conditions is an important basis for understanding the current conditions and the potential implications of future conditions on wildfire threat to the community. Historical conditions may be altered by the interruption of the natural fire cycle (i.e., due to fire exclusion, forest health issues, human development) and/or climate change.

4.1.1 Fire Regime and Fire Weather

Historic Fire Regime

The Biogeoclimatic Ecosystem Classification (BEC) system describes zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. Subzones may be further divided into variants based upon climatic variation and the resulting changes in the vegetative communities; variants are generally slightly drier, wetter, snowier, warmer, or colder than the climate of the regional subzone.²⁷ BEC zones have been used to classify the Province into five Natural Disturbance Types (NDTs). NDTs have influenced the vegetation dynamics and ecological functions and pathways that determine many of the characteristics of our natural systems. The NDT classification is based on the frequency and severity of pre-European disturbance events (including but not limited to wildfires) and provides an indication of historical fire regime. The physical and temporal patterns, structural complexity, vegetation communities, and other resultant attributes should be used to help design fuel treatments, and where possible, to help ensure that treatments are ecologically and socially acceptable²⁸. The AOI is characterized by the BEC subzone and associated NDT as outlined in Table 6.

Table 6. BEC zones and natural disturbance types found within the AOI²⁹.

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
Coastal Douglas-fir, Moist Maritime (CWHmm) BEC Zone	NDT2	4,992	100%

The entirety of the AOI is categorized as NDT2. Natural Disturbance Type 2 comprises forest ecosystems (CWHmm) with infrequent stand initiating events where fires were often of moderate size (20 to 1,000 ha) with a mean return interval of fire of approximately 200 years. Many of these fires occur after periods of extended drought and produce a forested landscape characterized by extensive areas of mature forest with intermixed patches of younger forests.³⁰ Although the fire frequency is not high and fires are

²⁷ BECWeb: <https://www.for.gov.bc.ca/HRE/becweb/resources/classificationreports/subzones/index.html>

²⁸ Province of British Columbia, 1995. Biodiversity Guidebook, s.l.: s.n.

²⁹ Source: MFLNRORD BEC Map (DataBC)

³⁰ Province of British Columbia, 1995. Biodiversity Guidebook, s.l.: s.n.

generally not large, pre-planning and preparation are essential to reduce the negative impacts of a wildfire.

While natural disturbance regimes are useful for describing the historical disturbance pattern typical for an area, fire history is complex and highly variable across space and time for many ecosystems.³¹ Furthermore, forest health issues, human development and natural events contribute to changes in the fire regime, forest attributes and fuel hazard around the community.

Forest Health Issues

Several forest health issues were identified during field assessments in the AOI. Invasive species commonly occur in many of the parks and protected areas in the municipality, with some areas having low to no forest cover due to invasive species competition during stand establishment or development. The occurrence of species such as English holly, English ivy and Himalayan blackberry were noted in low-disturbance interface forest stands within 200 m from the nearest road or establishment. The removal of invasive species should occur concurrently with fuel treatments to ensure cost efficiencies. Site monitoring should occur post-treatment to evaluate treatment efficacy and assess further mitigation requirements.

English holly treatment may be in the form of manual removal, with small plants being pulled to remove the roots and large plants cut at the root collar to suppress the growth of future sprouts. English ivy mitigation can occur via manual pruning or pulling of the plant at the root and removal of resulting plant material from the site, avoiding cuttings, as those can sprout. Areas treated for English ivy removal should be mulched or covered in chips produced during the fuel treatment, and frequently monitored and managed post-treatment. Himalayan blackberry treatment may be done manually, individual stems less than 1 cm in diameter can be pulled or dug out by root crowns and larger patches should be brushed or mowed twice seasonally. For the most effective results, the first treatment should be done in May and the second removal should be completed by the end of June once all the stored carbohydrates in the roots have been deployed into the foliage.

The Coast Forest Health Overview outlines forest health issues present within the Arrowsmith TSA.³² This overview and forest health strategy (2015-2017) outlines ten forest health issues that are most prevalent within this timber supply area: Douglas-fir beetle, drought, gypsy moth, mountain pine beetle, root diseases (primarily laminated root disease and *Armillaria* spp.), spruce aphid, western black headed budworm, western hemlock looper, western spruce budworm and windthrow. The 2017 provincial summary of forest health conditions identified recent forest health impacts in the Arrowsmith TSA.³³ These include laminated root disease, a common damaging agent in southern BC; only five spot

³¹ Hall, E. 2010. Maintaining Fire in British Columbia's Ecosystems: An Ecological Perspective. Report submitted to the Wildfire Management Branch, Ministry of Forests and Range.

³² 2015-17 Coastal Timber Supply Areas Forest Health Overview. 2015. Available online at: https://www.for.gov.bc.ca/ftp/HFP/external/!publish/Forest_Health/TSA_FH_Strategies/2015-Coast%20FH%20Strategy.pdf

³³ 2017 Summary of Forest Health Conditions in British Columbia. 2017.

disturbances of armillaria root disease; and Douglas-fir beetle infestations, which rose in the West Coast Region.

Spatial data available through DataBC³⁴ do not indicate that any significant forest health impacts have occurred within the AOI, either historically or contemporarily. This is likely attributable to agricultural and residential development that has reduced continuous forest cover within the AOI. Forest health factors are important to note, because they have implications for the level of surface fuel accumulation in affected stands, as well as access and working conditions for firefighters in the event of wildfire. Both laminated and armillaria root rot can result in high levels of windthrow due to the destabilization of infected trees' root systems.

Human Development and Natural Events

Most land cover change in the AOI can be described as residential and some agricultural and commercial/industrial development. These processes entail land clearing and road building. Forest harvesting is not common within the AOI. Abiotic and biotic natural events occur at small geographic scales. The overall implication of human development is an increase in human ignition potential with a decrease in hazardous fuels cover as land clearing for human development generally increases the non-fuel and O-1a/b fuel types (see Appendix A-1) for a description of fuel types).

Since the establishment of settler communities within the DNS, there have been numerous anthropogenic and natural changes that have occurred on the landscape. The following is a list of notable changes observed within the AOI and a description of associated implications regarding wildfire behaviour.

- Residential land development has occurred across the AOI since the mid-19th century following wide-spread settlement by early pioneers engaging in resource-based activities. The majority of the AOI has been developed into privately owned parcels. This has resulted in significant land-cover change, and has increased the area of wildland-urban interface. Population growth is expected to continue and the area's proximity to the Greater Victoria Area, favourable climate and high recreational and landscape values make it a desirable place to live and work.
- Agricultural development – Within the boundaries of the District of North Saanich, 1,284 hectares are zoned within the Agricultural Land Reserve (ALR).³⁵ Farmland in the DNS is used for dairy production; for winery development; for nurseries and horticulture; for fruit and vegetable production; and rearing horses and other livestock, including beef cattle. In agricultural areas with year-round irrigation, the potential for fine fuels to cure during the wildfire season is low, and the potential wildfire behaviour is greatly reduced.

Fire Weather Rating

The Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. Fire Danger Classes provide a relative index of the ease of ignition and the difficulty of suppression. A network of fire weather stations is maintained during the

³⁴ https://catalogue.data.gov.bc.ca/pt_BR/dataset/pest-infestation-polygons (current as of September, 2017)

³⁵ District of North Saanich. 2010. *Official Community Plan*.

fire season by MFLNRORD and the recorded data are used to determine fire danger, represented by Fire Danger Classes, on forestlands within a community. The information can be obtained from the BCWS and is most commonly utilized by municipalities and regional districts to monitor fire weather, restrict high risk activities when appropriate, and to determine hazard ratings associated with bans and closures.

The BC *Wildfire Act* [BC 2004] and *Wildfire Regulation* [BC Reg. 38/2005], which specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation, and restrict high risk activities based on these classes. Fire Danger Classes are defined as follows:

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

It is important for the development of appropriate prevention programs that the average exposure to periods of high fire danger is determined. 'High fire danger' is considered as Danger Class ratings of 4 (High) and 5 (Extreme). Danger class days were summarized to provide an indication of the fire weather in the AOI. Considering fire danger varies from year to year, historical weather data can provide information on the number and distribution of days when the AOI is typically subject to high fire danger conditions, which is useful information in assessing fire risk. Figure 1 displays the average frequency of Fire Danger Class days between the months of April and October. The data is summarized from the Victoria Airport (EC) weather station (years 2010 – 2019) which provides the longest fire weather data collection interval within the AOI. According to Figure 1, the months with the highest average number of 'high' and 'extreme' fire danger class days are June, July, August and September. The month of August historically has the highest overall average number of 'extreme' fire danger class days followed by July and September. Although highest fire danger is within these four months, it should be noted that there are 'high' and 'extreme' danger class days which extend into May and October (Figure 1).

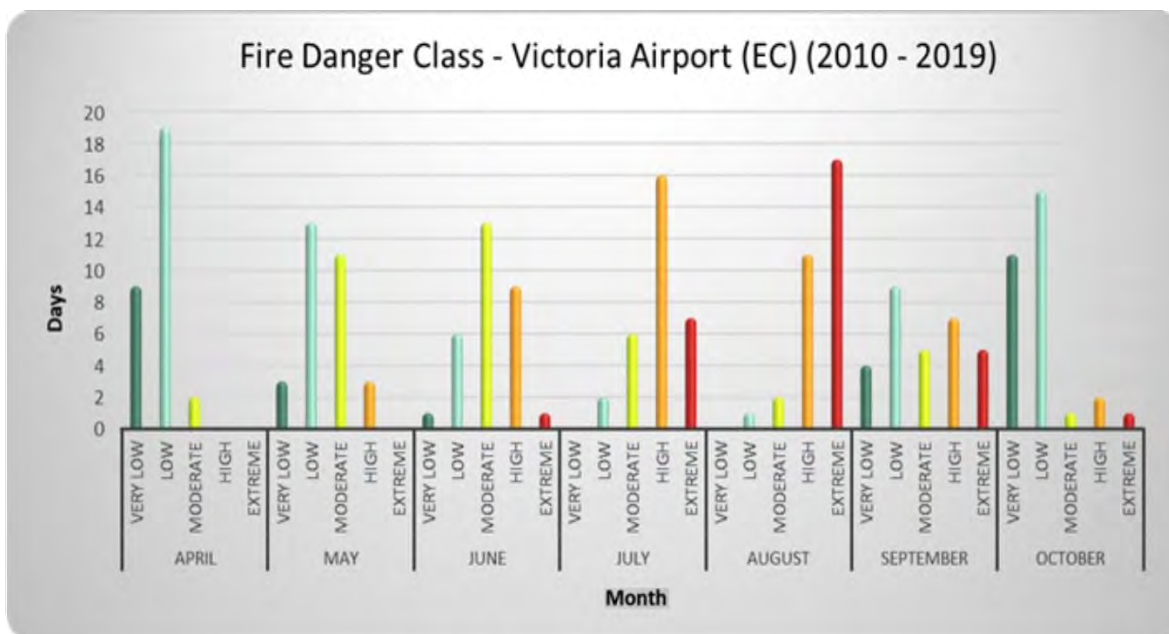


Figure 1. Average number of danger class days for the Victoria Airport (EC) weather station. Summary of fire weather data for the years 2010 - 2019.

4.1.2 Climate Change

Climate change is a serious and complex aspect to consider in wildfire management planning. "Climate change projections point to a warmer and drier environment and shifts in vegetation with the following implications in some areas of the province:

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

As a result, some existing forests have an increased probability of more frequent, intense and more difficult to control wildfires that are likely to result in increased tree mortality, detrimental impacts to soils and hydrology, and increased threat to the community and interface areas.³⁶ Numerous studies outline the nature of climate change impacts on wildland fire across Canada, and globally.³⁷ Although there are uncertainties regarding the extent of these impacts on wildfire, it is clear that the frequency, intensity, severity, duration and timing of wildfire and other natural disturbances is expected to be altered significantly with the changing climate.³⁸ Despite the uncertainties, trends within the data are

³⁶ Community Resiliency Investment Program. 2018. Community Wildfire Protection Plan Template.

³⁷ Flannigan, M.D et al. 2009. Implications of changing climate for global wildland fire. *International Journal of Wildland Fire* 18, 483-507.

³⁸ Dale, V., L. Joyce, S. McNulty, R. Neilson, M. Ayres, M. Flannigan, P. Hanson, L. Irland, A. Lugo, C. Peterson, D. Simberloff, F. Swanson, B. Stocks, B. Wotton. *Climate Change and Forest Disturbances*. *BioScience* 2001 51 (9), 723-734.

visible. As outlined in *Climate Projections for the Capital Region*³⁹, the following climate projections for the Capital Regional District, including the District of North Saanich are made:

- Year round increases in temperature, with the greatest increases occurring in the summer months (an increase in average summer daytime high temperatures of 3.2° C by the 2050s and 5.2° C by the 2080s);
- More than triple the number of days above 25°C, from a past average of 12 days per year to 36 days per year by the 2050s.
- Increase in the 1-in-20-year hottest day's temperature from a past of 32° C to 36° C by the 2050s.
- Decline in summer precipitation by approximately 20% by the 2050s, and increase in summer dry spells by approximately 20% by the 2060s. This trend is associated with drier fuels and soils, increasing fire behaviour potential.
- Overall increase in precipitation by 5% by the 2050s, with the greatest increase occurring during the fall season, in increasingly extreme events. Approximately 31% more precipitation on very wet days, and 68% more precipitation on extremely wet days is projected. This change to the hydrological regime in the region may influence watershed and groundwater storage ability; timing and quantity of run-off; and soil and fuel moisture during early fire season.
- Average winter temperatures are projected to increase, with a 69% decrease in the number of frost days. The "new normal" is a climate that is almost entirely frost free at lower elevations (inclusive of the DNS, which is located within 100 m of sea level).

An increased frequency of natural disturbance events is expected to occur as a result of climate change with coincident impacts to ecosystems. Models project a high level of annual variability, with considerably more precipitation falling in some years, while other years will experience droughts. Projected changes to natural disturbance regimes include:³⁹

- Increased number of storm events, with associated catastrophic blowdown and damage to trees from high winds;
- Increased potential for longer and more severe drought conditions, and increased potential for wildfire events; and
- Increased winter precipitation which may result in slope instability, mass wasting, increased peak flows (loss of forest cover from fire or other disturbance may increase the chance of mass wasting).

Insects and disease occurrence of spruce beetle and Swiss needle cast may increase; outbreaks of western hemlock looper may increase.⁴⁰ Other research regarding the intricacies of climate change and potential impacts on wildfire threats to Canadian forests has found that:

³⁹ Capital Regional District. 2017. *Climate Projections for the Capital Region*. Retrieved from: https://www.crd.bc.ca/docs/default-source/climate-action-pdf/reports/2017-07-17_climateprojectionsforthecapitalregion_final.pdf?sfvrsn=bb9f39ca_12

⁴⁰ MFLNRO, 2016. BC Provincial Government extension note 'Adapting natural resource management to climate change in the West and South Coast Regions'. Accessed online at: <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/regional-extension-notes/coasten160222.pdf>

- Fuel moisture is highly sensitive to temperature change and projected precipitation increases will be insufficient to counteract the impacts of the projected increase in temperature. Results conclude that future conditions will include drier fuels and a higher frequency of extreme fire weather days.⁴¹
- The future daily fire severity rating (a seasonally cumulative value) is expected to have higher peak levels and head fire intensity is expected to increase significantly in Western Canada. A bi-modal (spring-late summer) pattern of peak values may evolve to replace the historical late summer peak which is the current norm.⁴² The length of fire seasons is expected to increase and the increase will be most pronounced in the northern hemisphere, specifically at higher latitude northern regions. Fire season severity seems to be sensitive to increasing global temperatures; larger and more intense fires are expected and fire management will become more challenging.^{43, 44}
- Future climatic conditions may be more suitable for, or give competitive advantage to, new species of plants, including invasive species.⁴⁵

In summary, climate scientists expect that the warming global climate will trend towards wildfires that are increasingly larger, more intense and difficult to control. Furthermore, it is likely that these fires will be more threatening to WUI communities due to increased potential fire behaviour, fire season length, and fire severity.

4.2 PROVINCIAL STRATEGIC THREAT ANALYSIS

The Provincial Strategic Threat Analysis (PSTA) evaluates multiple data sets to provide a coarse (high-level) spatial representation of approximate relative wildfire threats across BC. It provides a starting point to assess the local wildfire threat. Three inputs are combined to create the PSTA wildfire threat analysis component⁴⁶:

- 1) **Historic fire density:** represents the ignition and fire spread potential based upon historic patterns and fire density weighted by fire size (larger fire perimeters were given a higher weight in order to reflect the greater cost and damage usually associated with larger fires).
- 2) **Spotting impact:** represents the ability of embers or firebrands from a burning fire to be sent aloft and start new fires in advance of the firefront, or outside of the fire perimeter. Spotting is most associated with high intensity crown fires in coniferous fuels and structure losses. For the wildfire threat analysis, the spotting analysis is based on estimating the threat to a given point

⁴¹ Flannigan, M.D., B.M. Wotton, G.A. Marshall, W.J. deGroot, J. Johnston, N. Jurko, A.S. Cantin. 2016. *Fuel moisture sensitivity to temperature and precipitation: climate change implications*. Climatic Change (2016) 134: 59 -71. Accessed online at <https://link.springer.com/content/pdf/10.1007%2Fs10584-015-1521-0.pdf>.

⁴² deGroot, W. J., M. D. Flannigan, A.S. Cantin. 2013. *Climate change impacts on future boreal fire regimes*. Forest Ecology and Management. 294: 35 -44.

⁴³ Flannigan, M.D., A.S. Cantin, W.J. de Groot, M. Wotton, A. Newbery, L.M. Gowman. 2013. *Global wildland fire season severity in the 21st century*. Forest Ecology and Management (2013) 294: 54 - 61.

⁴⁴ Jandt, R. 2013. Alaska Fire Science Consortium Research Brief 2013-3.

⁴⁵ Pacific Climate Impacts Consortium, 2017. Climate Extremes in the Georgia Basin Summary Report, Accessed online at: https://www.pacificclimate.org/sites/default/files/publications/Summary-Climate_Extremes_in_the_Georgia_Basin-Final.pdf

⁴⁶ BC Wildfire Service. 2015. *Provincial Strategic Threat Analysis 2015 Wildfire Threat Analysis Component*. Accessed online at: https://www.for.gov.bc.ca/ftp/!Project/WildfireNews/PSTA/Provincial_Strategic_Threat_Analysis_PSTA_2015_REPORT.pdf.

on the landscape from the fuels surrounding it, up to a distance of 2 km. Spotting distances greater than 2 km are rare and unpredictable.

- 3) **Head fire intensity (HFI):** represents the intensity (kW/m) of the fire front. HFI is correlated with flame length and fire behaviour. The greater the fire intensity (kW/m), or HFI and fire intensity class, the more extreme the fire behaviour is likely to be and the more difficult the fire will likely be to suppress. The HFI used in the wildfire threat analysis was developed using the 90th percentile fire weather index value.

The final wildfire threat analysis value was developed through an average weighting process of the aforementioned three layers⁴⁷. The values were then separated into 10 classes (1 – 10) which represent increasing levels of overall fire threat (the higher the number, the greater the fire threat); threat class 7 is considered the threshold. Threat classes of 7 and higher are locations where the threat is severe enough to potentially cause catastrophic losses in any given fire season, when overlapping with values at risk. Classes were grouped into the following general threat class descriptions: low (1 – 3); moderate (4 – 6); high (7 – 8); and, extreme (9 – 10).

There are considerable limitations associated with the PSTA wildfire threat analysis component based upon the accuracy of the source data and the modelling tools, the most notable being:

- Limited accuracy and variability of the fire history point data;
- Sensitivity to fuel type and the associated limitations of using fuel type approximations for fire behaviour modelling; and,
- 90th percentile rating for HFI, which represents a near worst-case scenario which may be artificial in some circumstances.

Consequently, the PSTA is complemented by a finer scale local wildfire threat analysis considering local factors to improve the wildfire threat assessment. The key steps to completing the local wildfire threat analysis and a detailed assessment of the local wildfire threat are described in Section 4.3 and Appendix A – Local Wildfire Threat Process.

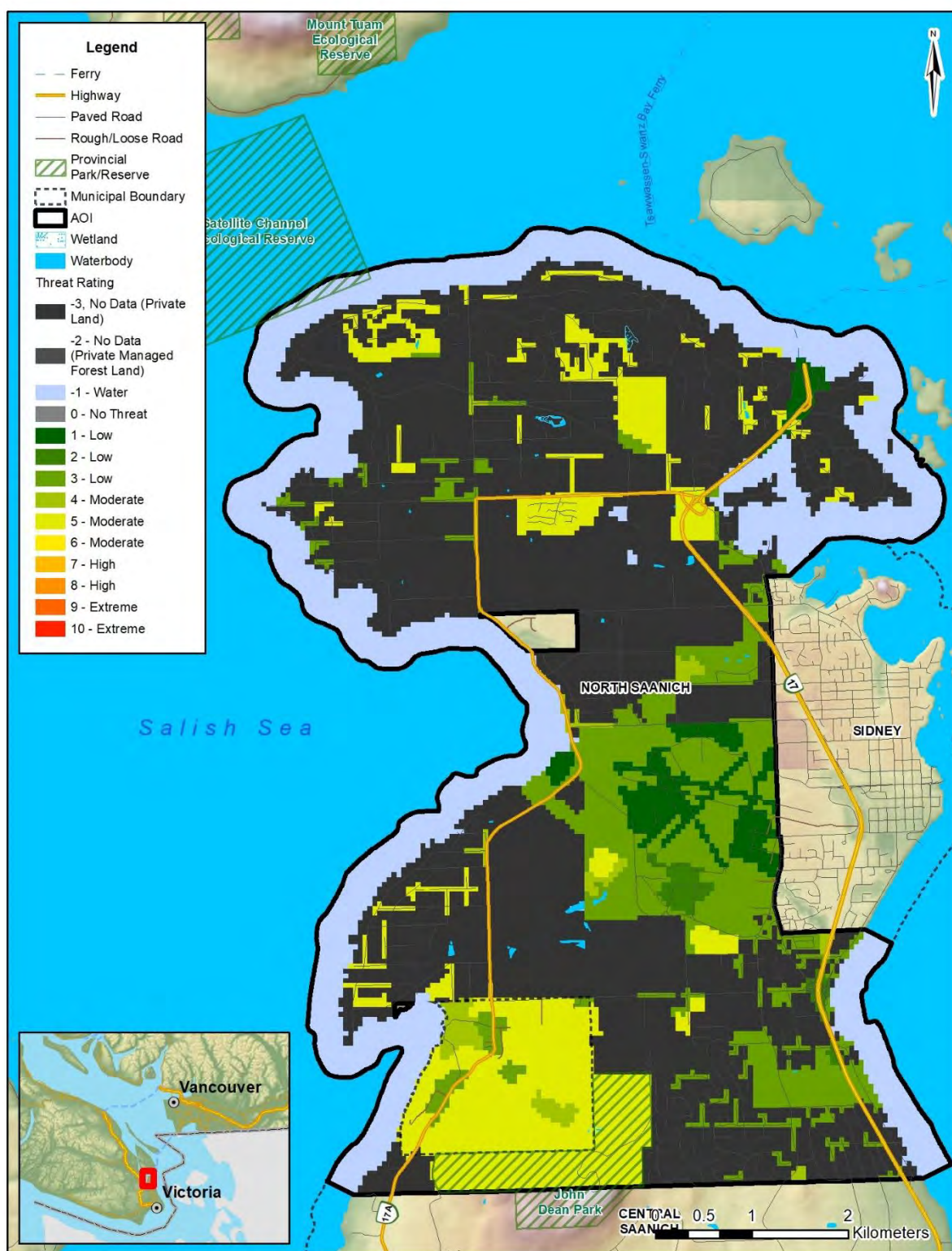
The fire threat ratings from the 2019 PSTA are summarized for the AOI in Table 7 and spatially illustrated in Map 3. Approximately half of the AOI is categorized as private land, which has no data for wildfire threat available in the PSTA dataset. Low threat areas cover 15% of the AOI and water covers 21%. Approximately 13% of the AOI is categorized as having a moderate wildfire threat rating in the provincial Wildfire Threat Analysis (Table 7). Areas rated a moderate wildfire threat are scattered throughout the AOI. One area in the southwest corner of the AOI, overlapping with ŁÁU,WELNEW/John Dean Provincial Park, represents a significant proportion of the total area of moderate wildfire threat. Other areas of note include interface neighborhoods around Horth Hill Regional Park, around Wain Road, and south of Woodcreek Drive. There are no areas within the AOI that are categorized as a high or extreme wildfire threat according to the 2019 PSTA dataset.

⁴⁷ Weighting of the three PSTA wildfire threat analysis components: Fire density 30%; HFI 60%; spotting impact 10% (water bodies were automatically given a value of ‘no threat’ [-1])



Table 7. Overall PSTA Wildfire Threat Analysis for the AOI (rounded to the nearest hectare).

Threat Class	Area (ha)	Threat Class Description	Percent of AOI
-3	2,524	No Data (Private Land)	51%
-2	0	No Data (Private Managed Forest Land)	0%
-1	1,053	Water	21%
0	0	No Threat	0%
1	137	Low	15%
2	34		
3	573		
4	56	Moderate	13%
5	615		
6	0		
7	0	High	0%
8	0		
9	0	Extreme	0%
10	0		
Total	4,992	-	100%



Map 3. Provincial Strategic Threat Rating.

4.2.1 Fire History

Fire ignition and perimeter data are depicted in Map 4. Fire ignition data for the area is available for 1950-2017 and fire perimeter from 1919-2017. Based on the fire ignition data, there have been 23 fire ignitions within the AOI, all of which were human-caused (due to smokers, incendiaries and fire use). Small and medium historical wildfires have burned throughout the AOI, ranging in area from approximately 2 ha to 35 ha. Three fires in total are recorded as having burned within the AOI. All three were human-caused, and occurred in the 1920's. South of the AOI two larger fires (424 ha, and 1,109 ha) occurred between 1922 and 1934. Both were human caused. This fire history demonstrates that the vast majority of fires in the AOI and adjacent occurred due to humans and that the common fires and relatively large scales seen in the first half of the 20th century have not occurred since.



Map 4. Fire Regime, Ecology and Climate Change.

4.3 LOCAL WILDFIRE THREAT ASSESSMENT

The local wildfire threat assessment process includes several key steps as outlined in Appendix A – Local Wildfire Threat Process and summarized as follows:

- Fuel type attribute assessment, ground truthing/verification and updating as required to develop a local fuel type map (Appendix A-1).
- Consideration of the proximity of fuel to the community, recognizing that fuel closest to the community usually represents the highest hazard (Appendix A-2).
- Analysis of predominant summer fire spread patterns using wind speed and wind direction during the peak burning period using ISI Rose(s) from BCWS weather station(s) (Appendix A-3). Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread.
- Consideration of topography in relation to values (Appendix A-4). Slope percentage and slope position of the value are considered, where slope percentage influences the fire's trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill.
- Stratification of the WUI according to relative wildfire threat based on the above considerations, other local factors and field assessment of priority wildfire risk areas.

WUI Threat Assessments were completed over five field days in September of 2019, in conjunction with verification of fuel types (see Appendix C for WUI Threat Assessment worksheets and photos). WUI Threat Assessments were completed in interface (i.e., abrupt change from forest to urban development) and intermix (i.e., where forest and structures are intermingled) areas of the AOI to support development of priority treatment areas, and in order to confidently ascribe threat to polygons which may not have been visited or plotted, but which have similar fuel, topographic, and proximity to structure characteristics to those that were.

Field assessment locations were prioritized based upon:

- Proximity to values at risk – Field assessments were clustered in the intermix and interface, as well as around critical infrastructure.
- Prevailing fire season winds – More field time was spent assessing areas upwind of values at risk.
- Slope position of value – More field time was spent assessing areas downslope of values at risk. Similarly, values at top of slope or upper third of the slope were identified as particularly vulnerable.
- Land ownership – Crown and municipal land was the main focus of field assessments.
- Local knowledge – Areas identified as hazardous, potentially hazardous, with limited access/egress, or otherwise of particular concern as vulnerable to wildfire, as communicated by local fire officials and BCWS zone staff.
- Observations – Additional areas potentially not recognized prior to field work were visually identified as hazardous and assessed during the week.

A total of 36 WUI threat plots were completed and over 130 other field stops (e.g., qualitative notes, fuel type verification, and/or photograph documentation) were made across the AOI (see Appendix F for WUI threat plot locations).

Using the verified and updated fuel types (Appendix A-1, Map 7) combined with field wildfire threat assessments and office-based analysis (Appendix A-1 to A-4), local wildfire threat for the AOI was updated. Using the Wildfire Threat Assessment methodology⁴⁸, there are two main components of the threat rating system: the wildfire behaviour threat class (fuels, weather and topography sub-components) and the WUI threat class (structural sub-component).

The result of the analysis shows that the AOI is composed of a mosaic of very low, low and moderate threat class stands, with some small areas of high threat class stands. High threat class stands represent less than 1% of the AOI area. The variability in wildfire threat is dictated primarily by the level of natural and anthropogenic disturbances that have historically occurred and persist on the landbase. The AOI is less than 1% high threat class rating, 10% moderate, 21% low, 20% very low/water (Map 5 and Table 8). The remaining 49% of the AOI is classified as private land and as such has not been allocated fire threat data. Table 8 also indicates the differences between the original PSTA threat rating and this CWPP's corrected fire behaviour threat.

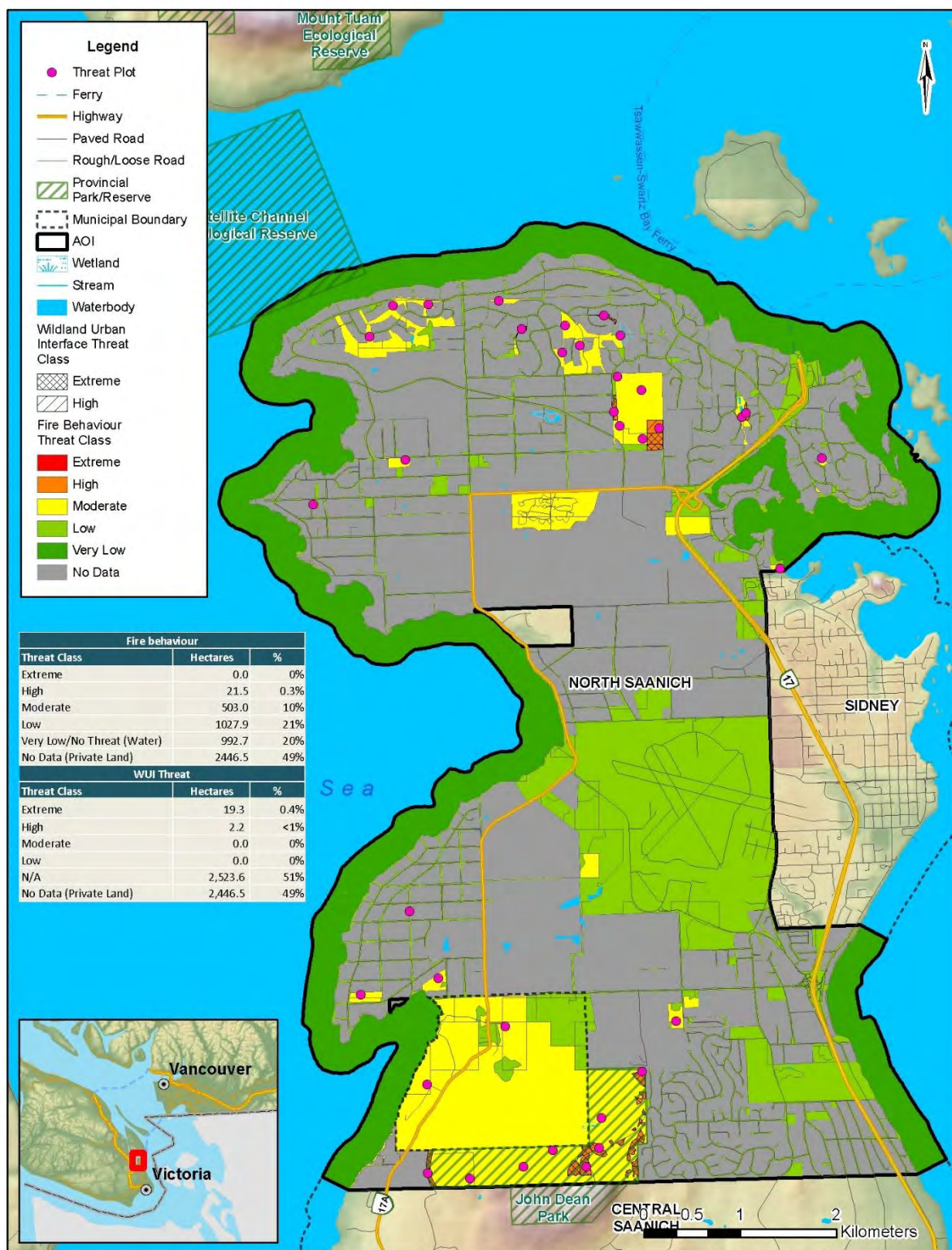
The areas that represent the highest wildfire behavior potential and greatest risk to values within the DNS are the areas of high threat class adjacent to Horth Hill Regional Park; in intermix neighborhoods north and east of Horth Hill Regional Park; surrounding an access/egress route through ŁÁU,WELNEW/John Dean Provincial Park; and surrounding critical infrastructure within ŁÁU,WELNEW/John Dean Provincial Park.

For detailed field data collection and spatial analysis methodology for the local threat assessment and classification, please see Appendix H – WUI Threat Assessment Methodology.

Table 8. Fire behaviour threat summary for the AOI.

Wildfire Behaviour Threat Class	2019 PSTA Data	2019 CWPP
	Percent of AOI	Percent of AOI
Extreme	0%	0%
High	0%	<1%
Moderate	13%	10%
Low	15%	21%
Very Low/ No Threat (Water)	21%	20%
No Data (Private Land)	51%	49%

⁴⁸ Using the 2012 WUI Wildfire Threat Assessments in B.C. Guide
(<https://www.ubcm.ca/assets/Funding~Programs/LGPS/SWPI/Resources/swpi-WUI-WTA-Guide-2012-Update.pdf>)



Map 5. Local Fire Behaviour Threat Rating and WUI Threat Rating.

SECTION 5: RISK MANAGEMENT AND MITIGATION FACTORS

This section outlines a wildfire risk management and mitigation strategy that accounts for fuel types present within the community, local ecology, hazard, terrain factors, land ownership, and capacity of local government. Wildfire risk mitigation is a complex approach that requires cooperation from applicable land managers/owners, which includes all level of governments (local, provincial, federal and First nations), and private landowners. The cooperative effort of the aforementioned parties is crucial in order to develop and proactively implement a wildfire risk mitigation program. Development of a successful wildfire risk mitigation strategy is dependent on hazard identification within the community, which accounts for forest fuels, high risk activities, frequency and type of human use, and other important environmental factors. The resulting wildfire risk management and mitigation strategy aims to build more resilient communities and produces strategic recommendations or actionable items that can be categorized as follows:

1. Fuel management opportunities to reduce fire behaviour potential in the WUI;
2. Applications of FireSmart approaches to reduce fire risk and impacts within the community; and,
3. Implementation of communication and education programs to inform and remind the public of the important role it plays in reducing fire occurrence and impacts within its community.

5.1 FUEL MANAGEMENT

Fuel management, also referred to as vegetation management or fuel treatment, is a key element of wildfire risk reduction. For the purpose of this discussion, fuel management generally refers to native vegetation/fuel modifications in forested areas greater than 30 m from homes and structures (Priority Zone 3 and beyond).

The objectives for fuel management are to:

- Reduce wildfire threat on private and public lands nearest to values at risk; and,
- Reduce fire intensity, rate of spread, and ember/spot fire activity such that the probability of fire containment increases and the impacts on the forested landscape and the watershed are reduced (create more fire resilient landscapes).

Ideally, these objectives will enhance protection to homes and critical infrastructure. Caveats associated with the statement include: 1) wildfire behaviour will only be reduced if the fire burns in the same location as treatments occurred, and 2) protection of homes and critical infrastructure is highly dependent upon the vulnerability to ignition by embers (ignition potential) directly around the value at risk. In summary, fuel treatments alone should not be expected to protect a community from the effects of wildfire, namely structure loss.

Fuel treatments are designed to reduce the possibility of uncontrollable crown fire through the reduction of surface fuels, ladder fuels and crown fuels. However, the degree of fire behaviour reduction achieved by fuel management varies by ecosystem type, current fuel type, fire weather, slope and other variables and it is important to note that it does not stop wildfire.

Fuel management on local government and provincial Crown land may be funded by the Union of BC Municipalities (UBCM) through the Community Resiliency Investment (CRI) Program (subject to current program requirements). The CRI Program (formerly the Strategic Wildfire Prevention Initiative or SWPI) also provides funding for selected FireSmart activities and planning on private land (subject to program requirements and limits).⁴⁹ It is important to recognize that approximately half of the AOI is located on private property, which increases some of the challenges encountered in mitigation of fuels on private lands. The best approach to mitigate fuels on private lands is to urge private landowners to comply with FireSmart guidelines (as described below in Section 5.2) and to conduct appropriate fuel modifications using their own resources (CRI program funding may be available). In general, when considering fuel management to reduce fire risk, the following steps should be followed:

- Carefully anticipate the likely wildfire scenarios to properly locate fuel modification areas;
- Acquire an understanding of local ecological, archaeological, and societal values of the site;
- Prescriptions should be developed by a qualified professional forester working within their field of competence;
- Public consultation should be conducted during the process to ensure community support;
- Potential treatment areas and draft prescriptions should be referred to First Nations with sufficient time for meaningful review and input;
- Treatment implementation should weigh the most financially and ecologically beneficial methods of fulfilling the prescription's goals;
- Pre- and post-treatment plots should be established to monitor treatment effectiveness; and
- A long-term maintenance program should be in place or developed to ensure that the fuel treatment is maintained in a functional state.

The fuel treatment opportunities identified in this document include the use of interface fuel breaks and interface fuel treatment as defined in Section 5.1.1, to reduce the wildfire potential around the AOI. Potential treatment activities include fuel removal, thinning, stand conversion, pruning, and chipping, or a combination of two or more of these activities. Stand conversion has been shown to be effective at reducing wildfire potential in mixed-wood or conifer dominated stands and is recommended as a BMP to encourage a higher deciduous component. This approach generally involves a thin-from-below to reduce ladder fuels and crown fuels continuity, targeting the removal of conifer species and the retention of broadleaf species.

⁴⁹ 2019 CRI FireSmart Community Funding & Supports – Program & Application Guide:
<https://www.ubcm.ca/assets/Funding~Programs/LGPS/CRI/cr-2019-program-guide.pdf>



5.1.1 Proposed Treatment Units

Funding opportunities from UBCM under the CRI Program will consider fire prevention activities on provincial Crown land, local government and reserve land⁵⁰. Fire prevention activities on private land that may be funded under this program are related to FireSmart activities (including FireSmart planning and assessments, local rebate programs for completion of eligible FireSmart activities, and provision of off-site disposal of vegetation management debris), subject to program requirements. This does not preclude other current and future funding opportunities or potential industrial partnerships and changes to existing programs.

The potential treatment areas represent moderate or high fire hazard areas which are close to values at risk (structures or infrastructure) and are located on Crown provincial or municipal land. It should be noted that the location of proposed treatment units on these land ownership types does not imply that high and extreme hazard areas do not exist on private land within the AOI. As stated in Section 5.1, mitigation approaches should also be pursued on private land where hazard exists, bearing in mind the different funding resources and objectives on these land types. Recommendation for treatment in areas of moderate fire hazard were limited to areas which would increase efficacy of, and/or create continuity between areas of low threat/no fuel areas. All polygons identified for potential treatment have been prioritized based on fire hazard, operational feasibility, estimated project cost, type and number of values at risk, common fire weather (wind direction), and expected efficacy of treatment. Although potential treatment areas have been ground-truthed during field work, additional refinement of the polygons will be required at the time of prescription development. Polygons will require detailed site-level assessment to stratify treatment areas (and areas of no treatment), identify values and constraints, and identify and engage all appropriate provincial agencies, First Nations, and stakeholders.

Recommended potential treatment areas within the AOI are outlined in Table 9 and displayed in Map 6. These fuel treatment opportunities include the use of interface fuel treatments (the treatment of both patches of fuels and linear interface fuel breaks) as defined below.

Fuel Treatment Types

The intent of establishing a fuel break (and associated treated patches) is to modify fire behaviour and create a fire suppression option that is part of a multi-barrier approach to reduce the risk to values (e.g., structures). A fuel break in and of itself, is unlikely to stop a fire under most conditions. The application of appropriate suppression tactics in a timely manner with sufficient resources, is essential for a fuel break to be effective. Lofting of embers (i.e., “spotting”) over and across a fuel break is a possibility (increasing with more volatile fuel types and fire weather) and has the potential to create spot fires beyond the fuel break that can expand in size and threaten values at risk, or land directly on or near structures and ignite them. To address spotting, fuels between the fuel break and the values at risk

⁵⁰ This new funding program (up to \$50 million over three years) was initiated in 2018 as per recommendations from the 2017 BC Flood and Wildfire Review Report by Abbott and Chapman (<https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bc-flood-and-wildfire-review-addressing-the-new-normal-21st-century-disaster-management-in-bc-web.pdf>). Program details are available on the UBCM’s website: <https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html>

should be evaluated and treated to create conditions where extinguishment of spot fires is possible. FireSmart standards should be applied to structures and associated vegetation and other fuel to reduce the risk of structures igniting. A multi-barrier approach that reduces the risk to values can include: establishing multiple fuel breaks (Interface Fuel Breaks), and applying FireSmart Standards to structures and the surrounding vegetation. Fuel breaks require periodic maintenance to retain their effectiveness.

Interface Fuel Breaks

Fuel breaks on Crown land immediately adjacent to private land and in close proximity to the wildland urban interface and/or intermix areas, are termed 'interface fuel breaks. These are designed to modify fire behaviour, create fire suppression options, and improve suppression outcomes. Interface fuel treatments are relatively small (approximately 100 meters wide) and when treated with appropriate fuel reduction measures, can break the crown fire threshold and reduce the risk of a crown fire reaching values at risk. Treatment widths can be varied to allow for alignment and to take advantage of natural and man-made fire resilient features that enhance effectiveness. Surface fire spread across the fuel treatment and spotting across the fuel treatment, are both concerns and rely on suppression actions to be effective. In order to reduce potential fire intensity and spotting, fuel on private land between the interface fuel treatment and structures should be treated according to FireSmart vegetation management standards. Structures in interface areas should be constructed or retrofitted to FireSmart design standards.

RECOMMENDATION #9: Proceed with detailed assessment, prescription development and treatment of hazardous fuel units and FireSmart fuel treatment demonstration treatment areas identified and prioritized in this CWPP.



Table 9. Proposed treatment area summary table.

FTU ID	FTU Name	Total Area (ha)	Treatment Unit Type/ Objective	Wildfire Behaviour Threat				Overlapping Values/Treatment Constraints	Treatment Rationale
				High	Mod	Low	Very Low		
1	Alec Road	1.8	Interface Fuel Break	1.8				This proposed treatment unit (PTU) overlaps the western edge of John Dean Provincial Park/LÁU,WELNEW and the western boundary is adjacent to private land on the other side of Alec Road. The PTU overlaps high-use trails, a guide outfitter licence, and BC Hydro overhead distribution lines. There is overlap with a sensitive ecosystem inventory (SEI) polygon and three occurrences of red-listed ecosystems. Consultation with BC Parks, BC Hydro, the guide certificate holder, private land holders, and an ecosystem biologist must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to the presence of hazardous fuels in proximity (<20 m) to private residences on Alec Road. The stand characteristic of this PTU is composed of young, dense Douglas fir and western redcedar (C-3 fuel type) located under and beside a BC Hydro utility line. Ladder fuels are continuous throughout the PTU due to frequent pruning of stems for utility line clearance. The proposed treatment will bolster the egress route along Alec Road between residences and John Dean Provincial Park/LÁU,WELNEW, reducing local wildfire threat and the potential for human and/or industrial (powerline) ignitions.
2	Horth Hill Southwest	1.6	Interface Fuel Break	1.6				This PTU is located on municipal land within Horth Hill Regional Park. The PTU overlaps with trails and a guide outfitter licence. The PTU is also adjacent to BC Hydro overhead distribution lines and private land parcels. There is overlap with a sensitive ecosystem inventory (SEI) polygon and one occurrence of a red-listed ecosystem and a red-listed species at risk. Consultation with North Saanich Parks staff, BC Hydro, private land holders, the guide outfitter licence holder, and an ecosystem biologist must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to its proximity to private residences (<30 m) and the presence of hazardous fuels. The PTU is composed of stands characterized by a C-3 fuel type with a Douglas fir overstorey and a dense western redcedar understorey, and a smaller mixed wood (45% conifer) area. Conifer ladder fuel continuity within the proposed treatment area is patchy to uniform and surface fuel loading is moderate. This type of stand is likely to exhibit high potential for crown fire behavior during periods of high or extreme fire danger. When implemented, this fuel break will reduce the potential for human ignitions along a high-use trail in Horth Hill Regional Park. Additionally, treatment will provide aesthetic value to park users through pruning and thinning.



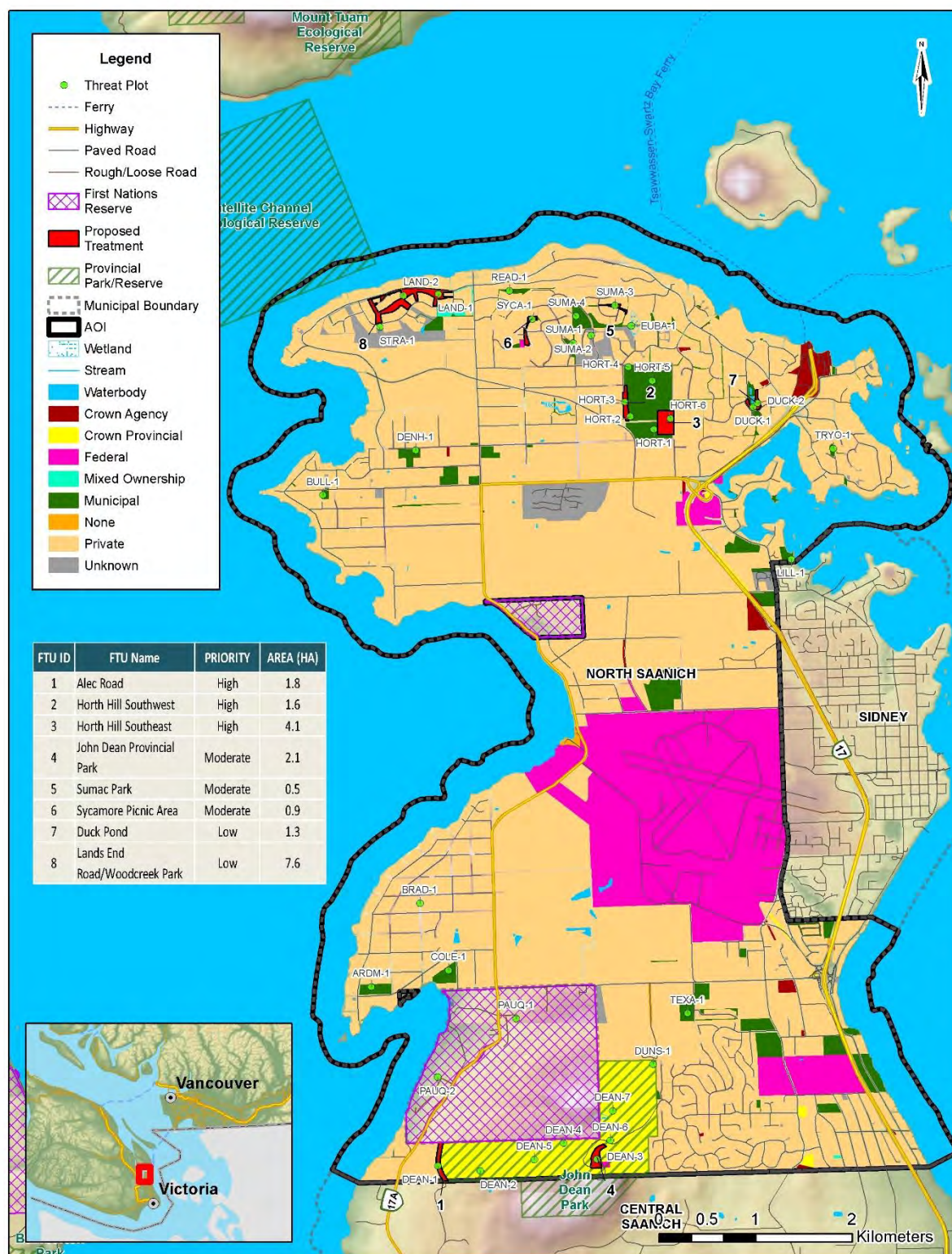
FTU ID	FTU Name	Total Area (ha)	Treatment Unit Type/ Objective	Wildfire Behaviour Threat				Overlapping Values/Treatment Constraints	Treatment Rationale
				High	Mod	Low	Very Low		
3	Horth Hill Southeast	4.1	Interface Fuel Break	4.1				<p>This PTU is located on municipal land within Horth Hill Regional Park. The PTU overlaps with a guide outfitter license, a sensitive ecosystem inventory (SEI) polygon and occurrences of one red-listed ecosystem. Consultation with North Saanich Parks staff, private land holders, the guide outfitter license holder, and an ecosystem biologist must occur during prescription development and prior to implementation to ensure all concerns are addressed.</p>	<p>This PTU has been recommended for treatment due to its location in Horth Hill Regional Park which has a network of high use trails and the presence of hazardous fuels. It is also close (<100 m) to private residences. The PTU is characterized as a moderately dense conifer leading stand with C-3 fuel type, continuous ladder fuels and high surface fuel loadings (primarily coarse woody debris). The proposed treatment will reduce wildfire risk to residents south of Horth Hill Regional Park and ignition potential from park and trail users. Additionally, treatment will provide aesthetic value to park users through removal of surface fuel. Thinning from below will also accelerate old growth succession in this area by reducing stem density and crown closure.</p>
4	ŁÁÚ,WELNEW/ John Dean Provincial Park	2.1	Interface Fuelbreak	1.9	0.2			<p>This PTU is entirely within John Dean Provincial Park/ŁÁÚ,WELNEW and is adjacent to a Capital Regional District water facility and to a federally owned parcel on Mt. Newton. The PTU overlaps Thunderbird Trail (a high use trail), as well as a guide outfitter licence and BC Hydro overhead distribution lines. There is overlap with a sensitive ecosystem polygon and five occurrences of red-listed ecosystems, and one masked occurrence of a species at risk. Consultation with BC Parks, BC Hydro, the guide outfitter licence holder, the Conservation Data Centre and an ecosystem biologist must occur during prescription development and prior to implementation to ensure all concerns are addressed.</p>	<p>This PTU has been recommended for treatment due to its proximity (<10 m) to critical infrastructure (Capital Regional District water facility). The PTU is characterized by an intermediate-age conifer leading stand with uniform ladder fuels and high fire behavior potential. The treatment will provide an anchor for the protection of communication structures on Mt. Newton (<30 m away) and will reduce the potential of a fire spreading into John Dean Provincial Park/ŁÁÚ,WELNEW from a downed or damaged power line or from park and trail users.</p>



FTU ID	FTU Name	Total Area (ha)	Treatment Unit Type/ Objective	Wildfire Behaviour Threat				Overlapping Values/Treatment Constraints	Treatment Rationale
				High	Mod	Low	Very Low		
5	Sumac Park	0.5	Interface Fuel Break	0.5				This PTU is on located on municipal land within Sumac Park. The PTU overlaps with a guide outfitter licence and is adjacent to BC Hydro overhead distribution lines and private land parcels. Eugene Bailin Memorial trail bisects the unit. A sensitive ecosystem inventory (SEI) polygon occurs ~50 m to the west of the PTU. Consultation with North Saanich Parks staff, BC Hydro, private land holders, the guide outfitter licence holder, and an ecosystem biologist must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to its proximity (<10 m) to private residences and presence of hazardous fuels. The PTU is composed of moderate-high hazard (C-3 fuel type) conifer leading stands with patchy ladder fuels and low crown base heights. Treatment will increase defensible space around adjacent properties in the event of wildfire and provide aesthetic value to users of Sumac Park and Eugene Bailin Memorial trail by pruning and thinning understory conifers.
6	Sycamore Picnic Area	0.9	Interface Fuel Break	0.4	0.5			This PTU is located on municipal land within Sycamore Park and neighboring greenspace. The PTU overlaps with a guide outfitter licence, and is adjacent to BC Hydro overhead distribution lines and private land parcels. Consultation with North Saanich Parks staff, BC Hydro, private land holders, and the guide outfitter licence holder must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to the presence of hazardous fuels and its proximity (<10 m) to private residences and critical infrastructure (water tower). The PTU is characterized as a mixed wood conifer-dominant stand (with high percent conifer) and patchy to continuous conifer ladder fuels. Treatment will reduce wildfire risk to residents surrounding Sycamore Park and provide aesthetic value to trail users by pruning and thinning understory conifers.
7	Duck Pond	1.3	Interface Fuel Break	0.7	0.5	0.1		This PTU is located on municipal land within Green Park. The PTU overlaps with a guide outfitter licence and is adjacent to BC Hydro overhead distribution lines and private land parcels. The PTU surrounds Duck Pond. Consultation with North Saanich Parks staff, BC Hydro, private land holders, and the guide outfitter licence holder must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to its proximity to private residences (<15 m) and presence of hazardous fuels. The PTU is primarily composed of mixed wood conifer-dominant stands (60% conifer or greater). The stand within this PTU has patches of dense understory conifers with low crown base heights. Treatment will reduce wildfire risk to residents surrounding Green Park and ignition potential from park and trail users. Additionally, treatment will provide aesthetic value to park users through pruning and thinning of dead and suppressed trees.



FTU ID	FTU Name	Total Area (ha)	Treatment Unit Type/ Objective	Wildfire Behaviour Threat				Overlapping Values/Treatment Constraints	Treatment Rationale
				High	Mod	Low	Very Low		
8	Lands End Road/ Woodcreek Park	7.6	Interface Fuel Break		7.0	0.6		This PTU is located in Woodcreek Park and overlaps with a guide outfitter licence and is adjacent to a BC Hydro distribution line, a Fortis Gas distribution pipeline, and private land parcels. An unnamed stream flows north to south through the PTU. Consultation with North Saanich Parks staff, BC Hydro, private land holders, and the guide outfitter licence holder must occur during prescription development and prior to implementation to ensure all concerns are addressed.	This PTU has been recommended for treatment due to its proximity (<10 m) to private residences along Woodcreek Drive and Lands End Road. The PTU is composed of moderate hazard C-5 stands with patchy and clumpy ladder fuels. Treatment will reduce wildfire risk to residents surrounding Woodcreek Park and provide aesthetic value to park users through pruning and thinning of dead and suppressed trees.



Map 6. Proposed Fuel Treatments.

5.1.2 Maintenance of Previously Treated Areas

As no fuel treatments have occurred within the AOI, maintenance activities for previously treated areas are not applicable. However, if fuel treatments are to occur in the DNS in the future, maintenance activities such as removing standing dead, reducing surface fuels, or additional thinning (overstorey reduction and thinning suppressed conifers or conifer regeneration) should occur as needed to maintain the effectiveness of these treatments. The return interval for maintenance activities depends upon site productivity and the type and intensity of treatment. Less productive areas can likely withstand a longer frequency between maintenance activities, while more productive areas would require treatments more often.

RECOMMENDATION #10: As treatments are implemented, treatment monitoring should be completed by a qualified professional to schedule next set of maintenance activities (5 – 10 years out). This can be completed as part of a CWPP update or as a stand-alone exercise.

5.2 FIRESMART PLANNING AND ACTIVITIES

This section provides detail on: 1) the current level of FireSmart implementation and uptake within the community; 2) identified FireSmart subdivisions and/or acceptance into the FireSmart Canada Community Recognition Program (FSCCRP); and 3) recommended potential FireSmart activities that can be applied within the AOI at a future date.

5.2.1 FireSmart Goals and Objectives

FireSmart® is the comprehensive nationally accepted set of principles, practices and programs for reducing losses from wildfire.⁵¹ FireSmart spans the disciplines of hazard/threat assessment; regional planning and collaboration; policy and regulations; public communication and education; vegetation/fuel management; training and equipment; and, emergency preparedness and response. FireSmart concepts provide a sound framework for advancing the goal of wildfire loss reduction, as it is a common goal shared with CWPPs.

The FireSmart approach and concepts, including recommended FireSmart guidelines⁵², have been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000; FireSmart has become the de facto Canadian standard. FireSmart is founded in standards published by the National Fire Protection Association (NFPA). The objective of FireSmart is to help homeowners, neighbourhoods, whole communities and agencies with fire protection and public safety mandates to work together to prepare for the threat of wildfire in the WUI. Coordinated efforts between all levels of planning and action are integral to effectively and efficiently reducing the risk to communities. Solutions are required at all scales from individual backyards, to communities and the wider landscape. In order to

⁵¹ FireSmart is the registered trademark held by the Partners in Protection Association.

⁵² FireSmart guidelines first published in the 1999 manual "*FireSmart: Protecting Your Community from Wildfire*", with a second edition published in 2003. The most recent "*FireSmart Begins at Home Manual*" is available at <https://firesmartcanada.ca/resources/>. The "*British Columbia FireSmart Begins at Home Manual*" provides detailed guidance and is available at BC FireSmart: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart>

succeed, these efforts must be integrated across the mosaic of land ownership (Figure 2). The highest level of planning within the FireSmart program is strategic direction, such as that provided in CWPPs.

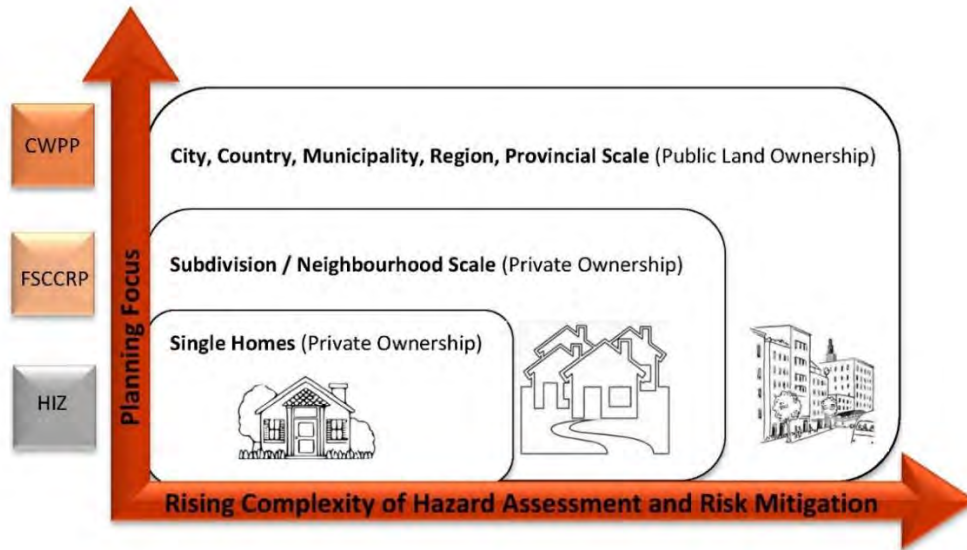


Figure 2. Diagram of the various, coordinated levels of the FireSmart program.⁵³ CWPP: Community Wildfire Protection Plan, FSCCRP: FireSmart Canada Community Recognition Program, HIZ: Home Ignition Zone.

The overarching goal of FireSmart is to encourage communities and citizens to adopt and conduct FireSmart practices to mitigate the negative impacts of wildfire to assets on public and private property. While responsibility for effectively mitigating hazards must be shared between many entities including homeowners, industry, businesses and governments;⁵⁴ the ultimate root of the WUI interface problem is the vulnerability of structures and homes to ignition during wildfire events, in particular vulnerability to embers. This leads to an emphasis on risk mitigations on private properties. Findings from an investigation of how homes survived and ignited during the Fort McMurray 2016 Horse River wildfire, indicate that the vast majority of initial home ignitions in the WUI were caused by embers rather than direct contact by flames or radiant heat.⁵⁵ Surviving homes in both urban and rural areas exhibited many attributes of FireSmart principles, regardless of the broader wildfire threat surrounding them.⁵⁵

The goal of FireSmart with respect to private properties is to encourage homeowners to implement FireSmart practices to reduce damages to their property and minimize the hazards associated with wildfire. These FireSmart practices should aim to accomplish the following:

- “Reduce the potential for an active crown fire to move through private land
- Reduce the potential for ember transport through private land and structures

⁵³ Figure and content developed by A. Westhaver. Adapted by A. Duszynska, 2017.

⁵⁴ <https://www.firesmartcanada.ca>

⁵⁵ 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.

- Create landscape conditions around properties where fire suppression efforts can be effective and safe for responders and resources
- Treat fuel adjacent and nearby to structures to reduce the probability of ignition from radiant heat, direct flame contact and ember transport
- Implement measures to structures and assets that reduce the probability of ignition and loss⁵⁶

Home Ignition Zone

Multiple studies (including the previously referenced recent Fort McMurray WUI fire investigation) have shown that the principal factors regarding home loss to wildfire are the structure's characteristics and immediate surroundings; the area that determines the ignition potential is referred to as the Home Ignition Zone (HIZ).^{57,58} The HIZ includes the structure itself and four concentric, progressively wider Priority Zones. HIZ Priority Zones are based upon distance from structure: 0 to 1.5 m (Priority Zone 1a-noncombustible zone), 0 – 10 m (Priority Zone 1), 10 – 30 m (Priority Zone 2), and 30 – 100 m (Priority Zone 3) (Figure 3). These zones help to guide risk reduction activities, with Recommended FireSmart Guidelines being most stringent closest to the structure. The likelihood of home ignition is mostly determined by the area within 30 m of the structure (Priority Zones 1a, 1 and 2). Recommended FireSmart guidelines address a multitude of hazard factors within the HIZ: building materials and design; vegetation (native or landscaped materials); and the presence of flammable objects, debris, and vulnerable ignition sites. More detail on priority zones can be found in the FireSmart Manual⁵⁹.

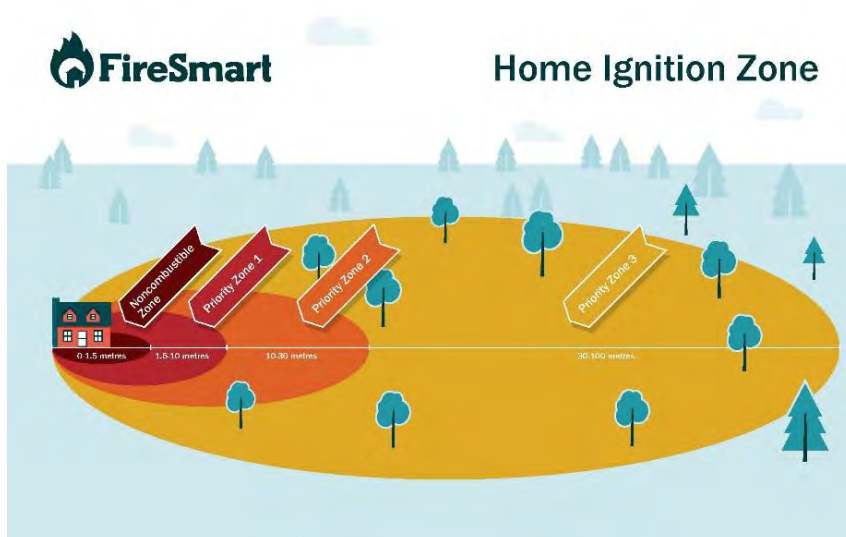


Figure 3. Illustration of FireSmart zones.

Retrieved from FireSmart Canada (<https://www.firesmartcanada.ca/mdocs-posts/firesmart-home-ignition-zone-graphic/>)

It has been found that, during extreme wildfire events, most home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers. Firebrands can be transported long

⁵⁶ Community Resiliency Investment Program. 2018. Community Wildfire Protection Plan Template. <https://www.ubcm.ca/assets/Funding~Programs/LGPS/CRI/Resources/2018-cwpp-template.docx>

⁵⁷ Reinhardt, E., R. Keane, D. Calkin, J. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. *Forest Ecology and Management* 256:1997 - 2006.

⁵⁸ Cohen, J. Preventing Disaster Home Ignitability in the Wildland-urban Interface. *Journal of Forestry*. p 15 - 21.

⁵⁹ <https://firesmartcanada.ca/> and <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart>

distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate within the HIZ in densities that can exceed 600 embers per square meter. Combustible materials found within the HIZ combine to provide fire pathways allowing spot surface fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

Because ignitability of the HIZ is the main factor driving structure loss, the intensity and rate of spread of wildland fires beyond the community has not been found to necessarily correspond to loss potential. For example, FireSmart homes with low ignitability may survive high-intensity fires, whereas highly ignitable homes may be destroyed during lower intensity surface fire events.⁵⁸ Increasing ignition resistance would reduce the number of homes simultaneously on fire; extreme wildfire conditions do not necessarily result in WUI fire disasters.⁶⁰ It is for this reason that the key to reducing WUI fire structure loss is to reduce home ignitability; mitigation responsibility must be centered on homeowners. Risk communication, education on the range of available activities, and prioritization of activities should help homeowners to feel empowered to complete simple risk reduction activities on their property.

FireSmart Canada Community Recognition Program

In the case of adjacent homes with overlapping HIZs, a neighbourhood (or subdivision) approach can be an effective method of reducing ignition potential for all homes within the neighbourhood. The FireSmart Canada Community Recognition Program (FSCCR Program) is an 8-step resident-led program facilitated by trained Local FireSmart Representatives designed for this purpose. It provides groups of residents with critical information and a means of organizing themselves to progressively alter hazardous conditions within their neighbourhood. The program also facilitates FireSmart knowledge and practices to quickly filter downwards onto the property of individual residents to further mitigate wildfire hazards at the single-home scale within the HIZ.

WUI Disaster Sequence

Calkin et. al. (2014)⁶⁰ coined the ‘WUI disaster sequence’, a six-step sequence which has been used to describe the situation in which the firefighting capacity of a community is overwhelmed by wildland/interface fires in highly ignitable communities: 1) extreme wildfire behaviour weather combined with, 2) a fire start, which 3) exposes numerous homes with high ignition potential, and results in numerous structures burning, 4) overwhelms suppression efforts and capabilities, and 5) leads to unprotected homes, and therefore 6) considerable structure loss (Figure 4).

Once multiple homes are ignited in an urban area, there is increasing potential for fire to spread from structure to structure, independently of the wildland vegetation. This is known as an urban conflagration. Effective fire protection depends on ignition resistant homes and properties during extreme wildfire events.⁶¹ Figure 4 illustrates that it is possible to break up the disaster sequence by decreasing the

⁶⁰ Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Accessed online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/>.

⁶¹ Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Accessed online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/>.

number of highly ignitable homes exposed to embers, therefore reducing the number of homes ignited and removing the consequences of multiple structures lost.

Overall, FireSmart leads to communities that are better adapted to wildfire, more resilient and able to recover following wildfires by sustaining fewer losses and disruption, and safer places to live and recreate. Action by homeowners is the number one priority for reducing structure loss in the event of a WUI fire, but the overall adaptation of the community to wildfire is multi-pronged and the landscape should not be ignored.⁶¹



Figure 4. The wildland/urban interface disaster sequence and the possibility to break up the disaster sequence by decreasing the number of highly ignitable homes.⁶²

5.2.2 Key Aspects of FireSmart for Local Governments

Reducing the fire risk profile of a community through FireSmart implementation requires coordinated action from elected officials, local government planners, developers, private land owners and industrial managers. This section presents various options of FireSmart practices, which when enacted, provide avenues for reducing fire risk within the community. An evaluation of the current level of FireSmart implementation within the District of North Saanich is also presented in this section.

Education

Communicating effectively is a key aspect of any education strategy. Communication materials must be audience specific and delivered in a format and through mediums that reach the target audience. Audiences should include home and landowners, students, local businesses, elected officials, Capital Regional District and DNS staff, and local utilities providers. Education and communication messages should be simple yet comprehensive. A basic level of background information is required to enable a solid understanding of fire risk issues and the level of complexity and detail of the message should be specific to the target audience.

⁶² Graphic adapted from Calkin et. al, by A. Westhaver.

FireSmart information material is readily available and simple for municipalities to disseminate. It provides concise and easy-to-use guidance that allows homeowners to evaluate their homes and take measures to reduce fire risk. However, the information needs to be supported by locally relevant information that illustrates the vulnerability of individual houses to wildfire.

The DNS staff and fire department have displayed leadership in their FireSmart education initiatives in the community and online. Initiatives include the purchasing of informational wildfire prevention signage, banners and booklets, development and delivery of mailout material and FireSmart assessments on more than 50 properties in Dean Park neighbourhood. These initiatives can be expanded upon and/or adapted to further enhance wildfire preparedness and education. The DNS should continue to host an open house event for Wildfire Community Preparedness Day in the spring, prior to the wildfire season. Timely educational materials to increase preparedness would be most effective immediately prior to the fire season.

A full list of recommendations pertaining to the Communication and Education strategy is presented in Section 5.3.

Planning and Development Considerations

Municipal policies and bylaws are tools available to mitigate wildfire risk to a community. It is recognized that, to be successful, all levels of government (municipal, provincial, and federal) and individual landowners need to work together to successfully reduce their risk. To that end, local government can use a range of policy tools and practices to help the community to incrementally increase FireSmart compliance over the mid-term (5 – 20 years) and therefore play a role in reducing the chance of structure loss from wildfire.

The planning objectives/considerations for the DNS are:

- To include wildfire considerations in the planning and acquisition strategy for parks and recreational areas.
- To develop policies and practices for design and maintenance of FireSmart publicly owned land such as community parks and open spaces and FireSmart publicly owned buildings.
- To conduct FireSmart and/or risk assessments of publicly owned lands and buildings to inform planning for prevention and mitigation activities as required.

FireSmart policies and practices can be incorporated in various aspects of development design, zoning and permitting to reduce wildfire hazard on private land and in the community at large. The development objectives/considerations for the DNS are:

- To utilize regulatory and administrative tools to reduce wildfire hazard on private land and increase number of homes compliant with FireSmart guidelines (with low ignition potential).
- To ensure higher level planning and regulation (i.e., OCP and/or land use, engineering and public works bylaws) incorporate FireSmart policies, as applicable, to reduce wildfire hazard in

vulnerable WUI neighbourhoods, and include measures that address wildfire prevention and suppression in subdivision design.

- To ensure multiple departments (including fire departments and/or emergency management staff) are included in the referral process for new developments.

FireSmart Vegetation Management

Some examples of actionable items for the DNS with regards to vegetation or fuel management and the FireSmart approach include: 1) policy development and implementation of FireSmart maintenance for community parks and open spaces (as per planning considerations discussed above); 2) implementing fire resistive landscaping requirements as part of the development permitting process (as per development considerations discussed above); and 3) provision of incentives (i.e., a local rebate program) and/or collection services for private landowners with a focus on pruning, yard and thinning debris (FireSmart activities for private land). More detailed recommendations regarding FireSmart activities for private land are discussed below.

The DNS does not currently enforce FireSmart landscaping requirements within development permit areas. More detailed recommendations regarding wildfire hazard development permit areas are provided below.

Development Permit Areas for Wildfire Hazard

The OCP contains specific language under Section 16.0 - Regional Context Statement to revisit the need for a wildfire development permit area subject to the results of the updated Community Wildfire Protection Plan. It is recommended that the DNS review the OCP, with consideration towards establishing a wildfire development permit area. Other jurisdictions' wildfire development permit areas can serve as models for various components.⁶³ The first step should be to establish DPA objectives (for example, minimize risk to property and people from wildland fires; minimize risk to forested area surrounding communities and development in the AOI; conserve the visual and ecological assets of the forest surrounding these areas; reduce the risk of post-fire landslides, debris follows and erosion, etc.). The following components should be considered during the OCP review and DP development process in order to help meet the established objectives:

- Use of fire-resistant exterior construction materials within the established development permit area, based on recognized standards such as NFPA 1144 (*Standard for Reducing Structure Ignition Hazards from Wildland Fire*⁶⁴) or FireSmart.
- Inclusion of minimum setbacks from forested edge and top of slope based on FireSmart principles.
- Use of FireSmart landscaping (low flammability plants, appropriate spacing and low flammability aggregates/ground cover based on FireSmart principles).
- Underground servicing.

⁶³ The District of North Vancouver and City of Maple Ridge have robust and well-documented Wildfire Hazard Development Permit processes.

⁶⁴ <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1144>

- Mitigation of fire hazard through fuel management activities based upon qualified professional recommendations (prescriptions and oversight). This is generally most applicable in the subdivision phase.
- Prompt removal of combustible construction materials, thinning/ fuel management debris, or clearing debris during the fire season.
- Coordinating QPs to ensure that requirements for overlapping, and potentially conflicting, development permit areas such as Creeks, Wetlands, Riparian Areas and Significant Water Resources are met.
- Review and approval process for submitted applications.
- Post-development inspections and sign-offs.
- Outline of responsibilities for staff and applicants.
- Enforcement and regulation (consequences of non-compliance).

It is advised to engage the development community in the DPA process to educate, inform, and allow for input.

In 2015, the province passed the *Building Act* as the new legislation to guide building and construction in the province. This Act establishes the province as the sole authority to set building requirements and limits local government authority to set building requirements in their bylaws. Section 5 of the *Building Act* provides an exception to the above limitation to local governments by giving them the authority to set local building bylaws for unrestricted and temporarily unrestricted matters, such as exterior design and finish of buildings in relation to wildfire hazard and within a development permit area. The British Columbia Building Code does not have any wildfire-specific fire-resistant design components. Until revisions of the Building Code to include requirements specific to prevention of wildfire spread are completed, local governments can set exterior requirements within an established development permit area for wildfire risk mitigation.⁶⁵

RECOMMENDATION #11: As part of the Official Community Plan (OCP) review, consider including wildfire as a natural hazard development permit area (DPA). A recommended development permit area for the DNS would include all areas that are located within 200 m of moderate or high wildfire behaviour threat class areas. This is a suggested distance which should be validated and defined through a more comprehensive GIS analysis of hazardous fuels and their proximity to the interface. Review similar wildfire hazard DPAs established in other jurisdictions and consider their use as models for various aspects of the DPA process.

RECOMMENDATION #12: Ensure that wildfire hazard development permit applications are referred to the fire department for opportunity for input prior to approval.

⁶⁵ Building and Safety Standards Branch. 2016. Bulletin No. BA 16-01 Building Act Information Bulletin: Update for Local Governments.



RECOMMENDATION #13: Consider developing a landscaping standard which lists flammable non-compliant vegetation and landscaping materials, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Consider including the landscaping standard as a development permit requirement within the applicable area, as well as making it publicly available for residents and homeowners outside of the DPA (can be provided at issue of building permit and made available at the District Office or other strategic locations).

Additional recommendations for amendments to policies and bylaws were discussed fully in Section 2.5.3.

Subdivision Design

Subdivision design should include considerations to decrease the overall threat of wildfire. Aspects of subdivision design that influence wildfire risk are access, water pressure and hydrant locations. The number of access points and the width of streets and cul-de-sacs determine the safety and efficiency of evacuation and emergency response. In the neighborhoods and/or developed areas within the AOI, on-street parking can contribute hazards on narrow or dead-end roads, which are already unlikely to have a high capacity under heavy smoke conditions.⁶⁶ When the time for evacuation is limited, poor access has contributed to deaths associated with entrapments and vehicle collisions during wildfires.⁶⁷ Methods for access design at the subdivision level can provide tools that help manage the volume of cars that need to egress an area within a given period of time.⁶⁶ These factors should be considered during the review of applications for new developments occurring on vacant lots within the DNS's wildland urban interface.

For new development in rural settings where hydrants are limited or unavailable (or it is otherwise determined by the DNS that adequate or reliable water supply systems may not exist), the NFPA 1142 can be used to help determine minimum requirements for alternative water supply (natural or artificial). Alternative water sources, such as dry hydrant systems, water usage agreements for accessing water on private land, cisterns or other underground storage, etc., should be reviewed by the DNS and the fire departments prior to subdivision development approval.

Increasing Local Capacity – Interagency Cooperation, Emergency Planning and Cross Training

Local capacity for emergency management and efficient response to wildland urban interface fires can be enhanced by addressing the following steps:

- Development and/or maintenance of Structural Protection Units (SPUs) which can be deployed in the event of a WUI fire;
- Conducting a comprehensive review of Emergency Management BC SPU deployment procedures for the purpose of fighting interface fires;
- Provision of sprinkler kits to community residents (at a cost);

⁶⁶ Cova, T. J. 2005. Public safety in the wildland-urban interface: Should fire-prone communities have a maximum occupancy? *Natural Hazards Review*. 6:99-109.

⁶⁷ De Ronde, C. 2002. Wildland fire-related fatalities in South Africa – A 1994 case study and looking back at the year 2001. *Forest Fire Research & Wildland Fire Safety*, Viegas (ed.). Accessed online at: <http://www.fire.unifreiburg.de/GlobalNetworks/Africa/Wildland.cdr.pdf>

- Engagement in annual cross-training exercises with adjacent fire departments and/or BCWS in order to increase both local and regional emergency preparedness with regards to structural fire and wildfire training;
- Participation in cross-jurisdictional tabletop exercises and seasonal readiness meetings;
- Development and/or participation in regional or multi-agency fire or fuel management tables (i.e., interface steering committee or wildfire working group) to facilitate communication and co-operation between groups and agencies responsible for wildfire preparation and response; and
- Provision of training and/or professional development for Local FireSmart Representatives, community champions to increase capacity for FireSmart activities.

A detailed account of current local capacity for the DNS and recommendations to address gaps is provided in Section 6:

FireSmart Demonstration Projects

FireSmart demonstration projects for publicly owned buildings or public and provincially owned critical infrastructure (as identified in Section 3.2) can display the practices and principles of FireSmart to the public. This may be in the form of replacing building materials with fire resistant materials, replacing landscaping with fire-resistant plants, and demonstration HIZ fuel treatments. Ideally, these projects would include elements of public education (signage, public tours, active demonstrations of operations, etc.). Appropriate/candidate FireSmart demonstration projects may be identified by the DNS and should be based on assessment by internal trained Local FireSmart Representatives or external Local FireSmart Representative consultant.

FireSmart Activities for Private Land

The best approach to mitigate fuels on private lands is to urge private landowners to comply with FireSmart guidelines and to conduct appropriate fuel modifications using their own resources (CRI program funding may be available subject to current funding requirements). The DNS can facilitate uptake within the community and the various neighbourhoods by: 1) supporting and/or facilitating planning for private land (with property owners' consent); 2) offering local rebate programs to homeowners on private land and First Nations land who complete eligible FireSmart activities on their properties; and as previously indicated (FireSmart vegetation management), 3) providing off-site debris disposal for private landowners who undertake their own vegetation management (with a focus on pruning, yard and thinning debris). Off-site debris disposal options include providing a dumpster, chipper or other collection method; providing curbside debris pick-up; and waiving tipping fees. Planning for private land may include developing FireSmart Community Plans for identified areas (i.e., a WUI neighbourhood, community, subdivision) and conducting FireSmart home and property assessments.

RECOMMENDATION #14: Develop and implement a community chipper program with the help of neighbourhood representatives. As a demonstration, this program can begin as a bi-annual initiative in two separate neighbourhoods.

FireSmart Compliance within the Area of Interest

As could be expected, there is a wide range of FireSmart compliance on private properties in the AOI. There are differences in the degree to which FireSmart best practices are visible within individual HIZs,

and in neighbourhoods throughout the DNS. Landscaping in the AOI is also in a range of FireSmart compliance. In neighborhoods located in interface areas, such as those adjacent to Horth Hill and LAU, WELNEW/John Dean Provincial Park, many homes do not maintain 10 m of defensible space. The main concern in these areas is the ubiquity of flammable landscaping options (i.e., cedar hedging) in proximity to residences, as well as the lack of defensible space between property footprints and adjacent forested areas. Bark mulch is commonly used as a landscaping material within the HIZ. Accumulations of conifer foliage in roof corners and gutters was not uncommon. Storage of combustible items under decks, carports, and other horizontal surfaces was common. In intermix areas, long, winding roads and driveways result in restricted access to residences. This magnifies the hazard posed by any FireSmart compliance issues. Additionally, for large private properties, fire hazard information can be difficult to obtain. On the other hand, there are large areas of the AOI which are developed for agriculture, and where residences are surrounded by irrigated agricultural fields and maintain substantial defensible space. Opportunities to improve FireSmart compliance and best practices were observed throughout the AOI and were not constrained to specific neighborhoods or locations.

Aside from differing levels of awareness, understanding and acceptance of recommended FireSmart guidelines by residential and commercial property owners, there are a number of other factors that add variability to the level of FireSmart compliance within the AOI. Ultimately, these also impact the vulnerability of structures and the amount of effort required to achieve a FireSmart rating for individual homes, neighbourhoods or the communities as a whole. These factors include but are not limited to: the age of homes or subdivisions; prevalent design features and favored building materials of the era; proximity to forested area (both on private land and adjacent Crown or DNS-owned land); density, lot size and lay-out of the subdivision; positioning of the home or neighbourhood in relation to slope, aspect and prevailing winds; and the stage and maturity of landscaping.

Neighbourhoods in the AOI were unofficially surveyed during field work. The following observations were made:

- Wildfire hazard levels range from low to high across neighbourhoods within the AOI;
- The bulk of hazards are associated with conditions of natural and landscaped vegetation immediately surrounding residential properties;
- For new development, where landscaping is not yet completed, educational approaches may aid in promoting fire resistant landscaping options and achieving defensible space in the HIZ;
- Hazards are magnified in some neighbourhoods due to poor access (i.e., presence of private and/or gated roads) and distance from nearest water supply or fire hydrant location; and,
- All neighbourhoods have good opportunities to mitigate risk through individual and collective action.

<p>RECOMMENDATION #15: The DNS should continue to train local fire services staff members as Local FireSmart Representatives to assist the various neighbourhoods in the DNS in complying with FireSmart principles at the neighbourhood and individual home-level.</p>
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5.2.3 Priority Areas within the AOI for FireSmart

This section identifies priority areas within the AOI that would benefit from FireSmart planning and activities. These priorities are based on general field observations and input from the DNS and are not based on a scientific sample or formal data collection. Recommended FireSmart activities are essentially the same for each neighbourhood or area; however, it is recommended that the DNS prioritize the neighbourhoods in Table 10.

Table 10. Summary of FireSmart Priority Areas.

Area	FireSmart Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities
Priority Area #1: Dean Park neighbourhood	N	N	<p>The following is a non-extensive list of FireSmart activities for which the DNS can engage suggested neighbourhood residents:</p> <ol style="list-style-type: none"> 1) Provide guidance to ensure landscaping is to an established FireSmart standard; 2) Incentivise private landowners to engage in retrofitting homes with building materials and design based on NFPA 1144 or FireSmart standards; 3) Encourage prompt removal of combustible construction materials or yard waste from private properties; and 4) Coordinate monthly or bi-monthly yard waste removal days prior to and during the fire season to reduce WUI fire hazard.
Priority Area 2: Horth Hill neighborhood	N	N	
Priority Area #3: Ardmore neighbourhood	N	N	
Priority Area #4: Alec Road	N	N	
Priority Area #5: Cloake Hill neighborhood	N	N	
Priority Area #6: Curteis Point neighborhood	N	N	
Priority Area #7: Deep Cove neighborhood	N	N	
Priority Area #8: Critical infrastructure	N	N/A	<p>Based on field observations, most critical infrastructure has some level of FireSmart setback from forested areas. Consider conducting frequent (2-3 years) maintenance treatments to ensure the wildfire risk does not reach higher than moderate. It is recommended that fuel treatments be considered for areas adjacent to critical infrastructure in order to bolster the effect of previous FireSmart treatments. FireSmart treatments may include thinning from below to reduce ladder fuels and crown fire potential, pruning of retained trees to 3 m, and reducing surface fuels. Additionally, consider adding regular brushing activities to the maintenance treatment schedule to control weeds and grasses around critical infrastructure.</p>

RECOMMENDATION #16: The DNS should apply for funding from the UBCM CRI Program to develop a local FireSmart rebate program. This will allow homeowners to access partial rebates for FireSmart activities on their properties, if rated as moderate or high risk in a FireSmart home and property assessment. The rebate program must adhere to the goals of FireSmart, as outlined in Section 5.2.1.

5.3 COMMUNICATION AND EDUCATION

Establishing effective communications and actively engaging key stakeholders in risk reduction activities are keystones to building a FireSmart community. Without the support and involvement of residents, businesses, public officials, and industry, the efforts of public officials, fire departments, and others to reduce wildfire losses will be hindered. In many communities, there is a general lack of understanding about interface fire, the relationship between ignition potential and loss of homes, and the simple steps that can be taken to minimize risk on private land. In addition, public perceptions regarding responsibility for risk reduction and the ability of firefighters to safely intervene to protect homes during a wildfire are often underdeveloped or inaccurate.

Based on the consultation completed during the development of this Plan, it is evident that North Saanich staff and some residents have a good level of awareness of interface fire risk, and a strong level of commitment to grow this awareness and understanding. However, field observations highlighted the need to further educate the community at large on what private land owners can do to build a FireSmart community and take personal responsibility for the ignition potential of their homes, businesses, lands, and neighbourhoods. Often, the risk of wildfire is at the forefront of public awareness during or after major wildfire events, whether close to home or further afield. The challenge is to retain this level of awareness beyond these times. The communication and education objectives for the DNS are:

- To improve public understanding of fire risk and personal responsibility by increasing resident and property owner awareness of the wildfire threat in their community, to establish a sense of responsibility for risk mitigation among property owners, and to empower them to act;
- To enhance the awareness of, and participation by, elected officials and all WUI stakeholders regarding proactive WUI risk mitigation activities; and,
- To reduce or avoid ignitions from industrial sources.

Bringing organizations together to address wildfire issues that overlap physical, jurisdictional or organizational boundaries is a good way to help develop interagency structures and mechanisms to reduce wildfire risk. Engagement of various stakeholders can help with identifying valuable information about the landscape and help provide unique and local solutions to reducing wildfire risk. The DNS should consider creating an Interface Steering Committee to coordinate wildfire risk reduction efforts. The steering committee could include staff from the District of North Saanich, First Nations and key stakeholders such as BCWS, BC Parks, agricultural groups/representatives, other industrial operators, and neighborhood associations, especially those located in interface or intermix areas.

Significant areas of private land in the DNS are within the ALR, supporting a range of crop and livestock agriculture production. The agriculture sector faces unique challenges with respect to wildfire planning and preparedness (including but not limited to livestock relocation). Consequently, the BC Agriculture & Food Climate Action Initiative (CAI), in collaboration with partners and through workshops delivered in various agriculture communities in BC, has developed wildfire planning resources specific to the agriculture sector. These resources incorporate FireSmart practices and facilitate collaboration and communication with local government. Recognizing and disseminating these CAI resources to the



agriculture sector/community will promote improved planning and preparedness of agriculture producers and encourage FireSmart practices on private farm land.

Moving from the CWPP to implementation of specific activities requires that the community is well informed of the reasons for, and the benefits of specific mitigation activities. In order to have successful implementation, the following communication and public education recommendations are made:

RECOMMENDATION #17 This report and associated maps to be made publicly available through webpage, social media, and public FireSmart meetings.

RECOMMENDATION #18: Complete or schedule periodic updates of the CWPP to gauge progress and update the threat assessment (hazard mapping) for changes in fuels, forest health, land planning, stand structure or changes to infrastructure in the interface. The frequency of updates is highly dependent upon major changes which would impact the DNS's wildfire threat assessment or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding program changes that may lead to new opportunities) and the potential need for a CWPP update should be initiated every 5 - 7 years.

RECOMMENDATION #19: Develop a social media strategy and ensure that its full power is leveraged to communicate fire bans, high or extreme Fire Danger days, wildfire prevention initiatives and programs, easily implementable FireSmart activities, updates on current fires and associated air quality, road closures, and other real-time information in an accurate and timely manner.

RECOMMENDATION #20: Promote FireSmart approaches for wildfire risk reduction to DNS residents through Town Hall meetings, workshops and/or presentations. Continue working with neighborhood associations, especially in interface and intermix locations throughout the DNS, to deliver information to residents. Aim to conduct the engagement/promotion campaign prior and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns.

RECOMMENDATION #21: Promote improved planning and preparedness of agriculture producers in the DNS and encourage FireSmart practices on private farm land through distribution or sharing of wildfire action planning resources prepared specifically for the agriculture sector by the BC Agriculture & Food Climate Action Initiative (i.e., on DNS website, mailouts). Resources include a Wildfire Preparedness and Mitigation Plan - Guide and Workbook.⁶⁸

RECOMMENDATION #22: Work towards FireSmart community recognition, at the neighbourhood level and facilitate uptake into the FireSmart Canada Community Recognition Program (FSCCRP). This will help reduce fire risk and aid in further funding applications.

⁶⁸ <https://www.bcagclimateaction.ca/library/wildfire-preparedness/>



RECOMMENDATION #23: Facilitate the FSCCRP uptake within the DNS and enhance its applications by including the following: 1) inviting BCWS crews to participate in and support the annual FireSmart events set up by participating neighbourhoods. 2) Encourage individual homeowner participants to complete the self-administered FireSmart home assessment tool. 3) Include within the FireSmart Canada Community Assessment Report the standard recommendation that participating neighbourhoods hold a home hazard assessment workshop as one of their FireSmart events.

RECOMMENDATION #24: Continue engaging with DNS residents, and further promote the use of the FireSmart Home Partners Program offered by the Partners in Protection Association, which facilitates voluntary FireSmart assessments on private property. Use the opportunity to educate the home or business owner about the hazards which exist on their property and provide easy improvements to reduce their risk.

RECOMMENDATION #25: Encourage schools to adopt and deploy existing school education programs (e.g., FireSmart BC Education Package) to engage youth in wildfire management and risk reduction. There is emergency preparedness curriculum available provincially, which includes preparedness for a variety of natural hazards, including wildfire (Master of Disaster). Other options/value-added activities include consulting with Association of BC Forest Professionals (ABCFP) and BC Wildfire Service (BCWS) (South Island Fire Zone), as well as local fire department and FireSmart representatives to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in elementary and/or secondary schools (field trips, guest speakers, etc.).

RECOMMENDATION #26: Develop and work with staff from the DNS, Tseycum First Nation and Pauquachin Nation, as well as all key stakeholders (BC Parks, BCWS, agricultural groups/representatives, and neighborhood associations) to formalize an Interface Steering Committee. The purpose of the steering committee would be to identify wildfire related issues in the area and to develop collaborative solutions to minimize wildfire risks. The following subject areas are recommended for the group to explore: 1) Public education and awareness needs; 2) Multi-disciplinary, multi-jurisdictional fuel treatment projects/hazard abatement projects; 3) Development of a funding strategy; and 4) Reduction of human-caused fires, fire prevention and right of way management.

RECOMMENDATION #27: Promote and provide information to private landowners related to residential sprinklers as a FireSmart prevention measure.

5.4 OTHER PREVENTION MEASURES

Fire prevention in the AOI is also addressed via the following avenues: 1) public display of danger class rating signs throughout the AOI, which should be updated on a weekly basis; 2) fire ban alignment with provincial fire bans; 3) potential enforcement of restricted access to back country areas similar to provincial requirements; and 4) enforcement of local bylaws such as the Fire Prevention and Regulation Bylaw, Parks Bylaw, and Unsightly Premises bylaw. The aforementioned activities are either currently being applied or have potential to be applied in order to reduce the potential and/or threat of wildfire ignitions within the AOI.

Risk of human-caused ignition within the AOI is not limited to private property owners and individual residents. Power lines and industrial activities pose a risk of ignition, particularly in areas where cured

fuels or fuel accumulations exist. Tree failures adjacent to power lines (transmission and distribution) can occur and represent a risk of ignition within the AOI. A cooperative approach for addressing the industrial area concerns must be undertaken by the DNS and pertinent industrial partners.

RECOMMENDATION #28: Work with industrial operators such as BC Hydro to ensure that high risk activities, such as grubbing/brushing and right-of-way mowing work do not occur during high fire danger times to reduce chance of ignitions as per the *Wildfire Act*.

RECOMMENDATION #29: Work with industrial operators (i.e., BC Hydro) to ensure that right-of-ways do not contain fine fuel accumulations (easily cured) or high conifer regeneration prior to and during the fire season and are maintained in a low hazard state (to serve as fuel breaks).

SECTION 6: WILDFIRE RESPONSE RESOURCES

This section provides a high-level overview of the local government resources accessible for emergency response and preparedness use. Accordingly, in emergency situations when multiple fires are burning in different areas of the Province, resource availability may be scarce. Therefore, local government preparedness and resource availability are critical components of efficient wildfire prevention and planning. Deployment of provincial resources occurs as per the process detailed in the *Provincial Coordination Plan for Wildland Urban Interface Fires* document⁶⁹. The aforementioned document establishes a protocol for collaborative and integrated emergency management in the event of WUI fires within British Columbia.

6.1 LOCAL GOVERNMENT FIREFIGHTING RESOURCES

Firefighting efforts and effectiveness can be affected by access to secondary power sources, water pressure and supply, and existing local government contingency plans. In the event of a wildfire emergency situation and loss of power, the DNS has access to backup generators, to power critical infrastructure such as fire halls and the EOC at the Municipal hall. However, should a wide-scale outage occur, known vulnerabilities to secondary power sources include mechanical failure and potential fuel shortages. Although the local government has not identified any issues with water pressure within areas that have fire hydrant service, there are known limitations to fire flows that create challenges for fire suppression. Specific limitations of the DNS water system with regards to wildfire suppression are detailed in Section 6.1.2.

Formal mutual aid agreements are in effect between the North Saanich Fire Department and the surrounding municipalities including the Town of Sidney, the District of Central Saanich and the District of Saanich (more detail is provided in Section 6.1.1). In the event of a WUI fire emergency, mutual aid in the DNS is activated, as required, between all fire departments. WUI fire events may also lead to aid requests with BCWS for areas within Mount Newton – John Dean Provincial Park.

⁶⁹ Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. Available online at: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf

6.1.1 Fire Department and Equipment

Fire protection within the AOI is the responsibility of the North Saanich Fire Department (NSFD). Table 11 provides an overview of the fire services capacity in the AOI, including fire department personnel and equipment. The NSFD fire protection service area covers the entire area within the District municipal boundary. The NSFD is also contracted to provide fire protection services for Pauquachin First Nation and Tseycum First Nation Indian Reserves.⁷⁰ The NSFD has informal fire services agreements with the Tseycum and Pauquachin First Nations.

The NSFD has both paid and volunteer members. In consultation with the NSFD it was determined that there are no significant structural firefighting equipment deficiencies; however, the department lacks in wildfire equipment. The NSFD's equipment is listed in Table 11 below and includes capability to draft from natural water sources, including salt-water pumping capacity, by truck draft or using portable pumps.

Table 11. Fire department capacity and equipment within the AOI.

Fire Protection Zones	Fire Department	Number of Stations	Number of Members	Apparatus type and number
District of North Saanich	North Saanich	2	3 career firefighters, approximately 35 volunteer firefighters, and one support staff	Two engines, 2 rescue trucks, one tender, and 4 trucks

Members of the NSFD undergo training focused on structural firefighting. For structural firefighters, the province-wide standard of basic wildland firefighting training is the structural protection program wildland firefighter level 1 (SPP WFF1) or S-100 course. All NSFD members have S-100 as a minimum. It is recommended that the NSFD members maintain training in S-100 and/or SPP-WFF1 (or equivalent), and that the fire department members engage in yearly practical wildland fire training with BCWS that covers at a minimum: pump, hose, hydrant, air tanker awareness, and employment of SPUs. The aforementioned cross-training opportunity could include, for example, a joint wildfire simulation exercise. This level of training would improve the local fire departments' commitment to wildfire preparedness.

The level of cross-training and working relationship with MFLNRORD's BCWS is minimal within the AOI. In consultation with the BCWS, it was noted that the needs for cross-training varies across communities, with cross-training events being focused on fire departments with limited access to mutual aid from nearby departments. Cross-training with the BCWS would enable local fire departments to prepare their responders with technical and practical firefighting training in order to action both structural and wildland fires.

RECOMMENDATION #30: Complete the development of formal fire services agreements with the Tseycum and Pauquachin First Nations. Use the negotiation of these agreement as an opportunity to develop relationships with Tseycum and Pauquachin governments, and consider collaborating to extend FireSmart and wildfire risk reduction initiatives to these communities.

⁷⁰ *First Nations in the Capital Regional District*. October 2013. Capital Regional District. Retrieved from: <https://pub-victoria.escribemeetings.com/filestream.ashx?documentid=14719>

6.1.2 Water Availability for Wildfire Suppression

Water is the single most important suppression resource. In an emergency response scenario, it is critical that a sufficient water supply be available. The Fire Underwriters Survey summarizes their recommendations regarding water works systems fire protection requirements, in *Water Supply for Public Fire Protection* (1999).⁷¹ Some key points from this document include the need for:

- Duplication of system parts in case of breakdowns during an emergency;
- Adequate water storage facilities;
- Distributed hydrants, including hydrants at the ends of dead-end streets;
- Piping that is correctly installed and in good condition; and
- Water works planning should always take worst-case-scenarios into consideration. The water system should be able to serve more than one major fire simultaneously, especially in larger urban centers.

Water service availability within the AOI is an important component of emergency response against a wildland urban interface fire or in the event of a large-scale emergency, such as a structural fire. As previously noted in Sections 3.2.3 and 3.3.1, water service is provided to the District of North Saanich via the Saanich Peninsula Water System, which is supplied by the Capital Regional District. Notable areas within the District where hydrant service is limited or nonexistent include: the southwest portion of the District (south of the Pauquachin First Nation reserve); agricultural areas in the central portion of the District (between Wain Road, West Saanich Road, and John Road); LAU, WELNEW/John Dean Provincial Park; and Horth Hill Park. Hydrant service is also limited in Tseycum First Nation (where only four hydrants have been installed).

The storage reservoirs in North Saanich are gravity fed, and in the case of a power outage, could provide water supply for one to two days. The duration of water supply in the case of a power outage is a function of the amount of water in reservoir storage. Water supply available for fire suppression within the DNS may be limited by variances in pressure zones, and seasonal dry spells. According to the District of North Saanich Water System Master Plan⁷² peak hour pressure deficiencies (i.e., pressures lower than 44 psi) were identified in the following areas: Wain and Clayton Roads; Camas Drive; high point on Baxendale Road; high point on Rosborough Road; high point on Cromar Road; top end of Honeysuckle Place; high point on Woodcreek Drive; and top end of Boas Road. In the areas of the southwest portion of the District that do not have fire hydrants, fire protection is provided via tender supported water shuttling.

To supplement water availability for firefighting, the District of North Saanich fire department has the capability to draft from natural and static water sources (e.g., Allard's Farm Pond), using either truck-

⁷¹ Retrieved from: <http://www.scm-rms.ca/docs/Fire%20Underwriters%20Survey%20-%201999%20Water%20Supply%20for%20Public%20Fire%20Protection.pdf>

⁷² District of North Saanich Water System Master Plan. 2016. Retrieved from: <https://northsaanich.civicweb.net/document/23952/Water%20System%20Master%20Plan.pdf?handle=C6895EDEE0A84E8CA748640F9A742167>

mounted or portable pumps. The NSFD also has the capability to draft water from the ocean. However, some of these other sources may be at risk of drying or experiencing reduced water levels during drought events, which typically coincide with high and extreme fire danger rating days. It is recommended that the location and relative quantity and availability of emergency surface water sources useable for fire suppression be described and mapped for future reference.

RECOMMENDATION #31: All new development should have a water system which meets or exceeds minimum standards of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*⁷³. NSFD should review the water supply to ensure it provides sufficient placement, flow, and reliability for suppression needs and that secondary power is available in the event of power outages.

6.1.3 Access and Evacuation

Emergency access and evacuation planning is of particular importance in the event of a wildfire event or other large-scale emergency. In 2019 the DNS along with other municipalities within the Capital Regional District received a grant to develop both a municipal and regional evacuation plan. The DNS Emergency Response Plan (ERP) was developed in 2019 and the regional plan is forthcoming. Important components of emergency planning with regards to a wildland/interface fire include the designation of specific evacuation routes, a list of key contacts, and the roles of local government personnel in the event of a wildfire. Currently, the DNS coordinates evacuations with the Sidney/North Saanich RCMP detachment and adjacent municipalities, as applicable. It is recommended that local and regional evacuation plans include the following provisions:

- Mapping and identification of safe zones, marshaling points and aerial evacuation locations;
- Planning of traffic control and accident management;
- Identification of volunteers that can assist during and/or after evacuation;
- Development of an education/communication strategy to deliver emergency evacuation procedures to residents.

RECOMMENDATION #32: Complete and participate in regular testing of, and updates to, the evacuation plan.

Road networks in a community serve several purposes including providing access for emergency vehicles, providing escape/evacuation routes for residents, and creating fuel breaks. Access and evacuation during a wildfire emergency often must happen simultaneously and road networks should have the capacity to handle both. In the event of a wildfire emergency, the Patricia Bay Highway (Highway 17), West Saanich Rd (Highway 17A) and Lands End Road are reliable, paved access and egress routes for the AOI. Paved roads connecting the AOI east to west, between Deep Cove and Swartz Bay, include Mills Rd and Wain Rd. In the event of a wildfire emergency, evacuation would be conducted by First Responders, RCMP, and the Peninsula Emergency Measures Organization (PEMO). If a wildfire were to block Highway 17 or

⁷³ National Fire Protection Association (NFPA). 2017. Standard on Water Supplies for Suburban and Rural Fire Fighting. Retrieved online at: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1142>

Highway 17A, evacuation from the AOI would be difficult. Smoke and poor visibility, car accidents, wildlife, and other unforeseen circumstances can further complicate evacuations and hinder safe passage.

Several developments within the DNS are located on single access roads or long private drives which branch off of Highway 17A and various side roads. Of particular note is the neighborhood located to the southwest of Mount Newton on Alec Road. Some critical infrastructure within the AOI, is also located at the end of long, narrow and/or private forested roads, especially the Marine Communications and Operations Centre and the communications towers operated by the Department of National Defense. An important tool that can increase the ability of the local fire department to access interface areas is the strategic development of recreational trails to a standard that supports emergency vehicles, and the installation of gates or other barriers to minimize access by unauthorized users.

RECOMMENDATION #33: Include a qualified professional with experience in operational wildland/interface fire suppression in the planning and strategic siting of future trails and parks.

6.1.4 Training

The North Saanich Fire Department maintains a current level of structural protection training as described in Section 6.1.1. It is recommended that all fire department members at minimum obtain S-100 and/or SPP-WFF 1 (or equivalent) certification, and that the fire departments engage in yearly practical wildland fire training with BCWS. It should be noted that SPP-WFF 1 is a new S-100 equivalent course for structural firefighters only, and as such BCWS has phased out instruction of S-100 training for fire departments.

It is recommended that the fire departments maintain communication and work cooperatively with the BCWS (Coastal Fire Center) to conduct yearly mock exercises, where information and technical/practical knowledge are shared, such as: fireline construction, Mark 3 pump operations, sprinkler protection, skid pack operations, portable water tank deployment, and wildland hose operations. These practices could also provide training to wildland crews on hydrant hookup methods, as well as provide an avenue to discuss working together on inter-agency fires. Additional training options could include engaging adjacent Fire Departments outside of the AOI (i.e., District of Central Saanich, the Town of Saanich and the District of Saanich) to conduct joint training so as to further strengthen regional emergency response and firefighting training.

RECOMMENDATION #34: The NSFD should work with BCWS to maintain an annual structural and interface training program. As part of the training, it is recommended to conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well-versed in their set-up and use. It is recommended the NSFD engage in yearly practical wildland fire training with BCWS that covers at a minimum: pump, hose, hydrant, air tanker awareness, and employment of SPUs. Interface training should include completion of a joint wildfire simulation exercise and safety training specific to wildland fire and risks inherent with natural areas. It is recognized that BCWS crew resources are limited and their availability and is highly dependent upon the current fire season and other BCWS priorities. Given this, consider coordinating with fire departments from other municipalities throughout the Capital Regional District to complete annual cross-training events together.



RECOMMENDATION #35: NSFD should engage in regular communication with the BCWS South Island Fire Zone/Cobble Hill Fire Base to foster a strong relationship and identify potential cooperative wildfire risk reduction opportunities.

RECOMMENDATION #36: Ensure that NSFD maintains the capability to effectively suppress wildland fires, through wildfire-specific training sessions. Maintain a high level of member education and training specific to interface and wildland fires by including S-100 and S-185 (combined) or SPP-WFF1, at a minimum. Consider expanding the training program to maintain a high level of member education and training specific to interface and wildland fires. SPP-115 provides training to structural firefighters on the use of wildfire pumps and hose (and fire service hose and hydrants) in the application of structural protection units (SPUs). The NSFD should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources allow.

6.2 STRUCTURE PROTECTION

The North Saanich Fire Department is well resourced in structural fire suppression equipment; however, wildland fire suppression equipment resources may be limited. The NSFD maintains a current level of training in structural firefighting (see Section 6.1.1 for additional detail). The NSFD is not equipped with a Structural Protection Unit (SPU). However; the UBCM owns four complete SPUs, each equipped to protect 30 – 35 structures. The kits are deployed by the MFLNRORD/BCWS incident command structure and are placed strategically across the province during the fire season based on fire weather conditions and fire potential. When the kits are not in use, they may be utilized by fire departments for training exercises. SPUs can be useful tools in the protection of rural/interface homes in the event of a wildfire. An important consideration in protecting the WUI zone from fire is ensuring that homes can withstand an interface fire event. Structure protection is focused on ensuring that building materials and construction standards are appropriate to protect individual homes from interface fire. Materials and construction standards used in roofing, exterior siding, window and door glazing, eaves, vents, openings, balconies, decks, and porches are primary considerations in developing FireSmart neighbourhoods. Housing built using appropriate construction techniques and materials in combination with fire resistant landscaping are less likely to be impacted by interface fires.

While many BC communities established to date were built without significant consideration of interface fire, there are still ways to reduce home vulnerability. Changes to roofing materials, siding, and decking can be achieved over the long-term through voluntary upgrades, as well as changes in bylaws and building codes. The FireSmart approach has been adopted by a wide range of governments and is a recognized process for reducing and managing fire risk in the wildland urban interface. More details on FireSmart construction can be found in the *“FireSmart Begins at Home Manual”*⁷⁴.

It is recommended that homeowners take a building envelope-out approach, that is, starting with the home and working their way out. Addressing little projects first can allow for quick, easy, and cost-effective risk reduction efforts to be completed sooner, while larger, more costly projects can be

⁷⁴ Available at <https://firesmartcanada.ca/resources/> (FireSmart Canada) and <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart> (BC FireSmart)

completed as resources and planning allow. For example, prior to the fire season, clearing roofs and gutters of combustible materials (leaves and needles), cleaning out any combustible accumulations or stored materials from under decks, moving large potential heat sources such as firewood, spare building materials or vehicles as far from the structure as possible, maintaining a mowed and watered lawn, removing dead vegetation, and pruning trees are actionable steps that residents can start working on immediately. The following link accesses an excellent four-minute video demonstrating the importance of FireSmart building practices during a simulated ember shower:

<http://www.youtube.com/watch?v=Vh4cQdH26g>.

The structure protection objectives for the DNS are to:

- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties and to reduce existing barriers to action;
- Enhance protection of critical infrastructure from wildfire (and post-wildfire impacts); and,
- Enhance protection of residential/commercial structures from wildfire.

RECOMMENDATION #37: Work with local distributors and homeowners within the District to improve education of homeowners and remove some barriers to FireSmart action. Local distributors can include: hardware stores, garden centers, and aggregate providers. Initiatives may include: 1) Developing and delivery of FireSmart workshop(s) for local distributors on FireSmart issues and solutions/advice for homeowners. These distributors can be educated upon which supplies are FireSmart and in what configuration they can be used (for example, external sprinkler system equipment, aggregates and ground cover, wire mesh for vents, deck skirting); 2) Advocating for a FireSmart branding in the retail stores (could be stickers on shelf pricing or a FireSmart-specific section) to increase public exposure to projects that can be done at a relatively low cost; and 3) Develop general cost implications of improvements so property owners can prioritize replacements.

RECOMMENDATION #38: Consider promoting or expanding programs which serve to remove barriers to action for homeowners by providing methods for them to cheaply and easily dispose of wood waste removed from their property. Programs may include scheduled community chipping opportunities, or yard waste dumpsters available by month in neighbourhoods. Programs should be available during times of greatest resident activity (likely spring and fall).

RECOMMENDATION #39: Complete a vulnerability assessment of all critical infrastructure, secondary power sources, and fuel availability. Seek contributions and information from Tseycum First Nation and Pauquachin First Nation about critical infrastructure for which ignition potential is high, or for which FireSmart best practices might be strengthened. Review current capability of secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.

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APPENDIX A – LOCAL WILDFIRE THREAT PROCESS

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

1. Fuel type attribute assessment, ground truthing/verification and updating as required to develop a local fuel type map (Appendix A-1).
2. Consideration of the proximity of fuel to the community, recognizing that fuel closest to the community usually represents the highest hazard (Appendix A-2).
3. Analysis of predominant summer fire spread patterns using wind speed and wind direction during the peak burning period using ISI Rose(s) from BCWS weather station(s) (Appendix A-3). Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread.
4. Consideration of topography in relation to values (Appendix A-4). Slope percentage and slope position of the value are considered, where slope percentage influences the fire's trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill.
5. Stratification of the WUI based on relative wildfire threat, considering all of the above.
6. Consider other local factors (i.e., previous mitigation efforts, and local knowledge regarding hazardous or vulnerable areas)
7. Identify priority wildfire risk areas for field assessment.

The basis for the prioritization of field assessment locations is further detailed in Section 4.3. Wildfire Threat Assessment plot worksheets are provided in Appendix C (under separate cover), plot locations are summarized in Appendix F, and the field data collection and spatial analysis methodology is detailed in Appendix H.

A-1 FUEL TYPE ATTRIBUTE ASSESSMENT

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and sixteen fuel types based on characteristic fire behaviour under defined conditions.⁷⁵ Fuel typing is recognized as a blend of art and science. Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been used within BC, with continual improvement and refinement, for 20 years.⁷⁶ It should be noted that there are significant limitations with the fuel typing system which should be recognized. Major limitations include: a fuel typing system designed to describe fuels which do not occur within the AOI, fuel types which cannot accurately capture the natural variability within a polygon, and limitations in the data used to create initial fuel types.⁷⁶ Details regarding fuel typing methodology and limitations are found in Appendix G. There are several implications of the aforementioned limitations, which include: fuel typing further from the developed areas of the study has a lower confidence, generally; and, fuel typing should be used as a starting point for more detailed assessments and as an indicator of overall wildfire threat, not as an operational, or site-level, assessment.

Table 12 summarizes the fuel types by general fire behaviour (crown fire and spotting potential). In general, the fuel type that may be considered hazardous in terms of fire behaviour and spotting potential in the AOI is C-3, particularly if there are large amounts of woody fuel accumulations or denser understory ingrowth. C-5 fuel types have a moderate potential for active crown fire when wind-driven.⁷⁶ An M-1/2 fuel type can sometimes be considered hazardous, depending on the proportion of conifers within the forest stand; conifer fuels include those in the overstory, as well as those in the understory. An O-1b fuel type often can support a rapidly spreading grass or surface fire capable of damage or destruction of property, and jeopardizing human life, although it is recognized as a highly variable fuel type dependent upon level of curing.⁷⁷ The O-1b fuel type was also attributed to sites dominated by invasive shrubs such as Scotch Broom. These fuel types were used to guide the threat assessment.

Forested ecosystems are dynamic and change over time: fuels accumulate, stands fill in with regeneration, and forest health outbreaks occur. Regular monitoring of fuel types and wildfire threat assessment should occur every 5 – 10 years to determine the need for threat assessment updates and the timing for their implementation.

⁷⁵ Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.

⁷⁶ Perrakis, D.B., Eade G., and Hicks, D. 2018. Natural Resources Canada. Canadian Forest Service. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description* 2018 Version.

⁷⁷ Ibid.

Table 12. Fuel type categories and crown fire spot potential. Only summaries of fuel types encountered within the AOI on Crown land are provided (as such, other fuel types, i.e., C-1, C-2, C-4 and C-7 are not summarized below).

Fuel Type	FBP/CFDDRS Description	AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire/Spotting Potential
C-3	Mature jack or lodgepole pine	Fully stocked, late young forest (western red cedar, hemlock, and/or Douglas-fir), with crowns separated from the ground	Surface and crown fire, low to very high fire intensity and rate of spread	High*
C-5	Red and white pine	Well-stocked mature forest, crowns separated from ground. Moderate understory herbs and shrubs. Often accompanied by dead woody fuel accumulations.	Moderate potential for active crown fire in wind-driven conditions. Under drought conditions, fuel consumption and fire intensity can be higher due to dead woody fuels	Low
O-1a/b	Grass	Matted and standing grass communities. Continuous standing grass with sparse or scattered shrubs and down woody debris. Vegetated, non-treed areas dominated by shrubs or herbs in dry ecosystems. Areas of very scattered trees. Hay fields. Areas harvested 7 – 24 years ago (dense or open and >4 m in height). Scotch-Broom dominated right-of-ways.	Rapidly spreading, high- intensity surface fire when cured	Low
M-1/2	Boreal mixedwood (leafless and green)	Moderately well-stocked mixed stand of conifers and deciduous species, low to moderate dead, down woody fuels.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)	<26% conifer (Very Low); 26-49% Conifer (Low); >50% Conifer (Moderate)
D-1/2	Aspen (leafless and green)	Deciduous stands	Always a surface fire, low to moderate rate of spread and fire intensity	Low
W	N/A	Water	N/A	N/A



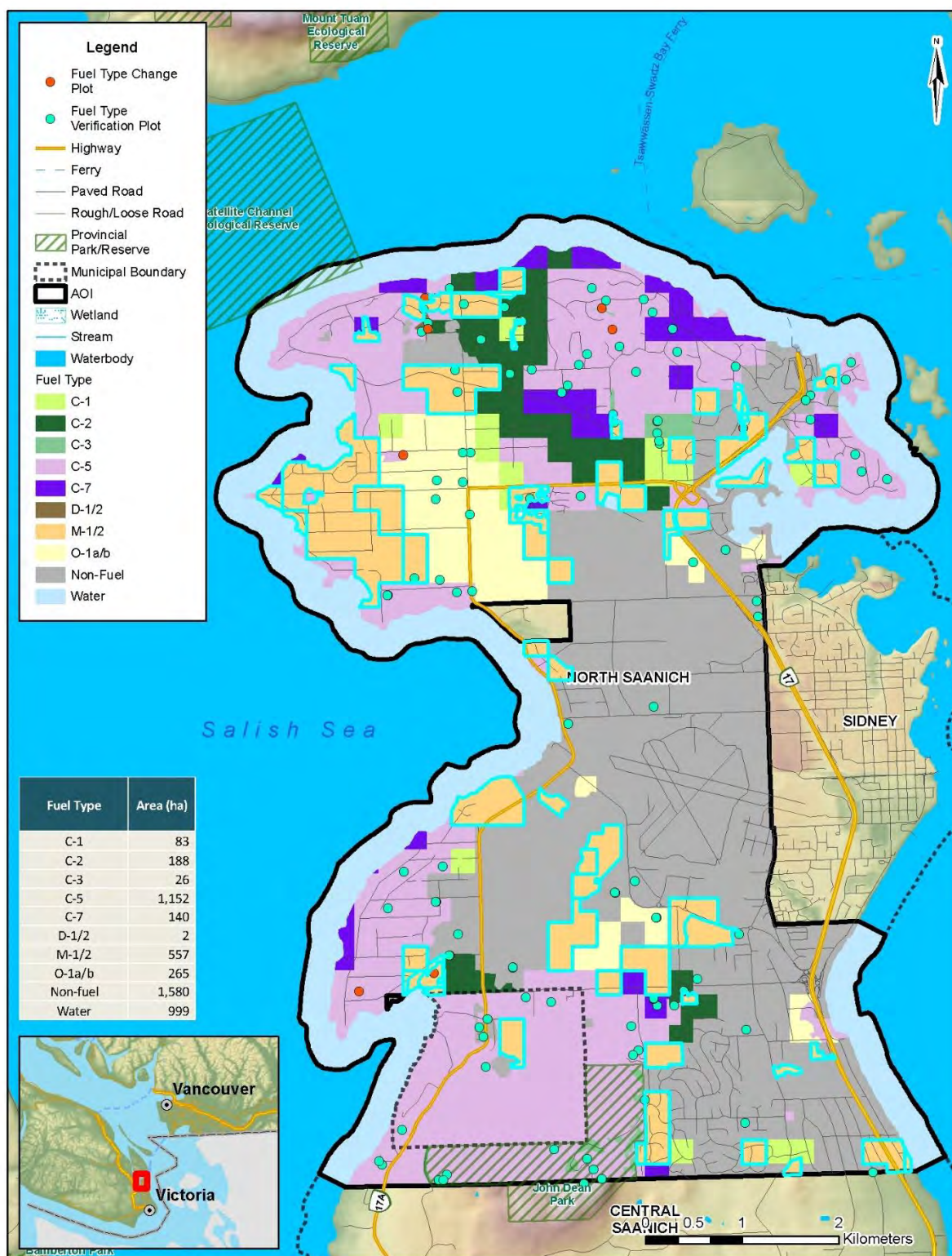
Fuel Type	FBP/CFDDRS Description	AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire/Spotting Potential
N	N/A	Non-fuel: irrigated agricultural fields, golf courses, alpine areas void or nearly void of vegetation, urban or developed areas void or nearly void of forested vegetation.	N/A	N/A

**C-3 fuel type is considered to have a high crown fire and spotting potential within the AOI due to the presence of moderate to high fuel loading (dead standing and partially or fully down woody material), and continuous conifer ladder fuels (i.e., western redcedar, Cw, and/or Douglas-fir, Fd).*

During field visits, ten recurring patterns of fuel type errors were found in the provincial dataset. They were:

- M-1/2 fuel types being incorrectly identified by the PSTA as C-1;
- M-1/2 fuel types identified as C-2;
- M-1/2 fuel types identified as W;
- D-1/2 fuel types identified as C-2;
- C-3 fuel types identified as C-5;
- C-3 fuel types identified as C-7;
- C-5 fuel types identified as C-2;
- C-5 fuel types identified as C-7;
- C-5 fuel types identified as O-1a/b; and
- C-5 fuel types identified as W.

All fuel type updates were approved by BCWS, using stand and fuel descriptions and photo documentation for the review process (see Appendix B for submitted fuel type change rationales).



Map 7. Updated Fuel Type.

A-2 PROXIMITY OF FUEL TO THE COMMUNITY

Fire hazard classification in the WUI is partly dictated by the proximity of the fuel to developed areas within a community. More specifically, fuels closest to the community are considered to pose a higher hazard in comparison to fuels that are located at greater distances from values at risk. As a result, it is recommended that the implementation of fuel treatments prioritizes fuels closest to structures and/or developed areas, in order to reduce hazard level adjacent to the community. Continuity of fuel treatment is an important consideration, which can be ensured by reducing fuels from the edge of the community outward. Special consideration must be allocated to treatment locations to ensure continuity, as discontinuous fuel treatments in the WUI can allow wildfire to intensify, resulting in a heightened risk to values. In order to classify fuel threat levels and prioritize fuel treatments, fuels immediately adjacent to the community are rated higher than those located further from developed areas. Table 13 describes the classes associated with proximity of fuels to the interface.

Table 13. 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	(101-500 m)	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	(501-2,000 m)	Treatment would be effective in limiting long - range spotting but short- range spotting may fall short of the value and cause a new ignition that could affect a value.
	>2,000 m	This should form part of a landscape assessment and is generally not part of the zoning process. Treatment is relatively ineffective for threat mitigation to a value, unless used to form a part of a larger fuel break/treatment.

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

A-3 FIRE SPREAD PATTERNS

Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread. The influence of topography on fire spread patterns is discussed in Appendix A-4. Wind plays a predominant role in fire behaviour and direction of fire spread and is summarized in the Initial Spread Index (ISI) Rose(s) from the local representative BCWS weather station – Victoria Airport (EC). The wind rose data is compiled hourly and provides an estimate of prevailing wind directions and wind speed in the area of the weather station.

The average of hourly wind readings for the fire season (April – October) shows that predominant winds originate from the west, southeast, and east, at windspeeds up to 25 to 30 km/hr and gusting upwards of >30 km/hr. Winds also occur to a lesser degree from the southwest and northeast (Figure 5). Potential treatment areas were identified and prioritized with the predominant wind direction in mind; wildfire that occurs upwind of a value poses a more significant threat to that value than one which occurs downwind.

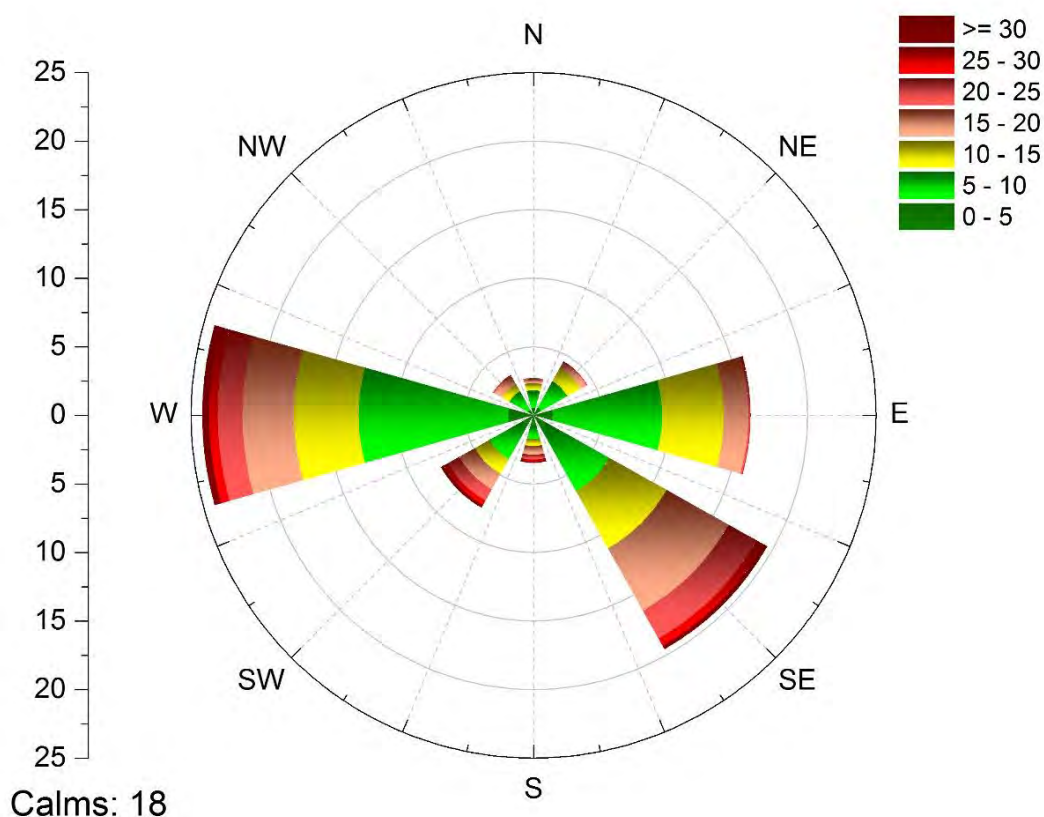


Figure 5. Windrose showing average hourly wind readings during the fire season (April 1 – October 31) 2010-2013. Data taken from the Victoria International Airport weather station.

A-4 TOPOGRAPHY

Topography is an important environmental component that influences fire behaviour. Considerations include slope percentage (steepness) and slope position where slope percentage influences the fire's trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill. Other factors of topography that influence fire behaviour include aspect, elevation and land configuration.

Slope Class and Position

Slope steepness affects solar radiation intensity, fuel moisture (influenced by radiation intensity) and influences flame length and rate of spread of surface fires. Table 14 summarizes the fire behaviour implications for slope percentage (the steeper the slope the faster the spread). In addition, slope position affects temperature and relative humidity as summarized in Table 15. A value placed at the bottom of the slope is equivalent to a value on flat ground (see Table 14). A value on the upper 1/3 of the slope would be impacted by preheating and faster rates of spread (Table 15). The majority of the AOI (99%) is on less than 20% slope and will likely not experience accelerated rates of spread due to slope class. Less than 1% of the AOI is likely to experience an increased or high rate of spread. On the larger topographic scale, the DNS and surrounding agricultural, industrial, commercial, recreational and residential developments would be considered bottom of the slope or valley bottom.

Table 14. Slope Percentage and Fire Behaviour Implications.

Slope	Percent of AOI	Fire Behaviour Implications
<20%	99%	Very little flame and fuel interaction caused by slope, normal rate of spread.
20-30%	1%	Flame tilt begins to preheat fuel, increase rate of spread.
30-40%	<1%	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
40-60%	0%	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	0%	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.

Table 15. Slope Position of Value and Fire Behaviour Implications.

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

APPENDIX B – WILDFIRE THREAT ASSESSMENT – FBP FUEL TYPE CHANGE RATIONALE

Provided separately as PDF package.

APPENDIX C – WILDFIRE THREAT ASSESSMENT WORKSHEETS AND PHOTOS

Provided separately as PDF package.

APPENDIX D – MAPS

Provided separately as PDF package.

APPENDIX E – WILDLAND URBAN INTERFACE DEFINED

The traditional and most simple definition for the wildland/urban interface (WUI) is “the place where the forest meets the community”. However, this definition can be misleading. Incorrectly, it implies that neighbourhoods and structures well within the perimeter of a larger community are not at risk from wildfire. As well, it fails to recognize that developments adjacent to grassland and bush are also vulnerable.

A more accurate and helpful definition of the WUI is based on a set of conditions, rather than a geographical location: “the presence of structures in locations in which conditions result in the potential for ignition of structures from the flames, radiant heat or embers of a wildland fire.” This definition was developed by the National Fire Protection Association and is used by the US Firewise program. It recognizes that all types of wildland fuel/fire can lead to structural ignition (i.e. forest, grassland, brush) and also identifies the three potential sources of structural ignition.

Two situations are differentiated. Locations where there is a clean/abrupt transition from urban development to forest lands are usually specified as the “interface” whereas locations where structures are embedded or mingled within a matrix of dense wildland vegetation are known as the “intermix”. An example of interface and intermixed areas is illustrated in Figure 6.

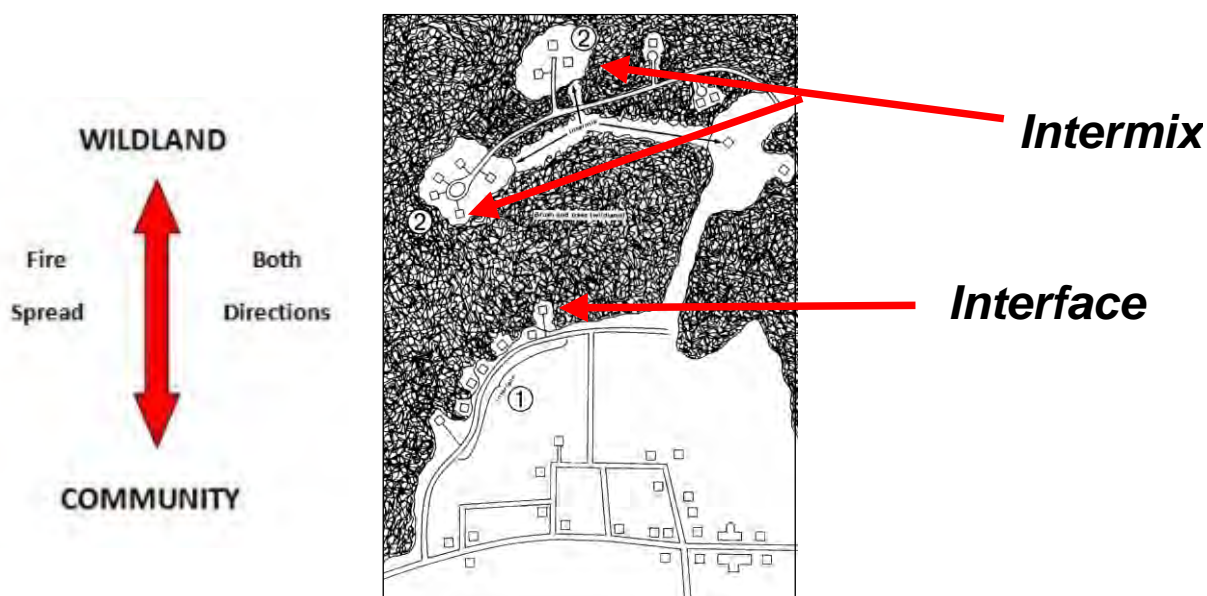


Figure 6. Illustration of intermix and interface situations.

Within the WUI, fire has the ability to spread from the forest into the community or from the community out into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk. Regardless of which scenario occurs, there will be consequences for the community and this will have an impact on the way in which the community plans and prepares itself for interface fires.

Fires spreading into the WUI from the forest can impact homes in two distinct ways:



1. From sparks or burning embers carried by the wind, or convection that starts new fires beyond the zone of direct ignition (main advancing fire front), that alight on vulnerable construction materials or adjacent flammable landscaping (roofing, siding, decks, cedar hedges, bark mulch, etc.) (Figure 7).
2. From direct flame contact, convective heating, conductive heating or radiant heating along the edge of a burning fire front (burning forest), or through structure-to-structure contact. Fire can ignite a vulnerable structure when the structure is in close proximity (within 10 meters of the flame) to either the forest edge or a burning house (Figure 8).



Figure 7. Firebrand caused ignitions: burning embers are carried ahead of the fire front and alight on vulnerable building surfaces.



Figure 8. Radiant heat and flame contact allows fire to spread from vegetation to structure or from structure to structure.

Current research confirms that the majority of homes ignited during major WUI events trace back to embers as their cause (e.g., 50% – 80+ %). Firebrands can be transported long distances ahead of the wildfire, across any practicable fire guards, and accumulate on horizontal surfaces within the home ignition zone in densities that can reach 600+ /m². Combustible materials found within the home ignition zone combine to provide fire pathways allowing spot fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

APPENDIX F – WUI THREAT PLOT LOCATIONS

Table 16 displays a summary of all WUI threat plots completed during CWPP field work. The original WUI threat plot forms and photos will be submitted as a separate document. The following ratings are applied to applicable point ranges:

- Wildfire Behaviour Threat Score – Low (0-40); Moderate (41 – 95); High (96 – 149); Extreme (>149); and,
- WUI Threat Score – Low (0 – 13); Moderate (14 – 26); High (27 – 39); Extreme (>39).

Table 16. Summary of WUI Threat Assessment Worksheets.

WUI Plot #	Geographic Location	Wildfire Behaviour Threat Class	WUI Threat Class*
ARDM-1	Ardmore Drive	Moderate	N/A
BRAD-1	Bradley Dyne Road	Moderate	N/A
BULL-1	R. O. Bull Park	Moderate	N/A
COLE-1	Coles Bay Regional Park	Moderate	N/A
DEAN-1	ŁÁU, WELNEW/ John Dean Provincial Park	High	Extreme
DEAN-2	ŁÁU, WELNEW/ John Dean Provincial Park	Moderate	N/A
DEAN-3	ŁÁU, WELNEW/ John Dean Provincial Park	High	Extreme
DEAN-4	ŁÁU, WELNEW/ John Dean Provincial Park	Moderate	N/A
DEAN-5	ŁÁU, WELNEW/ John Dean Provincial Park	Moderate	N/A
DEAN-6	ŁÁU, WELNEW/ John Dean Provincial Park	High	Extreme
DEAN-7	ŁÁU, WELNEW/ John Dean Provincial Park	Moderate	N/A
DENH-1	Denham Till Park	Moderate	N/A
DUCK-1	Duck Pond	Moderate	N/A
DUCK-2	Duck Pond	High	Extreme
DUNS-1	Homewood Ravensview	Moderate	N/A
EUBA-1	Eugene Bailin Memorial Trail	Moderate	N/A
HORT-1	Horth Hill Regional Park	Moderate	N/A
HORT-2	Horth Hill Regional Park	Moderate	N/A
HORT-3	Horth Hill Regional Park	High	High
HORT-4	Horth Hill Regional Park	Moderate	N/A
HORT-5	Horth Hill Regional Park	Moderate	N/A
HORT-6	Horth Hill Regional Park	High	High
LAND-1	Lands End Drive	Moderate	N/A
LAND-2	Lands End Drive	Moderate	N/A
LILL-1	Lillian Hofer Park	Moderate	N/A
PAUQ-1	Pauquachin Nation (Cole Bay IR 3)	Moderate	N/A
PAUQ-2	Pauquachin Nation (Cole Bay IR 3)	Moderate	N/A
READ-1	Readings Road	Moderate	N/A
STRA-1	Woodcreek Drive	Moderate	N/A



WUI Plot #	Geographic Location	Wildfire Behaviour Threat Class	WUI Threat Class*
SUMA-1	Sumac Park	Moderate	N/A
SUMA-2	Sumac Park	Moderate	N/A
SUMA-3	Sumac Park	High	Extreme
SUMA-4	Sumac Park	Moderate	N/A
SYCA-1	Sycamore Park	High	Extreme
TEXA-1	Texada Terrace	Moderate	N/A
TRYO-1	Tryon Place	Moderate	N/A

*Note that WUI threat scores are only collected for untreated polygons that rate high or extreme for Wildfire Behaviour Threat score. WUI threat scores are collected regardless of Wildfire Behaviour Threat score for treated polygons.

APPENDIX G – FUEL TYPING METHODOLOGY AND LIMITATIONS

The initial starting point for fuel typing for the AOI was the 2019 provincial fuel typing layer provided by BCWS as part of the *2019 Provincial Strategic Threat Analysis (PSTA)* data package. This fuel type layer is based on the FBP fuel typing system. PSTA data is limited by the accuracy and availability of information within the Vegetation Resource Inventory (VRI) provincial data; confidence in provincial fuel type data is very low on private land. The PSTA threat class for all private land within the AOI was not available. Fuel types within the AOI have been updated using orthoimagery of the area with representative fuel type calls confirmed by field fuel type verification. Polygons not field-verified were assigned fuel types based upon similarities visible in orthophotography to areas field verified. Where polygons were available from the provincial fuel typing layer, they were utilized and updated as necessary for recent harvesting, development, etc.

It should be noted that fuel typing is intended to represent a fire behaviour pattern; a locally observed fuel type may have no exact analog within the FBP system. The FBP system was almost entirely developed for boreal and sub-boreal forest types, which do not occur within the AOI. As a result, the local fuel typing is a best approximation of the Canadian Forest Fire Danger Rating System (CFFDRS) classification, based on the fire behaviour potential of the fuel type during periods of high and extreme fire danger within the local MFLNRORD region. Additionally, provincial fuel typing depends heavily on VRI data, which is gathered and maintained in order to inform timber management objectives, not fire behaviour prediction. For this reason, VRI data often does not include important attributes which impact fuel type and hazard, but which are not integral to timber management objectives. Examples include: surface fuels and understory vegetation.

In some cases, fuel type polygons may not adequately describe the variation in the fuels present within a given polygon due to errors within the PSTA and VRI data, necessitating adjustments required to the PSTA data. In some areas, aerial imagery is not of sufficiently high resolution to make a fuel type call. Where fuel types could not be updated from imagery with a high level of confidence, the original PSTA fuel type polygon and call were retained.

For information on the provincial fuel typing process used for PSTA data as well as aiding in fuel type updates made in this document, please refer to Perrakis, Eade, and Hicks, 2018.⁷⁸

⁷⁸ Perrakis, D.B., Eade G., and Hicks, D. 2018. Natural Resources Canada. Canadian Forest Service. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description* 2018 Version

APPENDIX H – WUI THREAT ASSESSMENT METHODOLOGY

As part of the CWPP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. As part of the program, proponents completing a CWPP or CWPP update are provided with the Provincial Strategic Threat Analysis (PSTA) dataset. This dataset includes:

- Current Fire Points
- Current Fire Polygons
- Fuel Type
- Historical Fire Points
- Historical Fire Polygons
- Mountain pine beetle polygons (sometimes not included)
- PSTA Head Fire Intensity
- PSTA Historical Fire Density
- PSTA Spotting Impact
- PSTA Threat Rating
- Structure Density
- Structures (sometimes not included)
- Wildland Urban Interface Buffer Area.

The required components for the spatial data submission are detailed in the Program and Application Guide Spatial Appendix – these include:

- AOI
- Fire Threat
- Fuel Type
- Proposed Treatment
- Threat Plot.

The provided PSTA data does not necessarily transfer directly into the geodatabase for submission, and several PSTA feature classes require extensive updating or correction. In addition, the Fire Threat determined in the PSTA is fundamentally different than the Fire Threat feature class that must be submitted in the spatial data package. The Fire Threat in the PSTA is based on provincial scale inputs - fire density; spotting impact; and head fire intensity, while the spatial submission Fire Threat is based on the components of the Wildland Urban Interface Threat Assessment Worksheet. For the scope of this project, completion of WUI Threat Assessment plots on the entire AOI is not possible, and therefore an analytical model has been built to assume Fire Threat based on spatially explicit variables that correspond to the WUI Threat Assessment worksheet.

Field Data Collection

The primary goals of field data collection are to confirm or correct the provincial fuel type, complete WUI Threat Assessment Plots, and assess other features of interest to the development of the CWPP update. This is accomplished by traversing as much of the AOI as possible (within time, budget and access constraints). Threat Assessment plots are completed on the 2012 version form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the AOI were determined through the completion of the following methodological steps:

1. Update fuel-typing using orthophotography provided by the client and field verification.

2. Update structural data using critical infrastructure information provided by the client, field visits to confirm structure additions or deletions, and orthophotography
3. Complete field work to ground-truth fuel typing and threat ratings (completed 36 WUI threat plots on a variety of fuel types, aspects, and slopes and an additional 130+ field stops with qualitative notes, fuel type verification, and/or photographs)
4. Threat assessment analysis using field data collected and rating results of WUI threat plots – see next section.

Spatial Analysis

Not all attributes on the WUI Threat Assessment form can be determined using a GIS analysis on a landscape/polygon level. To emulate as closely as possible the threat categorization that would be determined using the Threat Assessment form, the variables in Table 17 were used as the basis for building the analytical model. The features chosen are those that are spatially explicit, available from existing and reliable spatial data or field data, and able to be confidently extrapolated to large polygons.

Table 17. Description of variables used in spatial analysis for WUI wildfire threat assessment.

WUI Threat Sheet Attribute	Used in Analysis?	Comment
FUEL SUBCOMPONENT		
Duff depth and Moisture Regime	No	Many of these attributes assumed by using 'fuel type' as a component of the Fire Threat analysis. Most of these components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
Large Woody Debris Continuity	No	
Live and Dead Coniferous Crown Closure	No	
Live and Dead Conifer Crown Base height	No	
Live and Dead suppressed and Understory Conifers	No	
Forest health	No	
Continuous forest/slash cover within 2 km	No	
WEATHER SUBCOMPONENT		
BEC zone	Yes	
Historical weather fire occurrence	Yes	
TOPOGRAPHY SUBCOMPONENT		
Aspect	Yes	Elevation model was used to determine slope.
Slope	Yes	
Terrain	No	
Landscape/ topographic limitations to wildfire spread	No	
STRUCTURAL SUBCOMPONENT		
Position of structure/ community on slope	No	Distance to structure is used in analysis; position on slope relative
Type of development	No	
Position of assessment area relative to values	Yes	



WUI Threat Sheet Attribute	Used in Analysis?	Comment
		to values at risk is too difficult to analyze spatially.

The field data is used to correct the fuel type polygon attributes provided in the PSTA. The corrected fuel type layer is then used as part of the initial spatial analysis process. The other components are developed using spatial data (BEC zone, fire history zone) or spatial analysis (aspect, slope). A scoring system was developed to categorize resultant polygons as having relatively low, moderate, high or extreme Fire Threat, or Low, Moderate, High or Extreme WUI Threat.

These attributes are combined to produce polygons with a final Fire Behaviour Threat Score. To determine the Wildland Urban Interface Score, only the distance to structures is used. Buffer distances are established as per the WUI Threat Assessment worksheet (<200, 200-500 and >500) for polygons that have a 'high' or 'extreme' Fire Behaviour Threat score. Polygons with structures within 200m are rated as 'extreme', within 500m are rated as 'high', within 2km are 'moderate', and distances over that are rated 'low'.

There are obvious limitations in this method, most notably that not all components of the threat assessment worksheet are scalable to a GIS model, generalizing the Fire Behaviour Threat score. The WUI Threat Score is greatly simplified, as determining the position of structures on a slope, the type of development and the relative position are difficult in an automated GIS process. This method uses the best available information to produce the initial threat assessment across the AOI in a format which is required by the UBCM SWPI program.

Upon completion of the initial spatial threat assessment, individual polygon refinement was completed. In this process, the WUI threat plots completed on the ground were used in the following ways:

- fuel scores were reviewed and applied to the fuel type in which the threat plot was completed;
- conservative fuel scores were then applied to the polygons by fuel type to check the initial assessment;
- high Wildfire Behaviour Threat Class polygons were reviewed in google earth to confirm their position on slope relative to values at risk.

In this way, we were able to consider fuel attributes outside the fuel typing layer, as well as assessment area position on slope relative to structures, which are included in the WUI threat plot worksheet.

Limitations

The threat class ratings are based initially upon (geographic information systems) GIS analysis that best represents the WUI wildfire threat assessment worksheet and are updated with ground-truthing WUI threat plots. WUI threat plots were completed in a variety of fuel types, slopes, and aspects in order to be able to confidently refine the GIS analysis. It should be noted that there are subcomponents in the worksheet which are not able to be analyzed using spatial analysis; these are factors that do not exist in the GIS environment.

The threat assessment is based largely on fuel typing, therefore the limitations with fuel typing accuracy (as detailed in Appendix A-1 and Appendix G) impacts the threat assessment, as well.