District of Lantzville
Community Wildfire Protection Plan 2020

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Lantzville LoveLifeHere

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I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work.	
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EXECUTIVE SUMMARY AND 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 Lantzville (Lantzville) with a framework that can be used to review and assess areas of identified high fire risk within it. 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 in and adjacent to Lantzville.

In 2009, the RDN initiated a coordinated effort to develop a joint CWPP for the communities of Lantzville, Nanoose Bay, and Nanoose First Nation that was completed in 2010. This 2020 CWPP document is meant to supersede that previous 2010 CWPP and is focused solely on Lantzville.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. A total of **37** strategic recommendations are found in a tabularized format within this Executive Summary. In addition, these recommendations are more thoroughly discussed in their appropriate sections within the document. Because the area of interest extends outside Lantzville's District boundary onto private land and into other jurisdictions, Lantzville's role may be limited to the role of an influencer in some instances, while other recommendations can be directly implemented. 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 Lantzville. There is not one combination nor course of action which is the answer; Lantzville 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.

26 of the recommendations have been labelled as 'High Priority' and reflect Lantzville's high proportion of private property, single entry/exit neighbourhoods, as well as limited emergency access/evacuation points to Highway 19. These high priority recommendations outline strategies to:

- Protect critical infrastructure and mitigate post-wildfire impacts;
- Reduce wildfire hazards on private land;
- Increase public wildfire awareness;
- Improve access/evacuation to enhance emergency preparedness;
- Structure protection;
- Increase and continually develop Lantzville Fire Rescue staff training; and
- Improve water availability for emergency response.

Table 1. Summary of CWPP Recommendations by Document Section (Ordered by Priority Ranking)

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
Document Section 2: Local Area Description			
Objective: Review and amend the current regulatory framework to incorporate wildfire mitigation and preparedness considerations.			
2.5.3	**Medium**	**RECOMMENDATION #1**: As Lantzville builds upon the existing network of parks, trails, and open spaces, consider park acquisition and maintenance through a wildfire lens. This will help ensure wildfire risk, mitigation, liability, and future maintenance are considered as priorities in development of the parks and trails inventory, including consideration for long-term maintenance costs and access. Include the requirement for a qualified professional to review and assess the siting of parks and park access prior to acceptance into Lantzville's park inventory. 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 (through proper placement, emergency access and evacuation, clean-up of combustible fuels trailside, and work practices). *Specific to the Foothills Parks*, strong consideration should be given to the maintenance of existing roads (for fire response access), and a blanket 'no open fires' ban during the fire season.	~30-60 in-house hours (local government funding). May be eligible for UBCM CRI Program Funding
2.5.3	**Medium**	**RECOMMENDATION #2:** Review and amend the Building Bylaw "Owner's Responsibilities" clause 7.6 "Civic Addressing" to require permanent, accurate house numbering that can be clearly seen from the road at night to be posted prior to an occupancy permit being issued by a Building Official. Also amend clause 7.7 "Fire Access" to specify what constitutes acceptable access for firefighting vehicles and to include a fire access route "that has been inspected or approved by the local fire department (or other applicable professional)."	~6-8 Lantzville staff hours required for internal work.
Document Section 3: Values at Risk			
Objective: Protect critical infrastructure and mitigate post-wildfire impacts			
3.2	**High**	**RECOMMENDATION #3:** Engage a qualified professional, such as a Local FireSmart Representative, to complete formal FireSmart assessments of all critical infrastructure including the Lantzville fire hall, community muster locations, the BC Hydro sub-station and water infrastructure (including all reservoirs) as identified in this CWPP (Tables 5 and 6).	~$1,500-2,000 per location (consultant cost)
3.2	**High**	**RECOMMENDATION #4:** Use fire-resistant construction materials, building design and landscaping for all critical infrastructure when completing upgrades or establishing	n/a

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart principles (no combustible material within 10 m of structures).	
3.2.1	**High**	**RECOMMENDATION #6:** To mitigate impacts to critical infrastructure in the event of a wildfire, Lantzville should develop utility right-of-way best management practices (BMPs) for regular brushing and clearing of woody debris and shrubs in coordination with industrial partners to help reduce fire risk, utility pole damage, and subsequent outages. BC Hydro, Fortis BC, Island Corridor Foundation (owner of the retired rail line through Lantzville), and the Ministry of Transportation and Infrastructure should ensure rights-of-way do not contain fine fuel accumulations (< 7.5 cm, that are easily cured) and significant regeneration of conifer vegetation prior to and during the fire season and are maintained in a low hazard state. These corridors can also serve as fuel breaks during a wildfire event.	~8-16 in-house hours.
3.2	**Medium**	**RECOMMENDATION #5:** Lantzville's firehall, municipal hall, sewer stations, and water wells have backup gas- or diesel-powered generators. If a plan or schedule is not already in place, Lantzville should review the current capability of these secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.	~8 in-house hours per structure.
3.3.1	**Medium**	**RECOMMENDATION #7**: Lantzville should conduct a water supply vulnerability assessment to determine potential supply issues. This assessment could include an analysis of the vulnerability of water supply infrastructure to wildfire and/or mass wasting events.	~$10,000 for the assessment (consultant).
Document Section 5: Risk Management and Mitigation Factors Recommendations			
Objectives: Reduce wildfire threat through fuel management, maintain fuel treated areas to maintain acceptable wildfire threat levels, reduce wildfire hazards on private land, increase public wildfire awareness, and promote fuel management and joint initiatives			
5.1.1	**High**	**RECOMMENDATION #8**: Lantzville should proceed with detailed assessment, prescription development and treatment of fuel treatment units identified and prioritized in this CWPP.	UBCM CRI Program funding
5.1.1	**High**	**RECOMMENDATION #9**: In consultation with a BCWS Fuel Management Specialist and MFLNRORD, engage local woodlots and private managed forest land managers to develop forestry standards to reduce interface wildfire	~20 hours. Potential UBCM CRI Program funding.

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		threat. Key examples are: a rationale for reduced fire management stocking standards in the (wildland urban interface (WUI); harvest planning to integrate existing, planned fuel breaks with future cutblocks to address identified hazardous fuel types and spotting potential; and ensuring that high risk activities, such as vegetation management, pile burning, and harvesting do not occur during high/extreme fire danger times to reduce chance of ignitions (as per the Wildfire Act).	
5.1.2	**High**	**RECOMMENDATION #10:** Where operational fuel treatments are conducted, treatment monitoring 5-10 years out should be completed by a qualified professional to assess the efficacy of the treatment and to schedule maintenance activities. This can be completed with a CWPP update or as a stand-alone exercise.	UBCM CRI Program funding/Local Government funding
5.2.2	**High**	**RECOMMENDATION #11**: Review and update (as necessary) the Lantzville Official Community Plan with respect to its updated Wildfire DPA when completed. The following aspects should be considered in the OCP review and wildfire DPA development: 1) Establish DPA objectives (e.g. minimize risk to property and people from wildland fires, minimize risk to forested area surrounding the AOI, and conserve the visual and ecological assets of the forests surrounding communities, etc.; 2) Where possible, it is recommended to mandate FireSmart construction materials, some of which may be beyond BC Building Code within the established wildfire hazard development permit area; and 3) engage the development community in the DPA development process to educate, inform, and allow for input. This can be accomplished in a variety of formats, including, but not limited to, workshops, informational sessions, or open houses. In order to meet objectives, consider including the following elements: 1) minimum setbacks from forested edge based on FireSmart, 2) fuel management based upon qualified professional recommendations, 3) landscaping to FireSmart guidelines, 4) building materials and design based on NFPA 1144 and FireSmart standards, 5) underground servicing, 6) prompt removal of combustible construction materials or thinning/fuel management waste.	40-80 in-house hours UBCM CRI Program funding/Local Government funding
5.2.2	**High**	**RECOMMENDATION #12**: Develop 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, avoid	$2,000 - $3,000 to outsource. Alternatively, general FireSmart landscaping

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		wildlife attractants, 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 Lantzville municipal hall or other strategic locations).	information is available free of charge, but is not climate/ plant hardiness zone specific.
5.2.2	**High**	**RECOMMENDATION #13:** Develop and implement a community chipper program with the help of neighbourhood representatives. As a demonstration, start in one of the FireSmart priority neighbourhoods listed in Table 12.	Time dependent upon program. Eligible for UBCM CRI Program funding. Additional time for advertisement of program availability will be required.
5.2.2	**High**	**RECOMMENDATION #14:** Lantzville Fire Rescue Local FireSmart Representatives should engage as soon as possible to assist neighbourhoods and large-lot private land holders in complying with FireSmart principles at both the neighbourhood and individual home-level.	Time dependent upon amount of work done.
5.2.2	**High**	**RECOMMENDATION #15:** Lantzville 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 in-house hours.
5.3	**High**	**RECOMMENDATION #16:** Make this report and associated maps publicly available on District of Lantzville's website and social media platforms. In addition, this CWPP should be shared with local industry partners, particularly forest licensees such as local woodlots who may be interested in collaborating on direct fuel management treatments or with other sections of this CWPP. The wildfire threat class mapping included in this CWPP should be included in the online RDNMAP.	3-6 hours depending on method of distribution
5.3	**High**	**RECOMMENDATION #17:** 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 Lantzville's wildfire threat assessment or the rate	UBCM CRI Program funding/Local Government funding

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		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.	
5.3	**High**	**RECOMMENDATION #18:** Focus residents' attention on FireSmart by creating a FireSmart page on the Lantzville Fire Rescue Services webpage, in addition to the pages on outdoor burning, summer safety, and fireworks. This page should contain the existing Lantzville FireSmart guide and links to this CWPP, the wildfire Development Permit Area and guidelines, any landscaping guidelines that are developed, and links to FireSmart BC materials, including the FireSmart Begins at Home assessment manual and mobile app. This page can serve as a platform to promote workshops, waste disposal opportunities, the Fire Smart Canada Community Recognition Program, and other community FireSmart initiatives. Updates on fire bans, high or extreme Fire Danger days, and current fires can be integrated with this page. Updates and opportunities should also be communicated regularly through Lantzville's Facebook page. Promote residents to sign-up for RDN's Emergency and Information Alert System (this will likely relay the same fire bans, Fire Danger Days, etc.).	~40 hours. For set-up. Additional hours for updates as required. UBCM CRI Program funding
5.3	**High**	**RECOMMENDATION #19:** Prior to and during the fire season, plan and conduct public FireSmart workshops and presentations promoting FireSmart approaches for wildfire risk reduction. Supply FireSmart resources to homeowners during these engagement campaigns and promote the FireSmart Begins At Home mobile app as a method of conducting home assessments.	~20 hours. May be eligible for UBCM CRI Program funding
5.3	**High**	**RECOMMENDATION #23:** Promote and encourage FireSmart practices on private farmland 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 the Lantzville website, mailouts).	~30-40 hours
5.3	**Medium**	**RECOMMENDATION #20:** Encourage and facilitate neighbourhoods in the WUI to attain FireSmart Canada Community Recognition Program (FSCCRP) status and encourage homeowners to complete a FireSmart home assessment using the Home Assessment guide or the FireSmart Begins At Home mobile app. Encourage FSCCRP neighbourhoods to hold a home hazard assessment workshop as one of their FireSmart events. In addition, Lantzville should promote the use of the FireSmart Home	$5,000/ neighbourhood and an additional 40 hours/initiative UBCM CRI Program funding available

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		Partners Program which facilitates voluntary FireSmart assessments on private property to identify hazards and provide options to reduce the risk.	
5.3	**Medium**	**RECOMMENDATION #21:** Encourage School District 68 to adopt and deploy existing school education programs to engage youth in wildfire management and risk reduction during Fire Prevention Week. 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 BCWS (Coastal Fire Centre) as well as Lantzville Fire Rescue and FireSmart representatives to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in the local elementary school (field trips, guest speakers, etc.).	~10-20 hours UBCM CRI Program Funding
5.3	**Low**	**RECOMMENDATION #22:** Promote and provide information to private landowners related to exterior residential sprinklers as a FireSmart prevention measure. At FireSmart events distribute information on exterior sprinkler component parts, manufacturers, and water supply system requirements to ensure they are effective measures to wet down homes and Fire Priority Zone 1 (0-10 m) and discourage home ignition. Develop general costs of exterior sprinkler equipment for property owners.	~10-20 hours to prepare materials. Additional hours to disseminate information to landowners
Document Section 6: Wildfire Response Resources Recommendations			
Objectives: Improve water availability for emergency response, improve access/evacuation to enhance emergency preparedness, increase and continually develop Lantzville Fire Rescue staff training, and structure protection			
6.1.1	**High**	**RECOMMENDATION #24:** Consider funding opportunities to obtain additional wildland specific equipment as required, such as wildfire hose and fittings, portable water tank and pump(s), and hand tools, as well as PPE such as leather boots, gloves, and fire-resistant Nomex overalls.	~8 in-house hours
6.1.2	**High**	**RECOMMENDATION #25**: All new developments outside of existing water service areas should have a water system which meets or exceeds minimum standards of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.* Local fire departments should review the planned 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
6.1.2	**High**	**RECOMMENDATION #26**: Complete a fire flow/water vulnerability assessment of current infrastructure to	$10,000

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		identify where upgrades to systems, flows, hydrant number or location, and water storage, or secondary power is required. Prioritize and rank projects and complete or require upgrades as resources allow.	
6.1.3	**High**	**RECOMMENDATION #27**: Existing single access neighbourhoods should be reassessed for potential secondary access/evacuation routes. It is recognized that most of these neighbourhoods are older and surrounding private property can make this difficult. There could be opportunities for an easement or agreement-on-use on the edge of an individual's private property for a single lane gravel road that could create the required secondary evacuation route for a neighbourhood (to be used only in emergency evacuation situations). Another opportunity could be contacting BC Hydro and discuss using parts of the existing BC Hydro right-of-way access road as an emergency evacuation route (example: for Bayview Park Drive and the Winds neighbourhoods, utilizing Lorenzen Lane).	~8 hours per neighbourhood. Additional hours as per available opportunities.
6.1.3	**High**	**RECOMMENDATION #28**: Incorporate the requirement for all new and ongoing/underway developments to have two access/evacuation routes in the 2021 Interface Wildfire Protection DPA update. Work with the developers of the Foothills area to maintain the backroads that connect the Foothills development to Vipond Road. This secondary access/evacuation route would benefit both Foothills residents and users of the Foothills park area.	As part of recommendation #12. Additional hours to address Foothills developers.
6.1.3	**High**	**RECOMMENDATION #33**: Implement "high priority" proposed fuel treatment units at the intersection of Ware Road and Highway 19 (FTUs HIGH-N and HIGH-S).	UBCM CRI Program funding
6.1.4	**High**	**RECOMMENDATION #35:** Lantzville Fire Rescue should start working directly with BC Wildfire Service (BCWS) to create 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. Additionally, 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. Strategic information should be reviewed and shared, such as (spatial GIS or paper maps) of all known drafting sites. It is recognized that BCWS crew resources are limited and their availability is highly	Time/cost dependent on numbers and training done. Wildfire training may qualify for UBCM CRI Program funding

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		dependent upon the current fire season and other BCWS priorities.	
6.1.4	**High**	**RECOMMENDATION #36:** Continue to ensure that the Lantzville Fire Rescue maintains the capability to effectively suppress wildland fires, through wildfire-specific training sessions. Ensure all firefighters' training includes S100 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 fire departments should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources/budgets allow.	Time/cost dependent on numbers and training done. Wildfire training specific courses may qualify for UBCM CRI Program funding
6.2	**High**	**RECOMMENDATION #37**: Explore funding and program opportunities that would 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 (ie. Recommendation #14: chipper program). These may include yard waste dumpsters available by month in neighbourhoods or scheduled burning weekends (dependent on weather and venting and open burning bylaws). Programs should be available during periods when most yard clearing takes place (spring and/or fall).	~20 in-house hours UBCM CRI Program Funding/Local Government funding
6.1.3	**Medium**	**RECOMMENDATION #29**: Install (District roads) or require installation of (private or strata roads) signage, road paint, or both at all road locations required to be kept clear for emergency vehicle use (ex: no parking signage).	In-house hours and Local Government funding
6.1.3	**Medium**	**RECOMMENDATION #30**: Lantzville Fire Rescue should continue to implement routine, scheduled checks of locked gates and accessibility with keys on hand and ensure that all wildland response vehicles carry bolt-cutters to use in an emergency.	Time dependent on number of gates and schedule.
6.1.3	**Medium**	**RECOMMENDATION #32**: Discuss with the RDN their plan towards implementing recommendations in the 2020 Evacuation Route Plan Report. Emphasize recommendations of importance to Lantzville, such as including assigning neighbourhoods with a primary evacuation route (should there be a need to call for a rapid no-notice evacuation), and making a simple evacuation map and pre-planning brochure that would be available on the Lantzville Fire Rescue Services webpage that addresses: 1) primary evacuation route by	Time and cost dependent on which recommendations implemented.

CWPP Section	Priority	Recommendation / Next Steps	Estimated Cost ($) or Person hours
		neighbourhood/zone; 2) tips for being evacuation prepared (pre-packed bags with clothes, food, water; vehicles always left with minimum half-full gas tanks; etc.).	
6.1.3	**Low**	**RECOMMENDATION #31**: A locked gate should be installed at the end of Aulds Road where it enters Woodlot 1475. Identified by Lantzville Fire Rescue, this would keep out nuisance activities and limit associated fire ignitions in this wildland interface area.	$4,000 purchase and installation. (cost potentially shared with woodlot 1475 owner)
6.1.3	**Low**	**RECOMMENDATION #34**: As part of an annual Fire Prevention Week, communicate the importance of adequate, reflective house numbering for emergency response. Consider providing an opportunity for homeowners to purchase address signage at a reduced rate.	~40 hours to prepare for Fire Prevention Week. Demonstrations/In-person events qualify for UBCM CRI Program funding

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COMMONLY USED ACRONYMS

AAC	Allowable Annual Cut
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
VLUP	Vancouver Island Land Use Plan
CDC	Conservation Data Centre
CFFDRS	Canadian Forest Fire Danger Rating System
CRI	Community Resiliency Investment Program
CWPP	Community Wildfire Protection Plan
DPA	Development Permit Area
FBP	Fire Behaviour Prediction System
FMP	Fire Management Plan
FPA	Fire Protection Area
FSCCRP	FireSmart Canada Community Recognition Program
FTU	Fuel Treatment Unit
GAR	Government Actions Regulation
HIZ	Home Ignition Zone
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
MOTI	Ministry of Transportation and Infrastructure
NDT	Natural Disturbance Types
NFPA	National Fire Protection Agency
OFC	Office of the Fire Commissioner
PSTA	Provincial Strategic Threat Analysis
QP	Qualified Professional
SWPI	Strategic Wildfire Prevention Initiative
TSA	Timber Supply Area
UBCM	Union of British Columbian Municipalities
VQO	Visual Quality Objective
WRR	Wildfire Risk Reduction. Crown Land WRR is a category of funding for risk reduction activities on provincial Crown Land (introduced in 2019)
WUI	Wildland Urban Interface

SECTION 1: INTRODUCTION

In 2009, the Regional District of Nanaimo (RDN) initiated a coordinated effort to develop a joint CWPP for the communities of Lantzville, Nanoose Bay, and Nanoose First Nation, completed in 2010. Since then, Lantzville staff have recognized that there have been significant changes to the District, primarily: The Foothills subdivision development, the acquisition of forested parkland, the clearcutting of private lots, and the implementation of bylaws regarding environmental management, open burning, building and development, and emergency response.

In July 2020, B.A. Blackwell and Associates Ltd. was retained to assist Lantzville in developing a Community Wildfire Protection Plan (CWPP) Update; hereinafter referred to as the CWPP, with a sole focus on Lantzville. This CWPP revisits portions of the area assessed in the 2010 CWPP with a focus on integrating the updated Provincial Strategic Threat Analysis (PSTA), updated BC Wildfire Service (BCWS) fuel type mapping, and an improved wildfire threat analysis methodology.

The impact of recent wildfires and evacuations in the province also inform the development of this CWPP. 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 BC. Locally, Lantzville and the Nanaimo Regional District (RDN) have experienced few wildfires of note – the most recent being the 180-hectare Nanaimo Lakes fire which started in a utility corridor. Overall, human activity presents the greatest wildfire threat to Lantzville.

Recent wildfire disasters like those experienced in Slave Lake, Alberta (2011), Washington State (2014 and 2015), Fort McMurray, Alberta (2016), BC (2017, 2018), and California (2017, 2018, 2020) 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 interface (WUI).[1]

1.1 PURPOSE

The purpose of this CWPP is to identify and update the wildfire risk specific to Lantzville and the surrounding WUI, to describe the potential consequences of a wildfire to the community, and to examine options and strategies to reduce the wildfire risks. This CWPP provides a reassessment of the level of risk with respect to changes in the area that have occurred recently and gives Lantzville a current and accurate understanding of the threats to human life, property and critical infrastructure faced by the District from wildfires. This CWPP is intended to serve as a framework to inform the implementation of specific actions and strategies to: 1) increase the efficacy of fire suppression and emergency response, 2) reduce potential impacts and losses to property and critical infrastructure from wildfire, and 3). reduce wildfire behavior threat within the community.

[1] 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.

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 the Lantzville District boundary. 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 during plan development and ensuring linkages with relevant existing land use plans, legislation, and policy currently in place.
2) **Identification of the values at risk and assessment of the local wildfire threat**. Wildfire threat assessment takes into consideration local ecology and the natural fire regime, the 2019 Provincial Strategic Threat Analysis, and data collected in the field, including fuel type verification and completion of Wildfire Threat Assessment worksheets.
3) **Developing a risk mitigation strategy**. A guide for Lantzville to implement mitigation and risk reduction activities. The risk mitigation strategy accounts for prioritization of FireSmart activities, fuel treatments, 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 Council, the formation of a Wildfire Working Group as well as consultation with First Nations, government, and non-governmental agencies (See Section 1.2.1 for specifics).

1.2.1 Consultation

Engagement with local and provincial government 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' (WWG). This group was composed of Lantzville staff as well as regional wildfire and emergency response public officials. Those included were: Director of Public Works (Lantzville), Director of Planning & Community Services (Lantzville), Fire Chief (Lantzville), Emergency Planning Coordinator (RDN), and BCWS Wildfire Technician, South Island Zone. At the initial meeting of the Wildfire Working Group, the objective was to obtain information on wildfire risk mitigation initiatives currently in place or completed, review existing plans, policies, bylaws, and current resources, identify areas of concern and vulnerabilities, and to determine priorities and potential mitigation strategies. Members of the WWG were consulted at the onset of the project planning phase via questionnaires, on an ongoing basis throughout plan development, and some were integral in providing CWPP review and approval. The BCWS Provincial Wildfire Threat Specialist was also consulted regarding Fuel Type Change Rationales.

Information sharing took place with the Snaw-Naw-As (Nanoose FN), Ts'uubaa-asatx (Lake Cowichan FN), Stz'uminus FN, Halalt FN, Cowichan Tribes, Penelakut Tribe, Lyackson FN, Snuneymuxw (Nanaimo FN), and Te'Mexw Treaty Association, as identified through the Consultative Areas Database and in consultation with MFLNRORD and Lantzville, 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 the CWPP and the CWPP draft).

Additional stakeholders were consulted to identify synergies, opportunities for collaboration, and ensure linkages with adjacent and overlapping planning. These stakeholders included woodlot owners for woodlots W0020, W0012, and W1475. 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 Lantzville was assessed through a combination of the following approaches:

- Natural fire regime and ecology (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 the Lantzville 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 communities within it. 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.

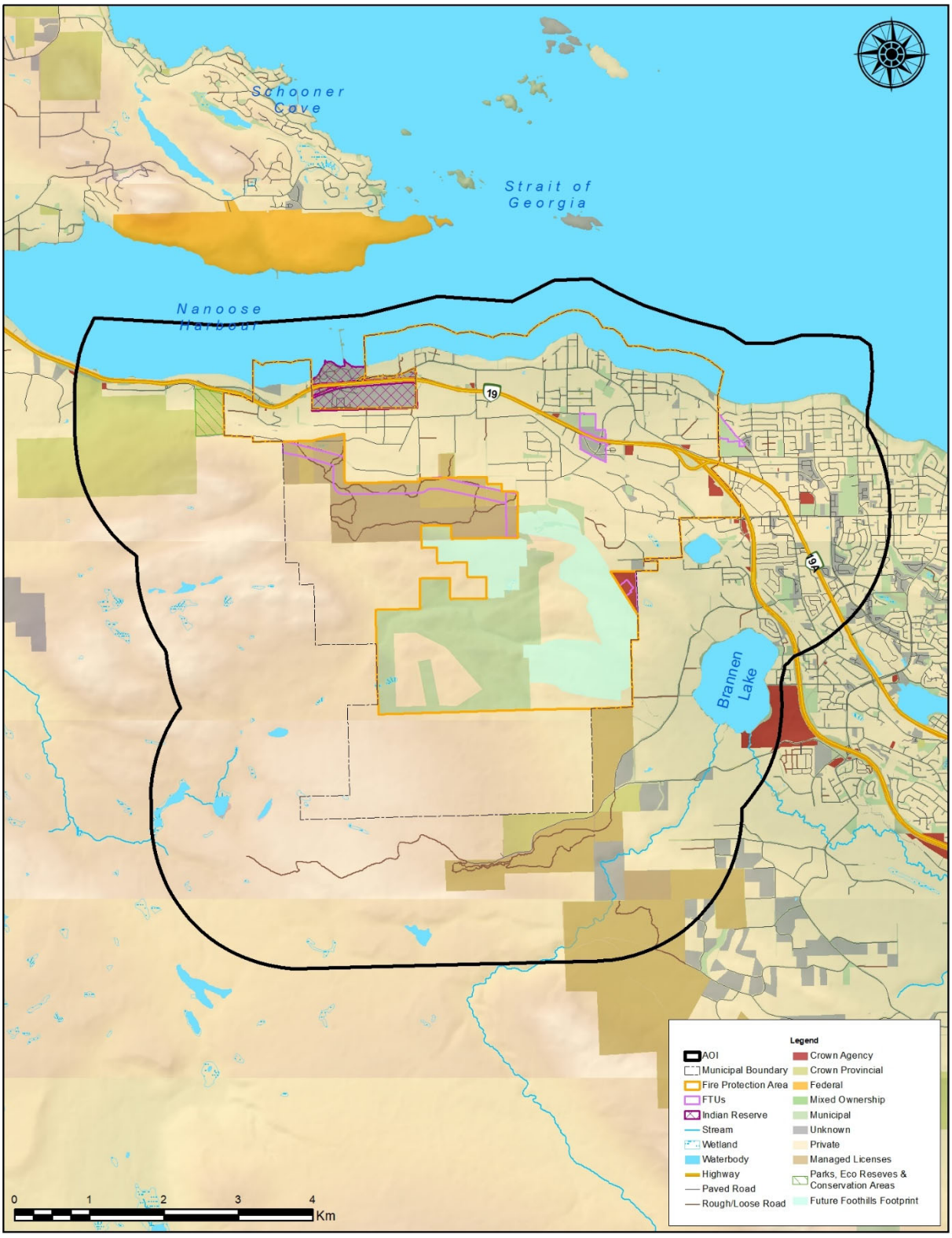
2.1 AREA OF INTEREST

Lantzville is located on the east coast of Vancouver Island, bordering the western boundary of Nanaimo. The AOI for the CWPP is illustrated below in Map 1. The AOI represents a two-kilometer spotting buffer around the District boundary. The AOI encompasses the Snaw-Naw-As (Nanoose) First Nation lands (outlined in purple), but a Band Council Resolution was not received by the Snaw-Naw-As for participation in the CWPP planning process, thus these reserve lands were not assessed. The AOI is characterized by a mix of semi-rural properties, residential neighbourhoods, private managed forest land, ocean coastline, woodlots, and the Lantzville village centre. The AOI is within the South Island Natural Resource District and the Coast Fire Zone and encompasses 7,883 hectares (which includes approximately 800 hectares of tidal coastline and water). A breakdown of land ownership in the AOI is provided in Table 2.

Table 2. Summary of AOI by land ownership.

Land Ownership	Hectares
Crown Agency	44.1
Crown Provincial	1,928.5
Federal	62.0
Municipal	709.7
Private	5,108.2
Unknown	30.7
Total	**7,883.2**

*The land ownership source is ParcelMap BC, provided by the Land Title and Survey Authority (LTSA). This dataset does not differentiate Indian Reserves from Federal Crown parcels.



Map 1. Area of Interest (AOI).

2.2 COMMUNITY DESCRIPTION

Lantzville is situated on the leeward side of the Vancouver Island Ranges within the drier, rolling Nanaimo lowlands. The climate is classified as warm and temperate, with an average rainfall of 1130mm/year (of which the majority is in the winter months) and average temperature of 10.1°C (of which the warmest are in the summer months).[2] The elevation ranges from 0m along the generally north-facing coastline and gently increases as you move towards the southern District extent, up to ~380m.

Through the late 1800's and early 1900's, the economy of Lantzville and the surrounding area was driven by agriculture and coal mining. Mining all but ceased by the 1920s, and since then Lantzville has evolved into a semi-rural suburb of Nanaimo.[3] Incorporated in 2003, forestry is now the primary economic driver. Overall, Lantzville is predominantly single-unit dwellings on lots of greatly varying sizes which contribute to its desirable semi-rural character.

Most services to residents of Lantzville are provided at the local level. The District government provides land use planning, building inspection, bylaw enforcement, administration, fire protection, roadworks, and water, sewage, and street lighting are provided where available.

Fire protection within Lantzville's District boundary is by the Lantzville Fire Rescue Services (Lantzville Fire Rescue), however the fire protection area (FPA) does not include private managed forest land nor Woodlot 1475. Lantzville Fire Rescue has mutual aid agreements (covering areas within the AOI but outside of the District boundary) with the City of Nanaimo and the Regional District of Nanaimo to the south/east and Parksville FD (District 69) to the north/west. Generally, a fire that occurs outside of these jurisdictions' FPA is under the jurisdiction of the BCWS. Fires within private managed forest land are responded to by BCWS.

Access and evacuation are a major concern within the AOI due to the number of communities with only one road in and out as well as there being only a few roads that connect to Highway 19. Combined, these not only present a challenge for emergency access and evacuation, but also limit the ability of fire crews to respond to fires and safely evacuate residents.

2.3 PAST WILDFIRES, EVACUATIONS, AND IMPACTS

Few wildfires have impacted the AOI in recent years. The most recent fire occurred in 2010 and burned less than 1 hectare of forested private land. No evacuation alerts nor orders were given, and arson was identified as the cause. The Nanaimo Lakes Fire in 2018 burned 180 hectares outside of the AOI but within the Nanaimo Regional District. The surrounding rural community was placed under evacuation alert with 77 addresses placed under evacuation order. That order was later downgraded to an alert. No structures were lost due to the fire, which started in a utility corridor.

[2] climate-data.org

2.4 CURRENT COMMUNITY ENGAGEMENT

Although Lantzville has no formal FireSmart program, there is recognition and awareness from both Lantzville staff and the Lantzville Fire Rescue of the threat posed to the communities in the AOI by wildfire. Lantzville Fire Rescue has distributed FireSmart materials to neighbourhoods that are in the wildfire urban interface (WUI) and has a fire danger notice board in front of the fire hall. Earlier this year (2020), two Lantzville Fire Rescue members took the Local FireSmart Representative Workshop, but community work has been limited due to the onset of the COVID-19 pandemic.

Some information on fire safety is provided on the Lantzville Fire Rescue webpage, including information on outdoor burning, fireworks, and a link to a Lantzville-specific FireSmart guide

2.5 LINKAGES TO OTHER PLANS AND POLICIES

The following is a summary of local 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

The District of Lantzville Emergency Program is coordinated by the Regional District of Nanaimo (RDN) under a joint Emergency Management Agreement that also includes the Town of Qualicum Beach, City of Parksville, City of Nanaimo, and three neighbouring First Nations.[3] Through Emergency Social Services (ESS), Lantzville is actively building a community-based response team to help evacuees during an emergency or disaster (ESS volunteers help through the first 72 hours following a disaster). Through the Neighbourhood Emergency Preparedness Program (NEPP), workshops are available to Lantzville residents and can be booked at no-cost.

The District of Lantzville Emergency Plan coordinates emergency response from both public service and private sector agencies. According to the Emergency Plan, a significant emergency such as a wildfire in Lantzville would be handled by the RDN.

Emergency preparedness and response is thus largely managed by the RDN, which is guided by higher level emergency management legislation such as the provincial Emergency Program Act. The Emergency Program Act describes the various roles and administrative duties of the province and local governments with regards to emergency organization, the implementation of higher-level emergency plans, the processes of declaring a state of emergency and coordinating post disaster relief programs and assistance. Lantzville residents can sign up for the RDN Emergency Notification System which is deployed in the event of evacuations and other emergency events occurring near registered recipients' homes, workplaces, schools, and other registered addresses. See Section 6.1.3 for summaries and recommendations related to access and evacuation planning.

[3] Lantzville.ca. *Emergency Preparedness*. 2019

2.5.2 Affiliated CWPPs

The previous 2010 CWPP encompassing Lantzville was reviewed and the recommendations were analyzed. Recommendations that were addressed or completed include wildland fire fighter training and education, wildland fire fighting equipment and apparatus purchases, and the development of an interface wildfire protection development permit area.

2.5.3 Local and Regional Government 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 District bylaws, strategies and policies are relevant to wildfire planning in the AOI.

Lantzville Official Community Plan (2019)

An Official Community Plan (OCP) is an aspirational expression of the objectives and policies of the local government and provides Lantzville with a long-range framework to guide, monitor and evaluate future land use and development. The following sections (described in Tables 3 and 4) contain objectives and policies which are directly relevant to wildfire risk reduction, emergency response, and community resilience post-disaster.

Table 3. Summary of Lantzville Official Community Plan wildfire-relate objectives and policies

Section/Subsection/Goal	Objective/Policy Description
Section 4, Goal 1: Protect the Natural Environment	Goals and objectives to preserve Lantzville's natural beauty and to maintain healthy land, air, and water as the community evolves while recognizing and addressing fire risks at the interface and in developed areas.
Section 4.2.1 – Natural Ecosystems and Sensitive Areas	Lantzville supports the principles contained in the *Environmental Best Management Practices for Urban and Rural Land Development in B.C.* document and will take steps to implement the guidelines with respect to wildfire considerations.
Section 4.2.2 – Natural Hazard Areas	Lantzville recognizes that natural and other hazard areas that pose a risk to life and property occur in certain areas of the community. Lantzville will coordinate land use and environmental management policies to help protect people and the built environment from fire hazard. Adopted policies include FireSmart principles, reduction of wildfire risks, etc.
Section 5.2.2 – Resource – Forestry	Relating to preserving community character, Lantzville adopts policies with the aim of preserving its forestry resources for future generations, including encouraging woodlot owners and owners of adjacent properties to manage trees and vegetation in a manner that will reduce fire risk.

Section/Subsection/Goal	Objective/Policy Description
Section 8.2 – Managing the Rate of Infill Growth *Section 8.3 – Objectives*	Addressing planning for new development in Key Infill Areas, infrastructure and services should be designed using appropriate development standards, including green infrastructure and FireSmart principles.
Section 8.6 – Community Amenity Contributions *Section 8.6.1 - Policies*	Policies regarding developer community amenity contributions. Unless invested voluntarily by the developer, the funds are kept in District reserves and invested in projects that improve the quality of life of people in the community (such as improvements to the fire hall).
Section 9.2.2 – Water Distribution System	Addresses Lantzville's need to extend the water distribution system to address safety and fire protection concerns by adopting policies, such as considering the extension of public water services to residential users in rural and agriculture areas of the community on a case-by-case basis.
Section 9.2.6 – Municipal Services Facilities	Policies adopted as a framework for ongoing provision of District services and facilities, such as supporting and maintaining the community Fire Hall and its equipment and supporting the volunteer staff complement.
Section 11.1.8 – Foothills Comprehensive Development Plan Area	The Foothills Comprehensive Development Plan Area is established policy in the OCP and is under implementation. Policies include that one neighbourhood commercial site is permitted in the development plan area.
Section 11.2.4 – Mapping of Development Permit Areas *Section 11.9 – DPA 7 – Interface Wildfire Protection* *Section 11.9.2 – Justification*	Eleven Development Permit Areas are established and designated in the OCP and are shown on attached maps. DPA VII is specific to interface wildfire protection. Subdivision or development within those areas that have a high or extreme interface wildfire rating poses an increased risk to human safety and property. The objective of this DPA is to protect new subdivisions and development from hazardous conditions associated with interface wildfires by effectively managing the risks. A review and update of DPA VII is currently underway by B.A. Blackwell & Associates Ltd, in relation to this CWPP update.

RECOMMENDATION #1: As Lantzville builds upon the existing network of parks, trails, and open spaces, consider park acquisition and maintenance through a wildfire lens. This will help ensure wildfire risk, mitigation, liability, and future maintenance are considered as priorities in development of the parks and trails inventory, including consideration for long-term maintenance costs and access.

Include the requirement for a qualified professional to review and assess the siting of parks and park access prior to acceptance into Lantzville's park inventory. 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 (through proper placement, emergency access and evacuation, clean-up of combustible fuels trailside, and work practices).
Specific to the Foothills Parks, strong consideration should be given to the maintenance of existing roads (for fire response access), and a blanket 'no open fires' ban during the fire season.

Table 4. Summary of Lantzville's wildfire and emergency related Bylaws

Bylaw	Description
Bylaw 39: Fireworks Regulation Bylaw	A bylaw regulating the sale and use of fireworks. Fireworks can only be possessed and/or discharged by obtaining a permit from the Fire Chief, or on October 31st.
Bylaw 154: Development Charges Bylaw	A bylaw to impose development cost charges for the purpose of providing funds to assist the District in paying the capital costs of providing, constructing, altering or expanding sewage, water, drainage, and highway facilities, and improving parkland to service developments for which the charges are imposed.
Bylaw 175: Subdivision and Development Works and Services Bylaw	A bylaw to establish subdivision and development servicing requirements, including information for fire water flow requirements, valve locations, hydrant locations, etc.
Bylaw 178: Emergency Program Bylaw	A bylaw to provide a comprehensive program of emergency management by a coordinated response of the District of Lantzville that will respond to natural and human caused hazards, including fire and forces of nature. Includes set emergency planning meetings and members, allows for property and people acquisition if needed, controls or prohibitions on travel, etc.
Bylaw 180: A Bylaw to Establish Development Approval Information Area Requirements	The District of Lantzville OCP designates the entire District as a development approval area and specifies the circumstances in which development approval information may be required. The District Official or Council may require an applicant to provide an assessment of any natural hazard, including a determination as to whether the land is safe for the intended use and recommendations regarding hazard mitigation.
Bylaw 182: Building Bylaw	A bylaw to regulate construction in the District for the health, safety and protection of persons and property in the public interest, including inspections for fire access and a survey plan for firefighting routes.

Bylaw	Description
Bylaw 185: Fire Protection Services Bylaw	A bylaw to establish regulations for the protection of persons and property. It grants the Fire Chief the right to enter inspect properties, take measures to suppress fires, and require property owners to remove or reduce anything that is a fire hazard. It includes regulations pertaining to open air fires, outdoor cooking/ceremonial fires, agriculture clearing waste fires, and a ban on all open fires on the beach.

RECOMMENDATION #2: Review and amend the Building Bylaw "Owner's Responsibilities" clause 7.6 "Civic Addressing" to require permanent, accurate house numbering that can be clearly seen from the road at night to be posted prior to an occupancy permit being issued by a Building Official. Also amend clause 7.7 "Fire Access" to specify what constitutes acceptable access for firefighting vehicles and to include a fire access route "that has been inspected or approved by the local fire department (or other applicable professional)."

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 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)[4]

The Vancouver Island Land Use Plan (VLUP) is the higher-level planning document for all of Vancouver Island. 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. No sections of the VLUP deal specifically with wildfire or fuel management.

There are two non-legal Old Growth Management Areas within the AOI, but outside the Lantzville District boundary. No treatments are being recommended in these areas.

Relevant Legislation

Forest and Range Practices Act – Government Actions Regulation (GAR)

[4] The Province of BC, 2000. Vancouver Island Strategic Land Use Plan.

There is one Wildlife Habitat Area (no-harvest zone) within the AOI, but outside the Lantzville District boundary. This area was visited during field work and no fuel management plans are being recommended.

There are multiple Visual Quality Objective (VQO) polygons in the AOI (and within the Lantzville District boundary) categorized as Partial Retention (PR). Some VQO polygons overlap proposed fuel treatments and the treatment prescriptions should be planned accordingly.

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.

Fire Management Plan

The Vancouver Island Central Coast Response Fire Management Plan (FMP)[5] that encompasses the District of Lantzville 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 relevant to 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 District of Lantzville within the AOI. To address this gap, interface and landscape fuel break opportunities have been identified as part of this CWPP.

Forest Stewardship Plans

Woodlot Management Plans apply to the three woodlots in the AOI. The primary purpose of a Woodlot Management Plans is to propose an allowable annual cut (AAC) for the woodlot license taking into account inventory information and resource management considerations. There are no other forest licensees that operate in the AOI.

The *Private Managed Forest Land Act* governs the management of those lands applied and approved for as private managed forest land (of which there is ~724 ha within the District of Lantzville). The Act specifies management objectives for: soil conservation; water quality; fish habitat critical wildlife habitat; and reforestation.

Parks Management

There is one Provincial Park within the AOI, but outside the Lantzville District boundary: Arbutus Grove Park. The Management plan for this park consists of a Purpose Statement and Zoning Plan (PSZP), approved in 2003. The PSZP for Arbutus Grove Park identifies the primary purpose of the park is to

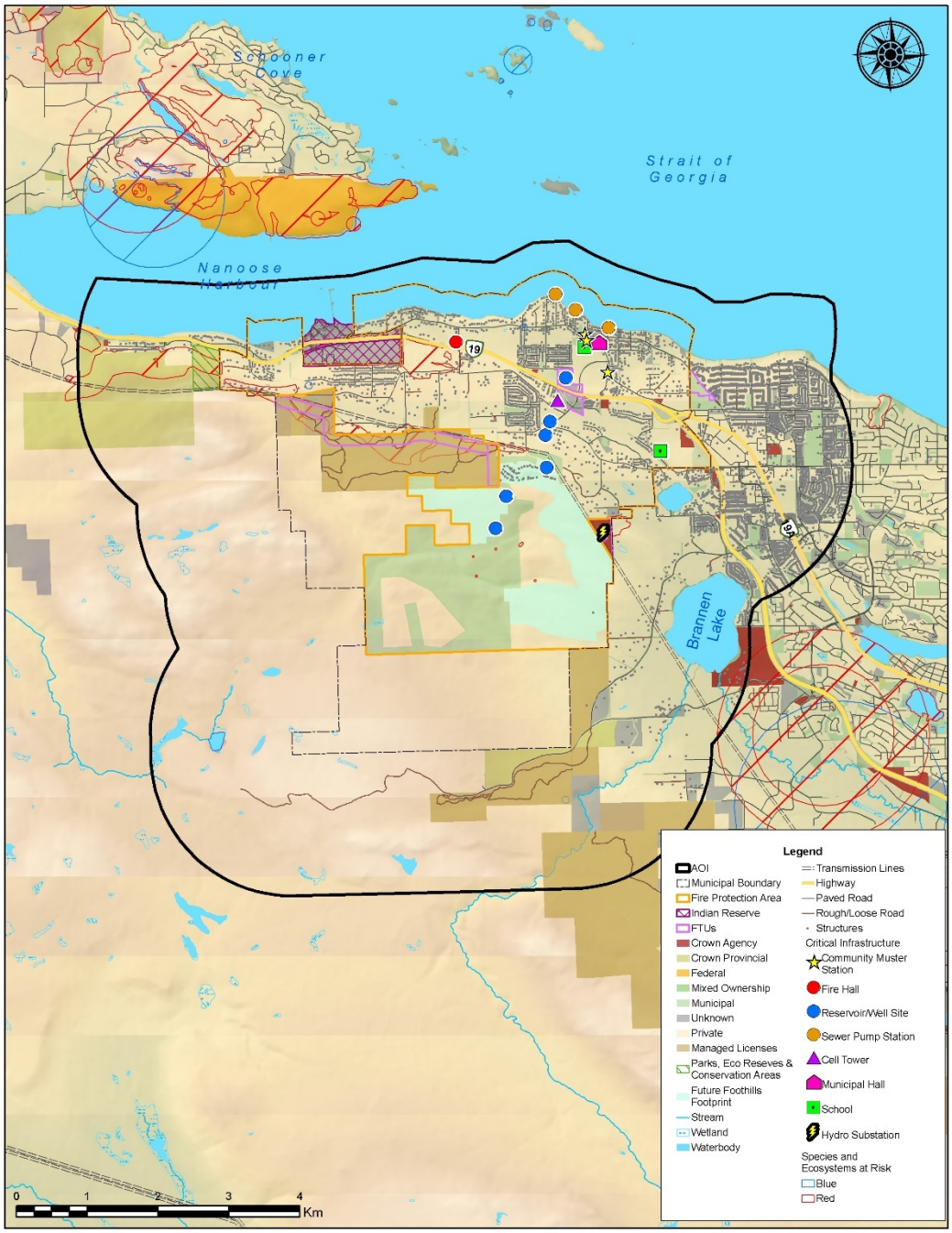
[5] Ministry of Forests, Lands, Natural Resource Operations and Rural Development. 2018.

protect a representative stand of arbutus trees.[6] Special values in the park include mature arbutus trees and the Park has no structures or roads and sees low levels of use. It also serves to protect the under-represented CDFmm biogeoclimatic zone.

SECTION 3: VALUES AT RISK

The following section is a description of the extent to which wildfire has the potential to impact the values at risk (VAR) within the AOI. The 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. VAR also include hazardous values that pose a safety hazard. Key identified VAR are illustrated below in Map 2.

[6] BC Parks. Arbutus Grove Provincial Park Purpose Statement and Zoning Plan. 2003



Map 2. Values at Risk within the AOI.

3.1 HUMAN LIFE AND SAFETY

Human life and safety are the 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. Lantzville has a population of 3,605[7], that has stayed relatively stable since 2001. The average age of the population was 46 years old and the number of occupied private dwellings identified in the 2011 National Household Survey was 1,470 (almost all single detached homes with 90% owner occupancy).[8]

Highway 19, crossing the AOI from east to west, divides Lantzville into two sections: Lower Lantzville, extending north of the highway to the coast; and Upper Lantzville, extending south of the highway into the Foothills area. Lantzville's village and economic centre is in Lower Lantzville. It contains a mix of light-industrial and commercial businesses. Housing lines the northern coastline. Approximately 140 hectares of land falls within the Agricultural Land Reserve and some farming is pursued. Lantzville does not see heavy use by tourists, and as such most of the recreational outdoor areas (beach front, local parks, the Foothills trails and back-roads) are used by locals year-round.

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 Lantzville, consultation with the Wildfire Working Group, and access to recent orthophotography has enabled the update of a provincial spatial layer with structure locations that accounts for the most recent developments. Additionally, owing to the WUI concerns of the ongoing Foothills development, polygons showing its estimated future development (from OCP map #8) have been added for local wildfire threat analysis.

3.2 CRITICAL INFRASTRUCTURE

Protection of critical infrastructure 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 not only supports the community during an emergency but also determines, to a great degree, the extent and cost of wildfire recovery and economic and public disruption during post wildfire reconstruction.

Critical infrastructure includes emergency and medical services, electrical and natural gas services, transportation, water, social services, and communications infrastructure. A critical infrastructure dataset was provided by Lantzville/RDN GIS staff and this data was included in Map 2. Table 5 and 6 identify critical infrastructure within the AOI.

As outlined in Section 5.2, FireSmart principles are imperative to reducing wildfire risk to critical infrastructure. During field visits, it was observed that Lantzville's critical infrastructure (i.e., fire hall, community muster locations, etc.) are in various levels of compliance with FireSmart principles.

RECOMMENDATION #3: Engage a qualified professional, such as a Local FireSmart Representative, to complete formal FireSmart assessments of all critical infrastructure including the Lantzville fire hall,

[7] Statistics Canada. 2016 Census

[8] Lantzville Official Community Plan – 2011 National Household Survey Data

community muster locations, the BC Hydro sub-station and water infrastructure (including all reservoirs) as identified in this CWPP (Tables 5 and 6).

RECOMMENDATION #4: Use fire-resistant construction materials, building design and landscaping for all critical infrastructure when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart principles (no combustible material within 10 m of structures).

RECOMMENDATION #5: Lantzville's firehall, municipal hall, sewer stations, and water wells have backup gas- or diesel-powered generators. If a plan or schedule is not already in place, Lantzville should review the current capability of these secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.

3.2.1 Electrical Power

Electrical service for Lantzville is received through a network of wooden pole transmission lines supplied by BC Hydro. One large overhead high-voltage transmission line (metal towers) bisects the AOI east-west, connecting the Lantzville substation (at the south end of Manhattan Way) to the regional electrical grid.

A large fire has the potential to impact electrical service by causing disruption in network distribution through direct or indirect processes. For example, heat from flames or fallen trees associated with a fire event may cause power outages. Neighbourhoods with small, street-side wooden poles that connect to homes are particularly vulnerable to fire.

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 all District water wells and sewers via gas or diesel generators, as well as some critical infrastructure such as the Lantzville Fire Rescue and Lantzville municipal hall (which doubles as the local emergency operations center). 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 long outages. Refer to Section 6.1 for discussion and recommendations related to backup power and water availability for fire suppression.

RECOMMENDATION #6: To mitigate impacts to critical infrastructure in the event of a wildfire, Lantzville should develop utility right-of-way best management practices (BMPs) for regular brushing and clearing of woody debris and shrubs in coordination with industrial partners to help reduce fire risk, utility pole damage, and subsequent outages. BC Hydro, Fortis BC, Island Corridor Foundation (owner of the retired rail line through Lantzville), and the Ministry of Transportation and Infrastructure should ensure rights-of-way do not contain fine fuel accumulations (< 7.5 cm, that are easily cured) and significant regeneration of conifer vegetation prior to and during the fire season and are maintained in a low hazard state. These corridors can also serve as fuel breaks during a wildfire event.

3.2.2 Communications, Pipelines and Municipal Buildings

Residents in Lantzville are serviced by the Nanaimo Regional General Hospital and the Nanaimo Airport, both outside of the Lantzville District boundary and the AOI. Fortis BC has underground natural gas pipelines that run throughout Lantzville supplying natural gas to almost all neighbourhoods.[9] The main supply lines are along Lantzville Road and along the BC Hydro main overhead transmission line. In the event of a wildfire, FortisBC will work with local and provincial emergency responders and employ their own emergency response protocols, including shutting down compressor stations, if required.[10] Rogers Communications Inc. operates and maintains a cellular communication tower located on the southeast corner of the Peterbilt Pacific Inc. property. A full inventory of critical infrastructure for communications, pipelines and regional District buildings with updated locations is presented in Table 5, below.

Table 5. Critical Infrastructure Identified by Lantzville and during CWPP field visits. Displayed on Map 2.

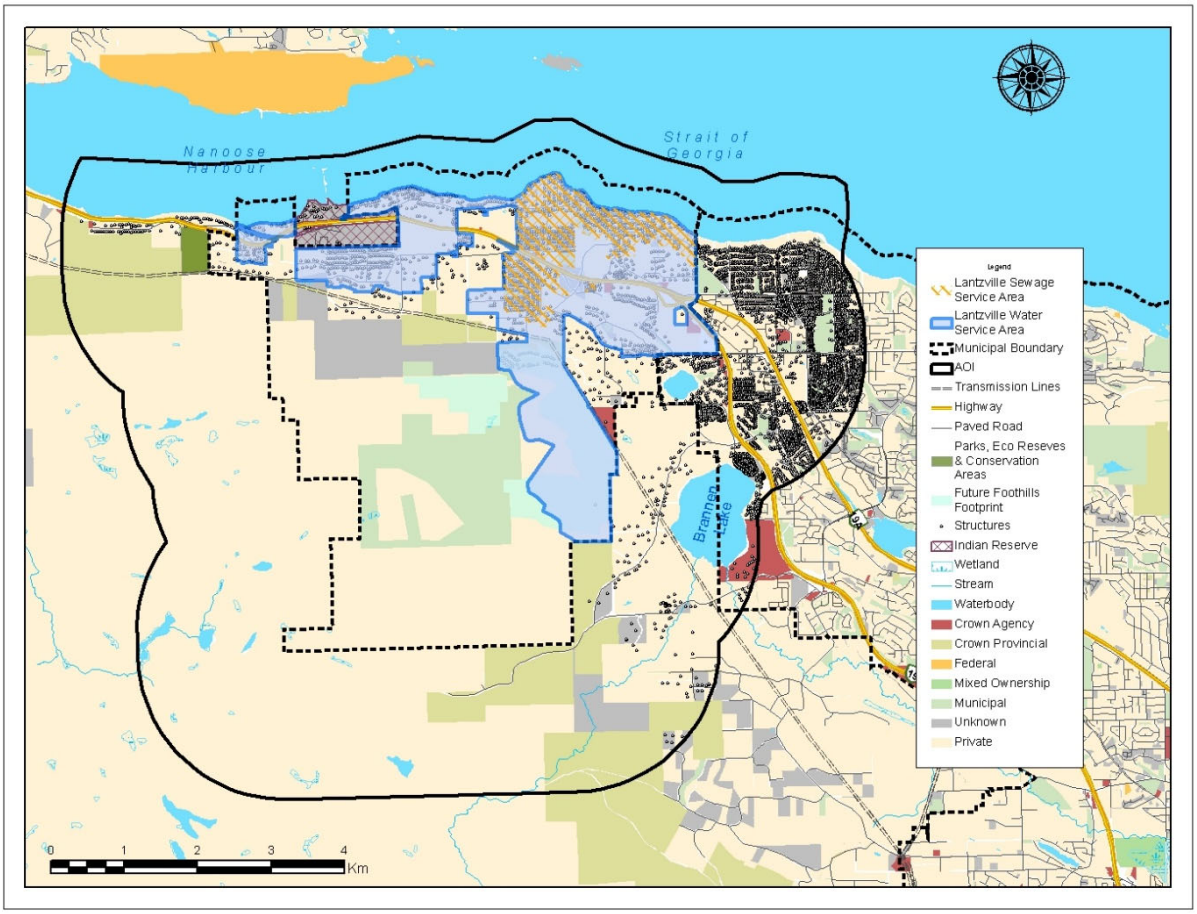
Critical Infrastructure Type	Location
Cellular Communication Tower - Rogers	Between Metro Rd and Industrial Rd; SE corner of Peterbilt Pacific Inc. property (easement access). Upper Lantzville
Community Muster Station - Costin Hall	7232 Lantzville Rd, Lantzville, BC V0R 2H0. Lower Lantzville
Community Muster Station - St. Phillips Church	7113 Lantzville Rd, Lantzville, BC V0R 2H0. Lower Lantzville
Community Muster Station - Royal Canadian Legion	7227 Lantzville Rd, Lantzville, BC V0R 2H0. Lower Lantzville
Fire Hall - Lantzville Fire Hall	7580 Superior Rd, Lantzville, BC V0R 2H0. Lower Lantzville
BC Hydro Substation - Lantzville Substation	South end (terminus) of Manhatten Way. Upper Lantzville
Lantzville Municipal Hall	7192 Lantzville Rd, Lantzville, BC V0R 2H0. Lower Lantzville
School - Seaview Elementary	7000 Lantzville School Rd, Lantzville, BC V0R 2H0. Lower Lantzville
School - Aspengrove	7660 Clark Drive, Lantzville, BC V0R 2H0. Upper Lantzville

3.2.3 Water and Sewage

District water and sewage systems are provided throughout much of the AOI. Most of the existing homes and businesses in the developed area of Lantzville are on the District water system. Far fewer properties are part of the District sewer service area. Properties not part of the District systems rely on private wells and/or septic systems to meet their needs. Additionally, Lantzville has a water agreement with the City of Nanaimo to supply (via Lantzville's existing infrastructure connected to the City of Nanaimo's water mains) water to Upper Lantzville in the event of an emergency. The revenue for the operation, maintenance and capital and administration of these utilities comes directly from landowners and is

[9] Servicerequestportal.fortisbc.com/newgasline
[10] https://www.fortisbc.com/safety-outages/preparing-for-emergencies/wildfires-and-evacuations

raised through taxation and other user fees. Map 3 shows the Lantzville water service and sewer service areas. Table 6 lists critical water and sewer infrastructure and their locations.



Map 3. Lantzville water service and sewer service areas

Table 6. Critical Water/Sewer Infrastructure Identified by Lantzville and during CWPP field visits. Displayed on Map 2.

Critical Infrastructure Type	Location
Well Field - Foothills Source Well	49.227416°N 124.05625°W. In the Foothills. Upper Lantzville.
Reservoir - Foothills wells	49.23147°N 124.093455°W. In the Foothills phase 1 development. Upper Lantzville.
Reservoir - Lower Foothills Reservoir	49.234969°N 124.085431°W. South side of the start of Old Logging Road. Upper Lantzville.

Critical Infrastructure Type	Location
Reservoir - Harwood Drive Reservoir (Planned for decommission 2021)	49.239116°N 124.085464°W. North side of Spences Way. Upper Lantzville.
Municipal Well Field - Harby Road East Well Field	49.246363°N 124.081128°W. Municipal land on the south side of the end of Harby Road East. Lower Lantzville.
Reservoir - Ware Road Reservoir	49.240817°N 124.08458°W. Northeast of the junction of Ware Road and Philip Road. Upper Lantzville.
Sewer Pump Station - Huddlestone Road Pump Station	49.25531°N 124.07910°W. North end (terminus) of Huddlestone Road. Lower Lantzville.
Sewer Pump Station - Lavender Road Pump Station	49.25287°N 124.07277°W. North end (terminus) of Lavender Road. Lower Lantzville.
Sewer Pump Station - Sebastion Road Pump Station	49.25702°N 124.08286°W. North end (terminus) of Sebastion Road. Lower Lantzville.

3.3 HIGH ENVIRONMENTAL AND CULTURAL VALUES

The following section identifies high environmental and cultural values and where they are located. 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 and Community Watersheds

Although there is little potential for wildfire to impact aquifer water supply, depending on fire size and severity, there is the potential for significant hydrological impacts to the AOI, extending for years post-burn.[11] Some areas may have a lower threshold for precipitation triggered events and would be particularly vulnerable to post-wildfire debris flows, mass wasting, landslides, and flooding. This could directly impact the communities through structure loss and risk to public safety, or indirectly, through loss or damage of critical infrastructure.

Climate change is the biggest vulnerability to fire season water supply in Lantzville, as a reduction in available surface water will impact groundwater availability.[12]

RECOMMENDATION #7: Lantzville should conduct a water supply vulnerability assessment to determine potential supply issues. This assessment could include an analysis of the vulnerability of water supply infrastructure to wildfire and/or mass wasting events.

3.3.2 Cultural Values

There are three main First Nations groups on Vancouver Island: the Kwakwaka'wakw, the Nootka and the Coast Salish. The AOI overlaps with the traditional territory and/or interest area of seven First Nations, two Tribes, and one Treaty Association: Snaw-Naw-as (Nanoose First Nation), Ts'uubaa-asatx

[11] 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.
[12] http://www.plan2adapt.ca/tools/planners?pr=34&ts=8&toy=16, Pacific Climate Impacts Consortium, 2012

(Lake Cowichan First Nation), Stz'uminus First Nation, Halalt First Nation, the Cowichan Tribes, the Penelakut Tribe, Lyackson First Nation, Snuneymuxw (Nanaimo First Nation), and the Te'Mexw Treaty Association.

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, middens) 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 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 there are known overlaps with archeological sites within the AOI, and there is potential for previously unidentified archeological sites to exist elsewhere in the AOI. Prior to stand modification for fire hazard reduction, and depending on treatment location, preliminary reconnaissance surveys or archeological impact assessments 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 must 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 study area, 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. Within the AOI there were no masked occurrences, only non-sensitive occurrences.

Table 7 below lists the occurrences of species at risk that have been identified within the AOI.

Table 7. Publicly available occurrences of Red and Blue-listed species recorded within the AOI.

Common Name	Scientific Name	Category	BC List	Habitat Type
Northern Red-legged Frog	*Rana aurora*	Ranidae (true frog)	Blue Listed	Both aquatic and terrestrial environments (needing aquatic for breeding). Tall shrubs, and forests of all age/structural classes (from

Common Name	Scientific Name	Category	BC List	Habitat Type
				pole/sapling to old forest), preferring flatter sites at lower (below 500m) elevation.[13]
Common Wood-nymph	*Cercyonis pegala incana*	Insect (butterfly)	Red Listed	Grassy forest openings, woodlands, meadows, and streambanks, as well as anthropogenic habitats such as clearcuts and roadsides, weedy fields, and powerline rights-of-way. Associated with Garry Oak meadows and Douglas-fir woodlands, and dry coastal Douglas fir forest containing native grasses.[14]
Grand Fir / Dull Oregon-grape	*Abies grandis / Berberis nervosa*	Ecological Community	Red Listed	Terrestrial
Douglas-fir / Dull Oregon-grape	*Pseudotsuga menziesii / Berberis nervosa*	Ecological Community	Red Listed	Terrestrial
Western Redcedar / Salmonberry	*Thuja plicata / Rubus spectabilis*	Ecological Community	Red Listed	Terrestrial

Through consultation with the CDC and a biologist or qualified professional, all site level operational plans must determine if species at risk 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 Qualified Professional with local knowledge is recommended at the prescription phase.

Lantzville itself designates specific natural and sensitive ecosystems as Development Permit Areas with guidelines for use. These ecosystems were mapped as part of the Sensitive Ecosystem Inventory Project for Southeast Vancouver Island (2004 update), and the Sensitive Ecosystem Inventory (SEI) data is available from the District.[15] It is also recommended that this database is consulted during creation and implementation of all fuel management or other wildfire mitigation activities, and the consultation of a biologist or qualified professional may be required.

[13] Env.gov.bc.ca, *Red-legged Frog*, 2004

[14] Goert.ca, *Cercyonis pegala incana*, 2011

[15] Lantzville Official Community Plan

3.4 OTHER RESOURCE VALUES

There are multiple resource values associated with the land base, including timber supply, agriculture, wildlife habitat, recreation, and tourism.

The AOI overlaps the Arrowsmith Timber Supply Area (TSA), administered by the South Island Natural Resource District. The only Crown forest land available for harvest within the District of Lantzville is managed under Woodlot 1475. The potential opportunity to work with local woodlot licensees on commercial thinning projects that meet multiple objectives, including fuel management, should be considered.

There are no active or pending Provincial recreation polygons nor Crown recreation sites within the AOI. There are many active recreation trails, the majority of which are in W1475 and the Foothills area.

There are five active mineral reserves and one active guide outfitter in the AOI. Fuel reduction treatments are not anticipated to have a measurable effect on these resource values.

3.5 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders. The AOI does not contain any industrial sites nor facilities that can be considered hazardous values. Lantzville's refuse is transported to Nanaimo. There are no hazardous waste transfer stations within the AOI.

The management and treatment of fuels in proximity to hazardous infrastructure is critical 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:

$$\boldsymbol{Wildfire\ risk\ =\ Probability\ x\ Consequence}$$

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 a 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.[16] 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 settlement 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 acceptable.[17] The AOI is characterized by the BEC subzones and associated NDTs as outlined in Table 8 and Map 4.

Table 8. BEC zones and natural disturbance types found within the AOI.[18]

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
CDFmm: Coastal Douglas-fir moist maritime	NDT2	3,300.5	42%
CWHxm1: Coastal Western Hemlock very dry maritime, eastern variant	NDT2	3,738.7	47%
CWHxm2: Coastal Western Hemlock very dry maritime, western variant	NDT2	844.1	11%
TOTAL		**7,883.2**	**100%**

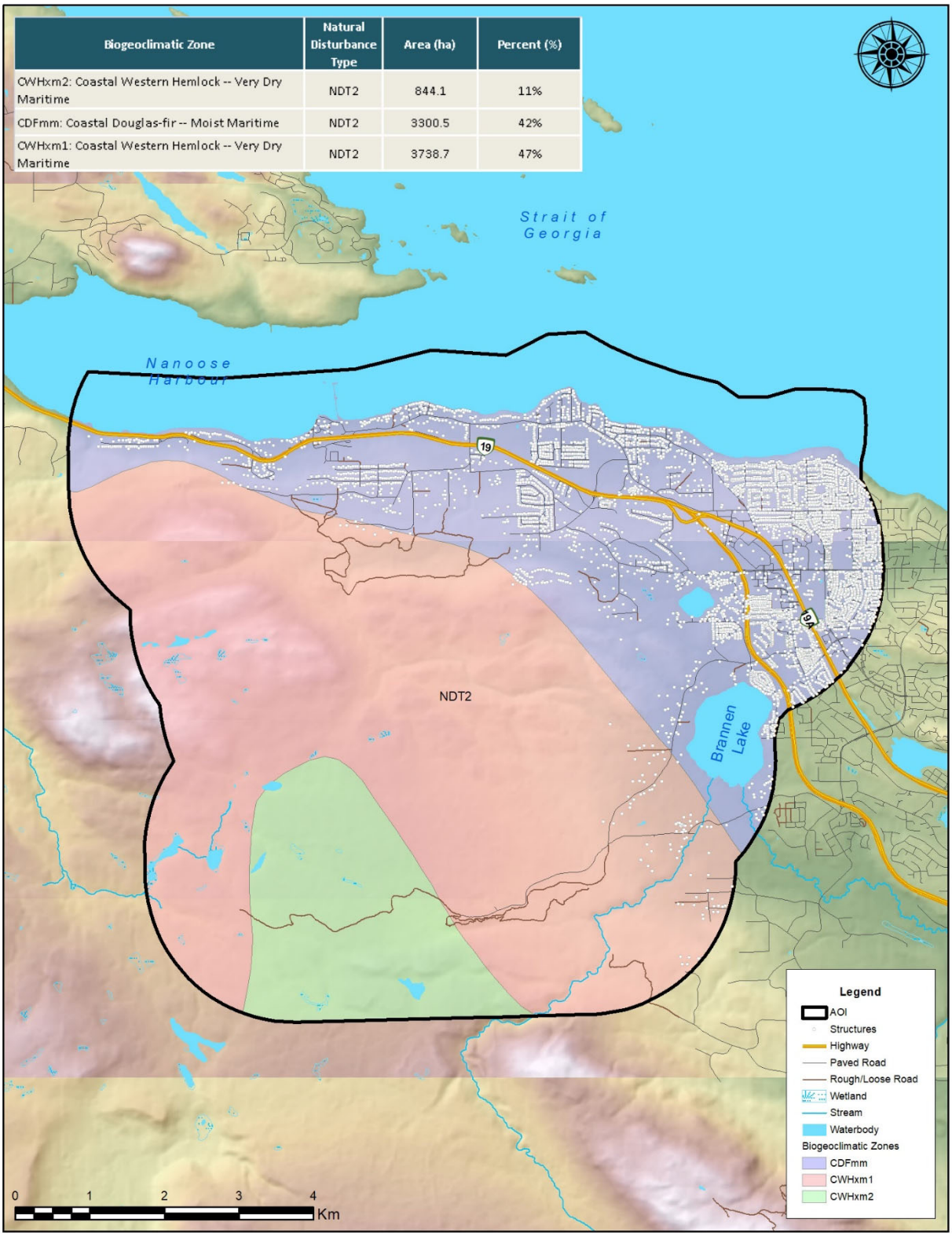
[16] BECWeb: https://www.for.gov.bc.ca/HRE/becweb/resources/classificationreports/subzones/index.html
[17] Province of British Columbia, 1995. Biodiversity Guidebook.
[18] MFLNRORD BEC Map (DataBC)

100% of the AOI is characterized as NDT2: forest ecosystems with infrequent stand initiating events, and comprises grassland, shrubland, and forested ecosystems.[19] The Biodiversity Guidebook describes NDT2 as one where fires were often of moderate size (20-100 ha), with unbrned areas resulting from sheltering terrain features, higher site moisture, or chance. The mean return interval of these disturbances is approximately 200 years. Many of these fires occurred after periods of extended drought and produce extensive areas of mature forest with intermixed patches of younger forests. Although the fire frequency is not high and fires are generally not large, pre-planning and preparation are essential to reduce the negative impacts of a wildfire in this ecosystem.

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.[19] Furthermore, forest health issues, human development and natural events contribute to changes in the fire regime, forest attributes and fuel hazard around the community.

[19] 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.

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
CWHxm2: Coastal Western Hemlock -- Very Dry Maritime	NDT2	844.1	11%
CDFmm: Coastal Douglas-fir -- Moist Maritime	NDT2	3300.5	42%
CWHxm1: Coastal Western Hemlock -- Very Dry Maritime	NDT2	3738.7	47%



Map 4. Biogeoclimatic Zones and natural disturbance regimes within the AOI.

Forest Health Issues

Spatial data available through DataBC[20] indicates both biotic and abiotic factors have affected the AOI. These include: Western spruce budworm (1926-1928), laminated root rot (2011-present), drought (2016-present), Douglas-fir bark beetle (2011, 2016), and mountain pine beetle (2016). The recent beetle and root rot mortalities are small and largely due to endemic populations. The recent drought mortalities are likely a sign of changing climate patterns.

Despite the recent instances of forest health issues affect only small areas within the AOI, there are implications on the level of surface fuel accumulation in affected stands, as well as access and working conditions for fire fighters in the event of wildfire. Standing dead as well as downed trees were observed during the field visit and danger tree assessments and falling are recommended (and BCWS required for ground crews) prior to commencing any proposed fuel treatment work.

Human Development and Natural Events

Most recent land cover change in the AOI can be described as urban/suburban development or forestry operations. Natural disturbance (see above) has resulted in little change to the landscape. Forest harvesting with various levels of retention occurs within the AOI on Crown land woodlots and private managed forest land. Rapid urban development has occurred in the east side of the AOI (Nanaimo). Within Lantzville, little development has occurred until recently, characterized by two main changes: one, the recent (~2017-18) clearcut harvesting of small private land parcels within Lantzville (some adjacent to the town centre); two, the completion of Phase 1 of the Foothills subdivision development, with more phases planned in the future. The overall implication of human development is an increase in human ignition potential and an increase in interface and intermixed development areas. Forest harvesting and land clearing generally increases the slash (S-1 to S-3) and mixed conifer/deciduous (M-1/2) fuel types on the landscape as stand development occurs (see Appendix A-1 for a description of fuel types).

Notable land cover changes within the AOI in the last century and their associated implications regarding wildfire behaviour are:

- Agricultural development – approximately 7.4% of the AOI and 2.0% of Lantzville is characterized as Agricultural Land Reserve (ALR). These areas are a mix of retained forested land and cleared land converted to grass fields for grazing or hay growing, or for crop production. Grazing pastures left to dry out (especially in the summer fire season months) are easily ignitable from embers and flames and can readily carry a fire (acting as a wick).
- Forest industry activities – forest harvesting is common on provincial Crown land as well as on private land within the AOI. Piling and burning are part of the slash hazard abatement practices in the area. A delay in pile burning can lead to high fuel loading along roadsides and at slash pile locations. Heavy equipment operations are a historical source of wildfire ignitions in the AOI.[21]

[20] https://catalogue.data.gov.bc.ca/pt_BR/dataset/pest-infestation-polygons (current as of December 2019)

[21] BCWS Historic Ignition Dataset.

- Lantzville housing/subdivision development - population growth and subdivision development has resulted in residential neighbourhoods that are highly intermixed within conifer leading stands and in many cases have only one access/evacuation route.
- Population growth of neighbouring urban areas – Urban development has also occurred in the City of Nanaimo to the east of Lantzville and throughout southern Vancouver Island. Fire ignitions in the AOI are largely human-caused, and the increase in population of the region mirrors the increase in human fire ignitions over the last 20 years.

Fire Weather Rating

Fire weather refers to weather conditions that are conducive to fire. These conditions determine the fire season, which is the annual period(s) of the year during which fires are likely to start, spread, and cause sufficient damage to warrant organized fire suppression. 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 fire season by MFLNRORD and the recorded data are used to determine fire danger, represented by Fire Danger Classes, on forest lands within a community. The information can be obtained from the BCWS and is most 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 in the AOI over the last 10 years 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 danger class days between the months of April and October. The data summarized comes from the Qualicum Airport BCWS weather station, which is in Qualicum Beach (approximately 25 km northwest of Lantzville). According to Figure 1, fire weather in the AOI is the most severe from July to September. Months with the highest number of 'high' or 'extreme' danger class days are August (25 days), July (15 days), and September (10 days). Although fire danger peaks in August, it is important to note that Lantzville has a long fire season - 'high' danger class days have also been recorded in May, June, and October.

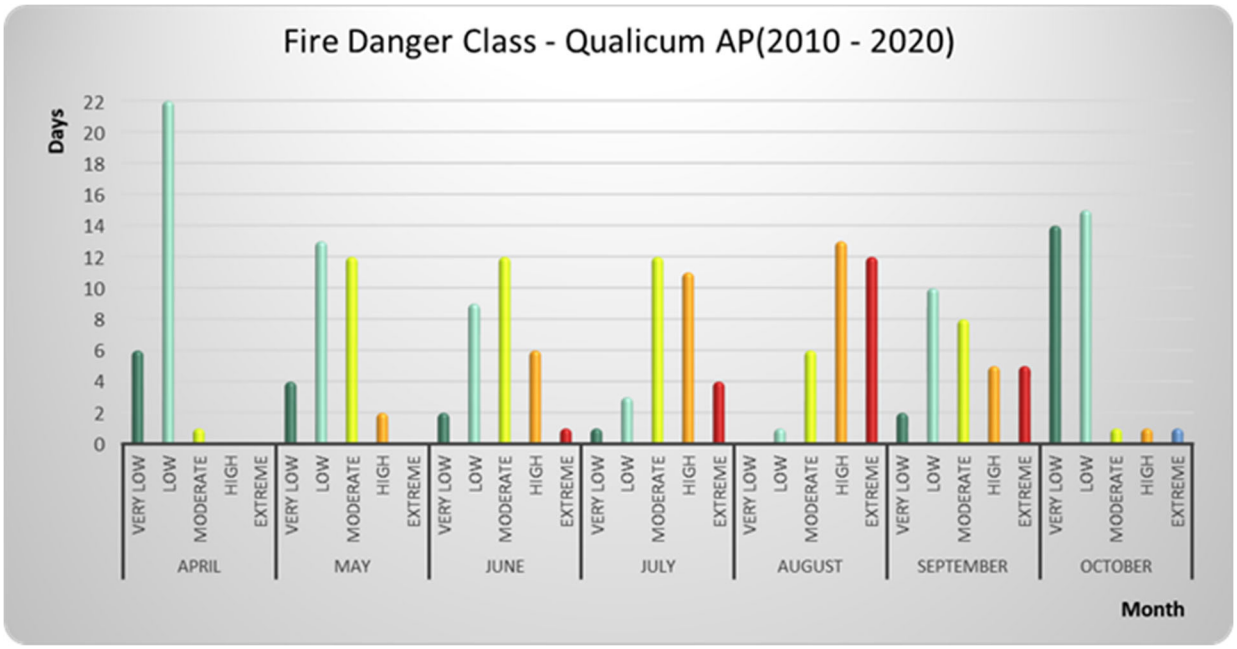


Figure 1. Average number of danger class days for the Qualicum Airport fire weather station. Summary of fire weather data for the years 2010- 2019.

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."[22] Numerous studies outline the nature of climate change impacts on wildland fire across Canada, and globally.[23] 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.[24] Despite the uncertainties, trends within the data are visible.

As outlined in the Pacific Climate Impacts Consortium *Plan2Adapt Summary of Climate Change for Vancouver Island in the 2050's,*[25] the following climate projections for Vancouver Island are made (projected from an average for 1961-1990).

- Mean annual temperature rise of 1.5°C.
- Mean annual precipitation rise of 6%
    - Mean summer precipitation decrease of 14%.
    - Mean winter precipitation increase of 6%.

The assumed consequences of these changes in relation to wildfire danger during the fire season is that a decrease in summer precipitation and overall annual temperature rise will lead to drier fuels and soils, increasing fire behaviour potential, forest fire frequency, and forest fire severity.[26]

An increased frequency of natural disturbance events overall is expected to occur because of climate change with coincident impacts to ecosystems. These include:

- Storm events, including catastrophic blowdown and damage to trees;
- Wildfire events and drought; and
- Increased winter precipitation which may result in slope instability, mass wasting, and increased peak flows (loss of forest cover from fire or other disturbance may increase the chance of mass wasting).

Incidents of forest health agents as well as drought induced tree mortality may increase, exacerbating climate-related stresses on forests.[27] Other research regarding the intricacies of climate change and potential impacts on wildfire threats to Canadian forests has found that:

- Fuel moisture is extremely sensitive to temperature change and projected precipitation increases will be insufficient to counteract the impacts of the projected increase in

[22] Community Resiliency Investment Program. 2018. Community Wildfire Protection Plan Template.
[23] Flannigan, M.D et al. 2009. Implications of changing climate for global wildland fire. International Journal of Wildland Fire 18, 483-507.
[24] 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.
[25] http://www.plan2adapt.ca/tools/planners?pr=34&ts=8&toy=16, Pacific Climate Impacts Consortium, 2012
[26] https://srd.ca/wp-content/uploads/2018/10/Climate_Change_Campbell_Riv_2018_Lewis.pdf, 2018. Dr. J. Lewis.
[27] 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

temperature. Results conclude that future conditions will include drier fuels and a higher frequency of extreme fire weather days.[28]

- The future daily fire severity rating 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.[29] 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.[30, 31]
- Drier areas may experience regeneration problems due to an increase in summer droughts.[30]

In summary, climate scientists expect that the warming global climate will trend towards wildfires that are more frequent, 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 component:[32]

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 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

[28] 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.
[29] 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.
[30] 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.
[31] Jandt, R. 2013. Alaska Fire Science Consortium Research Brief 2013-3.
[32] BC Wildfire Service. 2019. Provincial Strategic Threat Analysis: 2019 Update.

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 layers.[33] 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.

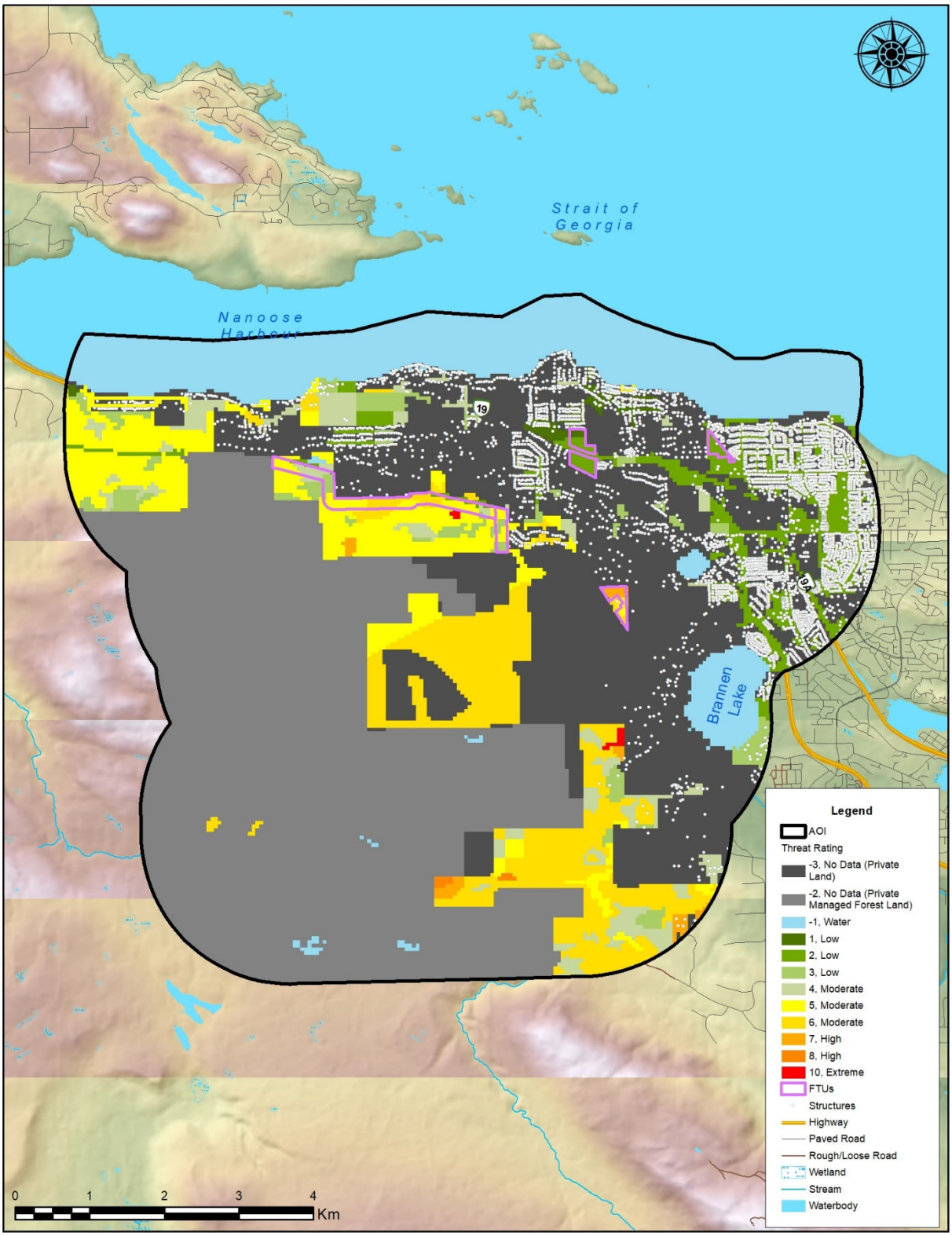
The fire threat ratings from the 2019 PSTA are summarized for the AOI in Table 9 and spatially illustrated in Map 5. Private land accounts for two thirds (64.3%) of the AOI and has no data in the PSTA dataset. Additionally, 12.4% of the AOI is water (lakes and ocean). Out of the remaining 23.3% of the AOI, Low threat areas cover 7.4%, Moderate threat areas cover 15.4%, and High and Extreme threat areas together cover only 0.5%.

Table 9. Overall PSTA Wildfire Threat Analysis for the AOI.

Threat Class	Area (ha)	Threat Class Description	Percent of AOI
-3	2,302.3	No Data (Private Land)	29.2%
-2	2,767.4	No Data (Private Managed Forest Land)	35.1%
-1	979.4	Water	12.4%
0	-	No Threat	0.0%
1	36.7	Low	7.4%

[33] 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])

Threat Class	Area (ha)	Threat Class Description	Percent of AOI
2	396.9		
3	149.1		
4	204.9	Moderate	15.4%
5	453.1		
6	555.8		
7	27.2	High	0.4%
8	5.3		
9	-	Extreme	0.1%
10	5.3		
Total	**7,883.3**	**-**	**100.0%**



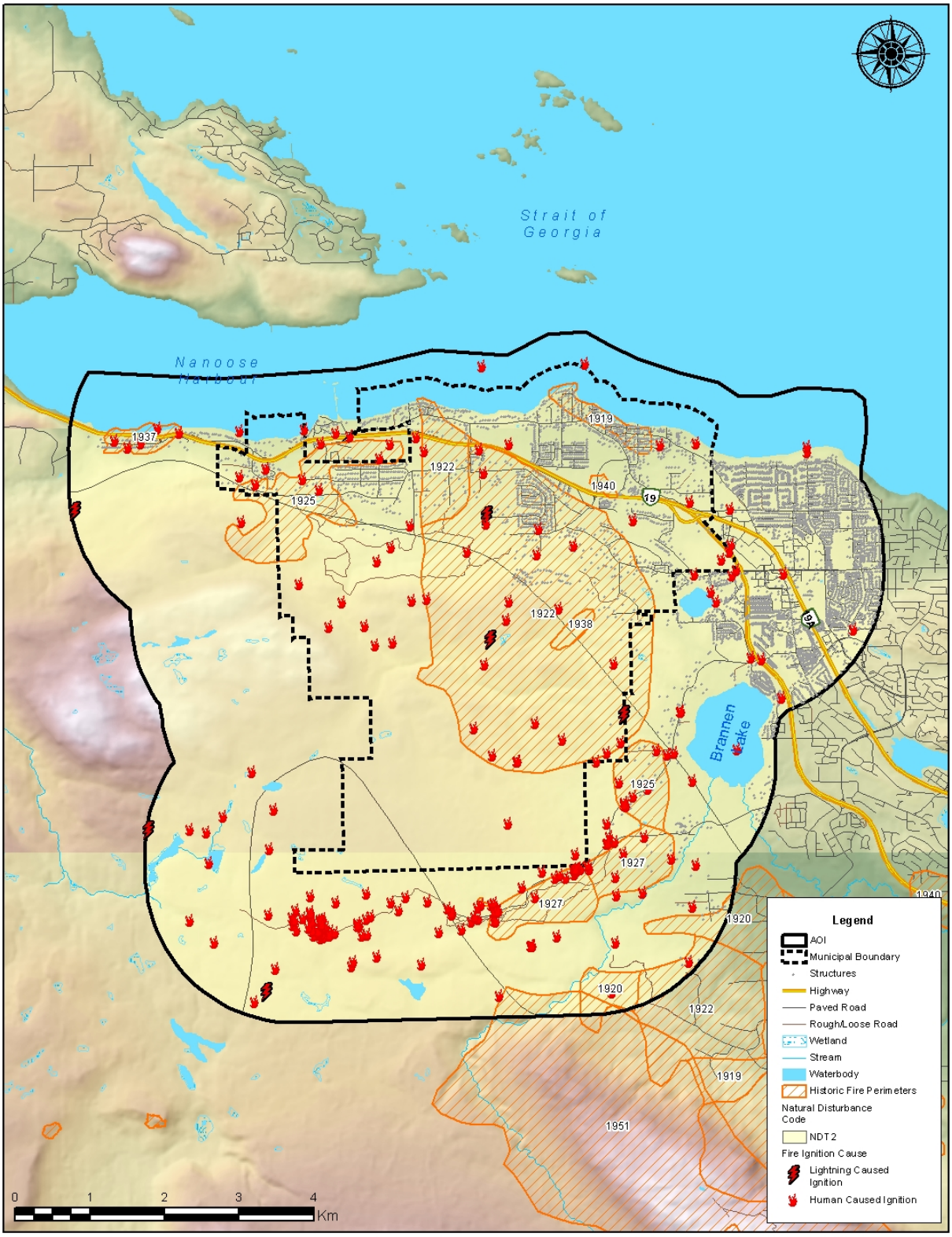
Map 5. Provincial Strategic Threat Rating.

4.2.1 Fire History

Historical fire ignition and perimeter data are depicted in Map 6. The following PSTA fire ignition data is available from 1950-2019 and fire perimeter data is available from 1919-2019 for the AOI.

Based on the BCWS historical wildfire polygon dataset, approximately 65% of the total area of the AOI (including non-forested area) has burned in the last 100 years. However, most fires have been small to moderate in size (less than 100 ha) and few fires have occurred recently. The largest fire to burn within or near the AOI occurred in 1951 and was over 2,000 hectares in size. The most recent fire within the AOI occurred in 2010 and burned less than 1 hectare of forested private land. No evacuation alerts nor orders were given, and arson was identified as the cause. The Nanaimo Lakes Fire in 2018 burned 180 hectares outside of the AOI. The surrounding rural community was placed under evacuation alert with 77 addresses placed under evacuation order. That order was later downgraded to an alert. No structures were lost due to the fire, which started in a utility corridor.

Based on the BCWS historical wildfire point (ignition) dataset (all incidents tracked by BC Wildfire Service), from 1950 to 2019 there were 286 ignitions, of which six were from lightning, 11 were unknown, and 269 were confirmed human or human activity caused. The data clearly shows that within the AOI humans have caused the overwhelming majority (94%) of past wildfire ignitions. In the forested backcountry, these ignitions are often located along active or old forest roads: seen on Map 6, this is the case for the cluster of ignitions along an old forest road (Weigles Road) at the south end of the AOI, outside the District boundary. All those ignitions are directly associated to the access feature (road), are from human activity, and took place from 2000-present.



Map 6. Fire History: Past Fire Ignitions (Human and Lightning), Spatial Fire History, and Fire Regime.

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 four field days in early September of 2020, in conjunction with verification of fuel types (see Appendix C – Wildfire 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.
- Land ownership – Crown, Provincial, and municipal land was the focus of field assessments.
- Local knowledge – Areas identified as hazardous, potentially hazardous, with limited access/evacuation, or otherwise of particular concern as vulnerable to wildfire, as communicated by local fire officials and BCWS zone staff.

A total of 16 WUI threat plots were completed and over 200 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 9) 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 methodology,[34] 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).

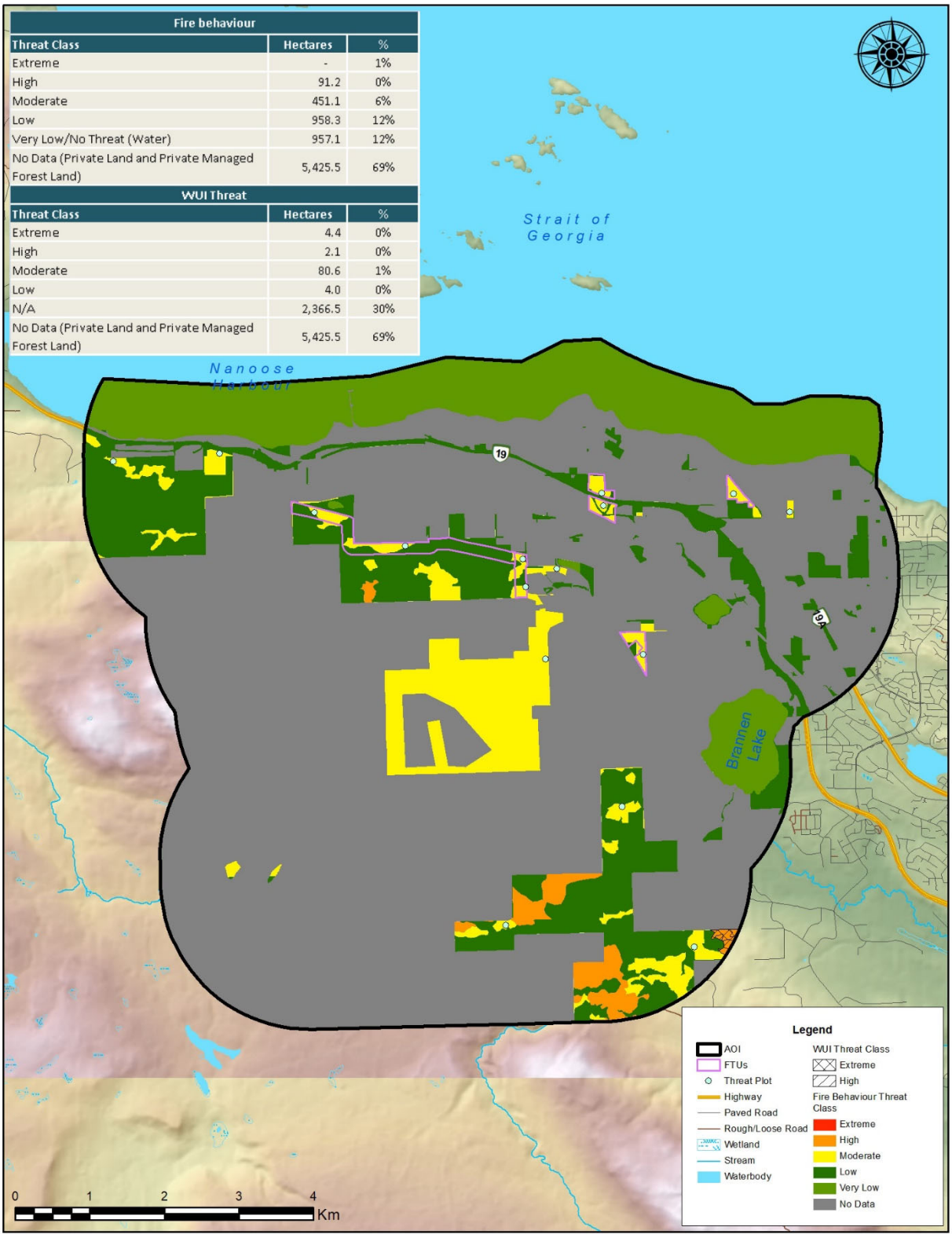
The result of the analysis, detailed in Table 10 and Map 7, shows that the AOI (excluding very low/water and private land – assessment of private land is not within the scope of this plan) is composed of a mosaic of low and moderate threat class stands; the variability in wildfire threat is dictated primarily by the level of natural and anthropogenic disturbances that have historically occurred and persist on the land base. The AOI is classified as 1.2% Extreme threat class rating, 0% High, 5.7% Moderate, and 12.1% Low. Table 10 also shows the differences between the original PSTA threat rating and this CWPP's corrected fire behaviour threat – the result of field and orthoimagery fuel type verification and changes. The highest threat areas are concentrated in the Foothills area, and in the woodlots southeast of the Lantzville District boundary.

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 10. Fire behaviour threat summary for the AOI.

Wildfire Behaviour Threat Class	2019 PSTA Data	2020 CWPP
	Percent of AOI	Percent of AOI
Extreme	0.1%	1.2%
High	0.4%	0.0%
Moderate	15.4%	5.7%
Low	7.4%	12.2%
Very Low/ No Threat (Water)	12.4%	12.1%
No Data (Private Land and Private Managed Forest Land)	64.3%	68.8%

[34] 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 7. 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 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 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 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). To this date, no provincially funded fuel treatments have been completed within the AOI.

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).
- Create safe and effective anchor points for BCWS crews to fight fires, either through ground or air operations.

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) and by MFLNRORD through the Wildfire Risk Reduction (WRR) Program. 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, and include: FireSmart planning and assessments, local rebate programs for completion of eligible FireSmart activities, and provision of off-site disposal of vegetation management debris).[35] [36] This does not preclude other current and future funding opportunities or potential industrial partnerships and changes to existing programs. It is important to recognize that most of the AOI (65%) is located on private land, 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 and landscape fuel breaks, as defined in Section 5.1.1, to reduce the wildfire potential around and within the AOI. General treatment activities include commercial or non-commercial thinning, stand conversion, pruning, surface fuel removal, pile burning, 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 best management practice to encourage a higher deciduous

[35] CRI FireSmart Community Funding & Supports – Program & Application Guides by year. https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html

[36] 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

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.

In addition to the treatment units proposed in the following section, it is recommended that Lantzville recognizes important fuel treatment opportunities to improve emergency access and public safety in the event of evacuation through the reduction of hazardous fuels via fuel treatment where arterial roads meet Highway 19.

5.1.1 Proposed Treatment Units

Funding opportunities from UBCM under the 2021 CRI Program, specifically under the FireSmart Community Funding and Supports (FCFS) program, will consider fuel management activities in Regional District parks, on municipal Crown land, or First Nations land within the municipal boundary. Fuel treatments that represent contiguous, logical units that extend onto Crown land or outside of local government boundaries may also be considered for funding through the CRI Program if the fuel management activities are adjacent to community structures and the units extend no further than 1 km from the structure density threshold, as defined by the CRI Program. Eligible activities include development of fuel management prescriptions and burn plans, as well as operational implementation of those plans (treatments or prescribed burns).[37]

Fire prevention activities on private land that may be funded under the FCFS / CRI 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.

Funding for fuel treatments located exclusively on Crown land, outside of municipal boundaries, Regional District parks or First Nations land is administered through MFLNRORD under the Crown Land Wildfire Risk Reduction (WRR) program.[38] These fuel treatment units are in the 'Landscape Zone'; units within the Lantzville District boundary eligible for UBCM funding are in the 'Community Zone' (Table 11). Treatments on public land surrounding critical infrastructure are also in the 'Community Zone'.

The potential treatment areas represent moderate, high, or extreme fire hazard areas which are close to values at risk (structures or infrastructure) or have been identified as landscape level fuel treatments 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

[37] The 2021 CRI program guide is available at https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html

[38] The 2020 -2021 Crown Land Wildfire Risk Reduction Planning Guide is available at https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/funding-for-wildfire-prevention/crip/wrr.

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 11 and displayed in Map 8. Fuel treatment opportunities may be fuel breaks (linear, beginning and ending at an anchor point, and a minimum of 1 km where possible) or polygon treatments (not necessarily forming a continuous fuel break unit or tied into an anchor point).[39] Potential fuel treatment units recommended within the Plan are a combination of linear and polygon treatment units. Linear fuel breaks will require collaborative effort with multiple landowners and licensees.

The intent of establishing a fuel break (or fuel polygon) 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, but rather should be designed to transition and keep the crown fire to the surface where wildfire crews have suppression opportunities.[40] 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 should be evaluated and treated to create conditions where extinguishment of spot fires is possible and FireSmart recommended guidelines 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 (fuel breaks and fuel polygons), and
- applying FireSmart recommended guidelines to structures and the surrounding vegetation.

Fuel treatment units require periodic maintenance to retain their effectiveness.

RECOMMENDATION #8: Lantzville should proceed with detailed assessment, prescription development and treatment of fuel treatment units identified and prioritized in this CWPP.

RECOMMENDATION #9: In consultation with a BCWS Fuel Management Specialist and MFLNRORD, engage local woodlots and private managed forest land managers to develop forestry standards to

[39] https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_fuel_management_prescription_guidance_final.pdf
[40] BC Wildfire Service. 2020. 2020 Fuel Management Prescription Guidance. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_fuel_management_prescription_guidance_final.pdf

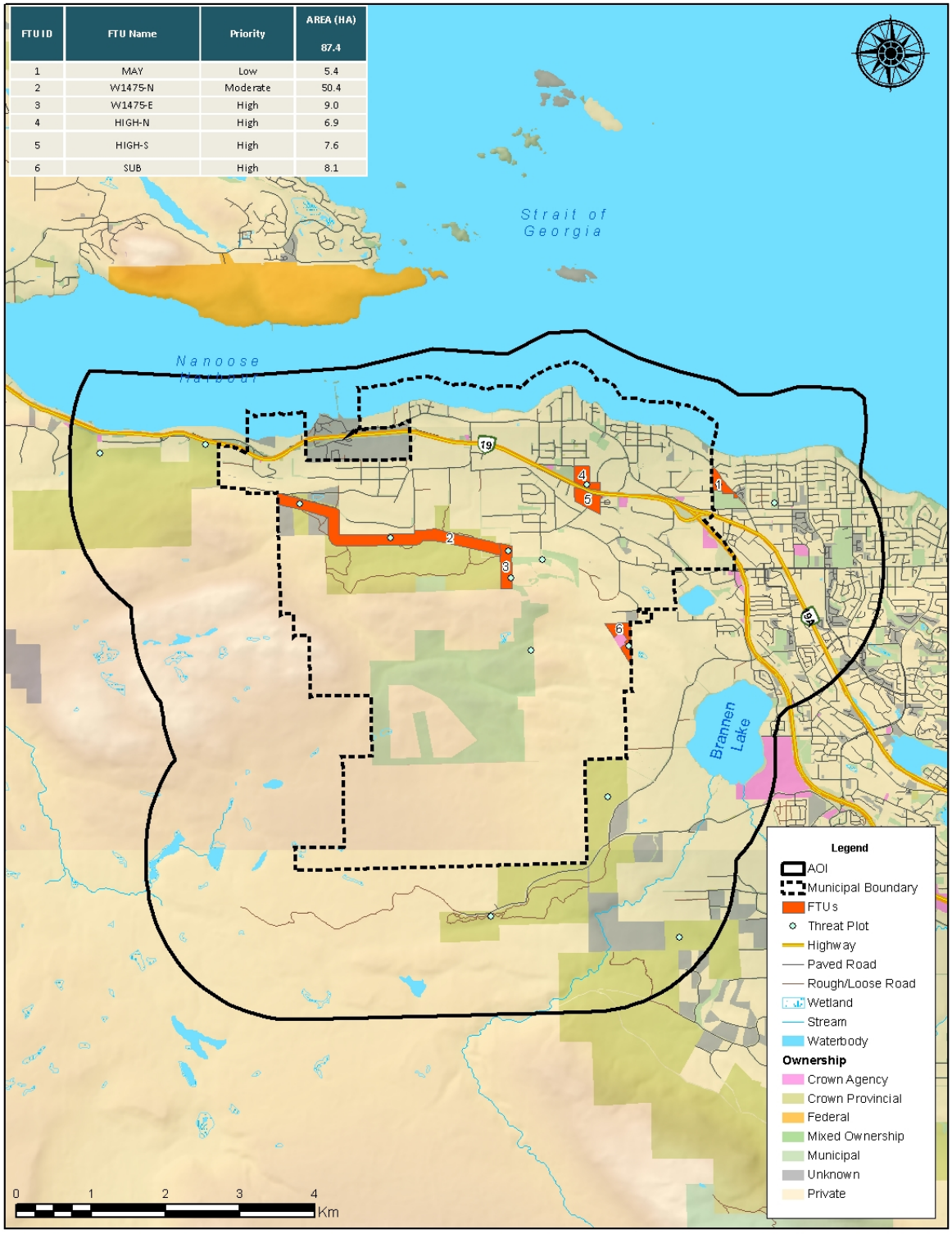
reduce interface wildfire threat. Key examples are: a rationale for reduced fire management stocking standards in the (wildland urban interface (WUI); harvest planning to integrate existing, planned fuel breaks with future cutblocks to address identified hazardous fuel types and spotting potential; and ensuring that high risk activities, such as vegetation management, pile burning, and harvesting do not occur during high/extreme fire danger times to reduce chance of ignitions (as per the Wildfire Act).

Table 11. Proposed Treatment Area Summary Table.

FTU # and Stratum	Geographic Area	Priority	Total Area (ha)	Treatment Unit Type/ Objective	Local Fire Threat (ha)			Overlapping Values / Treatment Constraints[41]	Treatment Rationale
					Extreme/ High	Mod	Low/Very Low		
1	May Richards Bennet Pioneer Park (Nanaimo)	Low	5.6	Polygon	0.0	5.4	0.0	Private land is adjacent to the treatment unit on both east and west sides (but is separated by two-lane paved public access roads). Municipal baseball fields and a soccer field (all grass) border the south edge. Treating this unit will need to be done in coordination with Nanaimo, as it lies entirely within its municipal boundary and May Richards Bennet Pioneer Park.	This unit encompasses a Nanaimo municipal park bordering the east edge of Lantzville. The park is characterized by a two-layered conifer dominant C-3 fuel type with moderate density of large-diameter overstory stems and high understory density Surface fuel loading is high throughout. The park is heavily used by the public, primarily for dog walking. Treatment would lower potential fire behavior in the park and the likelihood of human-caused ignitions, reducing fire threat to the surrounding properties as well as risk of spotting. Access to the unit is very good and the unit would serve as an effective public demonstration of fuel treatments, in addition to enhancing aesthetic value of the stand
2	W1475-N	Moderate	50.4	Fuel Break	0.0	14.3	36.1	The treatment unit lies entirely on Crown municipal land at the northern edge of Woodlot 1475 and abuts a high-voltage BC Hydro overhead transmission line right-of-way to the north. The unit is intersected by several recreation trails. The treatment unit includes a portion of the Knarston Creek Headwaters sensitive ecosystem, and other streams/watercourses. The treatment unit lies entirely within an established Visual Quality Objective polygon of Partial Retention (PR). Prior to prescription development, the woodlot license holder must be consulted – there are opportunities to include commercial thinning treatments under the woodlot's AAC.	The unit is intended as a fuel break between the District of Lantzville and Woodlot 1475 to protect private residences, critical electrical infrastructure, and Woodlot 1475 from human-caused fires. The fuel break will be anchored to the low-fuel right-of-way that borders the woodlot to the north. It is dominated by C-5 fuel type with scattered M1/2-75% conifer and S-1 (slash) fuel types where harvesting has occurred. The woodlot sees heavy public use along trails and fire ignition starts at known 'party spots'. Access to the unit is very good, and treatment may be designed to simultaneously achieve timber quality objectives in the woodlot.
3	W1475-E	High	9.0	Fuel Break	0.0	5.9	3.1	The treatment unit lies entirely on Crown municipal land within Woodlot 1475. The area sees heavy public use along the many trails. The treatment unit lies entirely within an Established	This unit is located along the east edge of Woodlot 1475, which is entirely within the Lantzville District boundary, and abuts private properties. The unit is a mix of C-5, M1/2-

[41] Prior to treatment implementation and where applicable, the following entities should be consulted so that impacts to values can be prevented or mitigated: directly adjacent private land holders, MFLNRO, a wildlife biologist, the Archeology Branch, MoTI, BC Hydro, and local First Nations.

FTU # and Stratum	Geographic Area	Priority	Total Area (ha)	Treatment Unit Type/ Objective	Local Fire Threat (ha)			Overlapping Values / Treatment Constraints[41]	Treatment Rationale
					Extreme/ High	Mod	Low/Very Low		
								Visual Quality Objective polygon of Partial Retention (PR). Prior to prescription development, the woodlot license holder must be consulted – there are opportunities to include commercial thinning treatments under the woodlot's AAC.	75%, and C-3 fuel types. The woodlot sees heavy public use along trails and fire ignition starts at known 'party spots' Human caused ignitions are the primary concern, and the woodlot has the potential to act as a tinderbox or wick – providing an abundant amount of fuel to any fire. Treatment would create an interface fuel break on the woodlot's east edge adjacent to private properties and prevent a wind-driven house fire spreading into the woodlot from the east (prevailing wind direction).
4	HIGH-N	High	6.9	Polygon	0.0	5.6	1.3	This treatment unit is on the north side of the intersection of Ware Road/Highway 19 and is on municipal land. Some public use on walking trails was observed.	Treatment of both the HIGH-N and HIGH-S units would create a reduced fuel polygon at a major emergency access/evacuation junction for both Lower and Upper Lantzville, of which there are only three. Fuel treatments will lower the probability of fire ignition and spread in these areas, protecting the egress route during a wildfire emergency. Also, treatments will increase sightlines for drivers at the intersection. The main cellular communication tower for the area is located at the southwest corner of the unit and treatment would protect this CI. These units are small and have good access, providing good opportunities to demonstrate interface vegetation management.
5	HIGH-S	High	7.6	Polygon	0.0	5.4	2.2	This treatment unit is on the south side of the intersection of Ware Road/Highway 19 and is on municipal land. Some public use on a dirt bike track was observed, as well as an active squatter camp. There is a Rogers cellular communication tower at the SW corner of the unit. There are no known overlaps with biological/environmental/archaeological values.	
6	SUB	High	8.1	Polygon	0.0	7.8	0.3	This treatment unit encompasses the Crown Agency forested land that surrounds the Lantzville BC Hydro substation. Private land (semi-rural mixed grass fields and forest) borders the north and west edges of the unit, while the ongoing Foothills subdivision development borders the unit to the west.	This unit is characterized by moderate density C-3 mature Douglas-fir leading stands. There is moderate fuel loading and moderate to high crown closure, with higher stem densities on the exterior of the unit. Fuel treatment will protect the substation (CI) and reduce hazardous levels of fuel loading across the landscape.



Map 8. Proposed Fuel Treatments.

5.1.2 Maintenance of Treated Areas

Future maintenance may be required to maintain or re-attain moderate or lower threat class ratings in fuel treatment units. Activities may include additional thinning, conifer regeneration reduction, or surface fuel continuity reduction (removal of excess woody debris). The return interval for maintenance activities depends upon site productivity and 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: Where operational fuel treatments are conducted, treatment monitoring 5-10 years out should be completed by a qualified professional to assess the efficacy of the treatment and to schedule maintenance activities. This can be completed with a CWPP update or as a stand-alone exercise.

5.1.3 Private Land Clearcutting

An identified concern of the District of Lantzville is the recent clearcutting of small private land lots in Lower Lantzville near the town centre (mostly done within the last 5 years). It was noted in the WWG meeting by BCWS that they had later assessed the cleared lots for fuel loading and fire risk and requested some landowners to reduce wildfire risk by removing excess slash build-up and slash piles. Communication and relationships shown here between Lantzville and BCWS are key to keeping communities FireSmart. Lantzville should continue to communicate and identify concerns to BCWS to get key information, support, and action on local wildfire issues

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.[42] 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.

[42] FireSmart is the registered trademark held by the Partners in Protection Association.

The FireSmart approach and concepts, including recommended FireSmart guidelines,[43] 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 reduce the risk effectively and efficiently to communities. Solutions are required at all scales, from individual backyards to communities and the wider landscape. To succeed, these efforts must be integrated across the mosaic of land ownership. The highest level of planning within the FireSmart program is strategic direction, such as that provided in CWPPs.

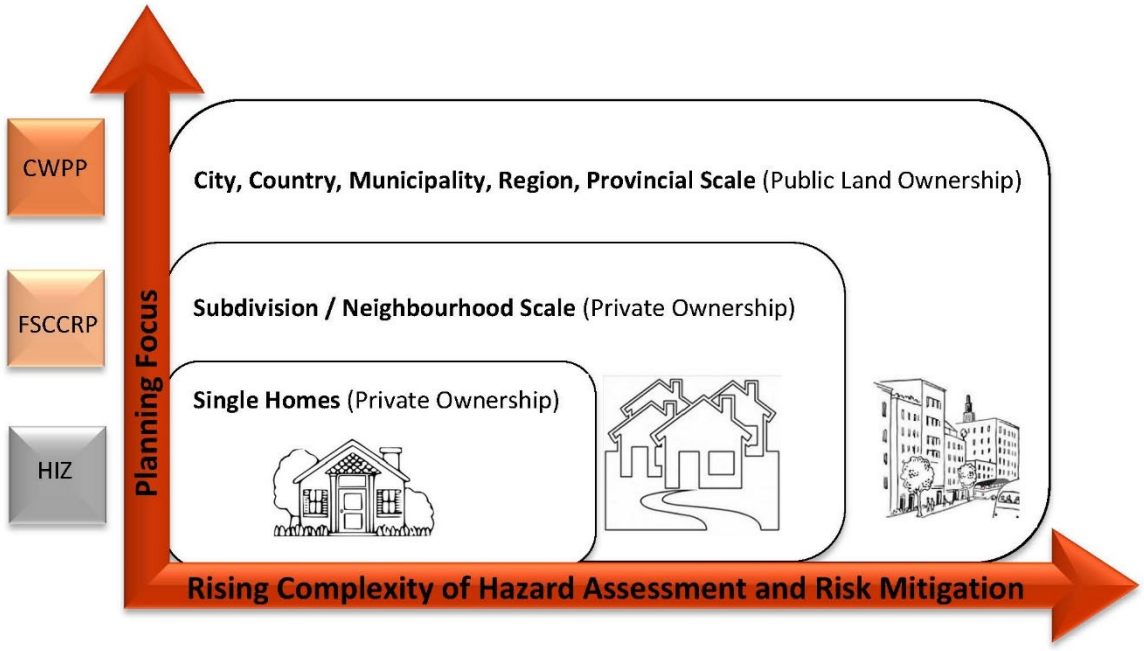


Figure 2. Diagram of the various, coordinated levels of the FireSmart program.[44] CWPP: Community Wildfire Protection Plan, FSCCRP: FireSmart Canada Community Recognition Program, HIZ: Home Ignition Zone.

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;[45] 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

[43] 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

[44] Figure and content developed by A. Westhaver. Adapted by A. Duszynska, 2017.

[45] https://www.firesmartcanada.ca

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.[46] Surviving homes in both urban and rural areas exhibited many attributes of FireSmart principles, regardless of the broader wildfire threat surrounding them.[46]

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
- Create landscape conditions around properties where fire suppression efforts can be effective and safe for responders and resources
- Treat fuel adjacent and nearby to structures to reduce the probability of ignition from radiant heat, direct flame contact and ember transport
- Implement measures to structures and assets that reduce the probability of ignition and loss"[47]

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).[48,49] 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: Non-combustible Zone), 1.5 – 10 m (Priority Zone 1), 10 – 30 m (Priority Zone 2), and 30 – 100 m (Priority Zone 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 Manual.[50]

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 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.

[46] 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.

[47] Community Resiliency Investment Program. 2018. Community Wildfire Protection Plan Template.

[48] 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.

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

[50] https://firesmartcanada.ca/ and https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart

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.[49] Increasing ignition resistance would reduce the number of homes simultaneously on fire; extreme wildfire conditions do not necessarily result in WUI fire disasters.[51] *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) 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 3).

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.[52] Figure 3 illustrates that it is possible to break up the disaster sequence by decreasing the 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.[52]

[51] 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 1 June, 2016 at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/.

[52] Calkin, D., J. Cohen, M. Finney, M. Thompson. "*How risk management can prevent future wildfire*"

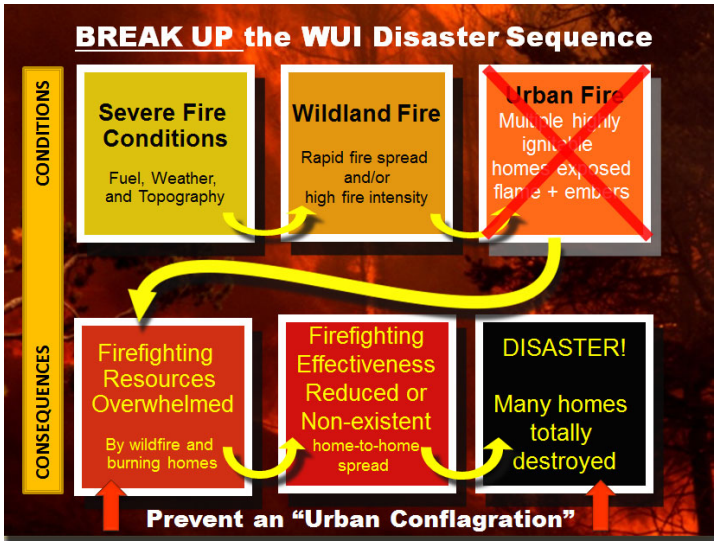


Figure 3. The wildland/urban interface disaster sequence and the possibility to break up the disaster sequence by decreasing the number of highly ignitable homes.[53]

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 landowners 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 AOI is also presented in this section.

Education

Effective communication 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, Lantzville District 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.

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.

Lantzville has undertaken some public education outreach in the community and online. This can be expanded upon and/or adapted to further enhance wildfire preparedness and education. Lantzville Fire Rescue is present in the community and has distributed education materials and used social media to educate the public with fire danger information, advisories, and about FireSmarting their properties.

[53] Graphic adapted from Calkin et. al, by A. Westhaver.

Lantzville should consider utilizing the FireSmart BC Education Package as an element of wildfire preparedness education to be presented annually in schools. Programming could include volunteer/advocacy work from professional foresters, wildland firefighters or prevention officers, and Lantzville staff. Lantzville should consider holding a wildland specific Fire Prevention Day or Week, or similarly formatted event, 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

Regional and 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 Lantzville are:

- To include wildfire considerations in the planning and acquisition strategy for parks and recreational areas.
- To adhere to (and amend if necessary) policies and practices (outlined in the OCP and bylaws) for the 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, buildings, and critical infrastructure 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 Lantzville are:

- Continue with an update to the Lantzville's Interface Wildfire Protection Development Permit Area (DPA 7) and associated guidelines. Lantzville has an established wildfire DPA that is currently under review with the intent for updating by BA Blackwell & Associates Ltd.[54]
- To utilize regulatory and administrative tools, such as the Interface Wildfire DPA, to reduce wildfire hazard on private land and increase number of homes compliant with FireSmart guidelines (with low ignition potential).
- Continue to ensure higher level planning and regulation (i.e., OCP and/or land use, engineering, and public works bylaws) incorporates FireSmart policies, as applicable, to reduce wildfire hazard in vulnerable WUI neighbourhoods.

[54] Lantzville Official Community Plan

- Continue to ensure multiple departments (ie. 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 Lantzville, 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.

Lantzville has not yet engaged in a proactive vegetation management strategy targeting high-use areas near values at risk within and immediately adjacent to developed areas. However, Lantzville does support the design of new developments to meet FireSmart guidelines. More detailed recommendations regarding wildfire hazard development permit areas are provided below.

Building Design and Construction

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.[55]

RECOMMENDATION #11: Review and update (as necessary) the Lantzville Official Community Plan with respect to its updated Wildfire DPA when completed.

The following aspects should be considered in the OCP review and wildfire DPA development: 1) Establish DPA objectives (e.g. minimize risk to property and people from wildland fires, minimize risk to forested area surrounding the AOI, and conserve the visual and ecological assets of the forests surrounding communities, etc.; 2) Where possible, it is recommended to mandate FireSmart construction materials, some of which may be beyond BC Building Code within the established wildfire hazard development permit area; and 3) engage the development community in the DPA

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

development process to educate, inform, and allow for input. This can be accomplished in a variety of formats, including, but not limited to, workshops, informational sessions, or open houses.

In order to meet objectives, consider including the following elements: 1) minimum setbacks from forested edge based on FireSmart, 2) fuel management based upon qualified professional recommendations, 3) landscaping to FireSmart guidelines, 4) building materials and design based on NFPA 1144 and FireSmart standards, 5) underground servicing, 6) prompt removal of combustible construction materials or thinning/fuel management waste.

RECOMMENDATION #12: Develop 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, avoid wildlife attractants, 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 Lantzville municipal hall 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 consideration 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 communities 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.[56] When the time for evacuation is limited, poor access has contributed to deaths associated with entrapments and vehicle collisions during wildfires.[57] Methods for access design at the subdivision level can provide tools that help manage the volume of cars that need to evacuation an area within a given period of time. These factors should be considered during the review of applications for new developments occurring on vacant lots within Lantzville's wildland urban interface.[56]

For new development where hydrants are limited or unavailable (or it is otherwise determined by Lantzville that adequate or reliable water supply systems may not exist), the NFPA 1142[58] 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 natural water sources, should be reviewed by Lantzville and Lantzville Fire Rescue prior to development approval.

[56] 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.
[57] 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.), http://www.fire.uni-freiburg.de/GlobalNetworks/Africa/Wildland.cdr.pdf
[58] National Fire Protection Association NFPA 1142. Standard on Water Supplies for Suburban and Rural Fire Fighting

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

Local capacity for emergency management and efficient response to WUI 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);
- 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 Lantzville 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 based on assessment by internally trained Local FireSmart Representatives or external Local FireSmart Representative consultants.

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). Lantzville can facilitate uptake within the AOI by:

1) Supporting and/or facilitating planning for private land (with property owners' consent);

2) Offering local rebate programs to homeowners on private land who complete eligible FireSmart activities on their properties;

3) FireSmart vegetation management: 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 at transfer stations that accept wood

waste. 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 #13: Develop and implement a community chipper program with the help of neighbourhood representatives. As a demonstration, start in one of the FireSmart priority neighbourhoods listed in Table 12.

FireSmart Compliance within the Area of Interest

Due to the semi-rural character of Lantzville, many homes in the AOI are in interface neighbourhoods or are on larger acreages surrounded by forest and/or grass fields – FireSmart should be a priority. However, FireSmart compliance on most private properties in Lantzville is generally low. The main concerns (observed during field visits) are the lack of a 10m defensible space surrounding main structures; the ubiquity of fire-prone vinyl or wood siding; unenclosed decks, flammable vegetation adjacent to homes (eg. cedar hedges). Storage of combustible items (firewood, propane cylinders) under decks, carports, and other horizontal surfaces was common. Some residences are surrounded by lawn, which are FireSmart compliant (if kept green), do not have conifers within 10 m of structures, and had hardy board siding – all compliant with FireSmart principles. It should be noted that grassland or non-irrigated hay fields (O-1a/b fuel type) can carry a fast-moving surface fire when grass is cured, and so FireSmart should be a priority for homes surrounded by grassland as well as forest. Overall, the number one concern was cedar hedging and shrubs.

Key factors contributing to the low level of FireSmart compliance within Lantzville include, but are not limited to: the age of homes or subdivision; prevailing design features and favoured building materials of the era; proximity to forested area (both on private land and adjacent Crown or municipal 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 moderate across neighbourhoods within the AOI;
- The bulk of hazards are associated with the proximity of homes to forest and/or grassland;
- Hazards are magnified in some neighbourhoods due to poor access (i.e., single access roads, long forested driveways) and distance from nearest water supply or fire hydrant location; and,
- All neighbourhoods have good opportunities to mitigate risk through individual and collective action.

RECOMMENDATION #14: Lantzville Fire Rescue Local FireSmart Representatives should engage as soon as possible to assist neighbourhoods and large-lot private land holders in complying with FireSmart principles at both the neighbourhood and individual home-level.

RECOMMENDATION #15: Lantzville 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.

5.2.3 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 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 Lantzville prioritize the neighbourhoods in Table 12.

Table 12. Summary of FireSmart Priority Areas.

Area	FireSmart Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities
Priority Area #1: the entire Foothills development area	N	N	The following is a non-extensive list of FireSmart activities for which Lantzville can engage suggested neighbourhood residents: 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[59] 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. Based on field observations, some but not all critical infrastructure has had 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 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.
Priority Area #2: Bayview Park Drive	N	N	
Priority Area #3: The Winds – Sywash Ridge Road	N	N	
Priority Area #4: The Winds and Superior Road	N	N	
Priority Area #5: Aulds Road (Phantom Road, Manhatten Way)	N	N	
Priority Area #6: Black Jack Road	N	N	

[59] National Fire Protection Association NFPA 1144. Standard for Reducing Structure Ignition Hazards from Wildland Fire

5.3 COMMUNICATION AND EDUCATION

Establishing effective communications and actively engaging key stakeholders in risk reduction activities are key 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 Lantzville staff have a good level of awareness of interface fire risk and a strong level of commitment to continue to grow their awareness and understanding. However, field observations highlighted the need to further educate the community at large on what private landowners 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 Lantzville 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 human activities, including 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. Lantzville should consider an annual meeting, prior to the fire season, of key stakeholders such as Lantzville staff, BCWS, recreational groups/representatives, industrial operators, local farmers/ranchers, woodlot managers, surrounding private managed forest land managers, and First Nations to discuss ‘all things wildfire’ for the upcoming season (such as fire season outlook, mitigation undertaken and planned, wildfire response protocols, etc.).

Agricultural Land Reserve (ALR) within the AOI supports hobby and commercial farming, hay and grazing fields, and forested areas. The agriculture sector faces unique challenges with respect to wildfire planning and preparedness. 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[60] to the agriculture community in Lantzville will promote improved planning and preparedness and encourage FireSmart practices on private farmland.

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

RECOMMENDATION #16: Make this report and associated maps publicly available on District of Lantzville's website and social media platforms. In addition, this CWPP should be shared with local industry partners, particularly forest licensees such as local woodlots who may be interested in collaborating on direct fuel management treatments or with other sections of this CWPP. The wildfire threat class mapping included in this CWPP should be included in the online RDNMAP.

RECOMMENDATION #17: 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 Lantzville'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 #18: Focus residents' attention on FireSmart by creating a FireSmart page on the Lantzville Fire Rescue Services webpage, in addition to the pages on outdoor burning, summer safety, and fireworks. This page should contain the existing Lantzville FireSmart guide and links to this CWPP, the wildfire Development Permit Area and guidelines, any landscaping guidelines that are developed, and links to FireSmart BC materials, including the FireSmart Begins at Home assessment manual and mobile app. This page can serve as a platform to promote workshops, waste disposal opportunities, the Fire Smart Canada Community Recognition Program, and other community FireSmart initiatives. Updates on fire bans, high or extreme Fire Danger days, and current fires can be integrated with this page. Updates and opportunities should also be communicated regularly through Lantzville's Facebook page. Promote residents to sign-up for RDN's Emergency and Information Alert System (this will likely relay the same fire bans, Fire Danger Days, etc.).

RECOMMENDATION #19: Prior to and during the fire season, plan and conduct public FireSmart workshops and presentations promoting FireSmart approaches for wildfire risk reduction. Supply FireSmart resources to homeowners during these engagement campaigns and promote the FireSmart Begins At Home mobile app as a method of conducting home assessments.

RECOMMENDATION #20: Encourage and facilitate neighbourhoods in the wildland urban interface (WUI) to attain FireSmart Canada Community Recognition Program (FSCCRP) status and encourage homeowners to complete a FireSmart home assessment using the Home Assessment guide or the FireSmart Begins At Home mobile app. Encourage FSCCRP neighbourhoods to hold a home hazard assessment workshop as one of their FireSmart events. In addition, Lantzville should promote the use of the FireSmart Home Partners Program which facilitates voluntary FireSmart assessments on private property to identify hazards and provide options to reduce the risk.

[60]BC Agriculture and Food Climate Action Initiative. Cariboo- Wildfire Preparedness & Mitigation Planning & Resources. https://www.bcagclimateaction.ca/regional-project/cb01/

RECOMMENDATION #21: Encourage School District 68 to adopt and deploy existing school education programs to engage youth in wildfire management and risk reduction during Fire Prevention Week. 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 BCWS (Coastal Fire Centre) as well as Lantzville Fire Rescue and FireSmart representatives to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in the local elementary school (field trips, guest speakers, etc.).

RECOMMENDATION #22: Promote and provide information to private landowners related to exterior residential sprinklers as a FireSmart prevention measure. At FireSmart events distribute information on exterior sprinkler component parts, manufacturers, and water supply system requirements to ensure they are effective measures to wet down homes and Fire Priority Zone 1 (0-10 m) and discourage home ignition. Develop general costs of exterior sprinkler equipment for property owners.

RECOMMENDATION #23: Promote and encourage FireSmart practices on private farmland 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 the Lantzville website, mailouts).

5.4 OTHER PREVENTION MEASURES

In addition to fuel treatment and community communication and education, fire prevention in the AOI is also addressed via Public display of a danger class rating sign outside the Lantzville Fire Rescue firehall and robust and restrictive bylaws governing beach fires, pile burning, and hazardous material build-up.

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) are common occurrences and represent significant risks to ignition within the AOI. A cooperative approach for addressing the industrial area concerns must be undertaken by Lantzville and pertinent industrial partners.

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 document.[61] The 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, Lantzville has installed backup generators, fueled by gas or diesel, to power critical infrastructure such as the municipal hall, fire hall, water treatment facility, and sewer pump stations. However, should a wide-scale outage occur, known vulnerabilities to secondary power sources include mechanical failure and potential fuel shortages. Although Lantzville Fire Rescue has not identified any issues with water pressure within areas that have fire hydrant service, there are known limitations to water supply/access in areas without hydrants. Specific limitations of the Lantzville water system with regards to wildfire suppression are detailed in Section 6.1.2.

In the event of a WUI fire emergency, mutual aid can be called upon as required and may also lead to aid requests from BCWS.

6.1.1 Fire Department and Equipment

Fire protection within the District of Lantzville is provided by the Lantzville Fire and Rescue Department (Lantzville Fire Rescue), consisting of one part-time Fire Chief and 26 volunteer paid on-call fire fighters. Departmental resources are included in Table 13 below. The Fire Protection Area (FPA) is restricted to the District boundary, however aid is available from surrounding jurisdictions and BCWS: formal mutual aid agreements are in effect between Lantzville Fire Rescue and the City of Nanaimo, the Regional District of Nanaimo (south of Lantzville), and Parksville Fire Department (north of Lantzville); there is an informal agreement with BCWS for aid if practicable. In the last three years, Lantzville Fire Rescue has called on mutual aid from neighbouring fire departments three times and never from BCWS.

The Lantzville FPA covers all land within the District other than woodlots and private managed forest land – an area of roughly 1,993 hectares (approximately 67% of the District). Lantzville Fire Rescue cannot respond to fires beyond its FDA unless there is written authorization to do so, Council approval, or a request for assistance in accordance with the Emergency Program Act (BC). In the event of a wildfire within the Lantzville FPA, Lantzville Fire Rescue would respond under BCWS direction. The areas outside the FPA are primarily under BCWS responsibility (agreements are in place between BCWS and private managed forest landowners), and response resources would be supplied via the Coastal Fire Centre.

Lantzville Fire Rescue is fully equipped to fight structural fires and has good capacity to fight wildland fires. The Lantzville Fire Rescue does not possess any sprinklers for structure protection, but these can be accessed from neighbouring fire departments if required (and not already in use). The greatest deficiency reported by the Fire Chief is day-time availability of volunteer staff.

[61] 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

Lantzville Fire Rescue structural and wildland firefighting equipment are detailed below in Table 13. Specific to wildland fire fighting, all members have Nomex overalls and most have leather boots. One truck is dedicated to wildland firefighting: Engine 5. It carries a 300 Imperial Gallon (IG) tank with a pump, as well as 2 portable pumps, 1 drop tank, 1000 feet of 1 ½ inch wildland fire hose, 500 feet of ¾ inch wildland fire hose, and an assortment of tools and hose nozzles and adapters. Additionally, the Tender 4 truck (with a 2000 IG tank and pump) is equipped for wildland firefighting with 2 portable pumps, 1 drop tank, 1000 feet of 1 ½ inch wildland fire hose, 500 feet of ¾ inch wildland fire hose, and an assortment of tools and hose nozzles and adapters.

Table 13. Lantzville Fire Rescue structural and wildland firefighting equipment.

Fire Department	Number of Stations	Number of Members	Apparatus type	Description
Lantzville Fire Rescue	1	1 – Chief (part-time) 26 - Volunteers	Engine 1	1000 IG* with a 1050 gpm* pump and class A foam
			Engine 2	894 IG with a 1250 gpm pump and class A foam
			Engine 5	(brush truck) 300 IG with a CET*
			Tender 4	2000 IG with a 1000 gpm pump and class A foam
			Rescue 3	(rescue only) No fire suppression ability
			Command 1	(Pickup truck) 50-gallon tank and small electric pump
			Command 2	(on order) Chief's vehicle
			Portable water pump	4
			Drop tank	2
			Wildland hose	2000 ft of 1 ½ inch 1000 feet of ¾ inch
			Wildland tools	Yes
			Hose adapters/nozzles	Yes
			Nomex overalls	Yes – for all members
			Leather boots	Yes – most members

*IG: Imperial Gallon; gpm: gallons per minute; CET: a fire pump retrofit/manufacturing company

Callouts were not fully entered into the Lantzville Fire Rescue record management system until 2015. From 2015 to present (mid-2020) Lantzville Fire Rescue responded to 31 structure fires and 28 wildland fires. Fire Rescue will also respond to calls for medical aid, motor vehicle accidents, and other non-fire emergencies if available. Wildland fire calls have ranged from a low of 1 in 2018 and up to a high of 9 in 2017. 2018-present had less than 5 wildland fire calls per year.

RECOMMENDATION #24: Consider funding opportunities to obtain additional wildland specific equipment as required, such as wildfire hose and fittings, portable water tank and pump(s), and hand tools, as well as PPE such as leather boots, gloves, and fire-resistant Nomex overalls.

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).[62] 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, the primary local water service is provided by ground wells (electric pumps with back-up gas/diesel pumps). Additionally, the Lantzville water system is connected with the City of Nanaimo water system so that water can be provided on an as-required basis to the Upper Pressure Zone of Lantzville. For suppression within the AOI, hydrant service is provided within the fire services area boundaries at varying levels of coverage, leaving significant areas that do not have fire hydrant services. Lantzville neighbourhoods/communities with no hydrant services or a concerning lack of water supply (as identified by the Fire Chief) are: Aulds, The Winds, Lisa Lane, Owen Road, Bayview Park Drive, and along most of Highway 19.

To supplement water availability for firefighting, Lantzville Fire Rescue can draw from local natural water sources such as lakes, ponds, and wetlands using either truck mounted or portable pumps. These waterbodies are mapped, and recently the Lantzville Fire Rescue assessed and flagged access to those in the back-country area around the Foothills development. In conjunction with department water tankers, these water sources aid Lantzville Fire Rescue in providing water services to those areas without hydrant service. However, most of these sources are also at risk of drying out or experiencing reduced water levels during drought events, which typically coincide with high and extreme fire danger rating days (summer).

RECOMMENDATION #25: All new developments outside of existing water service areas should have a water system which meets or exceeds minimum standards of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.* Local fire departments should review the planned 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.

[62] http://www.scm-rms.ca/docs/Fire%20Underwriters%20Survey%20-%201999%20Water%20Supply%20for%20Public%20Fire%20Protection.pdf

RECOMMENDATION #26: Complete a fire flow/water vulnerability assessment of current infrastructure to identify where upgrades to systems, flows, hydrant number or location, and water storage, or secondary power is required. Prioritize and rank projects and complete or require upgrades as resources allow.

6.1.3 Access and Evacuation

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 happen simultaneously and road networks should have the capacity to handle both. The main arterial route within the AOI is Highway 19, which effectively cuts Lantzville into two halves: Lower Lantzville (north of the highway), and Upper Lantzville (south of the highway). There are only a few roads that allow access to/across the highway: Lantzville Road (at its western end), Superior Road (where the fire department is located), Ware Road, and Aulds Road. Wildfire evacuations would be conducted by first responders and the BCWS. If a wildfire were to block one of the key routes/intersections listed above, evacuation from the AOI would be challenged. Smoke and poor visibility, car accidents, wildlife, and other unforeseen circumstances could further complicate evacuations and hinder safe passage.

Many developments/neighbourhoods within the AOI are located on single access roads; this limits the ability of fire crews to respond to fires and safely evacuate residents. The following single access routes or isolated neighbourhoods that cause suppression or evacuation concerns were identified during field visits and in consultation with the Wildfire Working Group: The Foothills, Winds, Bayview Park Drive, Lisa Lane, and Aulds Road (specifically Phantom Road, Manhattan Way, and Black Jack Drive). A new bylaw passed in June 2020 allows for the Lantzville Fire Rescue to review new development subdivision applications to ensure access is appropriate. Specific to the Foothills development, the Fire Chief stated that the fire trucks can turn around at the end of roads in the cul-de-sacs, but they need to be kept clear of parked vehicles.

RECOMMENDATION #27: Existing single access neighbourhoods should be reassessed for potential secondary access/evacuation routes. It is recognized that most of these neighbourhoods are older and surrounding private property can make this difficult. There could be opportunities for an easement or agreement-on-use on the edge of an individual's private property for a single lane gravel road that could create the required secondary evacuation route for a neighbourhood (to be used only in emergency evacuation situations). Another opportunity could be contacting BC Hydro and discuss using parts of the existing BC Hydro right-of-way access road as an emergency evacuation route (example: for Bayview and the Winds neighbourhoods, utilizing Lorenzen Lane).

RECOMMENDATION #28: Incorporate the requirement for all new and ongoing/underway developments to have two access/evacuation routes in the 2021 Interface Wildfire Protection DPA update. Work with the developers of the Foothills area to maintain the backroads that connect the Foothills development to Vipond Road. This secondary access/evacuation route would benefit both Foothills residents and users of the Foothills park area.

RECOMMENDATION #29: Install (District roads) or require installation of (private or strata roads) signage, road paint, or both at all road locations required to be kept clear for emergency vehicle use (ex: no parking signage).

Locked gates are in place at some but not all main access roads into Woodlot 1475 (which lies entirely within Lantzville). Lantzville Fire Rescue has been provided keys for access, but it is important that the keys are checked often as locks get tampered with, get replaced, and new keys may not be passed along. Emergency response access to the woodlot area is critical as this is a high-use area "party zone" with illegal bon-fires.

RECOMMENDATION #30: Lantzville Fire Rescue should implement routine, scheduled checks of locked gates and accessibility with keys on hand and ensure that all wildland response vehicles carry bolt-cutters to use in an emergency.

RECOMMENDATION #31: A locked gate should be installed at the end of Aulds Road where it enters Woodlot 1475. Identified by Lantzville Fire Rescue, this would keep out nuisance activities and limit associated fire ignitions in this WUI area.

Emergency access and evacuation planning is of particular importance in the event of a wildfire event or other large-scale emergency. The Regional District of Nanaimo and District of Lantzville commissioned an "Evacuation Route Plan" report completed in March 2020 by ISL Engineering and Land Services (ISL).[63] The report identified that wildfire would be the most likely emergency requiring evacuation, and that that the greatest impact would be to those residents south of the highway in Upper Lantzville (as the highway acts as a partial fire barrier). Additionally, the report suggested that new and future developments (such as the Foothills) would have the longest evacuation times. The report outlined five scenarios, one of which (Scenario 3) simulated evacuating Upper Lantzville from a wildfire using Highway 19. Even if residents were ready to depart, Scenario 3 resulted in a two-hour evacuation time A key concern identified was the risk of Highway 19 closing rapidly from wildfire spread. A key constraint identified was traffic back-up at single lane highway entrances (such as at the Lantzville Road intersection).

RECOMMENDATION #32: Discuss with the RDN their plan towards implementing recommendations in the 2020 Evacuation Route Plan Report. Emphasize recommendations of importance to Lantzville, such as including assigning neighbourhoods with a primary evacuation route (should there be a need to call for a rapid no-notice evacuation), and making a simple evacuation map and pre-planning brochure that would be available on the Lantzville Fire Rescue Services webpage that addresses: 1) primary evacuation route by neighbourhood/zone; 2) tips for being evacuation prepared (pre-packed bags with clothes, food, water; vehicles always left with minimum half-full gas tanks; etc.).

RECOMMENDATION #33: Implement "high priority" proposed fuel treatment units at the intersection of Ware Road and Highway 19 (FTUs HIGH-N and HIGH-S).

[63] ISL Engineering and Land Services. 2020." Evacuation Route Plan – Regional District of Nanaimo and District of Lantzville FINAL REPORT.

During field work it was noted (and by the Fire Chief at the Wildfire Working Group meeting) that many properties had insufficient or no visible address signage. Additionally, there were some neighbourhoods where private properties had narrow, steep driveways enclosed by dense conifer shrubs and trees. Combined, this makes locating and accessing structure fires (and other emergencies) difficult or not possible. Lantzville Fire Rescue has a small truck that can make it into these properties (Command 1) but its pump is not reliable enough for fighting a structure fire. The Fire Chief noted that there are plans to replace a current tanker truck with another smaller one for this purpose.

RECOMMENDATION #34: As part of an annual Fire Prevention Week, communicate the importance of adequate, reflective house numbering for emergency response. Consider providing an opportunity for homeowners to purchase address signage at a reduced rate.

6.1.4 Training

Lantzville Fire Rescue has a junior program that allows youth 16-19 years of age to become non-responding department members and get all required training completed before becoming regular members. Youth programs are vital towards creating interest and knowledge in community firefighting and support and keeping volunteer-reliant departments staffed into the future.

Members of Lantzville Fire Rescue currently receive training for both structural and wildland firefighting. Approximately 15 members have completed the S-100 Basic Fire Suppression and Safety course (wildfire fighting). Firefighter training is done weekly for 2-3 hours, primarily focused on structure fire and emergency response. The Fire Chief meets with BCWS representatives a few times a year a regional Fire Chiefs' Meeting which provides updates on the activities of local fire crews and BCWS crews and what can be expected for the upcoming fire season (fire weather predictions). No cross-training with BCWS crews has been completed to date. It is strongly recommended that all fire services members within Lantzville Fire Rescue have at a minimum S-100 and/or SPP-WFF1 (or equivalent), and that the fire department members engage in yearly practical wildland fire training (best in the spring prior to the start of fire season). Provision of training opportunities for structural firefighters in the realm of wildland firefighting is critical to building capacity for suppression and emergency management at the local level. Note that SPP-WFF1 (Wildland Firefighter Level 1 for structural firefighters) is a new S-100 equivalent course for structure firefighters only, and as such BCWS has phased out instruction of S-100 training for fire departments. SPP 115 is another course available to train structural firefighters in the application of structural protection units (SPUs).

BCWS holds annual meetings and workshops in conjunction with Emergency BC and all other first responders interested in emergency training. In addition to this training, it is recommended that the fire departments 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, 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 Lantzville to conduct joint training to further strengthen regional emergency response and firefighting training.

RECOMMENDATION #35: Lantzville Fire Rescue should start working directly with BC Wildfire Service (BCWS) to create 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. Additionally, 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. Strategic information should be reviewed and shared, such as (spatial GIS or paper maps) of all known drafting sites. It is recognized that BCWS crew resources are limited and their availability is highly dependent upon the current fire season and other BCWS priorities.

RECOMMENDATION #36: Continue to ensure that the Lantzville Fire Rescue maintains the capability to effectively suppress wildland fires, through wildfire-specific training sessions. Ensure all firefighters' training includes S100 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 fire departments should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources/budgets allow.

6.2 STRUCTURE PROTECTION

Lantzville Fire Rescue is well resourced in structural fire suppression equipment with some additional wildland equipment. An important consideration in protecting the WUI 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 (including Lantzville) 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 provincial 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*".[64]

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

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 completed as resources and planning allow. For example, prior to the fire season, clearing roofs and gutters of combustible materials (leaves, branches 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 Lantzville 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: Explore funding and program opportunities that would 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 (ie. Recommendation #14: chipper program). These may include yard waste dumpsters available by month in neighbourhoods or scheduled burning weekends (dependent on weather and venting and open burning bylaws). Programs should be available during periods when most yard clearing takes place (spring and/or fall).

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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, 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.[65] 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.[66] 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.[66] 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 14 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 are C-3 and C-7, 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.[66] 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. 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.

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

[66] 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.

Table 14. Fuel Type Categories and Crown Fire Spot Potential. Only summaries of fuel types encountered within the AOI are provided (as such, other fuel types, i.e., C-1, C-2, and C-4 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 (Douglas fir, spruce, or lodgepole pine), 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. Little grass or surface fuel accumulation.	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
C-7	Ponderosa pine and Douglas-fir	Open, uneven-aged forest, crowns separated from the ground except in conifer thickets, understory of discontinuous grasses, herbs. Areas harvested 25+ years ago (and not achieving M-1/2 or C-3 fuel type characteristics), open stand type (>40% crown closure).	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread	Moderate
O-1a/b	Grass	Matted and standing grass communities; sparse or scattered shrubs, trees and down woody debris. Hay fields and seasonal wetlands that have the potential to cure. Areas harvested <7 years ago with good slash management.	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; areas harvested 10-20 years ago	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

Fuel Type	FBP / CFDDRS Description	AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire / Spotting Potential
S-1/2	Slash (jack / lodgepole pine, white spruce / balsam, and coastal cedar / hemlock/ Douglas-fir, respectively)	Any conifer slash	Moderate to high rate of spread and high to very high intensity surface fire	Low
W	N/A	Water	N/A	N/A
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; areas burned <5 years ago	N/A	N/A

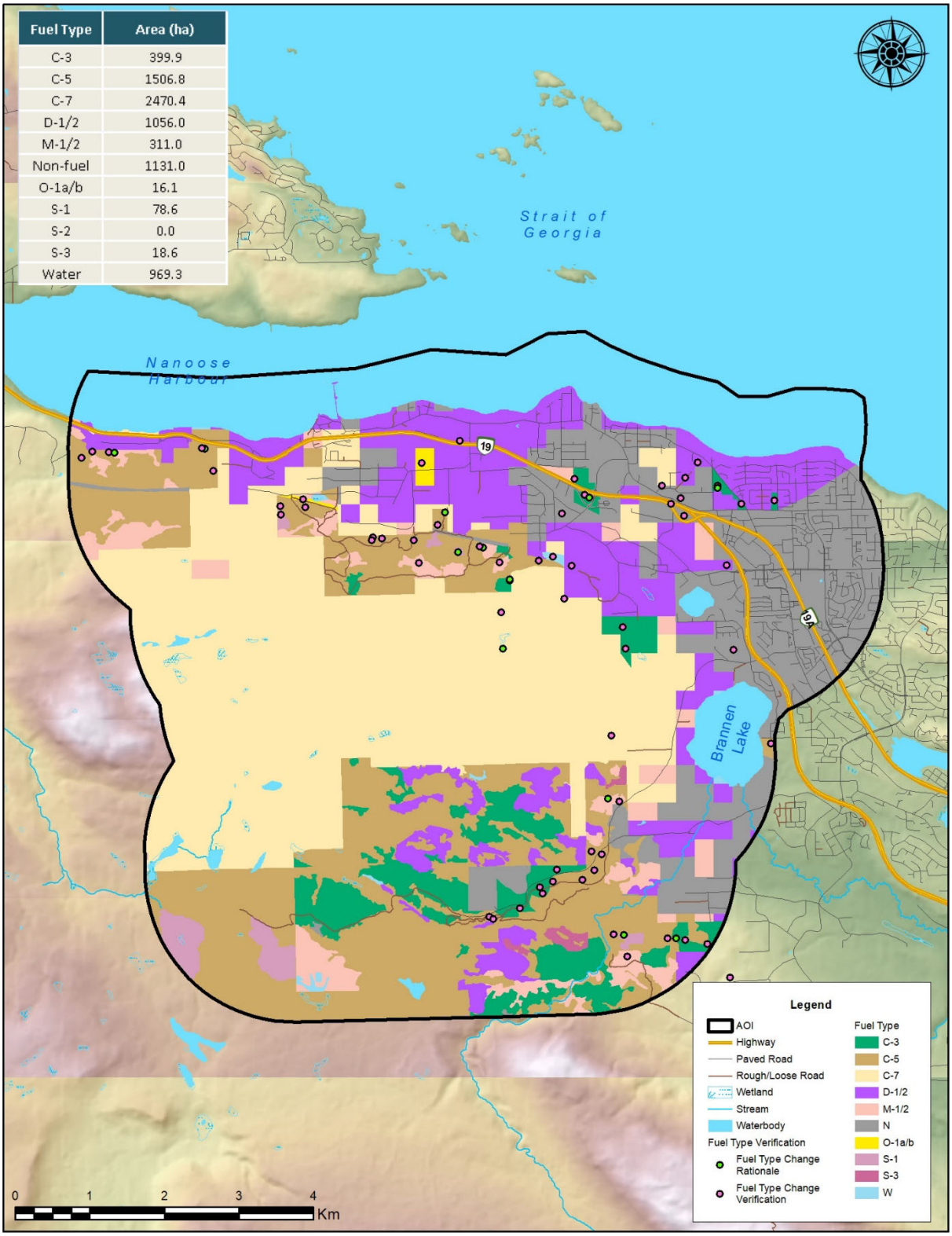
**C-3 fuel type is considered to have a high crown fire and spotting potential within the AOI due to the presence of moderate to high fuel loading (dead standing and partially or fully down woody material), and continuous conifer ladder fuels.*

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

- C-3 fuel types being incorrectly identified by the PSTA as C-7,
- C-5 fuel types identified as C-7,
- O-1a/b fuel types identified as C-7,
- C-7 fuel types identified as O-1a/b
- O-1a/b fuel types identified S-1,
- O-1a/b fuel types identified as D-1/2,
- S-1 fuel types identified as C-7,
- M-1/2 fuel types identified as C-2,
- M-1/2 fuel types identified as O-1a/b,
- M-1/2 fuel types identified as C-3
- C-5 fuel types identified as O-1a/b
- C-3 fuel types identified as O-1a/b,
- C-3 fuel types identified as M-1/2, and
- N fuel types identified as O-1a/b

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 9. 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 15 describes the classes associated with proximity of fuels to the interface.

Table 15. Proximity to the Interface.

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

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

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. The Initial Spread Index (ISI) is a numeric rating of the expected rate of fire spread that combines the effects of wind speed and fine fuel moisture. ISI roses can help plan the location of fuel treatments on the landscape to protect values at risk based on the predominant wind direction and frequency of higher ISI values. 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.

The local representative BCWS weather station for the AOI is Qualicum Airport, however wind data is not made available. Wind data has been taken from Bowser BCWS weather station. Although the Cedar BCWS weather station is closer to the AOI, Qualicum AP and Bowser were used because of their closer proximity to the coast giving a better representation of temperature and wind for the AOI. Hourly ISI roses depicting the frequency of ISI values by wind direction for Bowser over the fire season are shown below in Figure 4. Figure 5 displays the daily average ISI values for Bowser.

During the fire season (April – October), predominant daytime winds originate from the northeast, and to a lesser degree, daytime winds also come from the east. ISI values over 5 occur 25-30% of the time, with the highest values occurring most frequently with winds from the northeast and east.

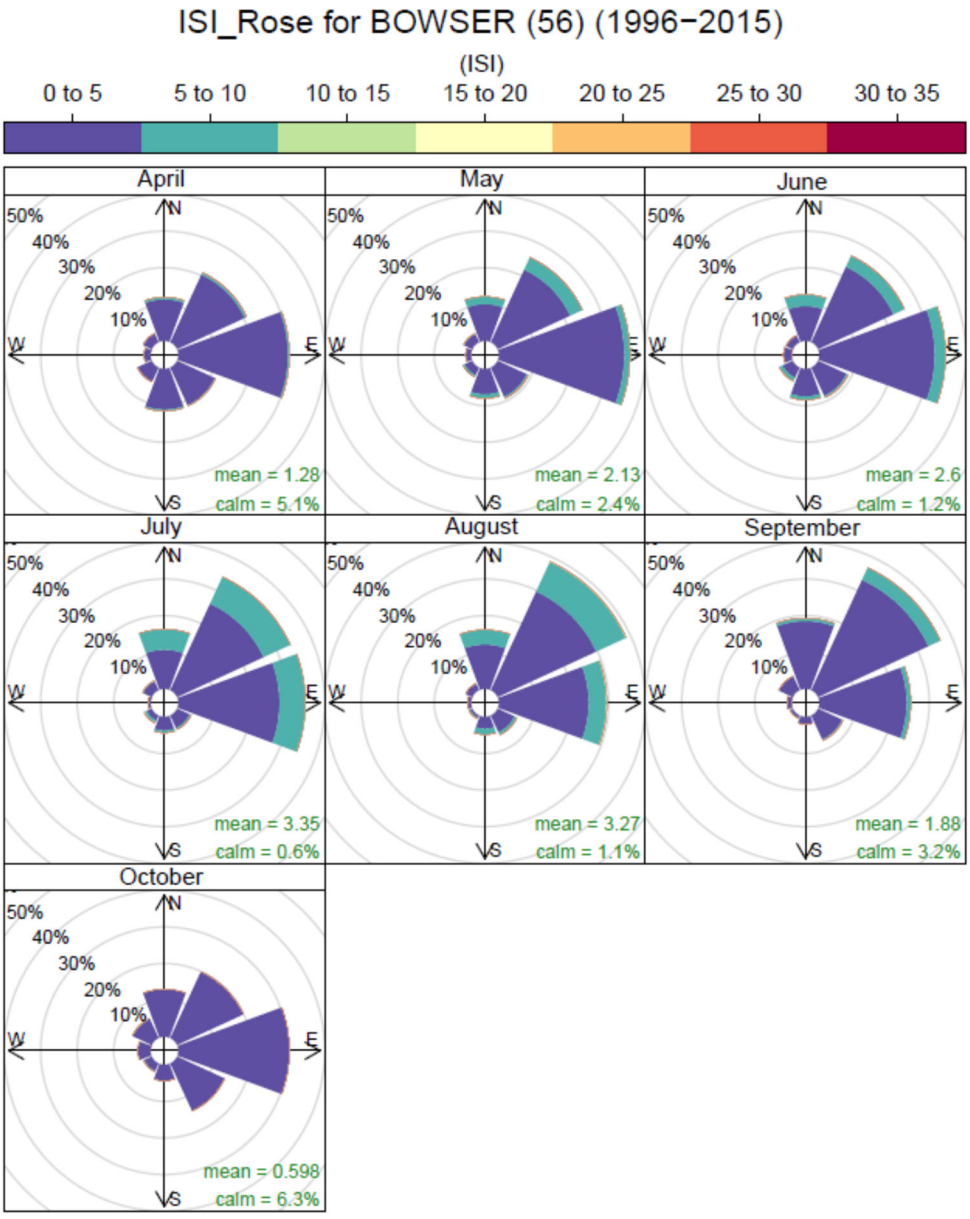


Figure 4. Initial Spread Index (ISI) roses depicting the average frequency of ISI values by wind direction for four 6-hour periods over the fire season April – October. Data taken from the Bowser weather station from 1996 to 2015.

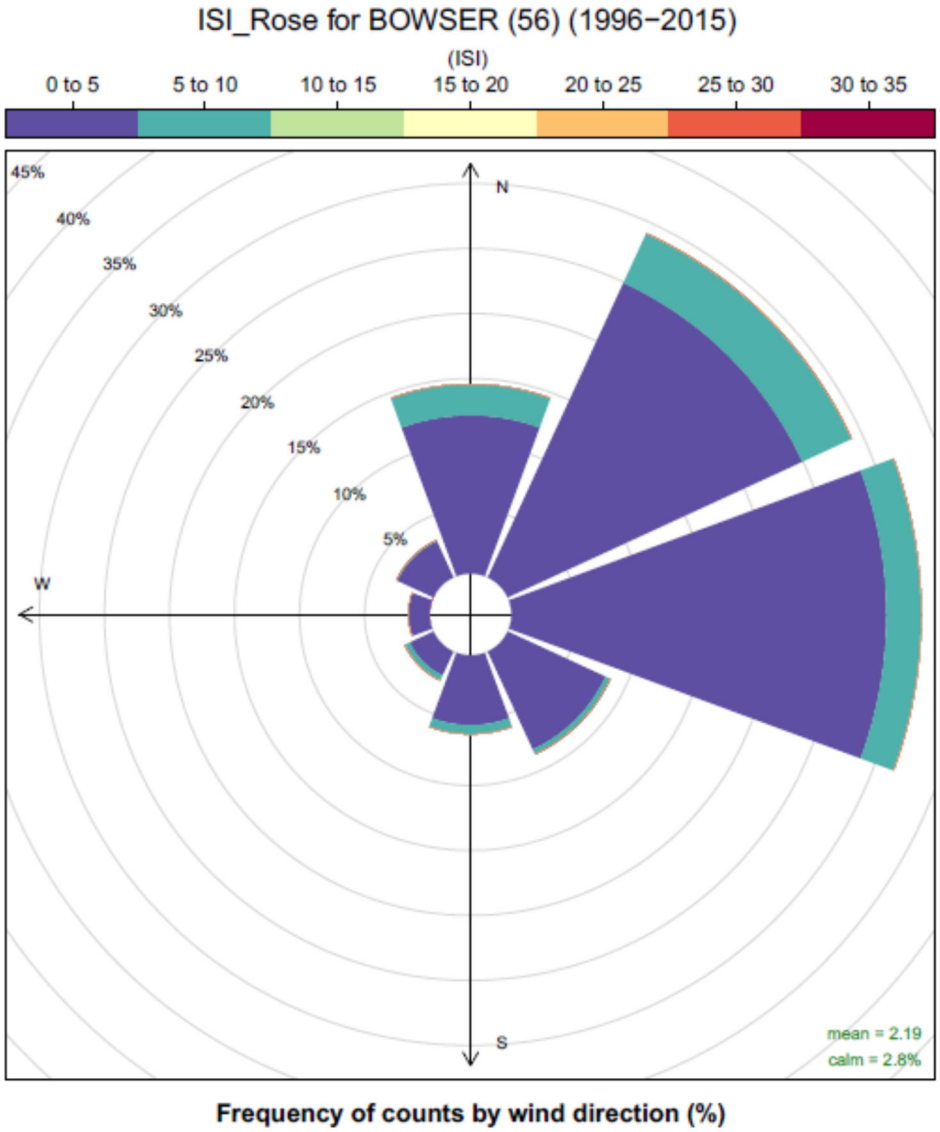


Figure 5. Initial Spread Index (ISI) roses depicting average daily wind speed and direction during the fire season (April – October) 1996 – 2015. Data taken from the Bowser fire weather station.

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 16 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 17. A value placed at the bottom of the slope is equivalent to a value on flat ground (see Table 16). A value on the upper 1/3 of the slope would be impacted by preheating and faster rates of spread (Table 17). The majority of the AOI (79%) is on less than 20% slope and will likely not experience accelerated rates of spread due to slope class. 10% of the AOI is likely to experience a high rate or very high rate of spread. Almost all housing developments and neighbourhoods in the AOI are within the <20% slope class. Of concern is the Foothills subdivision, which exhibits areas with steep slopes and thus higher associated rates of spread.

Table 16. Slope Percentage and Fire Behaviour Implications.

Slope	Percent of AOI	Fire Behaviour Implications
<20%	79%	Very little flame and fuel interaction caused by slope, normal rate of spread.
20-30%	11%	Flame tilt begins to preheat fuel, increase rate of spread.
30-40%	5%	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
40-60%	4%	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	1%	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.

Table 17. 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.

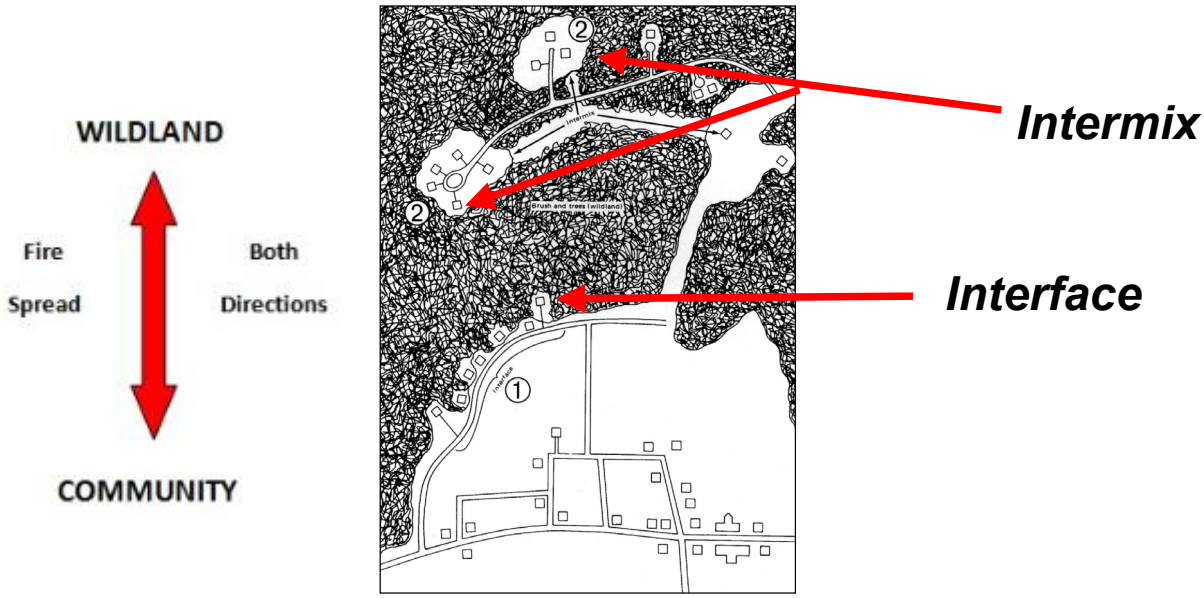


Figure 6. Illustration of intermix and interface situations.

Within the WUI, fire can 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.

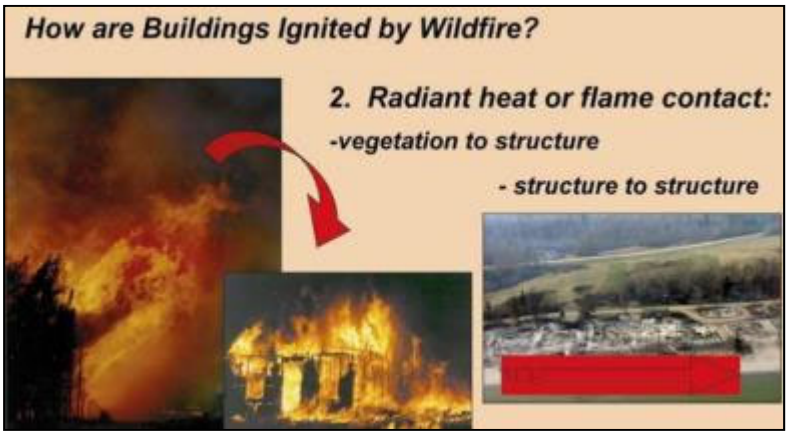


Figure 8. Radiant heat and flame contact allow fire to spread from vegetation to structure or from structure to structure.

Current research confirms that most 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^{+} /m^{2}. 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 18 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 18. Summary of WUI Threat Assessment Worksheets.

WUI Plot #	Geographic Location	Wildfire Behaviour Threat Class	WUI Threat Class*
Arbu1	Arbutus Provincial Park	Moderate	n/a
Foot1	Foothills park land at the north end of Old Logging Road	Moderate	n/a
Foot2	Foothills park land	Moderate	n/a
Hill1	South side of housing along Hillview Road	Moderate	n/a
Mary1	May Richards Bennet Pioneer Park	Moderate	n/a
Sax1	Saxer Park	Moderate	n/a
Sub1	Lantzville Substation (Manhatten Road)	Moderate	n/a
W0012-1	Southwest corner of Woodlot 0012	Moderate	n/a
W0012-2	North section of Woodlot 0012	Moderate	n/a
W0020-1	Recent cutblock, northeast section of Woodlot 0020 (spur rd SEC 4)	Moderate	n/a
W1475-1	North edge of Woodlot 1475. South side of Sywash Ridge Rd residences	Moderate	n/a
W1475-2	Northeast corner of Woodlot 1475	Moderate	n/a
W1475-3	Southeast corner of W1475. East of new Foothills development residence.	Moderate	n/a
W1475-4	Northwest corner of W1475.	Moderate	n/a
Ward1	Southwest of intersection of Ware Rd and Highway 19	Moderate	n/a
Ward2	Northwest of intersection of Ware Rd and Highway 19	Moderate	n/a

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

APPENDIX G – FUEL TYPING METHODOLOGY AND LIMITATIONS

The initial starting point for fuel typing for the AOI was the 2018 provincial fuel typing layer provided by BCWS as part of the *2018 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.[67]

[67] 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 16 WUI threat plots on a variety of fuel types, aspects, and slopes and an additional 200+ 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 19 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 19. 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	
Slope	Yes	Elevation model was used to determine slope.
Terrain	No	
Landscape/ topographic limitations to wildfire spread	No	
STRUCTURAL SUBCOMPONENT		
Position of structure/ community on slope	No	
Type of development	No	
Position of assessment area relative to values	Yes	Distance to structure is used in analysis; position on slope relative 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.

APPENDIX I – SUMMARY OF 2010 RECOMMENDATIONS

The following recommendations for wildfire risk reduction were made in the 2010 CWPP completed for Nanaimo, Lantzville, and Nanoose. These recommendations were attached to the WGG questionnaires sent out. The response from Lantzville Fire Rescue and local government representatives was no knowledge of any of the recommendations being actioned or implemented during their time as District employees.

RECOMMENDATIONS – ACTION PLAN[68]

Education and Community Involvement

- Support efforts by the local fire departments to educate homeowners and the public about interface issues through effective public awareness programs.
- Continue to promote interface awareness on the District of Lantzville website.
- Adopt the FireSmart (Partners in Protection, 2003) standard for community protection, both for public and private property.
- Cooperate with the Ministry of Forests and Range and Regional District of Nanaimo to create a condensed version (i.e., informative pamphlet) of the FireSmart Manual.
- Cooperate with the RCMP to establish a community policing office at Lantzville. A community policing presence could deter deliberately caused fires.
- Continue to promote FireSmart guidelines for interface safety at schools, community events and venues: (i.e. Fire Department talks at schools during Fire Prevention Week; Lantzville's Community Garage Sale and Mine Days; Nanoose Bay's Enos Lectures; Nanoose First Nations campsite).
- Continue to ensure local campgrounds, resorts, and summer camps are familiarised with pertinent sections of BC's Wildfire Act (SBC 2004) – including forest fire protection and campfire restrictions.
- Ensure any regulatory action taken to educate residents about interface actions is done in consultation with the Ministry of Forests and Range Protection Branch.
- Cooperate with the Ministry of Forests and Range to ensure standardised implementation of Coastal fire bans throughout the Region.

Vegetation Management

- Fuel Modified Zones –
    - Conduct neighbourhood "tailgate" sessions to encourage home and property owners to establish and maintain Fuel Modification Zones around residences and other structures, especially in High and Extreme hazard areas.
- UBCM Fuel Management Programs –
    - Make application to UBCM for funding to conduct operational fuel treatment at public lands interfacing development. Prioritise fuel management projects based on values-at-risk. Fuel reduction is recommended at the following public lands:
    - Copley Park, Lantzville (reduce/remove surface/ladder fuels in forested portion of park abutting homes)

[68] Strathcona Forestry Consulting. 2010. Lantzville, Nanoose Bay, and Nanoose First Nation Community Wildfire Protection Plan.

  - Sebastion Park, Lantzville (light understorey thin; reduce/remove surface/ladder fuels in this small, forested park abutting residences on Sebastion/Lantzville Road. Fuel treatment at this park would profile fuel management to the community, and might serve to reduce the beach fires and parties at Sebastion Road beach access.
  - Beachcomber Park, Nanoose Bay (light understorey thin; reduce/remove surface fuel in this ocean-side park flanking residences. Fuel treatment at this park might serve to reduce illegal fires in the area.
  - Woodlot 1314, Lantzville (reduce fuels in a 10-m buffer along trails and contiguous boundaries to improve sightlines and discourage human-caused fires in the woodlot). Residential acreages border the eastern portion of this woodlot.
- Fuel Management on "Vacant" Lands –
  - Pursue opportunities with owners of vacant, undeveloped lands bordering development to reduce fuel loading along boundaries abutting existing development:
    - Foothills
    - brush/grass parcels north of Woodgrove Mall, on the border of Lantzville and Nanaimo
- Slash Abatement –
  - Cooperate with local governments to ensure private land owners abate hazardous fuels in a safe and environmentally friendly manner.
- Roadside Fuels –
  - Continue to cooperate with BC Hydro to ensure regularly scheduled vegetation maintenance work along road rights-of-way.
- Fire-resistive Landscaping –
  - Encourage residents to landscape with fire-resistive vegetation.
- Fuel Disposal –
  - Encourage homeowners to compost deciduous litter and grass clippings.
  - Investigate with the Regional District of Nanaimo a community-wide program of managing yard wastes by collecting or composting, or converting such wastes into renewable energy.

Building Construction and Design

- Require all new construction/retrofits to follow RDN building permit process.
- Use fire-retardant roof covering assembly rated Class A, B, or C (i.e., metal, tile, ULC- rated asphalt).
- Use non-combustible siding material (i.e., stucco, metal siding, brick, cement shingles or cementitious materials, poured concrete, or ULC-rated wood siding).
- Investigate the feasibility of mandating spark arrestors on chimneys/stovepipes on new construction.
- Follow FireSmart guidelines for design, construction and maintenance of chimneys, window and door glazing, eaves and vents, and decking. http://www.partnersinprotection.ab.ca

Infrastructure

- Strategic Planning –
  - Cooperate with RDN on bylaw enforcement issues (i.e., "No Fires" at local parks).
  - For areas that are designated for future development in the OCP (that is, not already zoned for development), ensure that the secondary plans or bylaw amendment applications contain development permit areas for interface fire risk mitigation.

Request to the local government that development permit areas be applied to existing developed/subdivided areas in high or extreme interface hazard areas.
    - Liaise with Ministry of National Defense to improve emergency access at strategic areas of CFEMTR Nanoose Bay by rehabilitating old access roads and creating a 4WD access trail along the property's fenceline.
    - Consider creation of RDN staff position to act as liaison with regional fire departments.
    - Work with local government in rezoning applications of undeveloped lands within the District to ensure adequate servicing requirements for fire protection are met.
    - Encourage local government to issue FireSmart pamphlets to development applicants.
- Parks and Wildlands –
    - Encourage residents to institute informal "Forest Watch" neighbourhood patrols during fire season. Continue to encourage "Eyes on the Foothills".
    - Incorporate well-marked, mapped trails, roaded emergency access to Enos Lake, and signage with emergency contact numbers at strategic trail accesses at the Fairwinds development at Nanoose Bay.
- Access –
    - Strive to ensure property accesses (i.e., width, length, turning radii) are integrated as part of the RDN Building Inspection Services mandate, along with properly installed and visible address signs.
    - Liaise with local governments and the Ministry of Transportation and Highways on improving emergency access by completing/looping existing one-way road systems at areas identified by the local fire departments as having slower or possibly hazard delayed response times (i.e., Clark Road East and Clark Road West at Lantzville; Lisa Lane – between Lantzville and Nanoose Bay; Rivers Edge subdivision, Nanoose Bay).
    - Request Ministry of Transportation and Highways cuts brush on southeast side of Ware Rd/Highway 19 intersection, to make it better for west-bound vehicles to see LFR vehicles at the intersection.
    - Continue to refer any development applications for review to the local fire departments to ensure that access requirements and building features of any proposed development are sufficient to allow fire trucks and other emergency vehicles access to the properties and structures.
    - Contact rail/road transportation carriers to ensure local fire departments are notified of the types and amounts of hazardous materials regularly transported through the subject area. Ensure the carriers supply local fire departments with appropriate Material Safety Data Sheets.
    - Ensure up-to-date cadastral mapping for Nanoose First Nation is made available to Lantzville Fire Rescue for pre-org. mapping purposes.
    - Incorporate hydrant pressure data into pre-org (fire preparedness) mapping.

Fire Protection

- Fireflow –
    - Pursue the feasibility of installing additional hydrant at the Nanoose Bay Trailer Park to improve fire suppression capabilities.
- Compliance –
    - Cooperate with Indian and Northern Affairs Canada to ensure that hydrants at Nanoose First Nation are regularly maintained to comply with FUS standards.
- Firefighters –

    - Strive to increase the stability of local volunteer fire departments by providing more innovative benefits to firefighters (i.e., paid training, benefits, support, local tax deductions).
    - Pre-fire Planning –
    - Develop and document pre-fire plans (operating guidelines) for specific fire/emergency sites (rail/highway corridors/military base)
- Firefighting at the Grassroots Level –
    - Encourage homeowners bordering areas of extensive forest to equip their homes with personnel fire fighting equipment, including: rooftop access ladder, pump (non-electric power source), shovel, rake, large water barrel, and 10-L pail. Regular practices are recommended to ensure familiarity with the use of fire fighting equipment.
    - During extreme fire weather, encourage residents to use sprinkler systems powered by gas pumps drawing from cisterns to “wet down” PZ 1 zone around structures.