Community Wildfire Resiliency Plan

Mowachaht / Muchalaht First Nation

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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

The Community Wildfire Resiliency Plan (CWRP) process (evolving from the Community Wildfire Protection Plan - CWPP) was created in British Columbia (BC) as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Community Resiliency Investment (CRI) Program, managed by the Union of BC Municipalities, CWRPs aim to develop strategic recommendations based on the seven FireSmart principles (Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Emergency Planning, and Vegetation Management) to assist communities in improving safety and reducing the risk of damage to property and critical infrastructure from wildfires.

This CWRP provides Mowachaht / Muchalaht First Nation (MMFN) with an action plan that can be used to guide the improvement and/or development of emergency plans, emergency response, evacuation plans, communication and education programs, bylaw development in areas of fire risk, and the management of potentially hazardous forest lands for the wildland-urban interface (WUI). The CWRP focuses on MMFN reserve land that is within the wildland-urban interface which is comprised of three separate geographic areas: Tsa Xana, Yuquot and Ahaminquus. Emphasis was primarily put towards the inhabited community of Tsa Xana. Tsa Xana is an interface community where homes and structures are situated adjacent to the forest.

The key to increasing MMFN's community wildfire resiliency is to a) reduce structure ignitability, and b) reduce ignition potential. Thus, FireSmart activities on and surrounding homes and critical infrastructure (with a focus on a values-out approach, *i.e.,* starting with activities on the structure itself and then the surrounding area immediately adjacent and continuing outwards) are the foremost recommendations of this plan. Mitigation should be centered on construction and landscaping regulation through local policies, FireSmart vegetation management around structures, and resident education. Community outreach on the range of available activities and the prioritization of activities should help residents feel empowered to complete simple risk reduction activities on their properties.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. A total of 36 recommendations and action items are presented in a tabularized format (Table *1*) in this Executive Summary and are more thoroughly discussed in their appropriate sections within the plan. Recommendations and action items within this plan should be considered a toolbox of options to help reduce the wildfire threat to neighbourhoods within the plan's wildland-urban interface. MMFN will have to further prioritize implementation based on resources, strengths, constraints, and availability of funding, and regularly update the prioritization and course of action as variables change through time.

Table 1: MMFN Community Wildfire Resiliency Plan Action Plan

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
Education (Section 5.2)							
Residents							
1	High	Deploy a multi-media FireSmart communication strategy that utilizes various communication channels (e.g., MMFN website, social media channels, print materials, etc.) to educate community members on wildfire hazard and to promote the uptake of FireSmart activities.	A suite of FireSmart BC education resources, including promotional items, posters and graphics, videos, guides and manuals and a FireSmart social media handbook are available through the FireSmart online Resource Library. This CWRP, associated maps and the MMFN FireSmart Educational Video should also be made publicly available.	MMFN *(CFRC/FireSmart Coordinator)*	1 year then ongoing	CWRP, FireSmart Educational Video and FireSmart BC materials are available for viewing on the MMFN web page and social media platforms	UBCM CRI FCFS (up to cost maximums)
2	High	Fire danger information and advisories should be updated as needed on relevant communication channels (e.g., verbally, MMFN website and social media platforms).	Communicating current fire danger ratings and regulations ensure appropriate vigilance during higher fire ratings.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Up-to-date fire danger ratings and protocols are delivered to community members during wildfire season	Local government funding
3.a	High	Continue holding in-person wildfire/emergency community events. Augment education and outreach programs through organizing FireSmart workshops (e.g., Neighbourhood Champion workshop, FireSmart 101 seminar etc.).	Seminars and workshops provide targeted and detailed information on a variety of topics to educate community members to increase their wildfire resiliency.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	At least two wildfire community events annually; number of attendees	UBCM CRI FCFS (up to $5,350 per event)

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
3.b	High	Continue distributing FireSmart promotional materials at community safety events.	FireSmart BC resources help present a unified message. A suite of FireSmart promotional items and resources, such as giveaway promotional items and reusable print materials/manuals are available for download or purchase.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Quantity of resources distributed/number of times used at events	UBCM CRI FCFS (up to cost maximums)
4	High	Undertake steps to support Tsa Xana to become a recognized FireSmart Neighbourhood under the FireSmart BC recognition criteria.	FireSmart is most effective when neighbours collaboratively implement FireSmart activities. The FireSmart Canada Neighbourhood Recognition Program motivates individuals and groups to take action through community hype.	MMFN *(CFRC/FireSmart Coordinator)*	1 - 2 years	Tsa Xana achieves FireSmart recognition	UBCM CRI FCFS (up to $430 per assessment and $1,070 per plan)
5	Moderate	Seek opportunities to remove barriers to FireSmart uptake for residents with mobility issues through community support and engagement.	MMFN staff identified mobility issues as a concern for emergency planning. The CFRC should explore this during planning tables.	MMFN *(CFRC/FireSmart Coordinator)*	1 year then ongoing	FireSmart opportunities support residents with mobility issues	UBCM CRI FCFS funding available for CFRC meetings and coordination (up to $2,140 per meeting)
6	Moderate	Look for opportunities to educate residents on the importance of visible and reflective addresses for emergency service.	MMFM staff expressed concern over illegible addresses. Visible addresses are important to a safe and effective evacuation and emergency service.	MMFN *(CFRC/FireSmart Coordinator)*	1 year	All addresses are visible in all levels of light	UBCM CRI FCFS funding available for FireSmart education (up to cost maximums)
Visitors							
7	Moderate	Wildfire danger information and advisories should be communicated to tourists at the RV/Campground office and tourists visiting Yuquot.	Yuquot and Ahaminquus receive an influx of tourists coinciding with peak wildfire danger time periods. Education can be communicated to tourists through multiple communication avenues (e.g., verbally, on the tourism page of the MMFN/Yuquot webpage, at the Tourism Office once complete etc.).	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Fire danger ratings and protocols are delivered to tourists during wildfire season	UBCM CRI FCFS funding available for FireSmart education (up to cost maximums)
Legislation and Planning (Section 5.3)							
8	High	Digitally publish all analog legislation and policies on the MMFN website so that they are accessible for viewing and downloading by community members.	Though MMFN does not have any policies specific to wildfire, policies may be indirectly relevant to community resiliency.	MMFN	1 year	All analog legislation and policies are	Local government funding (approximately 40 - 60 hours)

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
						digitally available	
9	Moderate	Consider developing a FireSmart policy or regulation that mandates or guides design and construction of critical infrastructure and community assets.	Incorporate FireSmart development standards in MMFN community infrastructure to increase structural resiliency to fire.	MMFN	2-3 years	Adoption of a new policy that guides MMFN FireSmart construction	UBCM CRI FCFS funding available for FireSmart policies (up to $10,700)
10	Moderate	Consider developing standards and supporting guidelines to provide direction on residential FireSmart construction and landscaping in Tsa Xana.	This is to reduce wildfire risk of residential properties through the provision of hazardous yard conditions. Consider standardizing safe procedures for the storage of firewood and combustibles in regards to fire/wildfire hazard.	MMFN	2-3 years	Adoption of a new policy that includes property maintenance mandates	UBCM CRI FCFS funding available for FireSmart policies (up to $10,700)
Development Considerations (Section 5.4)							
11.a	High	A trained LFR (Recommendation 24) should assess wildfire risks to community assets (i.e., FireSmart Critical Infrastructure Assessment, FireSmart Home Ignition Assessment, FireSmart Home Partners Assessment). Alternatively, MMFN should engage with the SRD FireSmart Coordinator to delivery FireSmart assessments of community assets.	Assess the vulnerability to wildfire of community assets described in Table 4 to help guide risk reduction action items.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	1 year	All MMFN community assets assessed	ISC CFMP, ISC FNESS FireSmart Program, ISC FNIF and UBCM CRI FCFS
11.a	High	Plan and implement wildfire risk action items from completed Critical Infrastructure FireSmart Hazard Assessments in the sequence of infrastructure importance.	FireSmart Critical Infrastructure Assessments were completed for MMFN critical infrastructure in 2021. Plan and implement action items in the sequence of critical infrastructure importance and as feasible.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	2 - 5 years	Action items are prioritized and actioned upon as feasible	ISC CFMP, ISC FNESS FireSmart Program and UBCM CRI FCFS
12	High	Use fire-resistant construction materials, building design and landscaping for new community infrastructure such as the campground and Tourism Office.	Integrate FireSmart solutions into the design of the new tourism site through FireSmart compliant construction and landscaping. The FireSmart Home Development Guide may be used to guide design choices.	MMFN (LFR/FireSmart Coordinator	1-3 years	FireSmart principles incorporated into tourism expansion projects	ISC CFMP, ISC FNESS FireSmart Program and UBCM CRI FCFS

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
13	High	A trained LFR (See Recommendation 24) should assess the wildfire hazard of residential structures and surrounding vegetation and landscaping.	FireSmart Home Ignition Zone assessments encourage action in residential priority zones. Encourage uptake through education or through incentives like a FireSmart rebate program, combustible removal service or FireSmart Canada Neighbourhood Recognition Program.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	1 year	All residential structures assessed	ISC FNESS FireSmart Program and UBCM CRI FCFS
14	High	Invest in back-up generators for any critical infrastructure that does not have one.	Currently only the pumphouse has a back-up generator. Back-up generators for community buildings would facilitate emergency response and recovery (emergency social services) following a fire.	MMFN	3 years	All buildings have a back-up generator and fuel supply	ISC FNESS Wildland Fire Equipment Purchasing Program, ISC EMAP Non-Structural Mitigation and Preparedness Program and FNIF
15	Moderate	Enhance fire protection capacity in Yuquot by acquiring basic wildfire-related equipment. Consider establishing a cache (or equipment trailer) with trash pumps, portable hoses and FireSmart equipment (e.g., PPE, coveralls, water packs) near Summercamp activities. Cabins should also be equipped with basic wildfire suppression and emergency supplies (e.g., fire extinguisher, radios, first aid kits).	Fire response is challenged for Yuquot due to its remote nature. Equipping the reserve land with basic fire suppression tools and safety equipment will increase fire protection capacity and improve safety for community members and visitors.	MMFN	1 - 2 years	Fire cache on Yuquot. Cabins equipped with basic emergency and suppression supplies.	ISC FNESS Wildland Fire Equipment Purchasing Program; ISC EMAP Non-Structural Mitigation and Preparedness Program; and UBCM CRI
16	Moderate	Make a FireSmart rebate program available for residents who complete FireSmart construction as recommended in a FireSmart Home Ignition Zone Assessment. Focus on assisting with low-cost ways to FireSmart outbuildings and enclose decks/porches.	FireSmart rebate programs are an incentive to complete FireSmart work and/or participate in a Neighbourhood Recognition Program.	MMFN *(LFR/FireSmart Coordinator)*	1 year	5-10 properties participate annually	UBCM CRI FCFS (Up to $1000 rebate per property and 50% of costs)
17	Moderate	Review access and egress routes and dead-end roads for evacuation, first response accessibility, safety and staging of anchor points. Widen and/or upgrade routes in a priority sequence.	Access and egress designs should promote ease of navigation, vegetation clearance from roads and should consider evacuation safety.	MMFN *(Private Consultant)*	2 - 5 years	Road network assessed for fire	ISC EMAP Non-Structural Mitigation and Preparedness Program, UBCM CEPF and UBCM CRI UBCM
Interagency Cooperation (Section 5.5)							

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
19	High	Lobby Western Forest Products to reduce the wildfire hazard of adjacent cutblocks and from road right-of-way clearings.	Hazardous cutblocks were identified as a major contributor to rapid fire spread in the area by local BCWS staff. WFP commits to mitigate safety risks associated with operations and to work collaboratively with local First Nation communities.	MMFN *(WFP)*	1 year	WFP mitigates hazardous conditions of cutblock near Tsa Xana	Local staff time (approximately 10 hours)
20.a	High	Continue hosting regular Emergency Operations Centre (EOC) team (CFRC) meetings, incorporating FireSmart and wildfire management topics for wildfire risk reduction planning.	Address local wildfire-related issues and recommendations to develop collaborative solutions to mitigate wildfire risks.	EOC team (CFRC)	Ongoing	2 - 6 meetings annually that focus of wildfire risk reduction	UBCM CRI FCFS (up to $2,140 per meeting and coordination) and FNESS EOC Training and Mentoring
20.b	High	Engage recommended stakeholders in wildfire-focused EOC team (CFRC) meetings to foster collaboration of wildfire resilience actions through a multi-agency approach.	Multi-agency coordinated action can effectively reduce MMFN's wildfire risk profile. Key planners and responders should be involved in local FireSmart, wildfire resiliency planning and wildfire and emergency response.	EOC team (CFRC) *(local stakeholders*	1 year then ongoing	Key stakeholders are invited to all relevant meetings	UBCM CRI FCFS (up to $2,140 per meeting and coordination) and FNESS EOC Training and Mentoring
21	Moderate	Facilitate and participate in emergency training exercises with key emergency stakeholders. Exercises may be walkthroughs, workshops, table top exercises or full-scale exercises.	Emergency response efficiencies are maximized by having an understanding of neighbouring jurisdictions' responses. Tabletop exercises help identify weaknesses.	EOC team	Annually/On going	Participation in exercises. Emergency Plan updates as necessary	UBCM CRI FCFS (up to $2,140 per fire planning table) and FNESS Tabletop Exercise Design and Delivery
22	Moderate	Work with GRVFD to explore strategies to increase MMFN fire personnel enrollment.	Consider utilizing the FNESS Wildland Fire Fighting Training program to appropriately train interested MMFN community members (See Recommendation 28).	MMFN *(GRVFD)*	1 year then ongoing	Increased MMFN GRVFD uptake (1+ MMFN fire personnel)	ISC FNESS Wildland Fire Fighting Training Program
23	Moderate	Continue to work with the SRD to share resources to integrate FireSmart initiatives and increase FireSmart program/funding opportunities.	Strong interagency relationships with neighbouring jurisdictions like the SRD will increase MMFN's ability to prepare for a wildfire.	MMFN *(SRD)*	Ongoing	MMFN/SRD FireSmart programing collaboration	UBCM CRI FCFS funding available for interagency staffing costs
Cross-Training (Section 5.6)							

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
24	High	The Health & Safety Emergency Preparedness Officer should complete training to facilitate MMFN's FireSmart Program. Alternatively, pursue funding to employ/contract a FireSmart Coordinator or Local FireSmart Coordinator to deliver FireSmart education and assessments.	Applicants of the CRI FCFS program will be required to have a local FireSmart position as of 2024. Responsibilities undertaken in this role should support wildfire preparedness, prevention and mitigation.	MMFN *(Health & Safety Emergency Preparedness Officer)*	1 year	A FireSmart Coordinator position is created and filled, or new responsibilities are added to an existing position	UBCM CRI FCFS funding available for compensation and training
25	High	The Health and Safety Emergency Preparedness Officer should maintain and augment Incident Command System (ICS) training.	The Health and Safety Emergency Preparedness Officer is currently trained in ICS-100. ISC courses are available online to provide emergency staff with the knowledge and tools to effectively manage emergency events.	MMFN *(Health & Safety Emergency Preparedness Officer)*	Ongoing	The Health and Safety Emergency Preparedness Officer receives and maintains some level of ICS training	UBCM CRI FCFS and ISC EMAP funding available for staff time and course cost
26	High	MMFN landscaping/turf staff should undertake FireSmart wildfire reduction courses (e.g., Wildfire Risk Reduction training, Local FireSmart Representative training, FireSmart 101 etc.) to expand FireSmart landscaping strategies.	Landscaping/turf staff employ FireSmart principles throughout landscaping strategies. The program can be enhanced through pursuing relevant learning opportunities.	MMFN	1 year	Landscaping/turf staff participate in WRR, LFR and FireSmart 101 free courses	No associated course costs. UBCM CRI FCFS funding available for staff time
27	Moderate	The Health and Safety Emergency Preparedness Officer and other relevant staff should attend the Wildfire Resiliency and Training Summit on an annual basis.	Relevant learnings should be shared at CFRC meetings.	Health & Safety Emergency Preparedness Officer (relevant MMFN staff)	Annually	Annual attendance at Wildfire Resiliency and Training Summits (1-2 staff)	ISC FNESS FireSmart Program and UBCM CRI FCFS

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
28	Moderate	Enhance MMFN's fire protection capacity and awareness through pursuing the FNESS Wildland Fire Fighter Program for interested community members. Once trained, consider internally hiring personnel as FireSmart Crew members and/or contracting out crew to BCWS as an economic opportunity.	Increase local wildfire resources and expand economic opportunities through inter-agency cooperation.	MMFN *(GRVFD)*	1 - 2 years	Increased wildfire-trained MMFN community members	ISC FNESS Wildland Fire Fighting Training program
Emergency Planning (Section 5.7)							
29.a	High	Work on completing the MMFN Emergency Preparedness Plan. Wildfire preparation, response and recovery should be considered during action planning.	Emergency plans increase resiliency by providing the framework for emergency response and recovery. The development of the Emergency Preparedness Plan is in progress (April 2023).	EOC team (CFRC)	1 year	Emergency plan is completed and shared with local emergency management partners	FNESS Preparedness and Response Program, UBCM CEP and ISC EMAP Non-Structural Mitigation and Preparedness Program
29.b	High	Once complete, participate in regular testing of, and updates to, the Emergency Preparedness Plan. Include annual wildfire emergency simulation exercises. Identify hazards, barriers to access and other response issues and develop measures to address them.	Exercises could be walkthroughs, workshops, table top exercises, functional exercises or full-scale exercises.	EOC team (CFRC) *(relevant stakeholders)*	Annual	Exercises are conducted annually and plan amendments are made as necessary	FNESS Preparedness and Response Program, UBCM CEPF and ISC EMAP Non-Structural Mitigation and Preparedness Program
30	High	Digitize all analog emergency planning documents so that they are readily accessible during a potential emergency.	Electronic emergency planning documents will ease retrieval and access in the event of an emergency	MMFN *(Health & Safety Emergency Preparedness Officer)*	1 year	All planning documents are digitized and readily available to emergency staff	FNESS Preparedness and Response Program
31	High	Develop a Hazard, Risk and Vulnerability Analysis (HRVA) to build a risk profile of MMFN reserve lands that will inform decision making of community infrastructure.	An HRVA will support the development of the Emergency Preparedness Plan through assessing risks posed to MMFN.	EOC team (CFRC) *(Private Consultant)*	2 years	The development of an HRVA that supports	FNESS Preparedness and Response Program, CIRNAC Climate Change

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
						hazard mitigation and adaptation planning	Preparedness in the North and First Nation Adapt programs
32	Moderate	Create a community evacuation pre-plan that notes and maps muster points, key contacts, access/egress routes, first responder contact information, water sources, etc. Share plans with local first responders (fire departments) and with community members.	Pre-plans can help coordinate rapid response to a wildfire event. Developing local daily action guidelines based on expected wildfire conditions may support emergency pre-planning. MMFN staff identified inaccurate/outdated maps as a constraint to emergency response.	EOC team (CFRC) *(Private Consultant)*	5 years	A plan is developed and distributed to residents (online and in print)	UBCM CEPF, CIRNAC Climate Change Preparedness in the North and First Nation Adapt programs and ISC EMAP Non-Structural Mitigation and Preparedness Program
Vegetation Management (Section 5.8)							
Residential-Scale FireSmart Landscaping (Section 5.8.1)							
33.a	High	Continue FireSmart landscaping throughout Tsa Xana's FireSmart Home Ignition Zone (FireSmart Priority Zone 3/Extended Zone).	The landscaping program successfully reduces wildfire behaviour threat ratings through pruning, thinning and surface fuel removal activities.	MMFN	Ongoing	All forest land within Priority Zone 3 is treated.	ISC FNESS FireSmart Program (up to $50,000)
33.b	High	Purchase a wood chipper to support FireSmart landscaping by improving the ease of off-site debris disposal.	Wood trimmings and debris are currently manually hauled and burned off-site.	MMFN	2 years	A wood chipper is acquired	ISC FNESS FireSmart Program (up to $50,000)
34	High	Utilize FireSmart funding to remove combustible waste and hazardous materials from Home Ignition Zones (minimum 10 m from the primary residence). The removal of combustibles within the non-combustible zone should be prioritized, following the 'closest-first' principle.	FireSmart funding may be used to rent or purchase a disposable bin, as well as hire staff to facilitate yard waste removal as desired by homeowners. Home Ignition Zone Assessments must be completed prior to clean-up (Recommendation 13) as per funding requirements.	MMFN	1 - 2 years	Combustible waste removed from yards. Firewood and other combustibles stored safely.	ISC FNESS FireSmart Program (up to $50,000)

Item #	Priority	Recommendation / Next Steps	Comments	Lead (involved)	Timeframe	Metric for Success	Funding Source (Est. Cost ($) or Person Hours)
35	Moderate	As tourism offerings expand in Ahaminquus, scotch broom should be maintained, particularly along roadsides where ignition potential is higher.	Scotch broom is highly flammable due to its high oil content and continuity of deadwood on mature plants. Scotch broom is present throughout the Ahaminquus reserve land, with highest concentrations along the Gold River Highway.	MMFN	1 - 3 years then ongoing	Scotch broom is treated	ISC FNESS FireSmart Program (up to $50,000)
Fuel Management Treatments (Section 5.8.2)							
36	High	Develop and implement a fuel management prescription for the fuel management area identified in this plan.	This area has been proposed due to hazard, strategic location, and operability. The proposed treatment unit is within MMFN control and will increase community safety, as well as demonstrate FireSmart proactivity.	MMFN LFR	1-3 years	Implementation of fuel management in identified areas	ISC FNESS On-Reserve Fuel Treatment Program (up to $75,000) and UBCM CRI FCFS (up to $425/ha for a ~20 ha prescription)

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FREQUENTLY USED ACRONYMS

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CFFDRS	Canadian Forest Fire Danger Rating System
CFMP	Capital Facilities and Maintenance Program
CFRC	Community FireSmart Resiliency Committee
CI	Critical Infrastructure
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CMHC	Canadian Mortgage and Housing Corporation
CRI	Community Resiliency Investment
CWRP	Community Wildfire Resiliency Plan
CWPP	Community Wildfire Protection Plan
DPA	Development Permit Area
EMAP	Emergency Management Assistance Program
EOC	Emergency Operations Centre
FBP	Fire Behavior Prediction System
FCFS	FireSmart Community Funding and Supports*: Stream 1 of the UBCM CRI Program*
FNESS	First Nations Emergency Services Society
GRVFD	Gold River Volunteer Fire Department
HIZ	Home Ignition Zone
ICS	Incident Command System
INAC	Indigenous and Northern Affairs Canada
ISC	Indigenous Services Canada
LFR	Local FireSmart Representative
MMFN	Mowachaht /Muchalaht First Nation
NDT	Natural Disturbance Type
OFTP	Operational Fuel Treatment Program
PSTA	Provincial Strategic Threat Assessment
PTU	Proposed Treatment Unit
TFL	Timber Forest License
UBCM	Union of British Columbia Municipalities
VAR	Values at Risk
WUI	Wildland Urban Interface

SECTION 1: INTRODUCTION

1.1 OVERVIEW

In September 2022, B.A. Blackwell and Associates Ltd. was retained by Mowachaht / Muchalaht First Nation (MMFN; the Nation) to develop their first Community Wildfire Resiliency Plan (CWRP). A CWRP is both a localized risk assessment and an action plan to improve wildfire resiliency in a community. The CWRP is the latest evolution in community wildfire planning in British Columbia (BC). A CWRP has its roots in the Community Wildfire Protection Plan (CWPP) framework, which was originally established in BC in response to the series of devastating wildfires in 2003. Since then, many communities in BC have continued to face an ever-increasing threat of wildfire, as the 2017, 2018 and 2021 fire seasons proved to be three of the most historically damaging seasons on record.

CWRPs are currently being developed at many jurisdictional and geographic scales, and are individually tailored to address the needs of different communities in response to their size, their capacity, and the unique threats that they face. Despite these differences, the goals of a CWRP remain the same: to improve wildfire prevention, wildfire preparedness, and wildfire response and recovery in the face of ever-increasing wildfire risk. Implementing recommendations in this CWRP will improve public safety and reduce the risk of damage to values at risk from wildfires.

1.2 PLAN GOALS

This CWRP identifies the level of interface wildfire risk in Tsa Xana, Ahaminquus, and Yuquot by providing a current and accurate understanding of the threats to human life, infrastructure, and values at risk from wildfire. This CWRP is intended to serve as a framework to guide 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.

To help guide and accomplish the above strategies, this CWRP will provide MMFN with:

1) An assessment of wildfire risk to the community,
2) An assessment of values at risk and potential consequences from wildfire,
3) Maps of fuel types and recommended areas for fuel treatments,
4) An assessment of emergency response capacity, and
5) Options and strategies to reduce wildfire risk in the seven FireSmart disciplines: education, legislation and planning, development considerations, interagency cooperation, cross-training, emergency planning, and vegetation management.

1.3 PLAN DEVELOPMENT SUMMARY

The planning for this CWRP is based on the community boundaries of MMFN that are located within the wildland-urban interface (WUI). The WUI is traditionally understood as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.[1] For the purpose of a CWRP, the WUI is defined as a one-kilometer buffer around a structure density of six or more structures per km^2. Further information on the WUI and the communities of MMFN is found in Section 3.1 - Area of Interest and Wildland-Urban Interface and Section **Error! Reference source not found.** - **Error! Reference source not found.**.

The CWRP process consists of five general phases:

1) Formation of the Community FireSmart Resiliency Committee (Section 5.5 - Interagency Cooperation)
2) Review of relevant plans and legislation regarding emergency response and wildfire (SectionSECTION 2: - Relationship to Other Plans and Legislation);
3) Community description and identification of values at risk (Section 3 -

[1] FireSmart Canada. 'What is the wildland urban interface?' https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/what-is-the-wui/

4) Community Description);
5) Assessment of the local wildfire risk (Sections 4 - Wildfire Risk Assessment);
6) Analysis and action plan for each of the seven FireSmart disciplines (Section 5 - FireSmart Principles).

CWRPs are funded in BC by the Union of BC Municipalities (UBCM) under the Community Resiliency Investment (CRI) FireSmart Community Funding and Supports Program. As per funding requirements, this CWRP is completed according to the 2022 CRI template.

SECTION 2: RELATIONSHIP TO OTHER PLANS AND LEGISLATION

This section reviews laws, policies, plans and guidelines to identify linkages and content that is relevant to wildfire emergency planning and response.

2.1 LOCAL AUTHORITY EMERGENCY PLAN

Support for First Nations' emergency planning is provided by both the federal and provincial governments. Indigenous and Northern Affairs Canada (INAC) is responsible for supporting emergency management services on-reserve through the Emergency Management Assistance Program. The INAC National On-Reserve Emergency Management Plan outlines the role and responsibilities of the federal government with regards to emergency mitigation, preparedness, response, and recovery.[2] The Province of BC has a 10-year agreement with the Government of Canada to provide additional emergency management support on reservation land.[3]

MMFN is revising an Emergency Response Plan. It is a working document and is not currently available to the public, but is expected to be completed by May 2023. When complete, the document should be reviewed annually, and revised when community hazards change, when gaps are found within policy or procedures and as governance structure change.

Table 2 below describes the draft MMFN's Emergency Preparedness Plan and its relation to the CWRP. Local emergency management, and associated recommendations, is discussed in further detail in Section **Error! Reference source not found.**.

Table 2: Emergency Management Plans and their relationship to the CWRP

Local Plans	Description and Relation to CWRP
MMFN Emergency Response Plan – *Draft* (2023)	• A framework to ensure MMFN is prepared to deal with several types of disasters, including wildfire • Outlines structural and organizational requirements for coordinated response and recovery from emergencies on MMFN reserve land, including: use of resources for several different emergency situations, British Columbia Emergency Management System (BCEMS) implementation and operational levels, Emergency Operations Centre (EOC) structure, EOC primary and alternate, EOC activation authorization and requirements, EOC activation levels, EOC notification procedures, EOC staffing requirements, and EOC communication and information management. • Discusses recovery planning in the EOC, including responsibilities for the EOC director, operations team, planning team, logistics team, and finance/administration team.

[2] Indigenous and Northern Affairs Canada. 2017. *INAC National On-reserve Emergency Management Plan*. Available at: https://www.sac-isc.gc.ca/DAM/DAM-ISC-SAC/DAM-EMPL/STAGING/texte-text/emergency_plan_1496943857348_eng.pdf

[3] Province of BC. *Emergency management legislation – emergency legislation and indigenous communities*. Available at: https://www2.gov.bc.ca/gov/content/safety/emergency-management/local-emergency-programs/indigenous-emergency-operations

Local Plans	Description and Relation to CWRP
	• Outlines evacuation planning, including evacuation orders, evacuation routes, evacuation stages, evacuation alerts/notifications, and evacuation rescinds.

2.2 LINKAGES TO CWPPS/CWRPS

Village of Gold River CWPP (2020)

The Village of Gold River received funding under the CRI Community Funding and Supports program to develop a CWPP in 2020. The Village of Gold River is a neighbouring municipality of Tsa Xana and Ahaminquus reserve lands, and the Gold River Volunteer Fire Department delivers emergency services to Tsa Xana. Below is a summary of some of the recommendations from the CWPP that are relevant to MMFN and their *status*:

- Engage with MMFN and the Tahsis Fire Rescue Department for cost sharing and purchase of a Structural Protection Unit for shared usage and.
    - *Not addressed.*
- Maintain the fuels along Gold River Road and Head Bay Road as these are important access and evacuation routes during an emergency.
    - *Not addressed.*

Collaborative initiatives between the Nation and Gold River will be highlighted in Section 5.5 - Interagency Cooperation and explored through the recommendations in this CWRP.

Strathcona Regional District Electoral Area A CWPP (2020)

Strathcona Regional District received funding under the CRI Community Funding and Supports program to develop a CWPP for Electoral Area A in 2020. Ahaminquus and Tsa Xana reserve boundaries overlap with Electoral Area A of the Strathcona Regional District (SRD), but MMFN reserve land is outside the scope of the CWPP. Since the development of the CWPP, SRD Emergency Program staff have supported MMFN with FireSmart initiatives, and intend to continue a collaborative approach to wildfire preparedness. Section 5.5 - Interagency Cooperation further discusses joint FireSmart initiatives amongst Strathcona Regional District and MMFN.

2.3 HIGHER-LEVEL PLANS AND LEGISLATION

Table 3 below lists higher-level plans and legislation relevant to wildfire planning and risk mitigation. Even though they don't apply on-reserve, provincial land and resource use plans help guide where and how activities like resource extraction and infrastructure development occurs in MMFN traditional territory, which affects both wildfire threat and consequence. One exception is the Open Burning Smoke Control Regulation (OBSCR), which like the Wildfire Act, applies everywhere in BC.

Table 3: Higher-Level Plans

Issuing Government/Agency	Plan/Legislation	Description	Relationship to CWRP
Western Forest Products (2020)	TFL 19 Management Plan	Guides TFL management with a focus on timber supply and anticipated harvest levels. Outlines forest fuel management to reduce wildfire risk.	TFL 19 surrounds Tsa Xana. Forest fuels are not mitigated to reduce wildfire risk in various cutblocks near the community.
Western Forest Products (2017-2022)	Central Island Forest Operation Forest Stewardship Plan	Provides the operational direction for timber harvesting in TFL 19, showcasing how forest values and objectives set by government will be achieved.	Focuses on 11 values from the Forest and Range Practices Act. No plans or measures for monitoring wildfire risk are included in the plan.
Province of BC (1994)	Vancouver Island Regional Landscape Unit Plan	Designates, plans for and manages protected areas and provides strategic direction for conservation, recreation, cultural and economic values for areas within Vancouver Island Landscape Units.	MMFN'S WUI overlaps the Nootka and Gold Landscape Units[4] within the Campbell River Natural Resource District. The Vancouver Island Regional Landscape Unit Plan encompasses both Landscape Units.
Province of BC	BC Provincial Open Burning Smoke Control Regulation	Governs open burning relating to land clearing, forestry operations and silviculture, wildlife habitat enhancement, and community wildfire risk reduction.	All of Tsa Xana and Ahaminquus are within a High Smoke Sensitivity Zone. Approved burning for community wildfire risk reduction has reduced setbacks / restrictions.
Government of Canada (1985)	Historic Sites and Monuments Act	Designates, protects and conserves places, persons and events that are of national historic significant and national interest.	Designates Yuquot as a National Historic Site and protects respective cultural values accordingly.

[4] Province of British Columbia. Chilliwack Landscape Unit Plans. Available from: Chilliwack Landscape Unit Plans - Province of British Columbia (gov.bc.ca)

SECTION 3: COMMUNITY DESCRIPTION

MMFN have occupied traditional territories spanning from the western shores of Nootka Island to Woss Lake on Vancouver Island since time Immemorial. Today, the Nation holds 18 federal 'Indian Reserve' (IR) parcels within Electoral Area A of the Strathcona Regional District: Yuquot 1, Tsarksis 2, Aass 3, Nesuk 4, Moutcha 5, Sucwoa 6, Hisnit 7, Hoiss 8, Coopte 9, Tsowwin 10, Tahsis 11, Ahaminquus 12, Matchlee 13, Hleepte 14, Cheesish 15, Mooyah 16, Ous 17 Tsa Xana 18. MMFN are one of 14 member First Nations of the Nuu-chah-nulth Tribal Council. The CWRP is based upon Tsa Xana 18, Ahaminquus 12 and Yuquot 1 reserve lands.

Tsa Xana 18

The primary village of Tsa Xana is home to approximately 205 full-time residents with 62 private dwellings and a handful of community service facilities, including an administration building, elder's center, child care facility, community center and the House of Unity. Tsa Xana is located five kilometers north of the remote Village of Gold River, which provides fire suppression and emergency services to the community. The nearest urban center of Campbell River is approximately one hour east of Tsa Xana and is accessed via Gold River Highway 28. The pattern of development of the village is characterized by a series of cul du sacs / blocks with small to medium-sized lots and single- and semi-detached homes. Coniferous and mixedwood stands dominate the landscape surrounding the village. Homes are often embedded within the forest with minimal setback, with the exception of Ge-ee-si-nup and Wi-hut-suh-nup blocks in the eastern portion of the village. The topography of Tsa Xana is characterized by flat terrain with moderate to steep draws sloping towards Gold River on the eastern edge of the reserve parcel. Undeveloped provincial land surrounds Tsa Xana, most of which is forested land that is managed by Western Forest Products (WFP) through Tree Farm License (TFL) 19.

Yuquot 1

Yuquot is the cultural center of MMFN, and is one of the largest and deepest archeological deposits in BC. Yuquot is located on the southeast portion of Nootka Island and is accessed via a one-hour boat trip across the Muchalaht Inlet from Ahaminquus. Yuquot was the main village for the Nation until 1967 when Mowachaht / Muchalaht people were required by the federal government to re-locate to the Ahaminquus reserve at the head of the Muchalaht Arm. Presently, there is one full-time resident in Yuquot, one part-time resident and a number of community buildings and tourist infrastructure, including six rental cabins. A large, irrigated lawn is maintained on the southwest landing, which is divided into 17 individual MMFN-owned parcels. Community members have plans for the development of permanent structures on their respective parcels. Most MMFN community members campout in Yuquot, often for weeks at a time during warm summer months, to re-connect with their ancestral village. Yuquot also receives an influx of out-of-town recreationalists and tourists during warm summer months for hiking, whale-watching, kayaking, cabin retreating and fishing. Yuquot received over 1,000 hikers during the 2022 summer season.

Ahaminquus 12

Ahaminquus is located at the south end of Highway 28 and the northern shoreline of Muchalaht Inlet. MMFN occupied Ahaminquus from 1967 to 1996. Due to health problems associated with pollution from

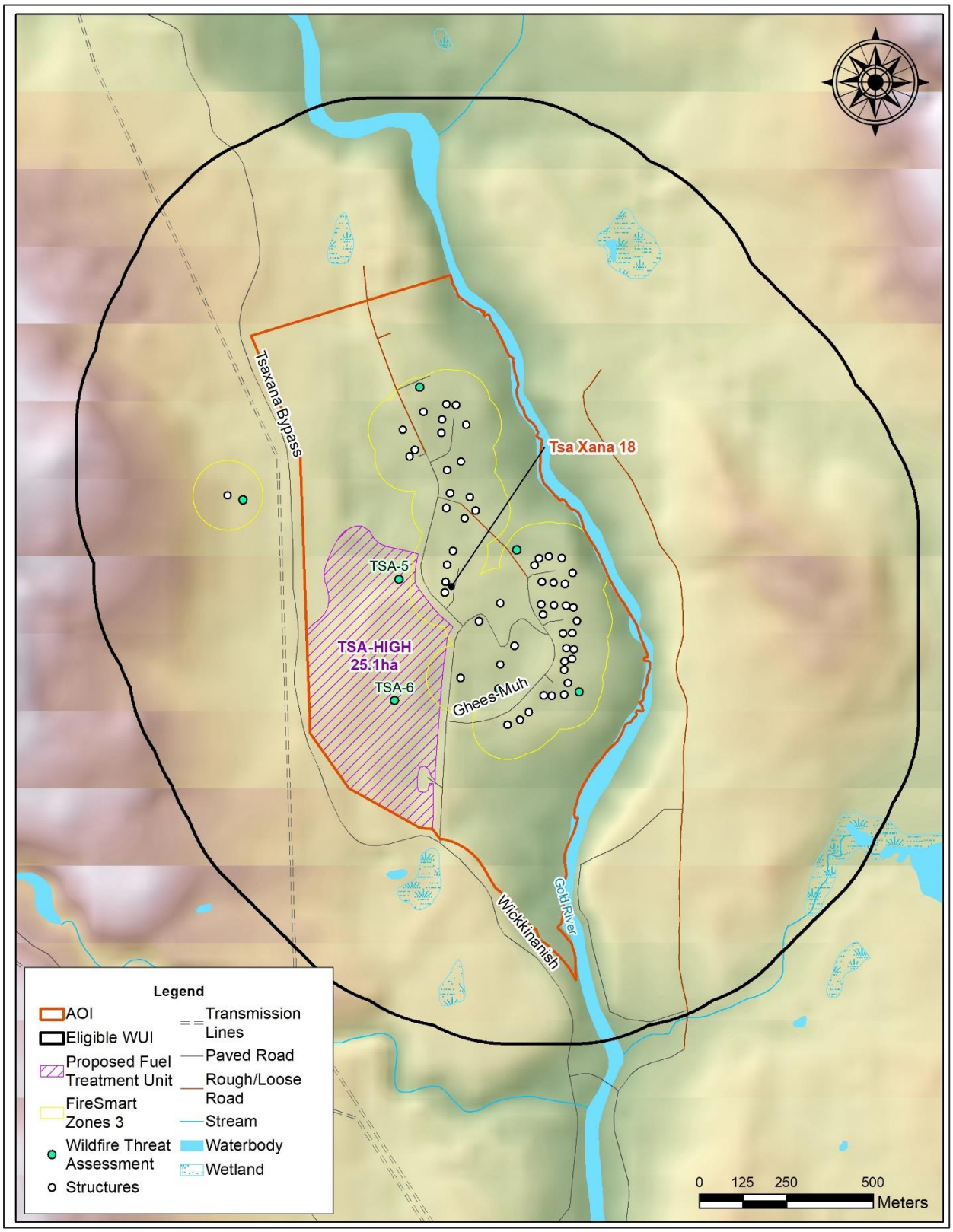
an adjacent pulp mill, the Nation relocated and developed to their present community of Tsa Xana. Now, Ahaminquus is free of structures beyond a fish cleaning shelter and a MMFN mobile office. To expand MMFN tourism offerings, the development of a campground is in progress in the reserve parcel, and there are plans to develop a tourism office. Private industrial infrastructure, including a pulp mill, log dump and commercial fishing infrastructure surround the reserve parcel in most directions.

MMFN reserve lands are within the BC Wildfire Service (BCWS) North Island / Mid Coast Fire Zone which is part of the greater Coastal Fire Centre. The closest BCWS fire base to the community is located in Campbell River. Structural fire protection to MMFN communities is provided by the Village of Gold River's Volunteer Fire Department.

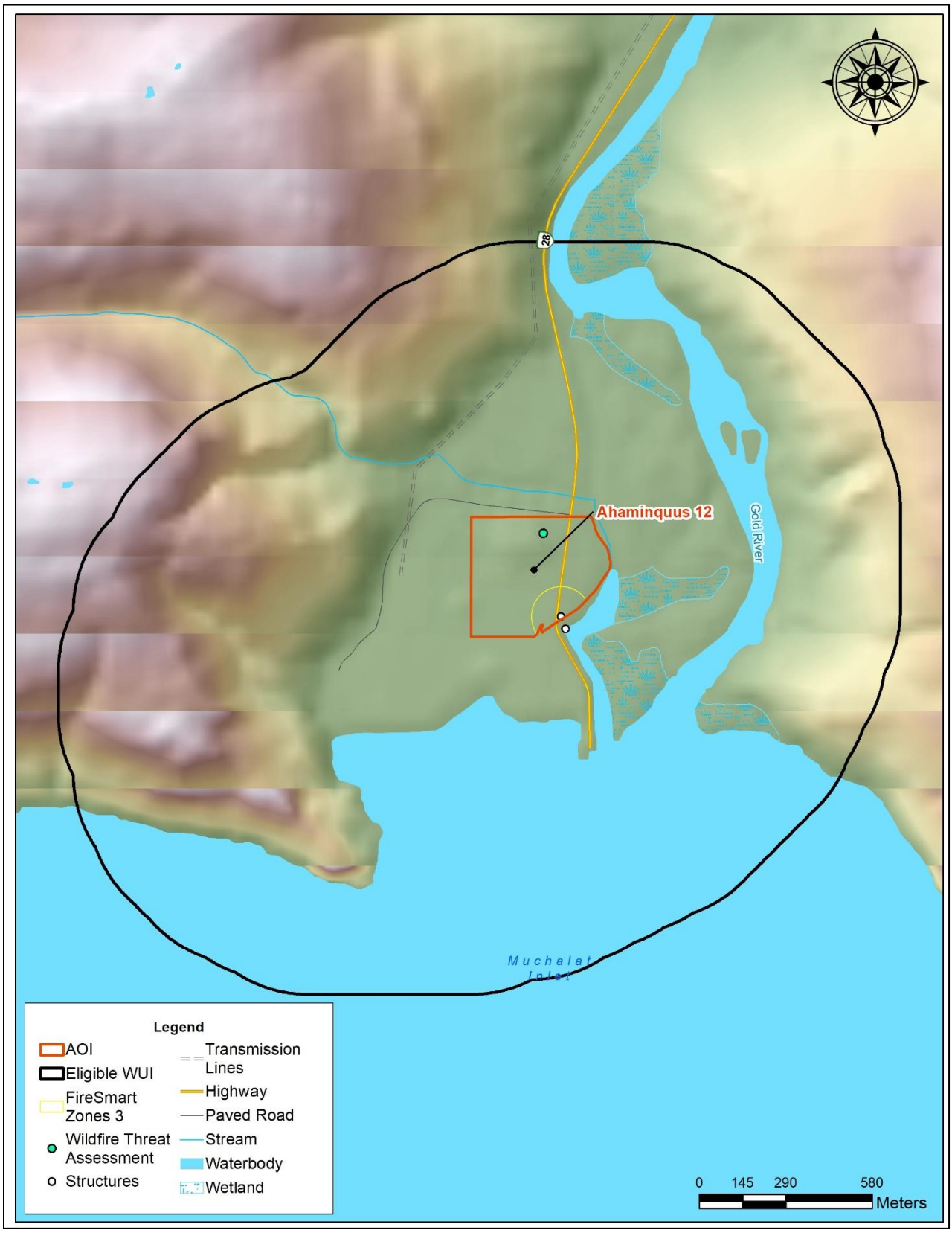
3.1 AREA OF INTEREST AND WILDLAND-URBAN INTERFACE

The Area of Interest (AOI) for the CWRP is Tsa Xana 18, Ahaminquus 12 and Yuquot 1 reserve. However, assessment work was only conducted in the 'eligible WUI' - the portion of reserve lands that overlap a one-kilometer buffer around a structure density of 6+ structures/km^2. This is the area eligible for funding under the Community Resilience Investment (CRI) FireSmart Community Funding and Supports (FCFS) program. This is referred throughout the document as the WUI. The 15 other MMFN reserve lands are excluded from the scope of the plan due to their remote locations and lack of development. Field work and GIS analyses for this CWRP cover only the MMFN reserve lands within the 'eligible WUI', a total of 205 hectares.

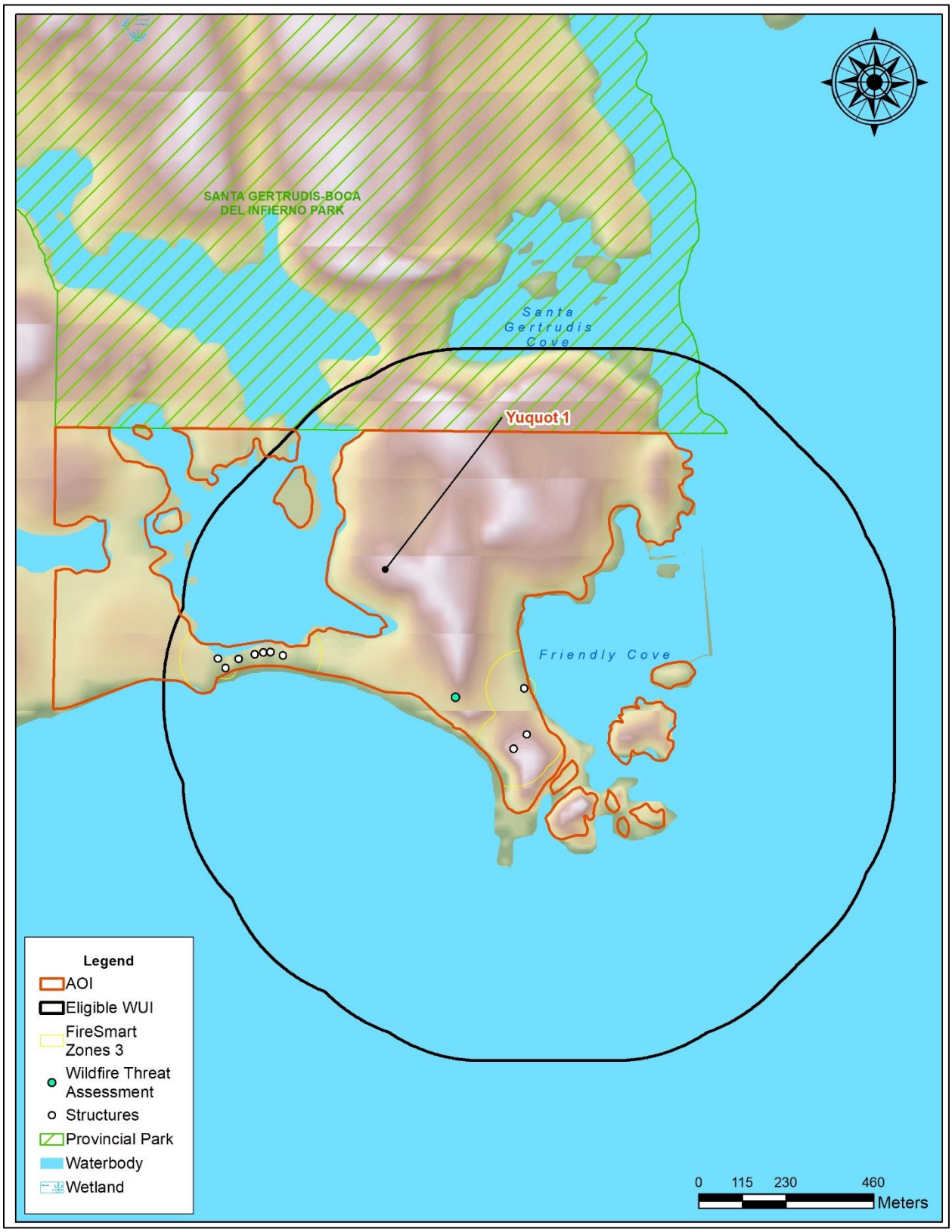
An overview of MMFN's AOI and WUI is shown below on **Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.**.



Map 1. Wildland Urban Interface of Tsa Xana



Map 2 Wildland Urban Interface of Ahiminquus



Map 3. Wildland Urban Interface of Yuqout

3.2 VALUES AT RISK

Values at risk are the human, natural, or cultural resources that could be negatively impacted by a wildfire. Protection of these values during a wildfire event is an important consideration for effective emergency response. Pre-identifying critical infrastructure and values at risk before an emergency event can ensure that essential services can be protected and/or restored quickly. First Nations-owned critical infrastructure can be recognized as any infrastructure essential to the health, safety, security or economic wellbeing of the community and the effective functioning of government.[5] Table 4 (and displayed on Map 1 through Map 3) lists critical infrastructure and community assets in Tsa Xana, Ahaminquus, and Yuquot, and highlights some risk and resilience factors for each. Detailed wildfire risk assessments of critical infrastructure and community assets are beyond the scope of the CWRP and should be assessed by a Local FireSmart Representative through a FireSmart Home Ignition Assessment, FireSmart Critical Infrastructure Assessment or FireSmart Home Partners Assessment. All critical infrastructure received FireSmart Critical Infrastructure Assessments in 2021. Community assets have not had wildfire hazard assessments completed yet. FireSmart Critical Infrastructure Assessments and hazard mitigation are expanded upon in Section 5.4 - Development Considerations.

Table 4: Critical Infrastructure on MMFN lands.

Type	Name	Location	Risk & *Resilience* Factors
Critical Infrastructure	Administration Building	Tsa Xana	-Direct exposure to surrounding conifer forests *-Fibre-cement siding, asphalt-shingle roof* *-Pruning and brushing in adjacent forests*
Critical Infrastructure	House of Unity	Tsa Xana	-Direct exposure to surrounding conifer forests -Wooden siding and fence attached
Critical Infrastructure	Education Building / Gym	Tsa Xana	*-Majority of area surrounding has been cleared and is well maintained*
Community Asset[6]	Elders Building	Tsa Xana	-Vinyl and wood siding, exposed wooden deck/walkway -Accumulations of combustible materials nearby *-Majority of area surrounding (within 10 m) has been cleared*
Critical Infrastructure	Pumphouse & Water Treatment (Old)	Tsa Xana	-Wooden siding with exposed areas -Direct exposure to conifer forests to the south *-Ignition-resistant metal roof*
Critical Infrastructure	Pumphouse & Water Treatment (New)	Tsa Xana	-Direct exposure to conifer forests to the south -Combustible materials stored adjacent *-Fibre-cement siding, ignition-resistant metal roof*
Critical Infrastructure	Reservoir (2)	Tsa Xana (off reserve)	-Exposure to conifer forests (albeit low-medium hazard) with brush and surface fuel accumulations -Remote location

[5] ISC FNESS. 2022. *FNESS–ISC On-Reserve FireSmart Program Guide*
[6] The FireSmart Community Funding and Supports program defines Critical Infrastructure and Community Assets separately – and offers different funding opportunities based on these definitions.

Type	Name	Location	Risk & *Resilience* Factors
			-Ignition resistant structures, majority of vegetation cleared within 10 m
Community Asset	Fish Cleaning Station	Ahaminquus	*-Mass timber structure* *-No hazardous vegetation adjacent*
Community Asset	Muchalaht Dock	Ahaminquus (off reserve)	*-Built on non-fuel (open water)* *- Free of combustibles* *- Large timber construction material*
Community Asset	Yuquot Church	Yuquot	-Direct exposure to conifer forests to the south and east -Primarily wooden exterior – *metal roof* -Remote location
Community Asset	Cabins #1 - 6	Yuquot	-Direct exposure to conifer forests, often with accumulations of brush and dead materials adjacent and forest debris on roofs -Construction vulnerabilities to fire – cedar siding, exposed undersides and decks, wood stoves
Community Asset	Outhouse (2)	Yuquot	-Direct exposure to conifer forests -Wooden construction

3.2.1 ELECTRICAL POWER

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. Additionally, vegetation encroachment on power lines can be a wildfire ignition source - a tree branch lying between two conductors can produce high-temperature electrical arcs. Power is provided to Tsa Xana by BC Hydro, received through a network of wood pole distribution lines with a main transmission line running along the Gold River Main Road from the Gold River substation. This system is well-mapped and BC Hydro will work with local fire departments and BCWS to mitigate impacts to this infrastructure in the event of a wildfire.[7] Encroachment of vegetation on powerlines and poles as well as minor accumulations of combustibles was noted along primary distribution lines on Wickkinanish and Ghees-Muh roads. Utility right-of-way best management practices, such as regular brushing and clearing of woody debris and shrubs should continue to be employed to help reduce fire risk, utility pole damage, and subsequent outages. Plans are in place to install solar panels in Yuquot to provide electrical power to rental cabins and residences.

Secondary power sources for critical infrastructure are important to reduce community vulnerability in the event of an emergency that cuts power for days, or even weeks. Vulnerabilities for secondary power sources include mechanical failure, potentially insufficient power sources should a wide-scale outage

[7] BC Hydro. 2020. *Earthquakes, wildfire, and floods.* Available from: https://www.bchydro.com/safety-outages/emergency-preparation/natural-disasters.html.

occur, and diesel fuel shortage in the event of long outages or road closures. The pumphouse has a backup generator, which will support water supply during a potential power outage.

3.2.2 WATER AND SEWAGE

Water in Tsa Xana is supplied via a well-pumphouse-reservoir system. Two reservoirs are located off-reserve, surroundedby recently harvested cutblocks in TFL 19. Hydrant coverage throughout Tsa Xana is sufficient, with 17 fire hydrants distributed throughout primary community routes and residential courts/blocks. MMFN staff noted that new developments are required to have a fire hydrant within working distance from structures. Furthermore, as part of the Fire Protection Services Agreement that the Nation has in place with the Gold River Volunteer Fire Department, the Tsa Xana water distribution system must satisfy fire flow requirements of reservation land. MMFN is responsible for upkeep and maintenance of the water distribution system to ensure that hydrants and standpipes are in working order at all times and that sufficient water flow is available for the purpose of fighting fires. While the water distribution system in Tsa Xana is well-developed and regularly serviced, there are concerns regarding water availability for fire suppression, particularly during dry, summer months. Local staff noted that water restrictions are common during summer months and recalled that both Tsa Xana reservoirs were drained in ten minutes during a house fire event in 2015. There are no water systems in place in Yuquot and Ahaminquus.

3.2.3 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders and include large propane facilities, landfills, rail yards, storage facilities containing explosives, pipelines, etc. Anywhere combustible materials, explosive chemicals, or gas/oil is stored can be considered a hazardous value. An undesignated vacant lot is commonly used to dispose of and burn yard trimmings and combustible materials. Local staff reports that residents are typically diligent about supervising fires and ensuring they are adequately suppressed. Nevertheless, hazardous forest land surrounds the burn site and vegetation management is recommended to increase their wildfire resiliency (See Section 5.8.2 - Fuel Management Treatments).

3.2.4 CULTURAL, ENVIRONMENTAL, AND OTHER RESOURCE VALUES

Cultural values have the potential to be impacted by wildfire or wildfire suppression activities through physical damage or alteration. Records have indicated that there are 546 documented historic and archeological sites within the MMFN'S WUI , with the highest concentrations in Yuquot. Over 4,000 archeological artifacts were uncovered throughout Yuquot during a large-scale excavation by Parks Canada archaeologists in 1966. Known archeological sites are not protected under the provincial Heritage Conservation Act, as reserve parcels are located Federal land. However, Yuquot has been commemorated as a National Historic Site since 1923, thus, cultural values are protected under the federal Historic Sites and Monuments Act. The MMFN Lands Manger manages referrals, environmental monitoring, and natural resources management for the Nation and should have early involvement in any vegetation management projects proposed on-reserve to mitigate potential impacts to cultural or resource values. Community members have the right to traditional food and medicine gathering and to harvest timber within MMFN reservation land.

In addition to off-reserve forestry and commercial fishing, tourism is one of the main economic drivers for the Nation. Tourism assets are an integral part of the Nation's employment, economic wellbeing, and plans for future growth and development (Table 4). Tourism activities are focused on Yuquot, and current offerings include water taxi services to the remote destination, six rental cabins, Nootka Island Trail and the annual Summercamp public event. Sport fishing charters from the Muchalaht Inlet dock on Ahaminquus are also offered to the public. Renovations and retrofits to rental cabins, solar panel installation on Yuquot and development of a campground and tourism facility in Ahaminquus make up MMFN's short-term tourism expansion plans. FireSmart considerations should be given to these community assets to increase their resilience, while vegetation management activities within the community should consider the impact on these and other resource values.

Though there are no provincially-listed species or ecosystems at risk occurrences overlapping with MMFN lands, a number of proposed areas of critical habitat for the Marbled Murrelet (*Brachyramphus marmoratus* – a federally listed species at risk) are found throughout Yuquot and adjacent to Ahaminquus and Tsa Xana. Through consultation with a biologist or qualified professional, all site-level vegetation management should identify and mitigate potential impacts to ecosystems or species at risk.

SECTION 4: WILDFIRE RISK ASSESSMENT

This section summarizes the factors that contribute to local wildfire risk on MMFN lands. Section 4.1 discusses the wildfire environment in Tsa Xana, Ahaminquus, and Yuquot: topography, fuel, and weather and includes climate change projections affecting the wildfire environment of the area. Section 4.1.3 and Section **Error! Reference source not found.** discuss wildfire history in the area and wildfire response data from local fire crews. Section 4.3 describes the analysis used to classify the local wildfire threat and WUI risk.

The local wildfire risk assessment helps to identify the parts of the community that are most vulnerable to wildfire so that wildfire risk reduction actions can be implemented effectively.

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

Wildfire Risk = Probability X Consequence

Where:

Wildfire risk is the potential losses incurred to human life and values at risk within a community in the event of a wildfire.

Consequences are the repercussions associated with fire occurrence in an area. Higher consequences are associated with densely populated areas, critical infrastructure, areas of high biodiversity, etc.

Probability is the threat of wildfire occurring in an area and is expressed by the ability of wildfire to ignite and then consume fuel on the landscape – its *wildfire threat*. Wildfire threat is driven by three major components of the wildfire environment:

1) **Topography:** slope and terrain (increase/decrease rate of spread), and aspect (affects fuel dryness).
2) **Fuel:** loading (amount), size and shape, arrangement (horizontal and vertical), compactness, chemical properties, and fuel moisture.
3) **Weather:** temperature, relative humidity, wind speed and direction, and precipitation.

4.1 WILDFIRE ENVIRONMENT

There are three environmental components that influence wildfire behavior: topography, weather, and fuel. These components are generally referred to as the 'fire behaviour triangle' (Figure 1); the ways in which they individually influence the wildfire environment of the WUI will be detailed below.

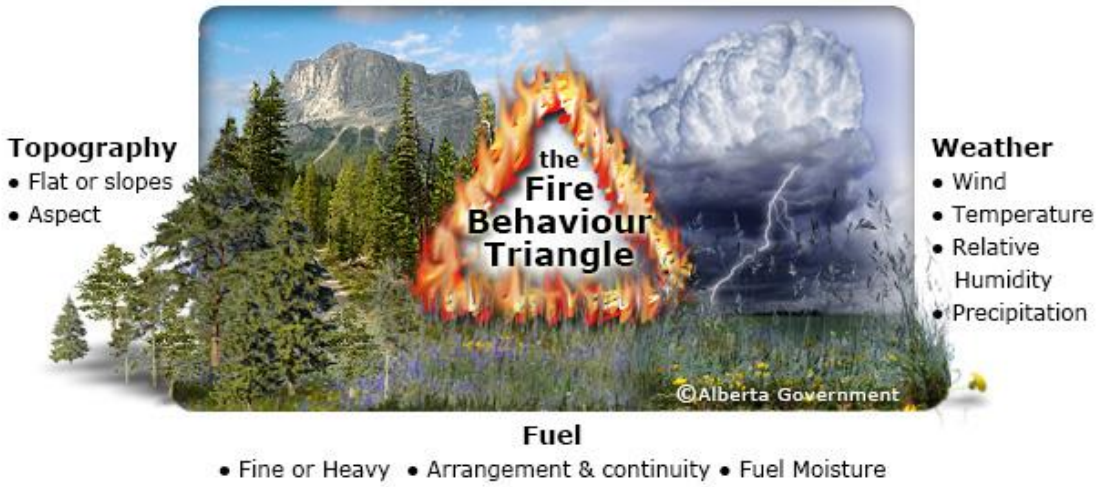


Figure 1: Graphic display of the fire behaviour triangle, and a subset of characteristics within each component.[8]

4.1.1 TOPOGRAPHY

Slope steepness influences a fire's trajectory and rate of spread; 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 configuration of features on the landscape that can restrict (i.e., water bodies, rock outcrops) or drive (i.e., valleys, exposed ridges) the movement of a wildfire.

Table 5 shows the percent of the WUI by slope steepness class, with corresponding fire behavior implications. The vast majority of the WUI (67%) is on less than 20% slope and will likely not experience accelerated rates of spread due to topography alone. 19% of the WUI is likely to experience an increased rate of spread, 8% a high rate of spread, and 6% is likely to experience a very high or extreme rate of spread because of topography. Steep slope grades that support rapid fire growth are primarily located along the Gold River drainage in the eastern portion of Tsa Xana and along the shorelines of Yuquot.

Table 5. Slope Percentage and Fire Behaviour Implications.

Slope	Percent of WUI	Fire Behaviour Implications
<20%	67%	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	19%	Flame tilt begins to preheat fuel, increase rate of spread.
31-45%	8%	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
46-60%	5%	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.

[8] Province of Alberta. *Wildfire Prevention and Enforcement*. Available from: https://blogs.ubc.ca/firemodel/discussion/

Table 6 shows the fire behavior implications of the slope position of a value. Values located in the lower slope are at the least risk. Values located mid-slope are at increased risk as they are threatened by faster rates of fire spread due to the pre-heating of fuels and longer flame lengths. Values in the upper 1/3 of a slope are at highest risk as they are impacted by extreme rates of spread.

Table 6. Slope Position of Value and Fire Behaviour Implications.

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

At a broad geographic scale, Tsa Xana is located at valley bottom of the Gold River drainage, which is favourable from a fire rate-of-spread standpoint. At a finer scale, there is a 40 – 80-meter gain in elevation from the river to the developed part of the community, which provides a *mid-slope – bench* influence if a fire was to ignite downslope of the community. The Tsa Xana reservoir is also located on a continuous mid-slope above the Gold River Main Road. Ahaminquus and Yuquot reserve areas are at sea-level and have relatively flat topography. Steep-sided valleys, both large and small, are also a risk factor in the WUI as they funnel winds that can drive fire both up and down them. Local BC Wildfire experts identified south aspects, steep slopes and wind as factors contributing to rapid fire spread in the area. The Gold and Muchalaht River drainages are relatively wide, with steep slopes on either side and a number of steep drainages and ravines intersecting. These smaller drainages provide additional convective features that can drive the fast upslope spread of fire. The Upana River drainage is considerably narrower and steeper.

4.1.2 WEATHER

Biogeolimatic Ecosystem Classification

The Biogeoclimatic Ecosystem Classification (BEC) system classifies BC into 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.[9] Local ecosystem conditions are an important basis to understanding wildfire probability and behaviour across natural landscapes.

Tsa Xana and Ahaminquus are classified into the Coastal Western Hemlock Very Dry Maritime BEC Zone (CWHxm2) and generally experience warm, dry summers with seasonal water deficits in many forested areas. Yuquot is located in the Coastal Western Hemlock Very Wet Hypermaritime BEC Zone (CWHvh1) which is much cooler and moister, with fog, cloud, and drizzle common throughout the year. The CWHvh1 receives approximately 71% more summer precipitation than the CWHxm2 BEC zone. As a result, fire danger conditions are much more considerable in Tsa Xana and Ahaminquus (and much less considerable in Yuquot) throughout the fire season.

Fire Weather Rating

Weather significantly impacts the potential for wildfire ignition, the rate of spread and burn intensity. BC Wildfire Service operate weather stations across BC to forecast fire weather through four primary data inputs: temperature, relative humidity, wind, and precipitation. Fire weather conditions are conductive to fire and help determine fire danger ratings. Historical fire weather data can provide information on the frequency and distribution of days of which a community is typically subject to high fire danger conditions.

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. 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) is 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.

[9]BECWeb. *Zone and Subzone Descriptions.* Available at: https://www.for.gov.bc.ca/HRE/becweb/resources/classificationreports/subzones/index.html

- **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.

Average fire danger class days as reported by nearby BC Wildfire weather stations are summarized to indicate comparable fire weather conditions for the community. Fire weather data may vary on a small scale based on the location of respective weather stations. The TS Burman station is located in a clearing near the mouth of the Burman River in the CWHvm1 – a BEC zone which receives approximately 76% more summer precipitation than the CWHxm2 – which likely results in an underestimation of fire danger in Tsa Xana and Ahaminquus. The Woss Camp station is in the CWHxm2 but is over 60 kilometers away in a clearing along the Nimpkish River, which likely experiences heightened humidity levels.

Fire danger class days reported through the TS Burman weather station is only available for the past three years, while the Woss Camp weather station depicts fire danger trends over a much longer period of 27 years. **Error! Reference source not found.** and Figure 3 show the average number of 'high' and 'extreme' fire danger days during the fire season (April – October) from each fire weather station. Dangerous fire weather peaks in July and August for both reporting stations. TS Burman has an average of nine days in July with high or extreme fire danger classes. Similarly, Woss Camp depicts an average of 11 days in July with high or extreme fire danger ratings. In August, TS Burman has 11 days of high or extreme fire weather and Woss Camp has 12 days of high or extreme fire danger days. Data from both weather stations demonstrate that periods of high and/or extreme fire danger can occur in shoulder autumn months (i.e., September and October), which was exemplified in 2022 on the coast of BC with hot, dry weather extending late into the fall.

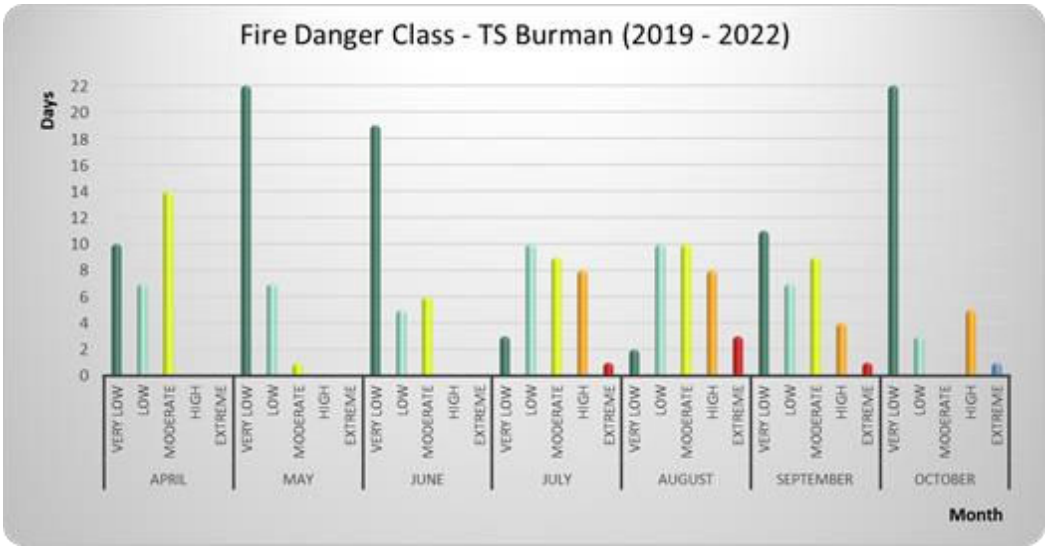


Figure 2. Average number of danger class days during the fire season for the TS Burman weather station (2019-2022)

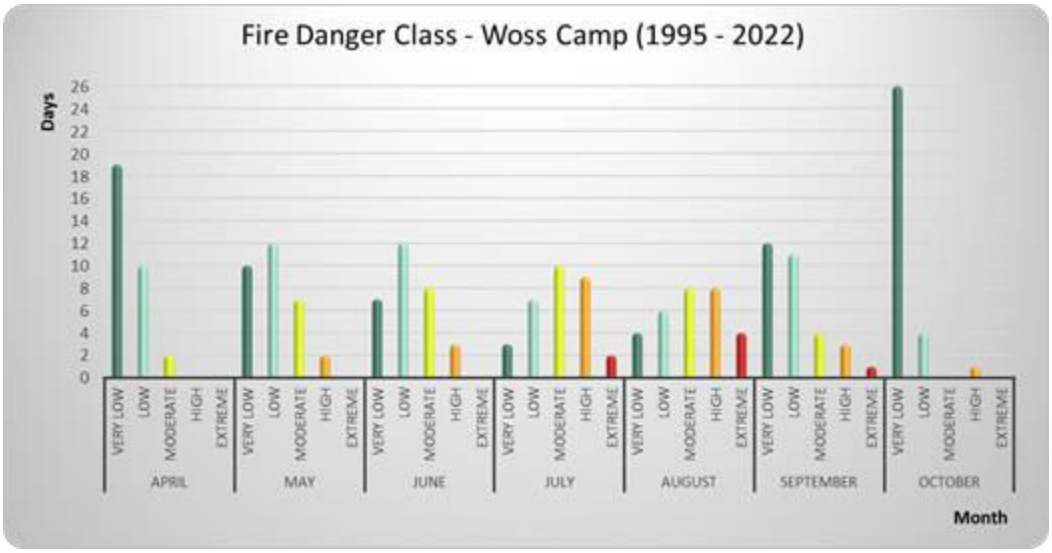


Figure 3. Average number of danger class days during the fire season for the Woss Camp weather station (1995-2022)

Fire Spread Patterns

Wind speed and direction are also critical weather components influencing fire behavior. Hourly wind speed and direction are also recorded at BCWS weather stations and the data is publicly available in the form of average Initial Spread Index (ISI) roses.[10] The ISI is a numeric rating of the expected rate of fire spread that combines the effects of wind speed and fine fuel moisture (controlled by temperature and relative humidity). Wildfire that occurs upwind of a value poses a more significant threat to that value than one which occurs downwind.

Wind patterns in the area are highly unpredictable and variable due to the complex topography. During the fire season, MMFN's WUI can experience strong winds from multiple directions, influenced by diurnal, inertial and antitriptic wind systems. As per ISI roses, the highest ISI wind directions likely originate from the northwest, which would drive fire spread in a general southeasterly direction. July and August are peak wind-driven fire spread months, with strong winds (high ISI values) occurring 15-20% of the time. Hourly data shows that wind speed picks up around 12 pm, remaining strong into the night. Contradictory to ISI rose data, local BCWS staff commented that an east to west fire spread trajectory is expected in the area, citing that dominant winds originate along the Elk River Valley and are driven by topographical influences as winds cross over adjacent tributaries and follow valley directions. Appendix A-6: Initial Spread Index (ISI) roses display the daily average and monthly ISI values for TS Burman and Woss Camp weather stations.

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

Climate Change

Climate change is a serious and complex aspect to consider in wildfire management planning. Numerous studies outline the nature of climate change impacts on wildland fire across Canada, and globally.[11] Although there are uncertainties regarding the extent of these impacts on wildfire, the frequency, intensity, severity, duration, and timing of wildfire and other natural disturbances is expected to be altered significantly with the changing climate.[12] Despite the uncertainties, trends within the data are visible.

The following climate predictions are made for the West Coast Region, which includes Vancouver Island (projected values for the 2050s, as compared to a baseline average from 1961 - 1990):

- Increased mean temperature (1.4˚C increase),
- Decrease in summer precipitation (-10%),
- Longer growing season with an increase in growing degree days,
- Reduced snowpack (28% and 51% reduction in snowfall in winter and spring, respectively).

As discussed above, the MMFN's WUI generally experiences moderate temperatures (daily temperatures of ~16-18˚C[13]) and precipitation (~55mm – 71mm precipitation in Tsa Xana and Ahaminquus[13] and ~79mm – 99mm in Yuquot[13)] due to its location on Vancouver Island. Summers in Tsa Xana and Ahaminquus can be warm with historic daily maximum temperatures reaching above 25˚C[13], but the area is not as dry as more continental areas of the interior. However, climate change is leading to hotter and drier seasons.

4.1.3 FUEL

The type and amount of fuel available for a wildfire is a major driver of the potential fire behaviour in an area. A primary factor in a community's wildfire threat is its proximity to the forest, which is the 'fuel' in a wildfire scenario. The closer values at risk are to the forest, the greater the probability of impact from a forest fire, either due to direct flame contact or ember spotting. Fuel is the only component of the fire triangle that can be realistically managed through human intervention. Although fuel structure varies throughout Tsa Xana and between Yuquot and Ahaminquus, the major risk factor that is common to most of the area is the continuity of forest cover. Most of the WUI is dominated by conifer forests that can carry fire, though the potential fire behaviour varies considerably with the fuel arrangement and amount.

[11] Flannigan, M.D et al. 2009. *Implications of changing climate for global wildland fire.* International Journal of Wildland Fire 18, 483-507.
[12] 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. 2001. *Climate Change and Forest Disturbances*. BioScience 2001 51 (9), 723-734.
[13] Government of Canada. 2023. *Canadian Climate Normal 1981 – 2010 Station Data. Gold River Townsite*. Retrieved from: Canadian Climate Normals 1981-2010 Station Data - Climate - Environment and Climate Change Canada (weather.gc.ca)

Tsa Xana

Continuous conifer-dominated forest stands encompass the village and are intermixed amongst the homes. Second-growth, dense conifer trees with abundant understory conifers dominate the forest landscape. Wildfire can spread rapidly throughout coniferous forests where trees are in close proximity to one another. Dead and suppressed understory conifers contribute to a considerable amount of fuel on the forest floor, which creates vertical continuity with the dense overstory (Photo 1). Local BCWS staff commented that during extremely dry weather events, stands with high percentages of dead material contribute to fire spread in the area (Photo 2). Pockets of mature conifer trees exist among the second-growth stands, particularly along the steep slopes of the Gold River drainage where conifer trees have naturally high crown base heights and a deciduous understory free of highly flammable vegetation (Photo 3). Mature forests generally present a lower wildfire hazard in Tsa Xana than the second-growth forests that dominate more the surrounding forested landscape.

Local MMFN staff have extensively pruned and brushed the forest adjacent to roads interspersed throughout homes. Elevating canopy base heights through manual pruning efforts has created a vertical fuel strata gap that has significantly reduced the fire hazard. Brushing dead and suppressed trees has also reduced horizontal fuel continuity, promoting a discontinuous fuel arrangement, which theoretically will slow fire spread in a potential wildfire event impacting Tsa Xana (Photo 4).

Blocks of second-growth forest surrounding the Tsa Xana community have recently been logged. Very hazardous slash fuel loads have been left behind throughout widespread cutblock networks (Map 4). Cutblocks with heavy surface fuel accumulation, both in large slash piles and scattered throughout the harvest area, were observed directly adjacent to the Tsa Xana community, abutting the secondary egress route of the Tsa Xana Bypass (Photo 5). Local BCWS staff noted that the majority of rapid fire growth in the area is fueled by woody debris (slash) left in cutblocks.

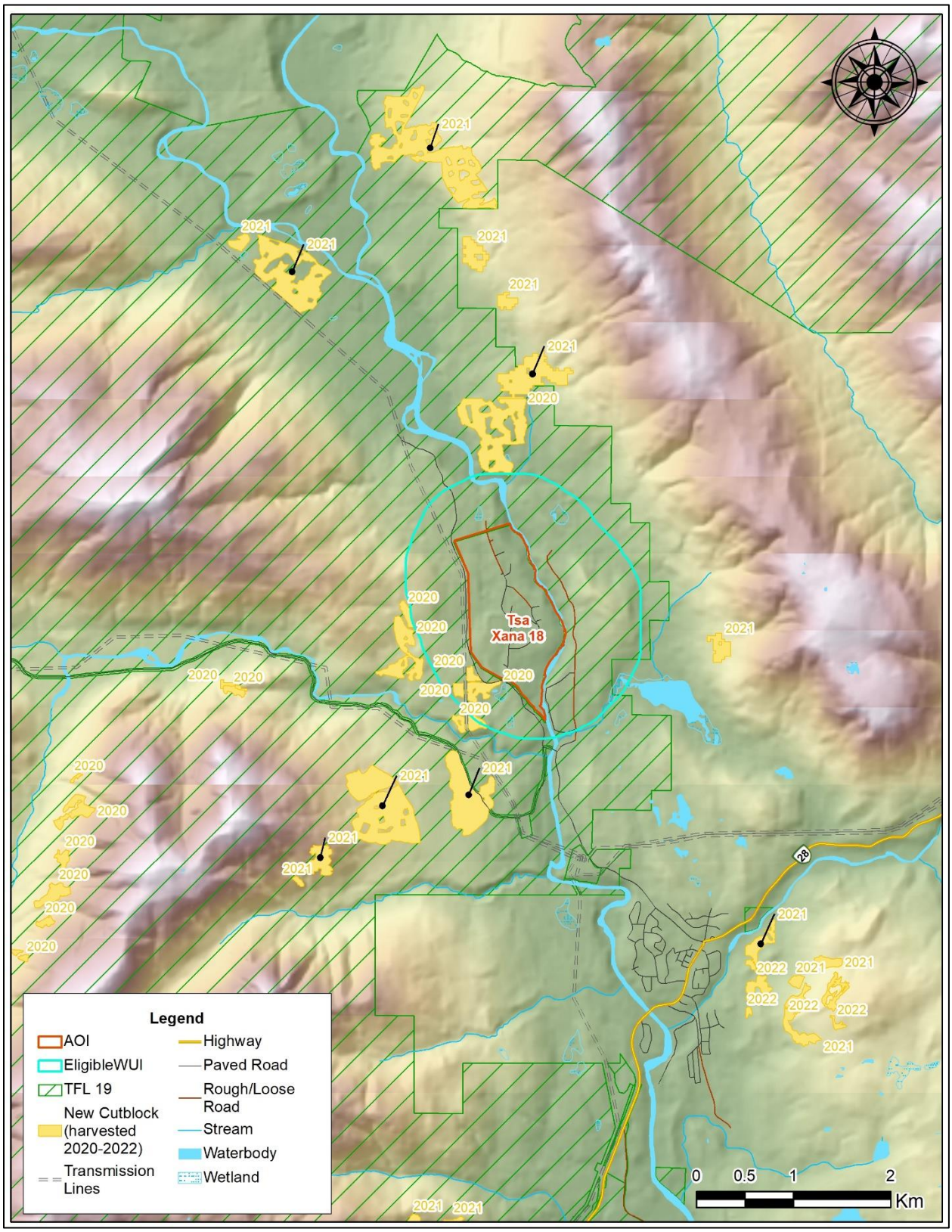
Photo 1. Hazardous young conifer forest with continuous ladder fuels (Tsa Xana)

Photo 2. Dead evaluated fuel loading in second-growth forest (Tsa Xana)

Photo 3. Less hazardous forest with high crown base heights (Tsa Xana, left and right)

Photo 4. Pruned and brushed young conifer stand presenting low wildfire hazard (Tsa Xana, left and right)

Photo 5. Heavy surface fuel loading throughout cutblock on Tsa Xana Bypass (left and right)



Map 4. Managed forest land and recent harvesting activities surrounding Tsa Xana

Ahaminquus

The forest of Ahaminquus is characterized by a mature stand composed of both deciduous (mainly big leaf maple trees) and coniferous trees (western redcedar, western hemlock and Douglas-fir). The understory is lush with large deciduous shrubs and ferns and scattered intermediate conifer trees. Low density, low surface fuel loading and a high deciduous component make the Ahaminquus forest lower in hazard.

Yuquot

Mature Sitka spruce-leading forests dominate the landscape of Yuquot. The understory primarily consists of well-developed deciduous shrubs, generally absent of volatile conifer ingress. Mortality of individual or small patches of trees have created gaps in the canopy where light penetrates to the understory and isolated pockets of coniferous understory are present (Photo 6). The multi-layered forest exhibits low-horizontal continuity and patchy vertical fuel continuity and is characterized by having a relatively low wildfire hazard.

Photo 6. Multi-layer mature Yuquot forest with canopy gaps and a lush deciduous understory

Fuel Type

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines sixteen fuel types based on characteristic fire behaviour under defined conditions.[14] BC Wildfire Service maintains a provincial fuel type layer that was confirmed and updated for this CWRP. It should be noted that a locally observed fuel type may have no exact analog within the FBP system, which was almost entirely developed for boreal

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

and sub-boreal forest types which do not occur within the study area. In these cases, the most appropriate fuel type to predict fire behaviour was assigned. Furthermore, fuel types depend heavily on Vegetation Resource Inventory (VRI) data, which is gathered and maintained to inform timber management objectives, not fire behaviour prediction. Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been successfully used within BC, with continual improvement and refinement, for 20 years.[15] In some areas, aerial imagery is of low spatial resolution and/or ground access was impossible, making fuel type assessment difficult. Where fuel types could not be updated from imagery with a high level of confidence, the original PSTA fuel type determination was retained.

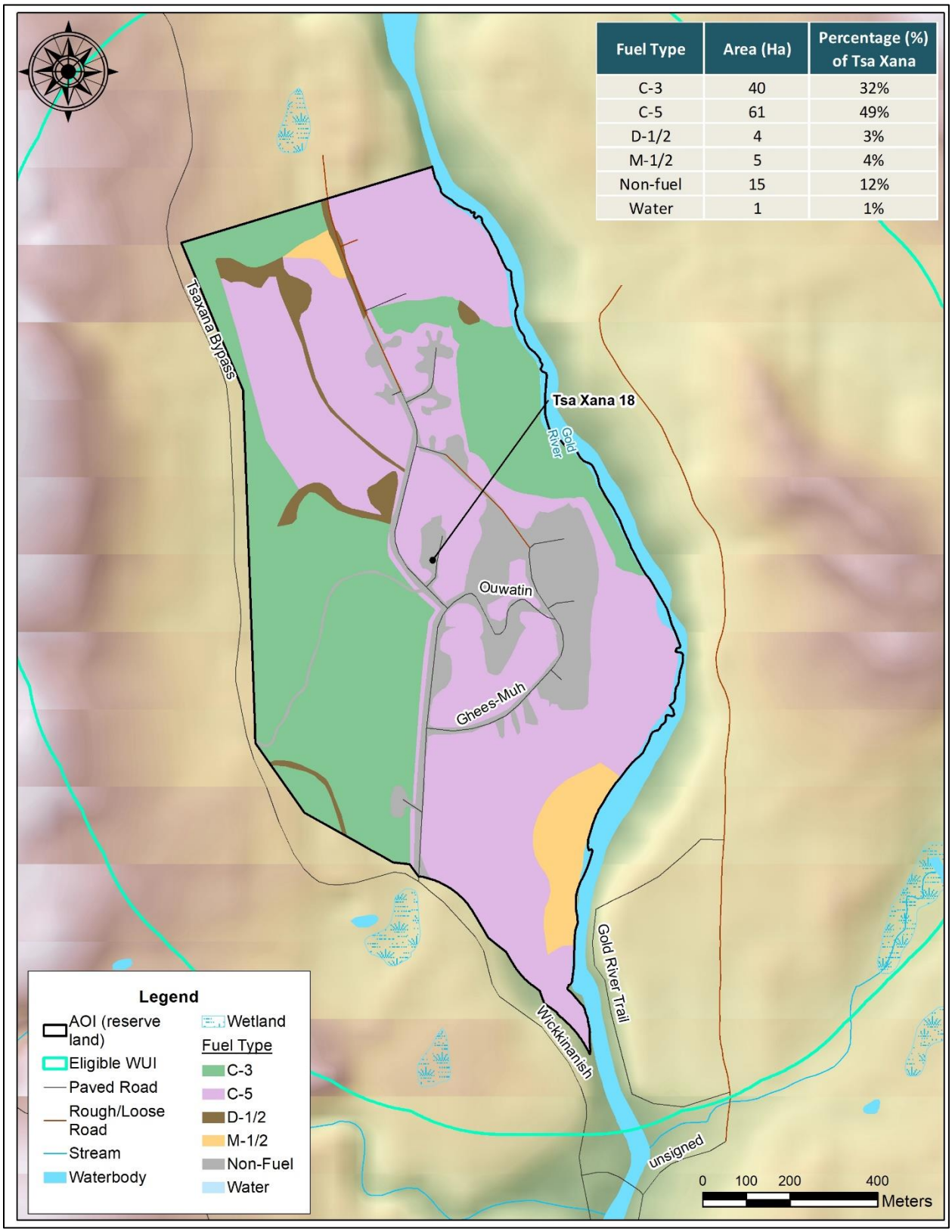
Fuel types (confirmed or updated by field work verification) within the plan area are detailed in Table 7. The most common fuel types on MMFN lands are C-5 and C-3. C-5 fuel types generally support low wildfire conditions, though under drought conditions, fuel consumption and fire intensity can be hazardous. Furthermore, C-5 fuel types with tall understory coniferous ingress can sometimes be considered hazardous as both vertical and horizontal fuel continuity may support fire movement. Much of the community is represented as “Non-fuel”. This fuel type should not be misconstrued as not susceptible to fire as these areas still often contain combustible materials, flammable vegetation, and valuable infrastructure. In many occasions on residential properties, storage decisions and structural qualities result in a fire hazard that is much higher than in the adjacent forest. Furthermore, if any grass fields are not routinely irrigated and are allowed to grow to a height greater than 10 cm and dry out, they may support a rapidly spreading surface fire capable of damage to or destruction of property (O-1a/b fuel type). Updated fuel types in MMFN lands are shown below on Map 5, Map 6 and Map 7.

Table 7. Fuel types in the Wildland Urban Interface

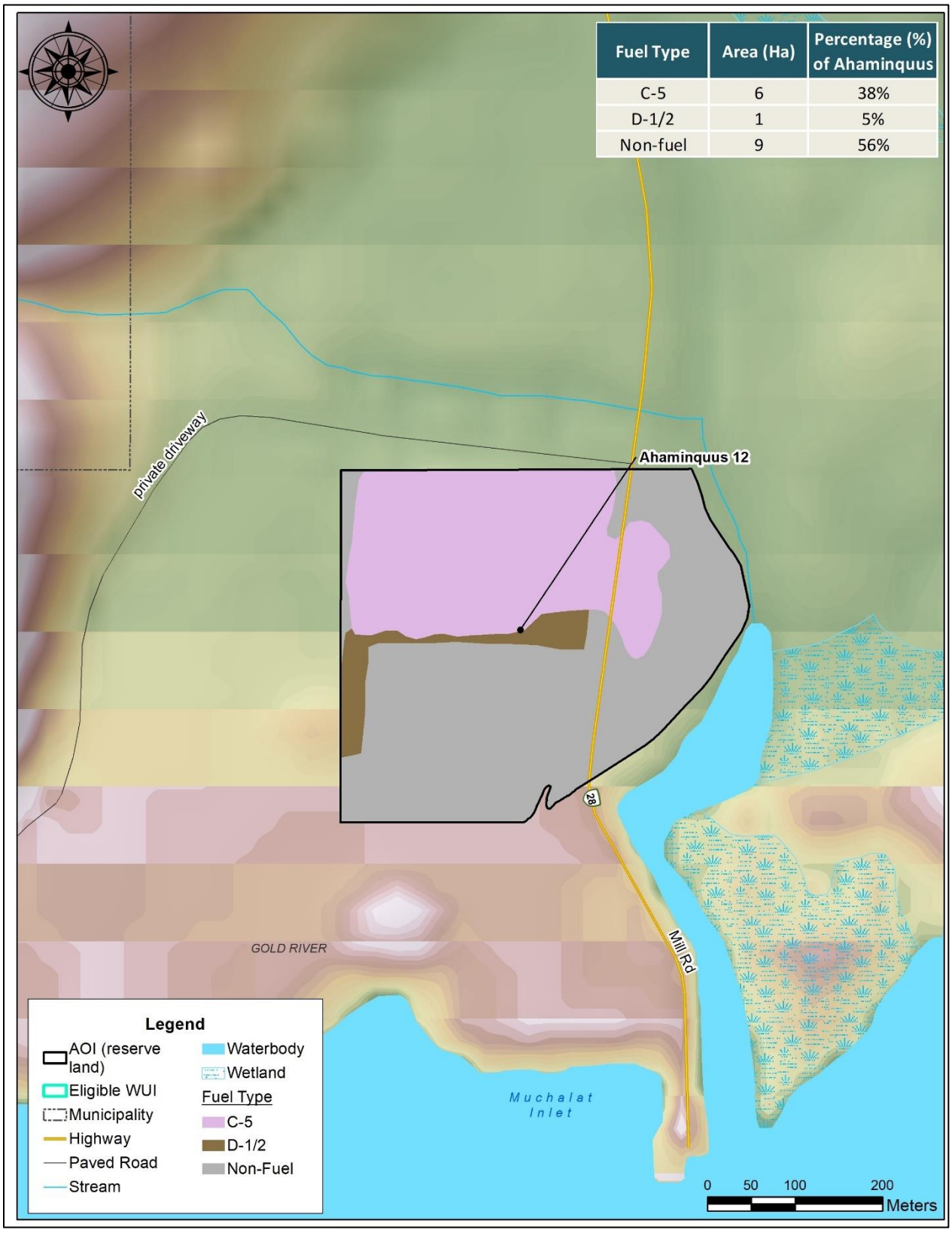
Fuel Type	Fuel Type Description Within WUI	Area (ha)	Percent (%) of MMFN’s WUI
C-3	Dense and often young conifer stands with a high component of dead standing trees and/or dead woody fuel on the ground. High horizontal and vertical fuel continuity. May be even aged or multi-storied but with a continuous flammable understory. High crown closure.	40	20%
C-5	Lower density and often more mature conifer stands. Natural canopy gaps, low surface fuel accumulations and continuity, and a low flammability (i.e., shrubby) understory. Overstory trees often have high crown base heights. Type was also applied to younger conifer stands that have been brushed and pruned.	121	59%
D-1/2	Deciduous stands/forest. Hazard increases with the amount of deadfall and/or establishment of a flammable shrub layer. Also applied to unmanaged roads / trails in the community.	6	3%
M-1/2	Mixed stands of conifers or deciduous species, low to moderate amounts of dead stems and downed woody fuels. Often	6	3%

[15] Perrakis, D., G. Eade, and D. Hicks. 2018. BC Wildfire Service. Ministry of Forests, Lands, and Natural Resource Operations. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description*

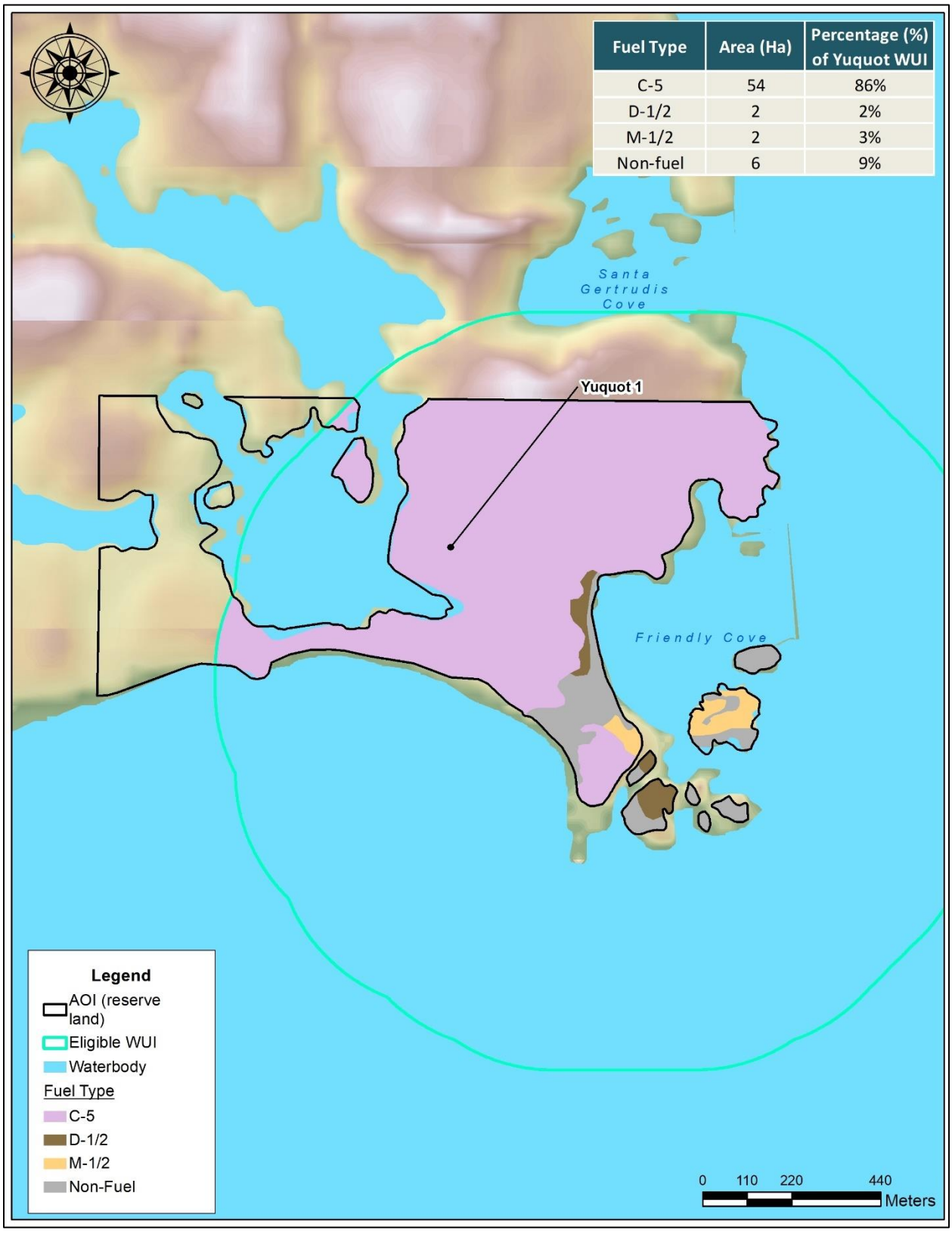
	transition tomore conifer dominated as pioneer deciduous species die out.		
Non-fuel	This type was applied to irrigated / maintained fields, cleared areas, roadways, exposed rock, shoreline and developed residential properties.	30	15%
Water	Ocean and river. Was not applied to creeks / drainages in the community that were not spatially discernible.	1	1%



Map 5. Verified fuel types in Tsa Xana



Map 6. Verified fuel types in Ahaminquus



Map 7. Verified fuel types in Yuquot's overlapping WUI[16]

4.2 WILDFIRE HISTORY

4.2.1 HISTORIC FIRE REGIME

The ecological context of wildfire and the role of fire in the local ecosystem under both current and historic conditions is an important basis for understanding the current and future wildfire threat to a community. Biogeoclimatic zones (as detailed in Section 4.1.3) have been used to classify the province into five Natural Disturbance Types / Regimes (NDTs). Natural disturbances have influenced the vegetation dynamics and ecological functions and pathways that determine many of the characteristics of our natural systems. The NDT classification is based on the frequency and severity of pre-European disturbance events (including, but not limited to, wildfires). While natural disturbance regimes are useful for describing the historic disturbance pattern typical for an area, fire history is complex and highly variable across space and time for many ecosystems.[17] Forest health issues, development patterns, forest harvesting, and natural events contribute to changes in the fire regime, forest attributes, and fuel hazard across landscapes.

Historically, natural disturbance patterns in CWHxm2 ecosystems like Tsa Xana and Ahaminquus typically resulted in even-aged stands, but sometimes post-disturbance regeneration periods and small-scale gap dynamics produced stands with uneven aged tendencies.[18] However, extensive logging and land clearing within the reserve parcels and surrounding hillsides have resulted in a mosaic of even-aged forest stands. As unmanaged stands continue to age, forest health issues (both biotic and abiotic) can affect stand structure and fuel loading.

Table 8 lists (and displayed on Map 5, Map 6 and Map 7) the distributions of biogeoclimatic zones and associated NDTs in the MMFN'S WUI. CWHxm2 ecosystems like Tsa Xana and Ahaminquus are categorized as NDT2– ecosystems with infrequent stand-initiating events. NDT2 ecosystems can be generalized as even-aged forest stands with extended post-fire regeneration periods. The mean disturbance return interval for these ecosystems is approximately 200 years. Wildfires were historically of moderate size (20 – 1000 ha), with larger fires occurring after long droughts. Natural disturbance patterns typically resulted in even-aged stands, but sometimes post-disturbance regeneration periods and gap dynamics produced stands with uneven aged tendencies.[19]

The CWHvh1 BEC zone that Yuquot is located in, is comprised of forest ecosystems with rare stand initiating fire or disease events. Long post-fire regeneration periods produced multi-storied forest canopies with small-scale patch dynamics attributed to mortality and subsequent regeneration of

[17] Hall, E. 2010. *Maintaining Fire in British Columbia's Ecosystems: An Ecological Perspective.* Available at: https://www.semanticscholar.org/paper/Maintaining-Fire-in-British-Columbia%27s-Ecosystems%3A-Hall/4d4c934dfae93dcb66bae394b08abd00b7c1daea

[18] Province of British Columbia. 1995 *Forest Practices Code Biodiversity Guidebook*. Available at: https://www.for.gov.bc.ca/ftp/hfp/external/!publish/FPC%20archive/old%20web%20site%20contents/fpc/fpcguide/BIODIV/chap2a.htm#ntv

[19] Province of British Columbia. 1995 *Forest Practices Code Biodiversity Guidebook*. Available at: https://www.for.gov.bc.ca/ftp/hfp/external/!publish/FPC%20archive/old%20web%20site%20contents/fpc/fpcguide/BIODIV/chap2a.htm#ntv

individual trees or small patches of trees. Natural disturbances remain rare in Yuquot, resulting in uneven-aged forests as a result of smaller scale gap dynamics.

Table 8: Biogeoclimatic Zones and Natural Disturbance Types in the MMFN'sWUI

Reserve Land	Biogeoclimatic Zone	Natural Disturbance Type
Ahaminimquus	CWHxm2: Coastal Western Hemlock Very Dry Maritime	NDT2
Tsa Xana	CWHxm2: Coastal Western Hemlock Very Dry Maritime	NDT2
Yuquot	CWHvh1: Coastal Western Hemlock Very Wet Hypermaritime	NDT1

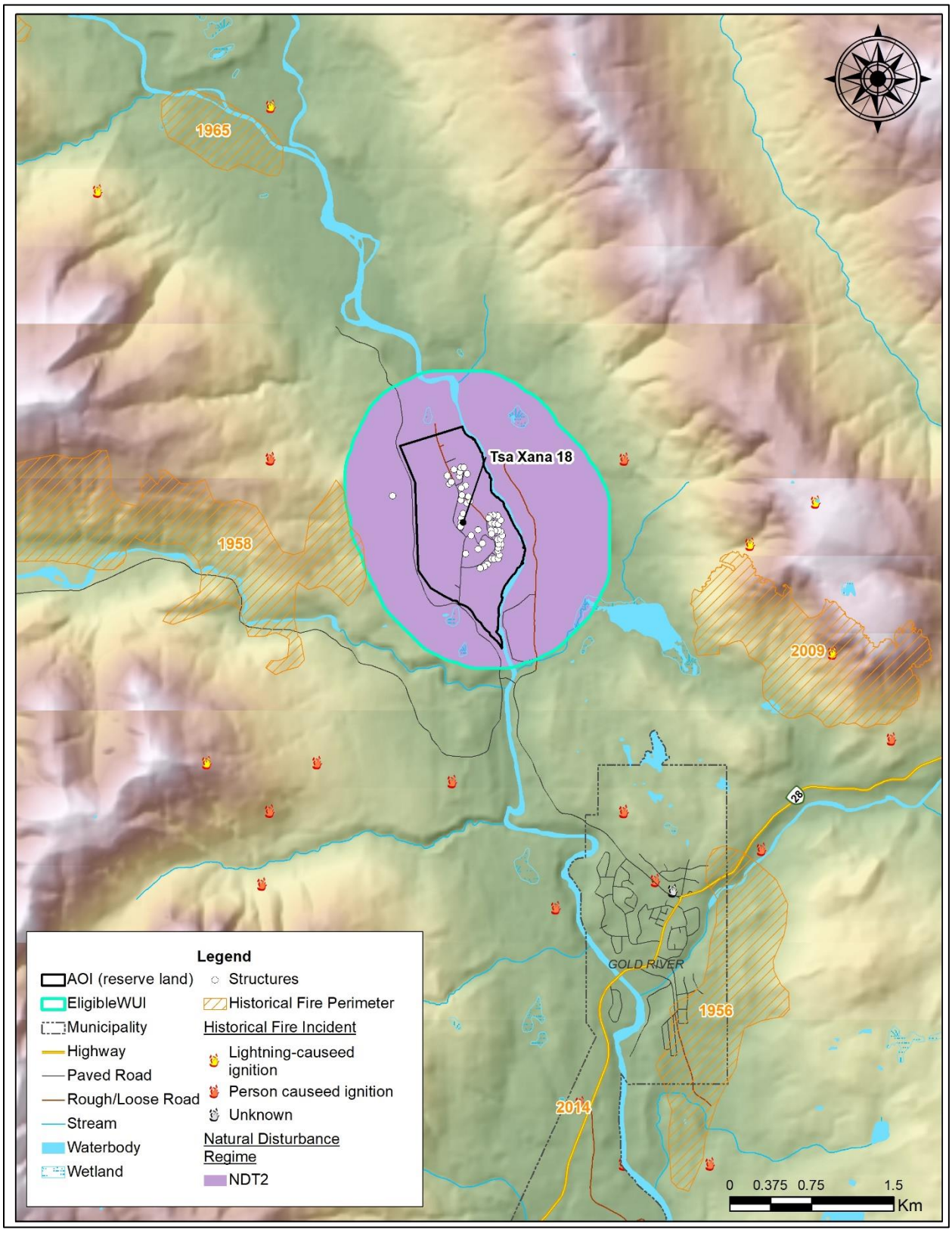
4.2.2 HISTORICAL WILDFIRE OCCURANCES

Historical fire ignition and perimeter data for the area encompassing MMFN land are depicted in Map 8 through Map 10.[20] Based on the BCWS historical wildfire datasets, wildfires in the WUI are infrequent and ignitions rarely result in a wildfire event. However, a number of large wildfires have occurred in similar forest landscapes and within the same regional climate, demonstrating the potential for these stand types to support threatening wildfire behavior.

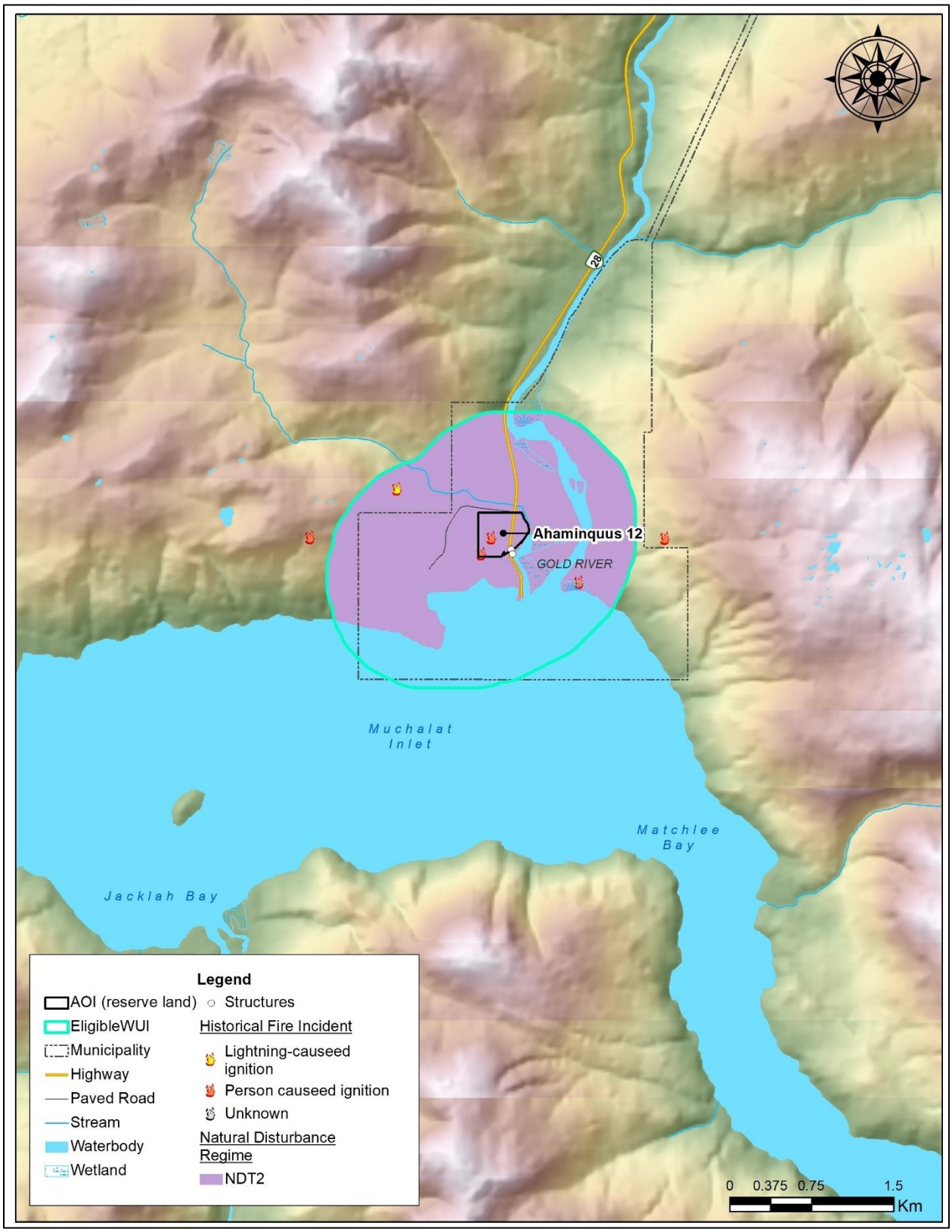
Most historic large-scale fire activity in the area is attributed to human-caused ignitions. Most notably, in 1965 a human-ignited wildfire occurred nearly seven kilometers north of Tsa Xana and grew to approximately 1,073 hectares. Other large-scale person-related fire events occurred within kilometers of Tsa Xana during the 1960's and 1970's. Though humans are the most common cause of ignitions in the area surrounding Tsa Xana and Ahaminquus, local BCWS experts commented that lightning-ignited wildfires actually account for the majority of fires of concern in the area. Of note is the 2009 lighting-initiated Antler Lake fire that burned 182 hectares of the mountain ridge adjacent Tsa Xana (1.5 Km southwest of the reservation lands). Steep slopes of the drainage were a contributing factor to its fast rate of spread. The wildfire also threatened MMFN and Gold River primary egress routes.

Two human-related ignitions have occurred in Ahaminquus; an escaped campfire in 1978 and a nuisance-caused fire in 2020, both emphasizing the importance of on-reserve fire education. Yuquot hasn't experienced any large-scale fire activity, however, a handful of human-related ignitions have historically occurred on Nootka Island. Though not represented in BCWS historical datasets, MMFN staff noted that an accidental brush fire occurred adjacent to the field on Yuquot during an annual campout several years ago. MMFN community members were quick to extinguish the escaped fire and did not require external support.

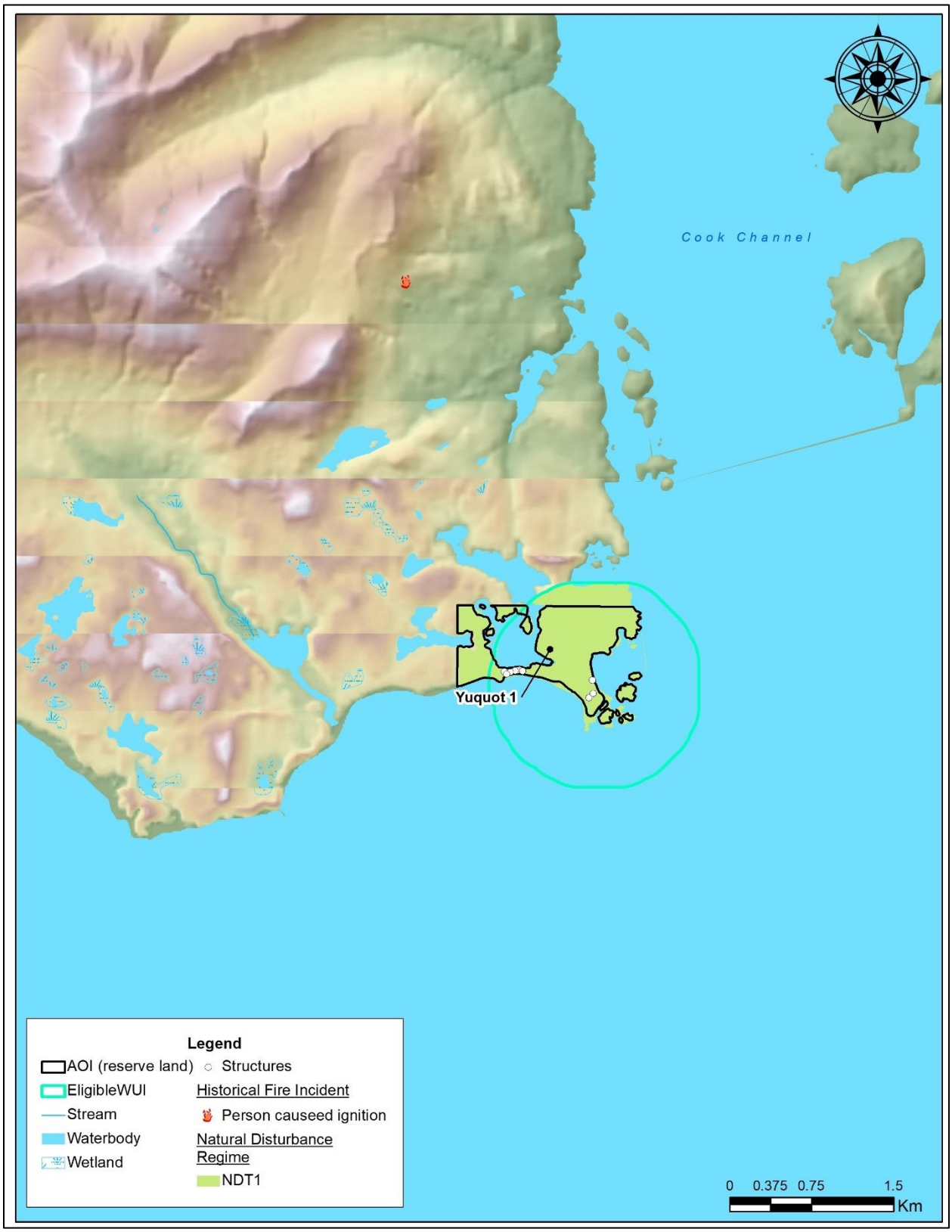
[20] Fire ignition data is available from 1951-2020 and fire perimeter data is available from 1919-2020.



Map 8. Tsa Xana natural disturbance regimes and historical fire ignitions and occurrences



Map 9. Ahaminquus Natural disturbance regimes and historical fire ignitions and occurrences



Map 10. Yuquot natural disturbance regimes and historical fire ignitions and occurrences

4.3 LOCAL WILDFIRE RISK ASSESSMENT

There are two main components of this local risk assessment: the wildfire behaviour threat class (fuels, weather, and topography sub-components) and the WUI threat class (structural sub-component). The local wildfire threat assessment process includes several key steps as outlined in Appendix A: Local Wildfire Risk Process and summarized as follows:

- **Fuel type attribute assessment:** ground truthing/verification and updating as required to develop a local fuel type map.
- **Consideration of the proximity of fuel to the community:** recognizing that fuel closest to the community usually represents the highest hazard.
- **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) (**Error! Reference source not found.**). Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread.
- **Consideration of topography in relation to values (Table 5 and Table 6):** 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.

Wildfire Threat Assessments were completed over several days in February 2023 in conjunction with verification of fuel types (see **Error! Reference source not found.**) to support analyses and the development of priority treatment areas. Eight site level Wildfire Threat Assessments were completed and 177 other field stops (e.g., qualitative notes, fuel type verification, and/or photograph documentation) were made throughout the WUI (Appendix A: Local Wildfire Risk Process along with Map 11, Map 12 and Map 13) to build the most accurate assessment of local fire risk possible.

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.
- **Local knowledge:** Areas identified as hazardous, potentially hazardous, with limited access/egress, or otherwise of particular concern as vulnerable to wildfire, as communicated by local fire officials and community forest representatives.
- **Observations:** Additional areas potentially not recognized prior to field work were visually identified as hazardous and assessed during the week.

It is important to note that the Local Wildfire Threat Assessment analyses do not apply to areas outside of the MMFN's WUI. As well, the threat assessment quantifies threat as it relates to forest fuels, and does not include the ignition potential of residential landscaping, structures or other infrastructure. Structure fires and structure-to-structure spread in a wildfire scenario are largely attributable to hazardous

conditions in the Home Ignition Zone of a structure (i.e., the area within 30 meters of the principal building and/or its attachments). However, the analyses do provide relevant information regarding wildfire threat that should be considered for FireSmart and emergency management planning and preparedness.

4.3.1 WILDFIRE THREAT CLASS ANALYSIS

Classes of the wildfire behaviour threat class analysis are as follows:

- **Very Low:** Waterbodies with no forest or grassland fuels, posing no wildfire threat;
- **Low:** Developed and undeveloped land that will not support significant wildfire spread;
- *Moderate*: Developed and undeveloped land that will support surface fires that are unthreatening to homes and structures;
- **High:** Landscapes or stands that are continuous, forested fuels that will support candling, intermittent crown fires, or continuous crown fires. These landscapes are often steeper slopes, rough or broken terrain and/or south or west aspects. High behaviour threat polygons may include high indices of dead and downed conifers; and
- **Extreme:** Continuous, forested land that will support intermittent or continuous crown fires.

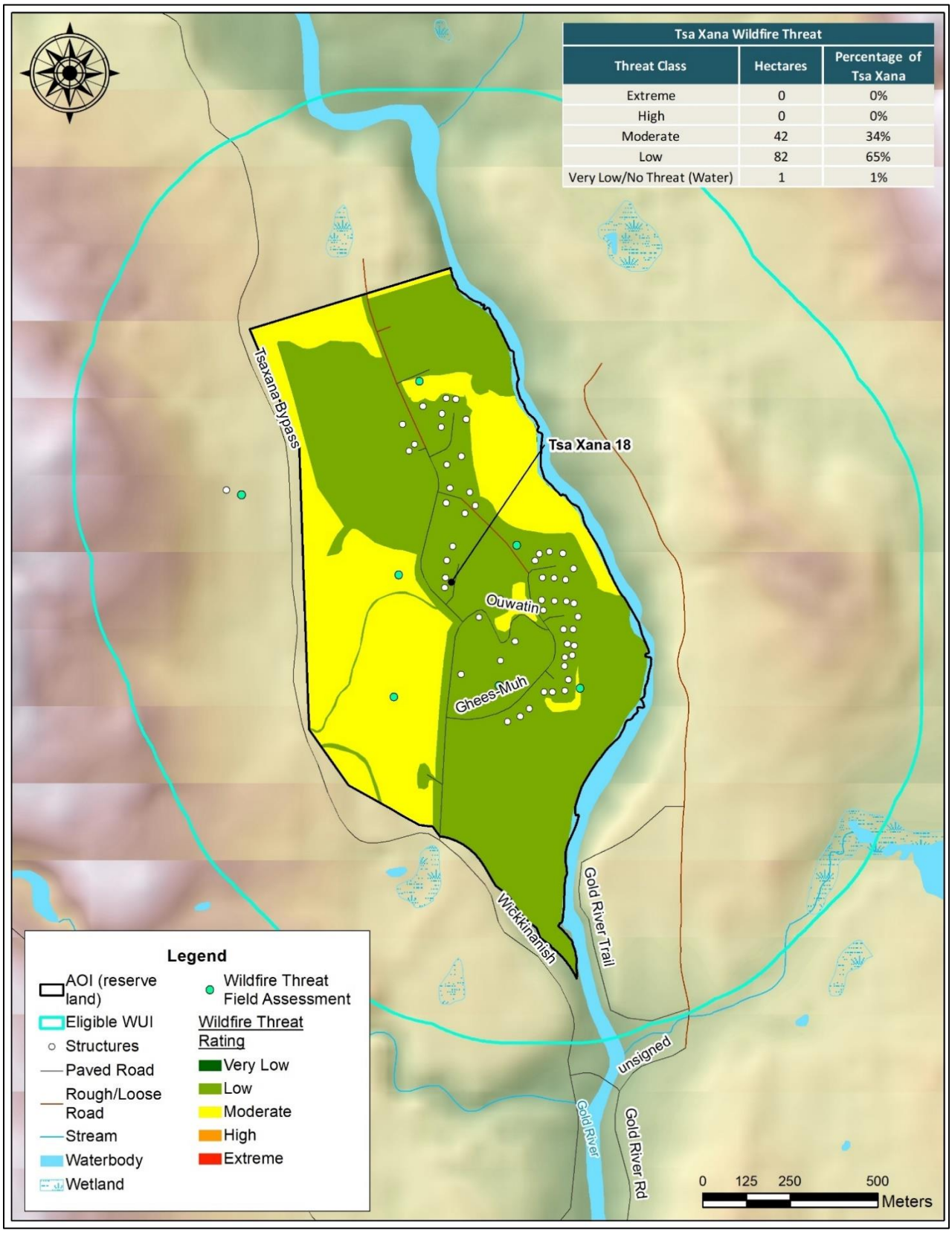
Results of the wildfire threat class analysis for the MMFN'S WUI are shown on Map 11 through Map 13, and in Table 9 below. Most of the MMFN'S WUI (79%) is represented by low wildfire behaviour landscapes. Low fire wildfire threat areas in Tsa Xana encompass residential development, pruned and brushed the forest areas, and low density, older conifer stands. Ahaminquus, including mixed coniferous and deciduous forest land and the cleared areas of the campground and marina, is characterized as having a low wildfire threat. Likewise, all of Yuquot's land base is represented as low wildfire threat, and neither the mature multi-layered forest nor the maintained fields and shorelines would support significant wildfire spread. Almost a quarter (21%) of the landscape is classified as a moderate wildfire behaviour threat. The 42 hectares of area represented by moderate wildfire landscapes is located in Tsa Xana. These moderate threat rating areas coincide with dense, second-growth coniferous forests. Wildfire threat is in relation to forest fuels, and hazardous structural and residential conditions of the Home Ignition Zone are not captured in the analysis.

Table 9: Fire behavior threat summary for the WUI

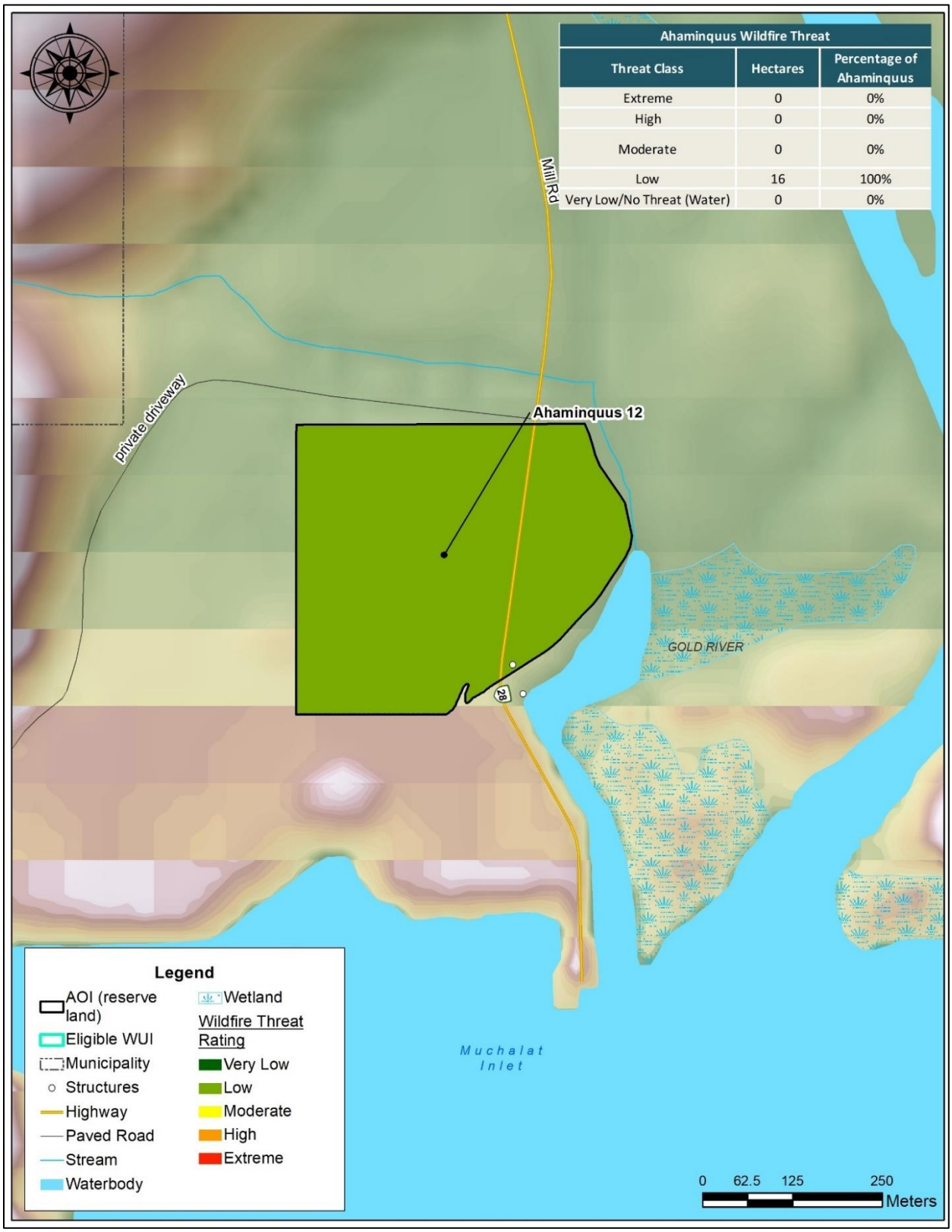
Wildfire Behaviour Threat		
Threat Class	**Hectares**	**Percentage (%) of MMFN's WUI**
Extreme	0	0%
High	0	0%
Moderate	42	21%
Low	161	79%
Very Low/No Threat (Water)	1	1%

4.3.2 WUI RISK CLASS ANALYSIS

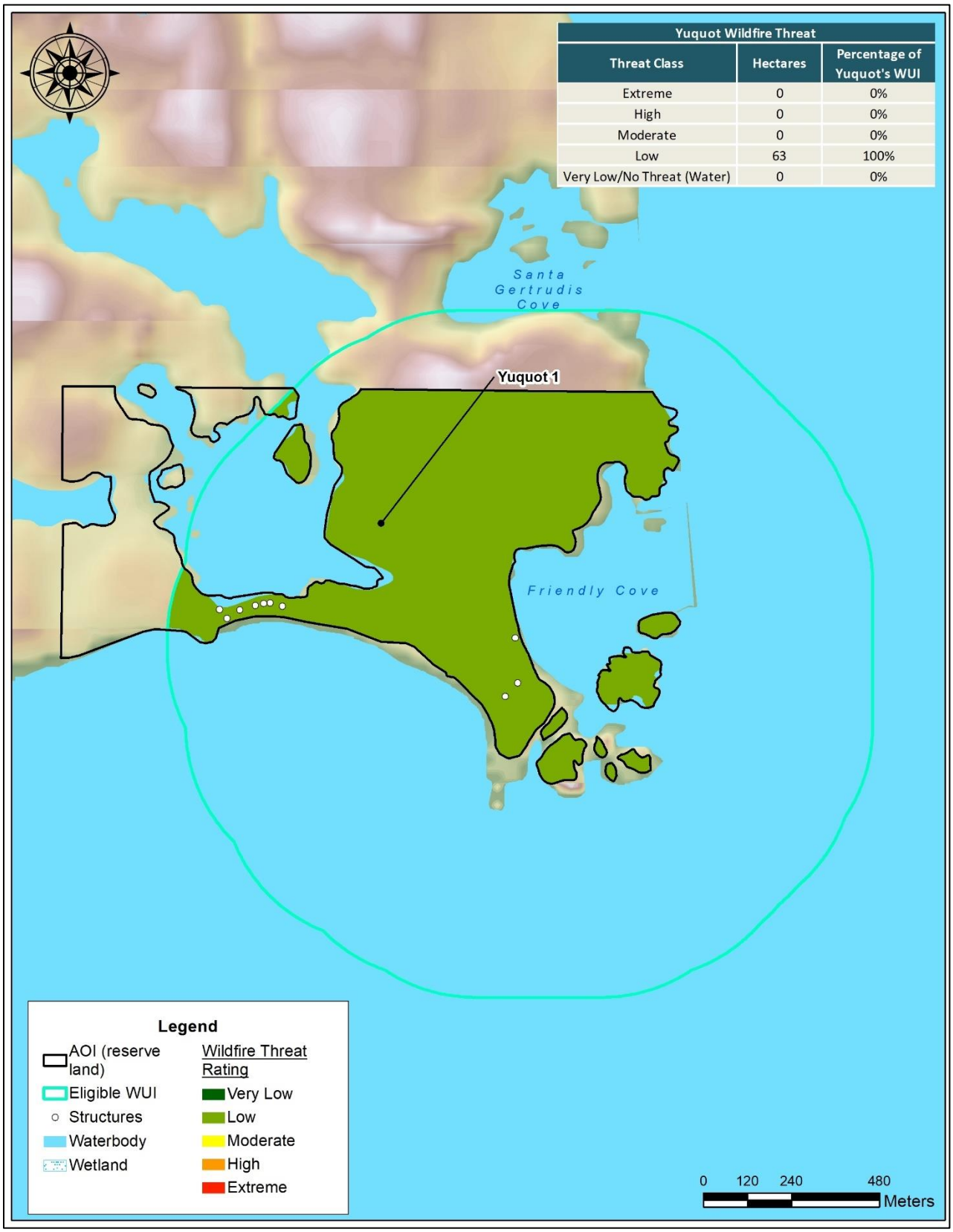
WUI risk classes are quantified when the Wildfire threat (the above) is assessed as high or extreme, causing potential unacceptable wildfire threats when near communities and developments. WUI risk classes were not analyzed since wildfire threat does not exceed a moderate threshold anywhere within the MMFN'S WUI.



Map 11: Local wildfire threat analysis of Tsa Xana



Map 12. Local wildfire threat analysis of Ahaminquus



Map 13. Local wildfire threat analysis of Yuquot

4.4 HAZARD, RISK, AND VULNERABILITY ASSESSMENT

The Hazard, Risk and Vulnerability Analysis (HRVA) that local governments undertake as part of the legislative requirements to develop a local Emergency Management Plan inventories and provides locally derived information about critical infrastructure important to the community.[21] Emergency Management BC supports this by providing the Critical Infrastructure Assessment Tool.[22]

The purpose of a HRVA is to help a community make risk-based choices to address vulnerabilities, mitigate hazards, and prepare for responding to and recovering from hazard events. The HRVA process assesses sources of potential harm, their likelihood of occurring, the severity of their possible impacts, and who or what is particularly exposed or vulnerable to these impacts.[23]

It is recommended that as values at risk of MMFN reserve land change significantly, this analysis is updated concurrently with a CWRP update. Wildfire risk and consequences, noted above in the Section 4.3 Local Wildfire Risk Assessment, should also be considered to for updates to emergency and respective wildfire incident plans.

[21] UBCM. 2020. *Community Wildfire Resiliency Plan Instruction Guide*. Retrieved from: Community Wildfire Resiliency Plan Instruction Guide (ubcm.ca)

[22] More information on the instruction guide can be found here: https://www2.gov.bc.ca/gov/content/safety/emergency-preparedness-response-recovery/local-emergency-programs/critical-infrastructure-assessment.

[23] Government of BC. 2020. *HRVA Example Report.* https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/hrva/hrva_forms-step_8-anytown_bc-sample_hrva_report.pdf.

SECTION 5: FIRESMART PRINCIPLES

FireSmart™ is the leading program in the country aimed at empowering the public and increasing neighbourhood resilience through wildfire mitigation measures. It has been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000. The FireSmart program covers a wide breadth of preventative measures, which are founded in the seven FireSmart disciplines: Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Cross-Training, and Vegetation Management. These seven disciplines, and the guiding principles behind FireSmart, can be applied at a number of spatial scales, and are not restricted to any type of land ownership, forest type or property type.

As discussed in Section 4.1.3 - Fuel, MMFN communities, specifically the primary village of Tsa Xana, are interface. Given that ignitability of home and critical infrastructure ignition zones is the main factor driving structure loss, FireSmart education, FireSmart building materials, and residential vegetation management are among the most important actions for MMFN to focus on to reduce its wildfire risks. This will help to ensure that structures and homes not only withstand a wildfire event, but also reduce the likelihood that a structure fire could spread into the forest, or home-to-home.

Most recommendations proposed in this plan are eligible for funding under the following funding programs:

- Union of Municipalities of British Columbia (UBCM) Community Resiliency Investment (CRI) FireSmart Community Funding and Supports (FCFS) program[24];
- First Nations' Emergency Services Society of British Columbia (FNESS) programs[25] (e.g., ISC-FNESS FireSmart Program, ISC-FNESS On-Reserve Operational Fuel Treatment Program, Wildland Fire Fighting Training Program, Preparedness and Response Program, Wildland Fire Equipment Purchasing Program etc.);
- Indigenous Services Canada (ISC) Capital Facilities and Maintenance Program (CPMP)[26];
- ISC First Nation Infrastructure Fund (FNIF)[27];
- ISC Emergency Management Assistance Program (EMAP)[28];
- ISC Climate Change Preparedness in the North Program[29];
- ISC First Nation Adapt Program[30] and;
- UBCM Community Emergency Preparedness Fund (CEPF)[31].

[24] Program information available from: FireSmart Community Funding & Supports | Union of BC Municipalities (ubcm.ca)
[25] Program information available from: https://www.fness.bc.ca/
[26] Program information available from: Capital Facilities and Maintenance Program (sac-isc.gc.ca)
[27] Program information available from: First Nation Infrastructure Fund (sac-isc.gc.ca)
[28] Program information available from: Emergency Management Assistance Program (sac-isc.gc.ca)
[29] Program information available from: Climate Change Preparedness in the North Program (rcaanc-cirnac.gc.ca)
[30] Program information available from: First Nation Adapt Program (rcaanc-cirnac.gc.ca)
[31] Program information available from: https://www.ubcm.ca/cepf

The UBCM CRI FCFS and FNESS funding streams are the primary programs to be pursued to achieve action items identified in this plan. Changes to these funding programs were announced for 2022-23 that are applicable to funding applications for 2023 and beyond. With reference to the 2023 CRI FCFS program guide, the most important of these changes include:

- All eligible activities must be capable of completion by the applicant within two years of the date of grant approval;
- Increased funding available for hiring and training FireSmart positions;
- Funding available for assessment, inventory, and purchase of FireSmart structure protection equipment;
- Regarding FireSmart projects for community assets:
    - To be eligible for funding, all community asset projects must have completed a FireSmart Home Ignition Zone Assessment, FireSmart Critical Infrastructure Assessment, or a FireSmart Home Partners Assessment;
- Rebates for retrofitting existing structures and new construction (up to 50% of the *total cost*).

Looking forwards to the 2024 CRI FCFS application intake and beyond, the application guide highlights that it will be required for all applicants to have *all* the following FireSmart components developed/active in their community:

- A person hired/contracted acting in a FireSmart position as a FireSmart coordinator (can be a title added to a current employee/contractor or a new hire).
- An active Community FireSmart & Resiliency Committee.
- A current CWRP or CWPP that is acceptable to the BCWS Wildfire Prevention Officer/Prevention Specialist or the FNESS Mitigation Specialist/Liaison. This includes assessment and identification of FireSmart and fuel management priorities.

Table 10 below summarizes FireSmart activities funded under the 2023 CRI FCFS program, and their level of implementation by MMFN.

Table 10: FireSmart activities funded under the 2023 UBCM CRI program, and their level of implementation in MMFN

CRI Funding Category	FireSmart Activities	Current Status
1. Education	Update public signage, social media, websites and/or newsletters, and community education materials or displays related to a proposed activity in categories 2-9 (below).	As part of the 2022 CRI FCFS grant, a FireSmart education video was developed for social media and the MMFN website. FireSmart educational resources will be distributed at an upcoming health/FireSmart event (spring 2023).
	Promote and distribute FireSmart educational materials and resources.	
	Organize and host public information meetings related to a proposed activity in categories 2-9 (below).	Have not explored this yet.

CRI Funding Category	FireSmart Activities	Current Status
	Encourage community participation in a Wildfire Community Preparedness Day.	Have not explored this yet.
	Support the organization of a Farm and Ranch Wildfire Preparedness workshop, Neighbourhood Champion workshop, community FireSmart day, FireSmart events and workshops, and/or wildfire season open houses.	The EOC team/CFRC is hosting a health and FireSmart event in the spring of 2023.
	Support neighbourhoods to apply for FireSmart Canada Neighbourhood Recognition Program.	The EOC team/CFRC is exploring the feasibility of fulfilling the FireSmart Canada Neighbourhood Recognition Program in Tsa Xana.
2. Legislation and Planning	Develop or amend a CWRP/CWPP (to the 2020 template).	Development of this CWRP in 2023.
	Develop FireSmart policies for the design and maintenance of public lands, such as regional parks, or buildings.	Have not explored this yet.
	Conduct FireSmart Assessments for publicly owned buildings to support future FireSmart projects for critical infrastructure (see category 7).	CI assessments have been completed for all MMFN critical infrastructure. No CI assessments have been completed for community assets yet.
3. Development Considerations	Amend OCPs or bylaws to incorporate FireSmart principles.	Have not explored this yet.
	Revise landscaping requirements in zoning and development permit documents to require fire resistant landscaping or include other FireSmart considerations.	Have not explored this yet.
	Establish Development Permit Areas for Wildfire Hazard.	Not applicable.
	Include wildfire prevention and suppression considerations in the design of subdivisions.	Have not explored this yet.
	Amend referral processes for new developments to ensure multiple departments, including the fire department and/or emergency management personnel, are included.	Have not explored this yet.
4. Interagency Cooperation	Develop, coordinate, and/or participate in a Community FireSmart Resiliency Committee or multi-agency fire and/or fuel management planning table.	Have not formally developed a CFRC, but the EOC team plans to be used jointly as a CFRC to provide strategic direction to emergency preparation with a focus on wildfire resiliency.
	Provide Indigenous cultural safety and humility training to emergency management personnel.	No in-house issues with this.
	Attend the annual Wildfire Resiliency and Training Summit, to be hosted by the BC FireSmart Committee.	Emergency staff (2) are attending the Wildfire Resiliency and Training Summit 2023.

CRI Funding Category	FireSmart Activities	Current Status
5. Emergency Planning	Develop and/or participate in cross-jurisdictional meetings and tabletop exercises focused on wildfire preparedness and suppression, including seasonal wildfire readiness meetings.	Emergency staff have participated in tabletop meeting with other Nuu-chah-nulth Tribal Council health/emergency staff focused on wildfire preparedness and suppression (EOC team/CFRC).
	Assess community water delivery ability as required for suppression activities, limited to current water system evaluation and available flow analysis.	The water distribution system is mandated by the fire services agreement to be regularly assessed and maintained to ensure adequate flow for fire suppression. Actioning upon a water delivery analysis may address vulnerabilities noted by MMFN public work staff and community members.
	Assess structural protection capacity.	Have not explored this yet. The Gold River Volunteer Fire Department is responsible for fire suppression in MMFN reserve lands.
	Use and/or promote EMBC Wildfire Preparedness Guide for community emergency preparedness events focused on wildfire.	Have not explored this yet.
6. Cross-Training	Provide or attend training for Local FireSmart Representatives (LFR).	No LFRs within MMFN, but SRD LFR has provided FireSmart services for the Nation.
	Support LFRs to attend facilitator training.	Not yet applicable to MMFN.
	Home Partners Program – Wildfire Mitigation Specialist training.	Have not explored this yet.
	Support local government or First Nation staff that have completed Wildfire Mitigation Specialist training to qualify as facilitators.	Not yet applicable to MMFN.
	Cross-train fire department members to include structural and interface wildfire training: - SPP-WFF1 Wildland Firefighter Level 1 - S-100 Basic fire suppression and safety - S-185 Fire entrapment avoidance and safety - S-231 Engine Boss - ICS-100	Not applicable to MMFN.
	Cross-train emergency management personnel: - ICS-100 - WRR Basics Course	One MMFN emergency staff member is trained in ICS-100.
7. FireSmart Projects for Critical Infrastructure	Completion of recommended mitigation activities identified in a FireSmart Home Ignition Zone or Critical Infrastructure Ignition Zone Assessment.	HIZ FireSmart assessments have not be performed. No recommended mitigation activities have been

CRI Funding Category	FireSmart Activities	Current Status
	Completion of a FireSmart Home Ignition Zone or Critical Infrastructure Ignition Zone Assessment once mitigation work has been completed.	completed as identified in CI FireSmart assessments.
8. FireSmart Activities for Residential Areas[32]	Conduct Home Ignition Zone Assessments for individual residential properties or homes.	No HIZ Assessments have been completed.
	Offer local rebate programs to residential property or homeowners that complete eligible FireSmart activities.	Have not explored this yet.
	Undertake Neighbourhood Wildfire Hazard Assessments.	Have not explored this yet.
	Support the development of preparedness and plans for specific areas.	Have not explored this yet.
	Conduct Home Partners Program wildfire mitigation assessment for individual residential properties or homes.	Have not explored this yet (no Wildfire Mitigation Specialists within MMFN).
	Provide off-site vegetative debris disposal for residential property or homeowners who have undertaken their own vegetation management, including: - Provide a dumpster, chipper, or other collection method. - Waive tipping fees. - Provide curbside debris pick-up.	Have not explored this yet.
9. Fuel Management	Undertake planning and development for fuel management on reserve or publicly owned land (fuel management prescriptions, burn plans, demonstration projects).	No fuel management planning has been completed.
	Undertake new fuel management treatments on reserve or publicly owned land (including demonstration projects).	No fuel management treatments or maintenance have been completed.
	Undertake fuel management maintenance activities on reserve or publicly owned land.	
	Undertake prescribed burns on publicly owned land or First Nations land when the primary objective is fuel management for community wildfire risk reduction.	No prescribed burning has been completed.

The primary objective of the FNESS-ISC Guide is to address hazards closest to structures first by funding treatments that protect residential and critical infrastructure. Table 10 summarizes activities eligible for funding under the 2022-2023 FNESS & ISC On-Reserve Fuel Treatment and On-Reserve FireSmart programs, and MMRN's current level of program uptake.

[32] To be eligible for funding, all FireSmart activities for residential areas must be located in the FireSmart Home Ignition Zone which includes the home and surrounding yard area - FireSmart Non-Combustible Zone and Priority Zones 1, 2 and 3 (only with residential property and/or homeowners' consent).

Table 11. Activities funded under the FNESS-ISC On-Reserve FireSmart and Fuel Treatment programs, and their current status in MMFN

FNESS-ISC Program	Eligible Activities	Current Status
On-Reserve Operational Fuel Treatment Program	Access/egress route widening or other upgrading	Have not explored this yet.
	Timber permit application and documentation required by ISC.	
	Fuel management prescription development or amendment	
	Danger tree assessments.	
	Tree felling, including hand and mechanical.	
	Pre- and Post-treatment surface fuel load analysis using photo-guide or other methodology identified in the applicable prescription.	
	Pre- and Post-treatment wildfire threat assessments.	
	Thinning, including hand and mechanical.	
	Pile Burning.	
	Pruning.	
	Piling, including hand and mechanical.	
	Debris management, including chipping, mastication and grinding.	
	Debris removal, including chip removal, hog fuel and slash removal.	
	Custom venting forecast.	
	Traffic and pedestrian control during active operations.	
	Preparation of pre- and post-treatment photos, maps, spatial data, and metadata.	
	Post-wildfire danger tree assessments and removal initiatives that address public safety concerns.	
	FireSmart or Home Partners Home Ignition Zone assessments and treatment-priority establishment.	Have not explored this yet.
	FireSmart Neighbourhood Assessment and Plan preparation with mapping.	Have not explored this yet.
	Thinning/spacing of trees.	Achieved throughout most of the residential Home Ignition Zone

FNESS-ISC Program	Eligible Activities	Current Status
On-Reserve FireSmart Program		through the MMFN landscaping program.
	Pile Burning.	Debris and trimmings are hauled off-site and burned locally as part of the MMFN landscaping program.
	Pruning.	Achieved throughout most of the residential Home Ignition Zone through the MMFN landscaping program.
	Piling, including hand and mechanical.	Have not explored this yet.
	Debris management, including chipping, mastication and grinding.	Have not explored this yet.
	Debris removal, including chip removal, hog fuel and slash removal.	Have not explored this yet.
	Custom venting forecast.	Have not explored this yet.
	Traffic and pedestrian control during active operations.	Have not explored this yet.
	Preparation of pre- and post-treatment photos, maps, spatial data, and metadata.	Have not explored this yet.
	Post-wildfire danger tree assessments and removal initiatives that address public safety concerns.	Have not explored this yet.
	Timber Permit application and documentation required by ISC.	Have not explored this yet.
	Chipping and hauling of flammable material created by homeowners.	Have not explored this yet.
	Moving flammable fuels or ignition sources such as dead and decaying brush, grass or vegetation away from homes and critical infrastructure.	Partially achieved through the MMFN landscaping program.
	Other activities that are recommended or consistent with guidance provided in the BC FireSmart Homeowners Manual.	Have not explored this yet.

5.1 FIRESMART COMMUNITY OVERVIEW

During CWRP development, FireSmart risk and resiliency factors for each reserve parcel were observed (Table 12). This incorporates field observations, the local risk assessment and information from the CFRC.

Table 12: FireSmart vulnerability and resilience by neighbourhood on MMFN Island

Community	Vulnerability	Resilience
Tsa Xana	- Interface community - Single-access/egress via single-lane bridge - Poor firewood storage setback from homes (often disorganized) - Combustibles scattered throughout lots - Phase 1 and 2 homes constructed with wood siding - Open decks with combustibles and debris locate beneath is common - Large, overhanging conifers interspaced between homes - Poor address visibility - Vulnerable outbuildings (smoke houses) - Open gutters - Unsheathed gaps beneath trailers	-Hydrants (17) - Within fire protection area -Flat topography, valley bottom - Phase 3 homes constructed with hardy board - Fire-rated roofing material - Good access within the community (numerous roundabouts, adequate turnarounds) - Some wood storage in outbuildings away from homes - Small, irrigated lawns
Ahaminquus	- Interface - Volatile scotch broom scattered throughout - Some storage of combustibles	- Irrigated campground free of ornamental vegetation - Mixwood forest - Flat topography, valley bottom - No permanent structures/residents - Adjacent to large waterbody - Within fire protection area
Yuquot 1	- Remote, boat access only (weather dependent) - Limited emergency resources/services, communication channels/connectivity - Continuous forested land adjacent to irrigated lawn - Influx of visitors during summer months	- Flat topography - Ample water availability for suppression - Low hazard mature forest - Mild, wet coastal climate - Few permanent structures and limited human activity

The sections to follow provide information on each FireSmart discipline. An analysis of actions that have been implemented in reserve land are listed, as well as any relevant gaps identified by MMFN staff, the Fire Department, BCWS representatives and as a result of the wildfire risk analysis. Each section contains a table of recommended actions for MMFN relating to that FireSmart discipline. Each recommendation includes a rationale, lead agency, timeline, potential funding avenues and, estimated resources to complete.

5.2 EDUCATION

Public education and outreach play a critical role in helping a community prepare for and prevent a wildfire. Participating in wildfire risk reduction and resiliency activities also promotes a sense of empowerment and shared responsibility. This discipline often supports the successful implementation of many other FireSmart disciplines by building awareness and understanding among both residents and visitors.

Messaging and community engagement regarding the emergency response program and FireSmart education is a priority for the Emergency Operations Centre (EOC) team. Since the establishment of the EOC team in early 2023, a public communications strategy for wildfire risk and mitigation has been established. The public education strategy will use several outreach methods to deliver wildfire risk reduction education, including hosting FireSmart events and workshops and the distribution of FireSmart educational print materials. Furthermore, to supplement the development of this CWRP, an educational video focused on MMFN wildfire risk and FireSmart principals was created. MMFN should look to use this educational video to initiate a multi-media communication strategy that provides information to residents about interface wildfire hazard and FireSmart principals by utilizing the municipal website and social media, in addition to print material. The Nation should continue to apply for funding to support FireSmart education through public outreach and accessing various communication outlets.

Neighbourhoods in which residents undertake steps to reduce hazards and vulnerabilities have a greater chance of surviving a wildfire without intervention of the fire department.[33] The FireSmart Canada Neighbourhood Recognition Program (FCNRP) is a program that supports neighbourhoods to self-organize to implement wildfire risk reduction activities tailored to specific individual and community vulnerabilities. A tight-knit community like Tsa Xana is a good candidate for the program, and with support and guidance, residents can work together to decrease wildfire risk. Furthermore, the EOC team has expressed interest in FCNRP uptake. MMFN should undertake the following steps to gain recognition:

1) A community leader is identified and they complete FireSmart Neighbourhood Campion training;
2) A Local FireSmart Representative completes a Neighbourhood Wildfire Hazard Assessment to evaluate Tsa Xana's wildfire readiness at a neighbourhood scale;
3) The Neighbourhood Champion creates a FireSmart Committee of engaged community members and planners;
4) The FireSmart Committee reviews and accepts the neighbourhood wildfire hazard evaluation.
5) The local FireSmart Committee develops a FireSmart Neighbourhood Plan to mitigate fire issues identified in the Neighbourhood Wildfire Hazard Assessment;
6) The Local FireSmart Representative works with Tsa Xana residents to implement FireSmart solutions.

[33] FireSmart Canada. 2023. FireSmart Canada Neighbourhood Recognition Program. Available from: https://firesmartcanada.ca/programs/neighbourhood-recognition-program/

7) The Local FireSmart Representative completes a post-solution Neighbourhood Wildfire Hazard Assessment and present findings to the local FireSmart Committee for review and acceptance.

In addition to educating residents, education directed at tourists using multiple communication avenues is key to reducing accidental fire ignition. Yuquot is a popular destination for tourists from the mainland, particularly during summer months when wildfire risks are highest. Due to the inherent constraints of emergency response on Yuquot, it is particularly important to communicate fire bans and fire danger information to tourists prior to departure from Ahaminquus to ensure that appropriate safety measures are established.

Table 13 below details the full list of recommended actions that MMFN can implement to enhance FireSmart education within its communities. Overall, MMFN should maintain the steps they have taken so far to promote wildfire risk awareness, wildfire preparedness and FireSmart principles, while expanding a communication strategy that targets specific wildfire risks to Tsa Xana residents.

Table 13: Education recommendations and action items

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
Residents							
1	High	Deploy a multi-media FireSmart communication strategy that utilizes various communication channels (e.g., MMFN website, social media channels, print materials, etc.) to educate community members on wildfire hazard and to promote the uptake of FireSmart activities.	A suite of FireSmart BC education resources, including promotional items, posters and graphics, videos, guides and manuals and a FireSmart social media handbook are available through the FireSmart online Resource Library. This CWRP, associated maps and the MMFN FireSmart Educational Video should also be made publicly available.	MMFN *(CFRC/FireSmart Coordinator)*	1 year then ongoing	CWRP, FireSmart Educational Video and FireSmart BC materials are available for viewing on the MMFN web page and social media platforms	UBCM CRI FCFS (up to cost maximums)
2	High	Fire danger information and advisories should be updated as needed on relevant communication channels (e.g., verbally, MMFN website and social media platforms).	Communicating current fire danger ratings and regulations ensure appropriate vigilance during higher fire ratings.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Up-to-date fire danger ratings and protocols are delivered to community members during wildfire season	Local government funding
3.a	High	Continue holding in-person wildfire/emergency community events. Augment education and outreach programs through organizing FireSmart workshops (e.g., Neighbourhood Champion workshop, FireSmart 101 seminar etc.).	Seminars and workshops provide targeted and detailed information on a variety of topics to educate community members to increase their wildfire resiliency.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	At least two wildfire community events annually; number of attendees	UBCM CRI FCFS (up to $5,350 per event)

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
3.b	High	Continue distributing FireSmart promotional materials at community safety events.	FireSmart BC resources help present a unified message. A suite of FireSmart promotional items and resources, such as giveaway promotional items and reusable print materials/manuals are available for download or purchase.	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Quantity of resources distributed/number of times used at events	UBCM CRI FCFS (up to cost maximums)
4	High	Undertake steps to support Tsa Xana to become a recognized FireSmart Neighbourhood under the FireSmart BC recognition criteria.	FireSmart is most effective when neighbours collaboratively implement FireSmart activities. The FireSmart Canada Neighbourhood Recognition Program motivates individuals and groups to take action through community hype.	MMFN *(CFRC/FireSmart Coordinator)*	1 - 2 years	Tsa Xana achieves FireSmart recognition	UBCM CRI FCFS (up to $430 per assessment and $1,070 per plan)
5	Moderate	Seek opportunities to remove barriers to FireSmart uptake for residents with mobility issues through community support and engagement.	MMFN staff identified mobility issues as a concern for emergency planning. The CFRC should explore this during planning tables.	MMFN *(CFRC/FireSmart Coordinator)*	1 year then ongoing	FireSmart opportunities support residents with mobility issues	UBCM CRI FCFS funding available for CFRC meetings and coordination (up to $2,140 per meeting)
6	Moderate	Look for opportunities to educate residents on the importance of visible and reflective addresses for emergency service.	MMFM staff expressed concern over illegible addresses. Visible addresses are important to a safe and effective evacuation and emergency service.	MMFN *(CFRC/FireSmart Coordinator)*	1 year	All addresses are visible in all levels of light	UBCM CRI FCFS funding available for FireSmart education (up to cost maximums)
Visitors							

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
7	Moderate	Wildfire danger information and advisories should be communicated to tourists at the RV/Campground office and tourists visiting Yuquot.	Yuquot and Ahaminquus receive an influx of tourists coinciding with peak wildfire danger time periods. Education can be communicated to tourists through multiple communication avenues (e.g., verbally, on the tourism page of the MMFN/Yuquot webpage, at the Tourism Office once complete etc.).	MMFN *(CFRC/FireSmart Coordinator)*	Ongoing during the wildfire season	Fire danger ratings and protocols are delivered to tourists during wildfire season	UBCM CRI FCFS funding available for FireSmart education (up to cost maximums)

5.3 LEGISLATION AND PLANNING

Legislation and planning play a significant role in building and maintaining FireSmart neighbourhoods.[34] MMFN residents and elected officials have opted for information rather than enforcement as a policy tool, due to limited enforcement resources. Regardless, how Nation policies relate to wildfire are still important, as they set the tone for risk recognition and community resilience. A summary of MMFN planning documents relevant to wildfire risk and emergency planning was provided earlier in Section 0 - Higher-Level Plans and Legislation.

The relationship between the built environment (homes, businesses, accessory structures, cultural resource facilities, infrastructure), and the natural environment (landscaping, parks, and natural areas such as grasslands and forests) influence wildfire susceptibility and the effectiveness to respond to it. Factors that can be planned for (and regulated through the land use planning and development process) affecting public safety during a wildfire include:[35]

- Regulations to enforce FireSmart building materials on new builds and renovations;
- Regulations to ensure new buildings are adequately offset from the forest and/or slope;
- Regulations to ensure that new developments have adequate access for firefighters and adequate water supply for emergency response;
- Bylaws to prevent combustible materials or flammable vegetation within five feet of homes;
- Bylaws to prevent highly-flammable vegetation in new developments (specifically close to homes);

Reviewing zoning bylaws *through a wildfire lens* to assess where they inadvertently promote conditions that may contribute to fire spread (*e.g.,* landscaping, fencing), and determining where bylaws can be updated or strengthened to reduce wildfire risk to development (such as adopting bylaws tied to wildfire hazard levels and requiring minimum standards for construction materials and techniques, and vegetation management) can help accomplish the goal of more wildfire resilient communities. In future land use and development policies, it is important that the Nation considers adopting language and regulations strictly relating to wildfire risk reduction, so that future land use and development are guided with wildfire preparedness in mind.

Opportunities to update or strengthen existing policies, and recommendations to incorporate an interface wildfire risk assessment into future plans, have been identified in Table 14.

[34] FireSmart Canada. 2023. The Seven FireSmart Disciplines: Legislation and Planning. Available from: https://firesmartcanada.ca/about-firesmart/the-seven-firesmart-disciplines/
[35] UBCM 2020. *Community Wildfire Resiliency Plan Instruction Guide.* Available from: Community Wildfire Resiliency Plan Instruction Guide (ubcm.ca)

Table 14: Legislation and planning recommendations and action items

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
8	High	Digitally publish all analog legislation and policies on the MMFN website so that they are accessible for viewing and downloading by community members.	Though MMFN does not have any policies specific to wildfire, policies may be indirectly relevant to community resiliency.	MMFN	1 year	All analog legislation and policies are digitally available	Local government funding (approximately 40 - 60 hours)
9	Moderate	Consider developing a FireSmart policy or regulation that mandates or guides design and construction of critical infrastructure and community assets.	Incorporate FireSmart development standards in MMFN community infrastructure to increase structural resiliency to fire.	MMFN	2-3 years	Adoption of a new policy that guides MMFN FireSmart construction	UBCM CRI FCFS funding available for FireSmart policies (up to $10,700)
10	Moderate	Consider developing standards and supporting guidelines to provide direction on residential FireSmart construction and landscaping in Tsa Xana.	This is to reduce wildfire risk of residential properties through the provision of hazardous yard conditions. Consider standardizing safe procedures for the storage of firewood and combustibles in regards to fire/wildfire hazard.	MMFN	2-3 years	Adoption of a new policy that includes property maintenance mandates	UBCM CRI FCFS funding available for FireSmart policies (up to $10,700)

5.4 DEVELOPMENT CONSIDERATIONS

Building materials and design, coupled with residential landscaping, are the most significant factors influencing home survivability during a wildfire. Development standards influence the potential impact a wildfire may ultimately have on a community. Damage potential is exacerbated when flammable building materials are used throughout the development landscape.[36] As such, strategic decisions regarding FireSmart building materials and design are important to reduce the ignitability of structures and protecting neighbourhoods from wildfire.

Important factors that can be planned for which affect public safety during a wildfire include:[1]

- Location of development, including hazardous or vulnerable land uses, in relation to high hazard forested vegetation, steep slopes, and other geographical features that contribute to extreme fire behavior.
- Access and circulation patterns.
- Availability and adequacy of water supply.
- Type of construction materials on structures and attachments (privately and publicly owned).
- Lot size and structure density.
- Design guidelines and architectural standards.

While development at the landscape level is relatively fixed, FireSmart practices and considerations may be factored into residential construction and maintenance. Homes in Tsa Xana have variable FireSmart compliance when considering building materials and maintaining a defensible space. Older developments (i.e., Blocks 1 and 2) are constructed with wood cladding while newer developments (i.e., Block 3 homes) are constructed with fire-resistant cement board siding. Roofs are uniformly constructed of fire-rated asphalt shingles and generally in good condition. Wood decks are common and combustible material is often stored beneath these and similar extensions. Outbuildings (i.e., smoke houses and firewood sheds) rarely meet FireSmart setback guidelines (>10m from primary structures) and are not mitigated to the same conditions as homes. Storage of combustible items (e.g., propane cylinders, jerry cans, construction materials etc.) adjacent to homes is also common.

Opportunities exist to embed FireSmart principles into home retrofits and yard maintenance. As a first step, the Nation should engage a Local FireSmart Representative to evaluate homes and properties for wildfire risk and provide property-specific recommendations for risk reduction. Looking ahead, MMFN may seek opportunities to remove barriers to FireSmart uptake (e.g., financial barriers, mobility issues) and encourage action through incentives like a FireSmart rebate program.

The construction of local critical infrastructure should also be considered *through a wildfire lens*. An inventory of critical infrastructure and community assets were listed in Section **Error! Reference source**

[36] FireSmart Canada. 2023. *The Seven FireSmart Disciplines: Development Considerations*. Available from: https://firesmartcanada.ca/about-firesmart/the-seven-firesmart-disciplines/

not found. - **Error! Reference source not found.**. Critical infrastructure FireSmart assessments were completed in 2021, though community assets were not evaluated. Field observations of community assets identified several hazardous development factors; FireSmart assessments of community assets are recommended as a result. To increase infrastructure resiliency, while demonstrating best practices to community members, recommended FireSmart improvements should be implemented by MMFN, as feasible.

Evacuation from wildfire is a real possibility to First Nations in BC - in the last decade, almost 9,000 First Nations evacuated their home in BC due to wildfire.[37] Adequate access and circulation routes are important to facilitate entry of first responders to neighborhoods in the event of an interface wildfire incident, and the exit or evacuation of residents. Road networks within Tsa Xana provide adequate access/egress through a series cul-du-sacs with large turnarounds. Though the neighbourhood design promotes an ease of navigation within the community, a problematic feature that exists in regards to access and egress is the lack of alternate routes in and out of the community. Moreover, Tsa Xana is accessed via a single-lane bridge over Gold River, which poses egress challenges as an evacuation event would result in a surge of eastbound evacuees, likely impeding community access of first responders. To prepare for a potential interface evacuation event, access roads and infrastructure should be reviewed for fire suppression accessibility, safety and for the staging of anchor points for firefighting equipment and personnel.

Recommendations and action items that MMFN can implement to foster resilient development are detailed below in Table 15.

[37] Government of Canada. 2022 Indigenous Services Canada. *Wildland fire and flood evacuation statistics*. Available from: Wildland fire and flood evacuation statistics (sac-isc.gc.ca)

Table 15. Development recommendations and action items

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
11.a	High	A trained LFR (Recommendation 24) should assess wildfire risks to community assets (i.e., FireSmart Critical Infrastructure Assessment, FireSmart Home Ignition Assessment, FireSmart Home Partners Assessment). Alternatively, MMFN should engage with the SRD FireSmart Coordinator to delivery FireSmart assessments of community assets.	Assess the vulnerability to wildfire of community assets described in Table 4 to help guide risk reduction action items.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	1 year	All MMFN community assets assessed	ISC CFMP, ISC FNESS FireSmart Program, ISC FNIF and UBCM CRI FCFS
11.a	High	Plan and implement wildfire risk action items from completed Critical Infrastructure FireSmart Hazard Assessments in the sequence of infrastructure importance.	FireSmart Critical Infrastructure Assessments were completed for MMFN critical infrastructure in 2021. Plan and implement action items in the sequence of critical infrastructure importance and as feasible.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	2 - 5 years	Action items are prioritized and actioned upon as feasible	ISC CFMP, ISC FNESS FireSmart Program and UBCM CRI FCFS
12	High	Use fire-resistant construction materials, building design and landscaping for new community infrastructure such as the campground and Tourism Office.	Integrate FireSmart solutions into the design of the new tourism site through FireSmart compliant construction and landscaping. The FireSmart Home Development Guide may be used to guide design choices.	MMFN (LFR/FireSmar t Coordinator	1-3 years	FireSmart principles incorporated into tourism expansion projects	ISC CFMP, ISC FNESS FireSmart Program and UBCM CRI FCFS
13	High	A trained LFR (See Recommendation 24) should assess the wildfire hazard of residential structures and surrounding vegetation and landscaping.	FireSmart Home Ignition Zone assessments encourage action in residential priority zones. Encourage uptake through education or through incentives like a FireSmart rebate program, combustible removal service or FireSmart Canada Neighbourhood Recognition Program.	Hired/trained LFR/FireSmart Coordinator *(alternate: SRD LFR)*	1 year	All residential structures assessed	ISC FNESS FireSmart Program and UBCM CRI FCFS

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
14	High	Invest in back-up generators for any critical infrastructure that does not have one.	Currently only the pumphouse has a back-up generator. Back-up generators for community buildings would facilitate emergency response and recovery (emergency social services) following a fire.	MMFN	3 years	All buildings have a back-up generator and fuel supply	ISC FNESS Wildland Fire Equipment Purchasing Program, ISC EMAP Non-Structural Mitigation and Preparedness Program and FNIF
15	Moderate	Enhance fire protection capacity in Yuquot by acquiring basic wildfire-related equipment. Consider establishing a cache (or equipment trailer) with trash pumps, portable hoses and FireSmart equipment (e.g., PPE, coveralls, water packs) near Summercamp activities. Cabins should also be equipped with basic wildfire suppression and emergency supplies (e.g., fire extinguisher, radios, first aid kits).	Fire response is challenged for Yuquot due to its remote nature. Equipping the reserve land with basic fire suppression tools and safety equipment will increase fire protection capacity and improve safety for community members and visitors.	MMFN	1 - 2 years	Fire cache on Yuquot. Cabins equipped with basic emergency and suppression supplies.	ISC FNESS Wildland Fire Equipment Purchasing Program; ISC EMAP Non-Structural Mitigation and Preparedness Program; and UBCM CRI
16	Moderate	Make a FireSmart rebate program available for residents who complete FireSmart construction as recommended in a FireSmart Home Ignition Zone Assessment. Focus on assisting with low-cost ways to FireSmart outbuildings and enclose decks/porches.	FireSmart rebate programs are an incentive to complete FireSmart work and/or participate in a Neighbourhood Recognition Program.	MMFN *(LFR/FireSmart Coordinator)*	1 year	5-10 properties participate annually	UBCM CRI FCFS (Up to $1000 rebate per property and 50% of costs)

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
17	Moderate	Review access and egress routes and dead-end roads for evacuation, first response accessibility, safety and staging of anchor points. Widen and/or upgrade routes in a priority sequence.	Access and egress designs should promote ease of navigation, vegetation clearance from roads and should consider evacuation safety.	MMFN *(Private Consultant)*	2 - 5 years	Road network assessed for fire	ISC EMAP Non-Structural Mitigation and Preparedness Program, UBCM CEPF and UBCM CRI UBCM

5.5 INTERAGENCY COOPERATION

Engagement and strong partnerships foster effective FireSmart programs.[38] The goal of interagency cooperation is to broaden from a single department- or agency-based siloes approach to a landscape-level, multi-agency approach to wildfire resilience.[39] Bringing organizations together to address wildfire issues that overlap physical, jurisdictional, or organizational boundaries is a good way to help develop interagency mechanisms to reduce wildfire risk. For a small community, with limited resources and staff capacity such as MMFN, interagency cooperation is especially crucial to increase the ability of the local government to plan and respond to emergencies effectively.

Mutual Aid Agreements allow for resources to be shared across jurisdictional boundaries bolstering firefighting capabilities to adjacent communities as needed. MMFN employs a multi-agency approach to emergency response through existing partnerships with neighbouring jurisdictions and First Nations. Fire protection services are provided through a mutual agreement between the Nation and the Village of Gold River. The joint partnership bolsters MMFN's capacity to effectively suppress fire on reserve land.

MMFN also has a working relationship with the Strathcona Regional District, who have historically shared staff resources for FireSmart projects. Most recently, Strathcona Regional District hired a Local FireSmart Representative to assess the wildfire risk to the Nation's critical infrastructure. Future opportunities for collaborative wildfire risk reduction exist through this pre-established relationship, as the Strathcona Regional District intends to hire a regional FireSmart Coordinator to manage FireSmart projects for respective electoral areas, municipalities and First Nations. Maintaining and building upon this partnership through sharing resources, applying for collective grants and delivering FireSmart education in tandem will help to increase the Nation's wildfire risk reduction program.

The small land base area of MMFN reserve lands means that the activities of neighbouring land managers has a strong influence on the Nation's wildfire risk profile. For example, harvesting activities on crown land surrounding the Tsa Xana community (as discussed previously in Section 4.1.3 - Fuel) has drastically changed the forest landscape and increased hazardous wildfire conditions throughout widespread cutblocks with high amounts of surface fuel. Though these hazardous conditions influence MMFN's wildfire risk profile, the managed forest land is beyond the jurisdictional boundary of Tsa Xana, thus, risk reduction at a landscape-level requires multi-agency engagement and cooperation. MMFN should advocate for Western Forest Products to mitigate wildfire hazard associated with woody debris accumulation as a result of harvesting operations adjacent to the Tsa Xana community.

Community FireSmart Resiliency Committee

A Community FireSmart Resiliency Committee (CFRC) reflects the key planners and responders most involved in local FireSmart, wildfire resiliency planning, and wildfire and emergency response. Committees

[38] FireSmart Canada. 2023. *The Seven FireSmart Disciplines: Interagency Cooperation*. Available at https://firesmartcanada.ca/about-firesmart/the-seven-firesmart-disciplines/
[39] CRI FCSF 2021 CWRP Supplemental Instruction Guide

such as this foster collaborative problem solving and planning, and delineate required roles and actions during times of emergency response.

An Emergency Operations Centre (EOC) team was developed in 2023 as an extension of MMFN Emergency Program to provide oversight for and strategic direction to MMFN emergency planning and response. The EOC team consists of emergency management staff from neighbouring First Nations within the Nuu-chah-nulth Tribal Council. Through this multi-agency team, the implementation of wildfire resiliency actions and public outreach are actioned upon. The EOC team is to be used jointly as the MMFN CFRC – thus eliminating redundancies and creating efficiencies of both time and resources.

Recommended participants that should be involved in planning tables specific to wildfire planning and mitigation to the committee are listed below in Table 16. These persons should partake in meetings for discussions relating to wildfire management, evacuation, and fuel or FireSmart vegetation treatments.

Table 16: MMFN EOC team / CFRC recommended additions

Agency/Land Manager	Title
BCWS Coast Fire Centre	Wildfire Officer – Prevention
BCWS North Island/Mid Coast Fire Zone	Wildfire Technician, Wildfire Assistant
Strathcona Regional District	Protective Services Coordinator
Strathcona Regional District	FireSmart Coordinator
Gold River Volunteer Fire Rescue Manager	Fire Chief
First Nations' Emergency Services Society	Mitigation Liaison
Western Forest Products	TFL 19 Land Manager

It is recommended that the CFRC focus on the following important risk reduction and planning measures during its initial meetings:

- Develop a Terms of Reference document to guide the CFRC;
- Prioritization of recommendations in this CWRP and the development of a timeline for implementation of key short- and long-term key recommendations,
    - Including projects/action items to apply for within the 2024 CRI FCFS program funding intake; and
- One or more FireSmart disciplines discussed per meeting.

Recommendations and action items that MMFN can implement to continue growing interagency relationships and increase interagency cooperation are listed below in Table 17.

Table 17: Interagency cooperation recommendation and action items

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
19	High	Lobby Western Forest Products to reduce the wildfire hazard of adjacent cutblocks and from road right-of-way clearings.	Hazardous cutblocks were identified as a major contributor to rapid fire spread in the area by local BCWS staff. WFP commits to mitigate safety risks associated with operations and to work collaboratively with local First Nation communities.	MMFN *(WFP)*	1 year	WFP mitigates hazardous conditions of cutblock near Tsa Xana	Local staff time (approximately 10 hours)
20.a	High	Continue hosting regular Emergency Operations Centre (EOC) team (CFRC) meetings, incorporating FireSmart and wildfire management topics for wildfire risk reduction planning.	Address local wildfire-related issues and recommendations to develop collaborative solutions to mitigate wildfire risks.	EOC team (CFRC)	Ongoing	2 - 6 meetings annually that focus of wildfire risk reduction	UBCM CRI FCFS (up to $2,140 per meeting and coordination) and FNESS EOC Training and Mentoring
20.b	High	Engage recommended stakeholders in wildfire-focused EOC team (CFRC) meetings to foster collaboration of wildfire resilience actions through a multi-agency approach.	Multi-agency coordinated action can effectively reduce MMFN's wildfire risk profile. Key planners and responders should be involved in local FireSmart, wildfire resiliency planning and wildfire and emergency response.	EOC team (CFRC) *(local stakeholders*	1 year then ongoing	Key stakeholders are invited to all relevant meetings	UBCM CRI FCFS (up to $2,140 per meeting and coordination) and FNESS EOC Training and Mentoring
21	Moderate	Facilitate and participate in emergency training exercises with key emergency stakeholders. Exercises may be walkthroughs, workshops, table top exercises or full-scale exercises.	Emergency response efficiencies are maximized by having an understanding of neighbouring jurisdictions' responses. Tabletop exercises help identify weaknesses.	EOC team	Annually/Ongoing	Participation in exercises. Emergency Plan updates as necessary	UBCM CRI FCFS (up to $2,140 per fire planning table) and FNESS Tabletop Exercise Design and Delivery

22	Moderate	Work with GRVFD to explore strategies to increase MMFN fire personnel enrollment.	Consider utilizing the FNESS Wildland Fire Fighting Training program to appropriately train interested MMFN community members (See Recommendation 28).	MMFN *(GRVFD)*	1 year then ongoing	Increased MMFN GRVFD uptake (1+ MMFN fire personnel)	ISC FNESS Wildland Fire Fighting Training Program
23	Moderate	Continue to work with the SRD to share resources to integrate FireSmart initiatives and increase FireSmart program/funding opportunities.	Strong interagency relationships with neighbouring jurisdictions like the SRD will increase MMFN's ability to prepare for a wildfire.	MMFN *(SRD)*	Ongoing	MMFN/SRD FireSmart programing collaboration	UBCM CRI FCFS funding available for interagency staffing costs

5.6 CROSS-TRAINING

Wildfire resiliency planning draws upon various professional disciplines who do not typically work in the wildfire environment.[40] As a result, cross-training of local government and staff, structural fire fighters and other key positions will support effective risk reduction activities and emergency response. Education of key stakeholders will promote informed decision-making and help to build local support for the adoption of FireSmart principles. To expand local capacity and expertise, MMFN should invest in cross-training opportunities for all persons involved in in a potential wildfire emergency.

All staff who are expected to participate in the development and implementation of this plan, or participate in wildfire response and recovery, should be appropriately trained. MMFN has a need for at least one trained FireSmart staff member to administer the FireSmart program. To increase local capacity, the CRI FCFS program has funding that can be applied to train or employ a FireSmart Coordinator, Local FireSmart Representative, Wildfire Mitigation Specialist or FireSmart Crew members. FireSmart programs may be better received by the community if they are delivered internally.

FireSmart specific training is an excellent way to accelerate the MMFN FireSmart program. FireSmart training opportunities that the Health & Safety Emergency Preparedness Officer or a hired FireSmart position may take include:

- **Local FireSmart Representative (LFR) Training:** Its purpose is to assist neighbourhood leaders and fire professionals to implement the FireSmart hazard assessments and develop associated recommendations and plans.
- **Wildfire Mitigation Specialist (WMS) Training:** Responsible for the facilitation of the FireSmart Home Partners Program and other related programs. Trains individuals to deliver more detailed assessments than basic Home Ignition Zone assessments.
- **FireSmart Community Champion Training:** Conducted by LFRs, its purpose is to prepare community champions (neighbourhood leaders) to take the initiative to begin the formal process of attaining FireSmart Community recognition status.
- **Wildfire Risk Reduction (WRR) Training:** Intended for non-forest professionals who are engaged in FireSmart BC programs. Informs participants of wildfire risk reduction strategies, concepts and funding opportunities.

FNESS also offers ample preparedness and response training opportunities, including Emergency Operations Centre (EOC) training, tabletop exercise support and wildfire training. The FNESS Wildland Fire Training Program[41] is developed to train First Nation fire crews up to a Type-2 Wildfire Crew Standard.[42]

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[40]UBCM FCFS. 2021. Community Wildfire Resiliency Plan Instruction Guide. Available at https://www.ubcm.ca/sites/default/files/2022-03/cri-fcsf-2022-CWRP-supplemental-instruction-Guide_0.pdf

[41] Program information available at: https://www.fness.bc.ca/core-programs/mitigation/

[42] Province of British Columbia. *Contract Crews.* Available from: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/wildfire-response/wildfire-personnel-and-response-tools/wildfire-crews/contract-crews#:~:text=Type%202%20contract%20crews%20conduct,)%2C%20patrol%20and%20move%20equipment

Type 2 firefighters are professional personnel that may conduct low-risk direct fire attack, establish hose and pump lines, dig fire guards and remove fuels. Once trained, MMFN personnel may remain as local resources and work on local mitigation projects and/or may enter into a standing offer agreement with BCWS. This may serve as a potential economic opportunity for the Nation, as BCWS may call upon contract crews as needed during wildfire events.[43]

Community leaders are also good candidates for participation in wildfire training. Training opportunities for engaged community members and staff include:

- **FireSmart 101:** Provides an introduction to FireSmart principals
- **FireSmart Local FireSmart Representative:** Training of Wildland Urban Interface concepts and wildfire hazard assessments
- **FireSmart Neighbourhood Champion Workshop:** Assists Neighbourhood Champions to initiate the process of attaining FireSmart Neighbourhood recognition status

Recommendations and action items that MMFN can implement to expand training opportunities, and enhance firefighting resources, are listed below in Table 18.

[43] [43] Province of British Columbia. *Wildfire Contract Opportunities.* Available from: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/employment-and-contracts/contract-opportunities

Table 18: Cross-training recommendation and action items

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
24	High	The Health & Safety Emergency Preparedness Officer should complete training to facilitate MMFN's FireSmart Program. Alternatively, pursue funding to employ/contract a FireSmart Coordinator or Local FireSmart Coordinator to deliver FireSmart education and assessments.	Applicants of the CRI FCFS program will be required to have a local FireSmart position as of 2024. Responsibilities undertaken in this role should support wildfire preparedness, prevention and mitigation.	MMFN *(Health & Safety Emergency Preparedness Officer)*	1 year	A FireSmart Coordinator position is created and filled, or new responsibilities are added to an existing position	UBCM CRI FCFS funding available for compensation and training
25	High	The Health and Safety Emergency Preparedness Officer should maintain and augment Incident Command System (ICS) training.	The Health and Safety Emergency Preparedness Officer is currently trained in ICS-100. ISC courses are available online to provide emergency staff with the knowledge and tools to effectively manage emergency events.	MMFN *(Health & Safety Emergency Preparedness Officer)*	Ongoing	The Health and Safety Emergency Preparedness Officer receives and maintains some level of ICS training	UBCM CRI FCFS and ISC EMAP funding available for staff time and course cost
26	High	MMFN landscaping/turf staff should undertake FireSmart wildfire reduction courses (e.g., Wildfire Risk Reduction training, Local FireSmart Representative training, FireSmart 101 etc.) to expand FireSmart landscaping strategies.	Landscaping/turf staff employ FireSmart principles throughout landscaping strategies. The program can be enhanced through pursuing relevant learning opportunities.	MMFN	1 year	Landscaping/turf staff participate in WRR, LFR and FireSmart 101 free courses	No associated course costs. UBCM CRI FCFS funding available for staff time
27	Moderate	The Health and Safety Emergency Preparedness Officer and other relevant staff should attend the Wildfire Resiliency and Training Summit on an annual basis.	Relevant learnings should be shared at CFRC meetings.	Health & Safety Emergency Preparedness Officer (relevant MMFN staff)	Annually	Annual attendance at Wildfire Resiliency and Training Summits (1-2 staff)	ISC FNESS FireSmart Program and UBCM CRI FCFS

Item	Priority	Recommendation	Comments	Lead *(involved)*	Timeframe	Success Metric	Funding Source
28	Moderate	Enhance MMFN's fire protection capacity and awareness through pursuing the FNESS Wildland Fire Fighter Program for interested community members. Once trained, consider internally hiring personnel as FireSmart Crew members and/or contracting out crew to BCWS as an economic opportunity.	Increase local wildfire resources and expand economic opportunities through inter-agency cooperation.	MMFN *(GRVFD)*	1 - 2 years	Increased wildfire-trained MMFN community members	ISC FNESS Wildland Fire Fighting Training program

5.7 EMERGENCY PLANNING

Deployment of provincial resources follows the Provincial Coordination Plan for Wildland-Urban Interface Fires,[44] which may lead to a scarcity of BCWS resources when several wildfire emergencies are taking place throughout the province. Therefore, local government wildfire preparedness and resource availability are critical components of community wildfire resilience – individuals and agencies need to be ready to act. Plans, mutual aid agreements, resources, training, and emergency communications systems make for effective wildfire response. MMFN's Emergency Preparedness Plan was in draft format at the time of writing this CWRP. This Plan details the emergency response procedures for MMFN; addressing evacuation, response and recovery considerations for a potential wildfire event.

Interface characteristics should be considered during action planning to help prepare communities for wildfire. Some of the complexities of interface wildfires in MMFN reserve lands are as follows:

- Access challenges: Single access via single-lane bridge (Tsa Xana), single-access (Ahaminquus), remote marine-access (Yuquot);
- Unmarked addresses (Tsa Xana);
- Increased number of evacuees during peak tourist months (Yuquot, Ahaminquus);
- Aging populations, mobility issues (Tsa Xana).

Wildfire Response

As discussed in Section 5.5 - Interagency Cooperation, the Nation has a fire response mutual agreement with the Village of Gold River for the Gold River Volunteer Fire Department to provide fire protection services to reserve land. Fire protection services are provided to residential, commercial and community buildings on reserve land on a 24-hour basis from the municipal fire hall, utilizing available staff and equipment. At the request of the Fire Department, MMFN may assist in fire suppression activities on reserve land under the direct control of the Fire Chief or Senior Officer of the Fire Department. The Fire Department may make fire prevention, fire investigation, fire equipment access, fire hydrants and standpipes and related inspections on reserve land. Based on inspections, the Fire Chief may issue recommendations to prevent, fire, eliminate or reduce fire hazards or facilitation fire protection to MMFN.

The Gold River Volunteer Fire Department has 19 active volunteers trained to exterior structure firefighting standards. Majority of fire personnel have completed SPP-WFF1 (Wildland Firefighter Level 1) training. The fire department has two pumper trucks, a rescue vehicle, and Fire Chief truck and trailer with drafting equipment. The Gold River 2020 Community Wildfire Protection Plan identified wildfire fighting equipment deficiencies and recommended augmentation of wildfire suppression equipment with portable water pumps, hoses, hand tools, backpack pumps, water storage bladders and personal protective equipment so that the Gold River Volunteer Fire Department is equipped to handle wildfire

[44] Province of British Columbia. 2016. *Provincial Coordination Plan for Wildland-Urban Interface Fires*. Available from: British Columbia Provincial Coordination Plan for Wildland Urban Interface Fires (gov.bc.ca)

response. The Nation should work with the Gold River Volunteer Fire Department to look for opportunities to augment wildfire response equipment.

Pre-Incident Planning

As MMFN updates their evacuation planning and management documents, procedures, roles, and responsibilities of evacuation operations should be planned for in the event of a wildfire. Wildfires are a unique emergency and thus require unique planning; pre-incident planning checklists should be used to develop pre-incident wildfire suppression plans and maps, and a wildfire response plan should be tested and practiced annually, pre-fire season. These plans and maps (some of which are wholly or partially developed as part of this document), developed in consultation with wildfire fighting professionals (*e.g.,* local BCWS staff, wildfire and emergency planning consultants) should consider at a minimum:[45]

- **Command:** Authority, constraints, structural protection needs, management constraints, etc.
- **Operations:** Helicopter base locations, flight routes, restrictions, and water intakes, fire control line locations and natural barriers, crew/personnel safety zones and staging locations, fuel caches, etc.
- **Logistics:** Base camp locations, roads and trails, utilities and communications (critical infrastructure).
- **Planning:** Maps (neighbourhoods, vegetation and fuel, hazards, critical infrastructure, archaeology and environmentally sensitive areas, water sources, access/egress, etc.

The pre-incident plan should be developed and tested using tabletop simulations, and if necessary, revised prior to every fire season. BCWS should be involved in this process to ensure that any mapping done as part of the Fire Management Planning process is not unnecessarily duplicated.

Wildfire Preparedness Condition Level

MMFN could also consider developing local daily action guidelines based on expected wildfire conditions. Table 19 below provides a Wildfire Preparedness Condition Guide template that outlines actions staff can take as fire danger levels change throughout the year (but mostly through the fire season).

Table 19: Example of a Wildfire Response Preparedness Condition Guide[46]

Fire Danger Rating	Action Guidelines
Low	• All MMFN staff on normal shifts. • Direct citizens to BCWS (or MMFN updated FireSmart/Wildfire webpage) for fire danger rating info.
Moderate	• All MMFN staff on normal shifts. • Information gathering and dissemination through CFRC. • Regional fire situation evaluated.

[45] UBCM 2020. *Community Wildfire Resiliency Plan Instruction Guide*. Retrieved from: Community Wildfire Resiliency Plan Instruction Guide (ubcm.ca)

[46] From FireSmart Community Funding and Supports 2021 CWRP Supplemental Instruction Guide

Fire Danger Rating	Action Guidelines
	• Direct citizens to BCWS (or MMFN updated FireSmart/Wildfire webpage) for fire danger rating info.
High	• All MMFN staff on normal shifts. • Regional fire situation evaluated. • MMFN and EOC staff notified of fire danger rating. • Establish weekly communications with CRFC. • Update or install additional fire danger rating signs in the communities.
Extreme	• Regional fire situation evaluated. • MMFN and EOC staff considered for level 1 activation standby. • Provide regular updates to MMFN social media, websites, and on-reserve staff/residents on the fire situations. • Provide updates as information changes. • Update fire danger rating sings in the community.
Fire(s) Ongoing	• All conditions apply as for Extreme (regardless of actual fire danger rating). • Mobilize EOC support if evacuation is possible, or fire event requires additional support. • Implement Evacuation Alerts and Orders based on fire behaviour prediction and under the direction of the EOC or BCWS. • Provide regular updates to MMFN social media, websites, and on-reserve staff/residents on the fire situations.

Recommendations and action items that MMFN can implement to continue productive and effective emergency planning are detailed below in Table 20.

Table 20: Emergency preparedness recommendation and action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
29.a	High	Work on completing the MMFN Emergency Preparedness Plan. Wildfire preparation, response and recovery should be considered during action planning.	Emergency plans increase resiliency by providing the framework for emergency response and recovery. The development of the Emergency Preparedness Plan is in progress (April 2023).	EOC team (CFRC)	1 year	Emergency plan is completed and shared with local emergency management partners	FNESS Preparedness and Response Program, UBCM CEP and ISC EMAP Non-Structural Mitigation and Preparedness Program
29.b	High	Once complete, participate in regular testing of, and updates to, the Emergency Preparedness Plan. Include annual wildfire emergency simulation exercises. Identify hazards, barriers to access and other response issues and develop measures to address them.	Exercises could be walkthroughs, workshops, table top exercises, functional exercises or full-scale exercises.	EOC team (CFRC) *(relevant stakeholders)*	Annual	Exercises are conducted annually and plan amendments are made as necessary	FNESS Preparedness and Response Program, UBCM CEPF and ISC EMAP Non-Structural Mitigation and Preparedness Program
30	High	Digitize all analog emergency planning documents so that they are readily accessible during a potential emergency.	Electronic emergency planning documents will ease retrieval and access in the event of an emergency	MMFN *(Health & Safety Emergency Preparedness Officer)*	1 year	All planning documents are digitized and readily available to emergency staff	FNESS Preparedness and Response Program
31	High	Develop a Hazard, Risk and Vulnerability Analysis (HRVA) to build a risk profile of MMFN reserve lands that will inform decision making of community infrastructure.	An HRVA will support the development of the Emergency Preparedness Plan through assessing risks posed to MMFN.	EOC team (CFRC) *(Private Consultant)*	2 years	The development of an HRVA that supports hazard mitigation and adaptation planning	FNESS Preparedness and Response Program, CIRNAC Climate Change Preparedness in

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
32	Moderate	Create a community evacuation pre-plan that notes and maps muster points, key contacts, access/egress routes, first responder contact information, water sources, etc. Share plans with local first responders (fire departments) and with community members.	Pre-plans can help coordinate rapid response to a wildfire event. Developing local daily action guidelines based on expected wildfire conditions may support emergency pre-planning. MMFN staff identified inaccurate/outdated maps as a constraint to emergency response.	EOC team (CFRC) *(Private Consultant)*	5 years	A plan is developed and distributed to residents (online and in print)	the North and First Nation Adapt programs UBCM CEPF, CIRNAC Climate Change Preparedness in the North and First Nation Adapt programs and ISC EMAP Non-Structural Mitigation and Preparedness Program

5.8 VEGETATION MANAGEMENT AND OTHER FIRESMART ACTIVITIES

As discussed in Section 4.1 - Wildfire Environment, fuel is the only aspect of the fire behavior triangle that can be modified to reduce wildfire threat. Fuel or vegetation management reduces potential wildfire intensity and ember exposure to people, structures, and other values through manipulation of both natural and cultivated vegetation within or adjacent to a community. A well-planned vegetation management strategy can greatly increase fire suppression effectiveness and reduce damage to property and to values.

Vegetation management can largely be accomplished through two different activities:

1. **Residential-scale FireSmart landscaping:** The removal, reduction, or conversion of flammable [landscaping] plants to create more fire-resistant areas in the FireSmart Home Ignition Zone (HIZ).

2. **Fuel management treatments:** The manipulation or reduction of living or dead forest and grassland fuels to reduce the rate of spread and head fire intensity and enhance likelihood of successful suppression.

5.8.1 RESIDENTIAL-SCALE FIRESMART LANDSCAPING

The goal of FireSmart landscaping is to design and maintain yards using FireSmart principles to make properties more resilient to wildfire. Strategic landscape planning and regular yard work routines that integrate FireSmart practices can reduce wildfire risks.

The ubiquity of highly flammable coniferous vegetation interspersed throughout properties in Tsa Xana and the lack of defensible space between structures and adjacent forested areas, particularly along community edges, are major vegetative threats to the community. Correspondingly, reducing, removing and converting combustible vegetation within residential areas are some of the most effective actions that can be taken to reduce wildfire risk to the Nation. FireSmart landscaping within 30 meters of homes will have the biggest impact to successful fire suppression.[47]

MMFN deploys a successful landscaping program where staff extensively thin and prune coniferous trees throughout Tsa Xana residential areas to mitigate wildfire hazard, decrease wildlife encounters and to improve the visual appearance of residential treed areas. The landscaping program positively influences wildfire behaviour dynamics by reducing the likelihood of an intense crown fire occurring within the community. Results of the Wildfire Threat Class Analysis (Section 4.3.1) indicate that these landscaped areas theoretically do not support significant wildfire spread. Woody debris and trimmings created as a result of thinning and pruning activities are manually loaded and hauled off-site for burning. Acquiring a

[47] FireSmart BC. 2023. FireSmart Begins at Home Manual. Available from: https://firesmartbc.ca/wp-content/uploads/2019/09/FireSmart_Booklet_web-Updated.pdf

wood chipper would improve the ease of vegetation debris disposal to support FireSmart landscaping best practices.

Combustible materials stored within 10 meters of residences are also considered a significant issue. Woodpiles, propane tanks and other flammable materials adjacent to and near homes provide fuel and ignitable surfaces. Flammable vegetation and combustible materials often combine to create fire pathways from yards to main structures (e.g., flammable coniferous tree in contact with combustible materials which connect to home). Locating these fuels away from homes in Tsa Xana will help to reduce structural fire hazards and improve the efficacy and safety of fire suppression activities.

The FNESS-ISC On-Reserve FireSmart Program is designed to fund treatment of fuels and combustible hazard within an extended FireSmart Home Ignition Zone (100m of housing or community infrastructure). Program funding can be utilized by the Nation to support yard waste removal and residential landscaping. Residential-scale FireSmart landscaping recommendations and action items are listed in Table 21.

5.8.2 FUEL MANAGEMENT TREATMENTS

Fuel management treatments are generally located outside of the Home Ignition Zone, and serve to further reduce wildfire risk to communities as well as to reduce the potential for fire transmission into adjacent forested lands. Fuel management treatments reduce potential fire behaviour to a level that allows for the best chance of successful fire suppression. While basic FireSmart landscaping can be guided by the recommendations of a Local FireSmart Representative, it is recommended that vegetation management outside of the Home Ignition Zone be directed by a forest professional, with wildfire risk reduction in their scope of practice, to ensure that additional forest values are not being negatively affected.

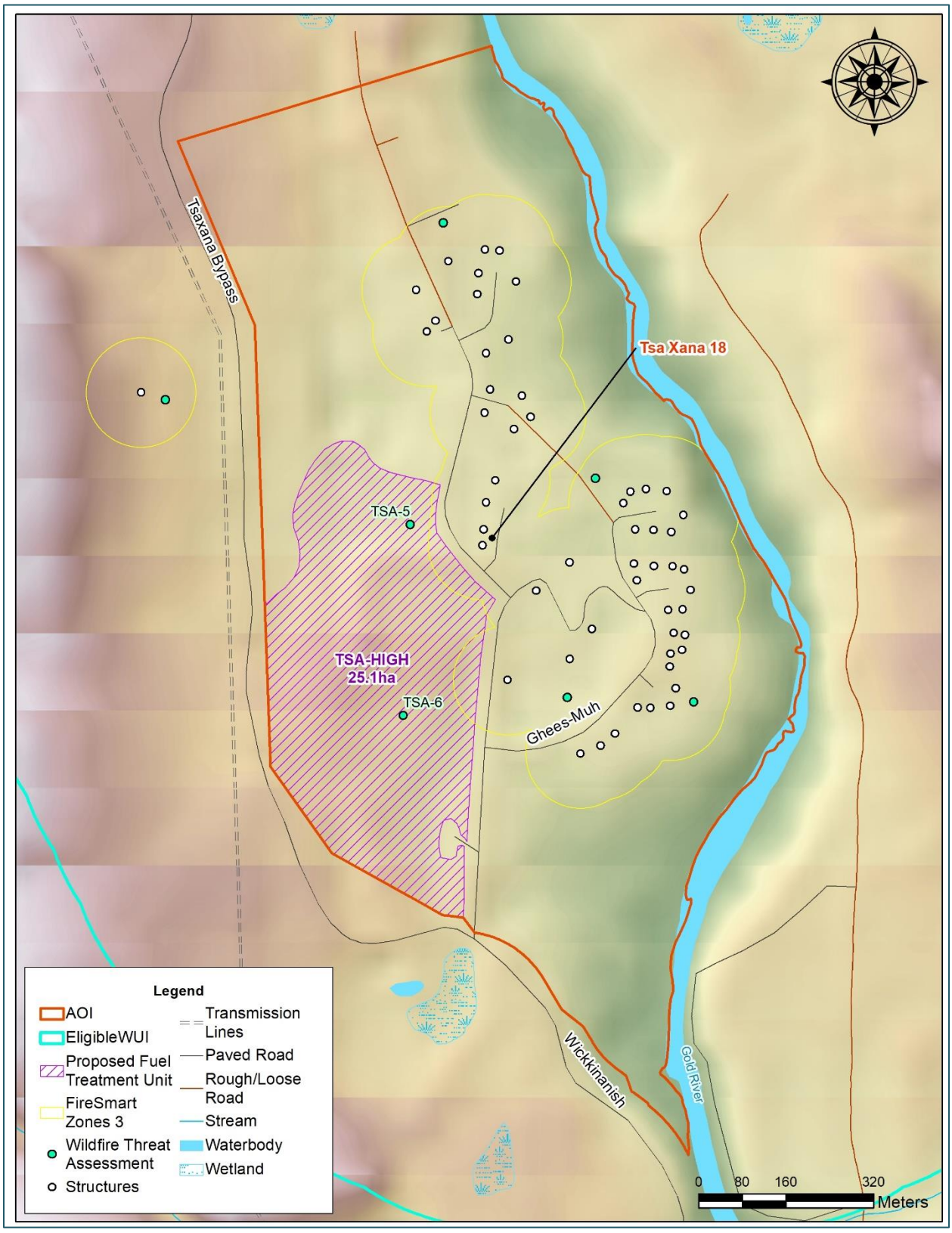
One proposed fuel treatment unit (PTU) has been proposed on MMFN reserve land (Map 14). The PTU is located just beyond the Home Ignition Zone in Tsa Xana in a forest stand with higher wildfire threat. The PTU is intended to address hazardous characteristics of forest land that is not captured in the FireSmart landscaping program. The unit will tie into low-hazard areas to increase fire response safety and allow access to defend the space. Further details of the PTU are provided in Table 22.

The FNESS-ISC On-Reserve Operational Fuel Treatment program is designed to treat forest fuels posing a wildfire risk to a community. The program funds fuel management projects in areas with moderate, high or extreme wildfire threat ratings that are within the Eligible WUI. Further funding opportunities exist through the UBCM CRI-FCFS program. MMFN should explore program funding opportunities to treat the PTU identified within this plan.

Due to the prevalence of low hazard forest stands with limited surface fuel, fuel management treatments were not recommended in Ahaminquus nor Yuquot. Where PTUs are not recommended, FireSmart landscaping is the recommended avenue for vegetation management. Recommendations and action items for fuel management are provided below in Table 21.

Table 21: Vegetation management action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Residential Landscaping							
33.a	High	Continue FireSmart landscaping throughout Tsa Xana's FireSmart Home Ignition Zone (FireSmart Priority Zone 3/Extended Zone).	The landscaping program successfully reduces wildfire behaviour threat ratings through pruning, thinning and surface fuel removal activities.	MMFN	Ongoing	All forest land within Priority Zone 3 is treated.	ISC FNESS FireSmart Program (up to $50,000)
33.b	High	Purchase a wood chipper to support FireSmart landscaping by improving the ease of off-site debris disposal.	Wood trimmings and debris are currently manually hauled and burned off-site.	MMFN	2 years	A wood chipper is acquired	ISC FNESS FireSmart Program (up to $50,000)
34	High	Utilize FireSmart funding to remove combustible waste and hazardous materials from Home Ignition Zones (minimum 10 m from the primary residence). The removal of combustibles within the non-combustible zone should be prioritized, following the 'closest-first' principle.	FireSmart funding may be used to rent or purchase a disposable bin, as well as hire staff to facilitate yard waste removal as desired by homeowners. Home Ignition Zone Assessments must be completed prior to clean-up (Recommendation 13) as per funding requirements.	MMFN	1 - 2 years	Combustible waste removed from yards. Firewood and other combustibles stored safely.	ISC FNESS FireSmart Program (up to $50,000)
35	Moderate	As tourism offerings expand in Ahaminquus, scotch broom should be maintained, particularly along roadsides where ignition potential is higher.	Scotch broom is highly flammable due to its high oil content and continuity of deadwood on mature plants. Scotch broom is present throughout the Ahaminquus reserve land, with highest concentrations along the Gold River Highway.	MMFN	1 - 3 years then ongoing	Scotch broom is treated	ISC FNESS FireSmart Program (up to $50,000)
Fuel Management Treatments							
36	High	Develop and implement a fuel management prescription for the fuel management area identified in this plan.	This area has been proposed due to hazard, strategic location, and operability. The proposed treatment unit is within MMFN control and will increase community safety, as well as demonstrate FireSmart proactivity.	MMFN LFR	1-3 years	Implementation of fuel management in identified areas	ISC FNESS On-Reserve Fuel Treatment Program (up to $75,000) and UBCM CRI FCFS (up to $425/ha for a ~20 ha prescription)



Map 14. Proposed fuel treatment In Tsa Xana

Table 22: Summary of Proposed Fuel Treatment Units

Name	Total Area (ha)	Priority	Wildfire Behavior Threat (ha)				Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme	High	Moderate	Low		
TSA-HIGH	25.1	High	0	0	23.9	1.2	The PTU is located entirely within the Tsa Xana reserve land with its west edge abutting the reserve boundary. Homes and critical infrastructure (e.g., pumphouse, elders building) on Wickkinanish Road, Outwatin Road and Ghees-Mh Road are within close proximity (50-120m) to the eastern portion of the PTU. A small undesignated landing site that is regularly used for burning yard trimmings is encompassed by the PTU.	The PTU is comprised of a young (approximately 50-70 years-old) Douglas-fir leading stand with a well-established understory and intermediate layers. The treatment unit is characterized as a C-3 fuel type with a dense overstory (approximately 1200-1500 stems per hectare) and dense understory (approximately 600 – 900 stems per hectare). The stand is undergoing stem exclusion and many dead suppressed stems are present as a result. Forest health pockets are present in some portions of the PTU, resulting in hang-ups and jackpots of surface fuel. The unit anchors to road right-of-way's and a deciduous-leading water drainage area to the north. Recommended treatment would focus on thinning dead and suppressed stems to reduce horizontal fuel continuity. Surface fuel removal, hazard tree removal and pruning would support wildfire hazard reduction. Treatment would improve egress safety of the only Tsa Xana access road (Wickkinanish Road).

SECTION 6: APPENDICES

6.1 APPENDIX A: LOCAL WILDFIRE RISK PROCESS

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 CWRP. This is accomplished by traversing as much of the WUI as possible (within time, budget, and access constraints). Threat Assessment plots are completed on the 2020 version form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the WUI 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 assess site-level threat ratings.
4. Threat assessment analysis using field data collected and rating results of WUI threat plots.

6.1.1 APPENDIX A-1: FUEL TYPING METHODOLOGY AND LIMITATIONS

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.[48] 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.[49] It should be noted that there are significant limitations with the fuel typing system which should be recognized.

Significant limitations with the fuel typing system which should be recognized. Major limitations include: a fuel typing system designed to describe fuels which sometimes do not occur within the WUI, fuel typing is not updated in private land, fuel types which cannot accurately capture the natural variability within a polygon, and limitations in the data used to create initial fuel types.[49]

There are several implications of the fuel typing limitations, which include: fuel typing further from the developed areas of the study generally has a lower confidence; and, fuel typing should be used as a starting point for more detailed assessments and as an indicator of overall wildfire risk, not as an operational, or site-level, assessment.

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

[49] 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 23 summarizes the fuel types by general fire behaviour (crown fire and spotting potential). These fuel types were used to guide the wildfire threat analysis.

Table 23. Fuel Type Categories and Crown Fire Spot Potential. Only summaries of fuel types encountered within the WUI are provided (as such, other fuel types, i.e., C-1, C-2 C-4, C-6, C-7, S-1, S-2, and S-3 are not summarized below)

Fuel Type	FBP / CFDDRS Description	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, hemlock, cedar), 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; brushed and pruned younger stands	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
M-1/2	Boreal mixedwood (leafless and green)	Moderately well-stocked mixed stand of conifers and deciduous species, low to moderate dead, down woody fuels	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)	<26% conifer (Very Low); 26-49% Conifer (Low); >50% Conifer (Moderate)
D-1/2	Aspen (leafless and green)	Deciduous stands	Always a surface fire, low to moderate rate of spread and fire intensity	Low
W	N/A	Water	N/A	N/A
N	N/A	Non-fuel: irrigated agricultural fields, golf courses, alpine areas void or nearly void of vegetation, urban or developed areas void or nearly void of forested vegetation	N/A	N/A

**C-3 fuel type is considered to have a high crown fire and spotting potential within the WUI 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, the most common fuel type errors found in the provincial dataset were C-3 fuel types being typed as D-1/2 and C-5.

The resulting updated fuel types were shown on Map 5, Map 6 and Map 7 in Section 4.1.3.

6.1.2 APPENDIX A-2: WILDFIRE THREAT SPATIAL ANALYSIS METHODOLOGY

As part of the CWRP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. Proponents completing a CWRP can obtain open-source BC Wildfire datasets, including Provincial Strategic Threat Analysis (PSTA) datasets from the British Columbia Data Catalogue. Wildfire spatial datasets obtained through the BC Open Data Catalogue used in the development of the CWRP include, but are not limited to:

- PSTA Spotting Impact
- PSTA Fire Density
- PSTA Fire Threat Rating
- PSTA Lighting Fire Density
- PSTA Human Fire Density
- Head Fire Intensity
- WUI Human Interface Buffer (2Km buffer from structure point data)
- Wildland Urban Interface Risk Class
- Current Fire Polygons
- Current Fire Locations
- Historical Fire Perimeters
- Historical Fire Incident Locations
- Historical Fire Burn Severity
- Fuel Type

As part of the program, proponents completing a CWRP are provided with a supplementary Structure point dataset from BC Wildfire Services.

The provided PSTA data does not 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 localized Fire Threat feature class that is included in the Local Fire Risk map required for project submission. 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.

Local 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 24 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 24. Description of variables used in spatial analysis for WUI wildfire risk 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
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
	No	

WUI Threat Sheet Attribute	Used in Analysis?	Comment
Live and Dead Coniferous Crown Closure	No	components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
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	Although included, these are broad classifications, meaning most polygons in the Study Area will have the same value
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	Too difficult to quantify – this is a relative value.
Type of development	No	Too difficult to analyze spatially.
Position of assessment area relative to values	Yes	Only distance to structures is used in this analysis, being above, below or sidehill too difficult to analyze spatially.

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 wildfire threat class. Table 25 below summarizes the components and scores to determine the Fire Threat.

Table 25. Fire Threat Class scoring components

Attribute	Indicator	Score
Fuel Type	C-1	35
	C-2	
	C-3	
	C-4	
	M-3/4,>50% dead fir	
	C-6	25
	M-1/2, >75% conifer	20
	C-7	
	M-3/4, <50% dead fir	
	M-1/2, 50-75% conifer	15
	M-1/2, 25-50% conifer	10
	C-5	
	O-1a/b	

Attribute	Indicator	Score
	S-1	
	S-2	
	S-3	
	M-1/2, <25% conifer	5
	D-1/2	0
	W	0
	N	0
Weather - BEC Zone	AT, irrigated	1
	CWH, CDF, MH	3
	ICH, SBS, ESSF	7
	IDF, MS, SBPS, CWHsds1 & ds2, BWBS, SWB	10
	PP, BG	15
Historical Fire Occurrence Zone	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7	1
	G3, G8, R3, R4, V6, G1, G9, V8	5
	G7, C5, G4, C4, V1, C1, N6	8
	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2	10
	N7, K4	15
Slope	<16	1
	16-29 (max N slopes)	5
	30-44	10
	45-54	12
	>55	15
Aspect (>15% slope)	North	0
	East	5
	<16% slope, all aspect	10
	West	12
	South	15

Limitations

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 Wildfire 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. Structures are considered, but there is no consideration for structure type (also not included on threat assessment worksheet). This method uses the best available information to produce accurate and useable threat assessment across the study area in a format which is required by the UBCM CRI program.

6.1.3 APPENDIX A-4: WILDFIRE THREAT PLOT LOCATIONS

Table 26 displays a summary of all WUI threat plots completed during CWRP 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: Low (0-48); Moderate (49 – 66); High (67 – 80); Extreme (>80).

Table 26: Summary of WUI Threat Assessment Worksheets

Wildfire Threat Assessment Plot ID	Geographic Location	Wildfire Behaviour Threat Class
TSA-1	Tsa Xana, forest behind Unity House	Moderate
TSA-2	Tsa Xana, east of homes	Moderate
TSA-3	Tsa Xana, east of ball diamond	Low
TSA-4	Tsa Xana, north of northmost homes	Moderate
TSA-5	Tsa Xana, west of community and between the two access roads.	High
TSA-6	Tsa Xana, west of community, south of "egress" road, north of garbage/public works yard.	Moderate
YUQ	Yuquot, north of trail and west of the community field	Low
AHA	Ahaminquus, forested patch west of road	Low
RES	Water reservoir above Tsa Xana	Moderate

6.1.4 APPENDIX A-5: PROXIMITY OF FUEL TO THE COMMUNITY

The correlation between structure loss and wildfire are described below.

Home and Critical Infrastructure Ignition Zones

Multiple studies have shown that the principal factors regarding home and structure loss to wildfire are the structure's characteristics and immediate surroundings. The area that determines the ignition potential of a structure to wildfire is referred to as (for residences) the Home Ignition Zone (HIZ) or (for critical infrastructure) the Critical Infrastructure Ignition Zone (CIIZ).[50,51] Both the HIZ and CIIZ include the structure itself and three concentric, progressively wider Priority Zones out to 30 m from the structure (Figure 4 below). More details on priority zones can be found in the FireSmart Manual.[52]

[50] 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. Retrieved from: Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States | Treesearch (usda.gov)

[51] Cohen, J. *Preventing Disaster Home Ignitability in the Wildland-urban Interface.* Journal of Forestry. p 15 - 21. Retrieved from: Preventing Disaster: Home Ignitability in the Wildland-Urban Interface | Journal of Forestry | Oxford Academic (oup.com)

[52] Available for download here: FireSmartBC_HomeownersManual_Printable.pdf

Figure 4. FireSmart Ignition Zone (HIZ)[53]

It has been found that during extreme wildfire events, most home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers. Firebrands can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate within the HIZ in densities that can exceed 600 embers per square meter. Combustible materials found within the HIZ combine to provide fire pathways allowing spot surface fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

Because ignitability of the HIZ is the main factor driving structure loss, the intensity and rate of spread of wildland fires beyond the community has not been found to necessarily correspond to loss potential. For example, FireSmart homes with low ignitability may survive high-intensity fires, whereas highly ignitable homes may be destroyed during lower intensity surface fire events.[51] Increasing ignition resistance would reduce the number of homes simultaneously on fire; extreme wildfire conditions do not necessarily result in WUI fire disasters.[54] It is for this reason that the key to reducing WUI fire structure loss is to reduce structure ignitability. Mitigation responsibility must be centered on structure owners. Risk

[53] FireSmart Canada. 2023. The Home Ignition Zone. Retrieved from: The Home Ignition Zone | FireSmart Canada
[54] 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. Retrieved from: How risk management can prevent future wildfire disasters in the wildland-urban interface (nih.gov)

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.

Table 27. Proximity to the Interface.

Proximity to the Interface	Descriptor*	Explanation
WUI 100 *HIZ/CIIZ and Community Zones*	(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 *Community and Landscape Zones*	(100-500 m)	Treatment would affect wildfire behaviour approaching a value, as well as the wildfire's ability to impact the value with short- to medium- range spotting; should also provide suppression opportunities near a value.
WUI 2000 *Landscape Zone*	(500-1000 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.
Landscape Zone	> 1000 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.*

6.1.5 APPENDIX A-6: INITIAL SPREAD INDEX (ISI) ROSES

Figure 5 displays the daily average ISI values and Figure 6 displays monthly averages for the Woss Camp BCWS weather station. Daily ISI values for the TS Burman Station were generated in-house and are displayed in Figure 7.

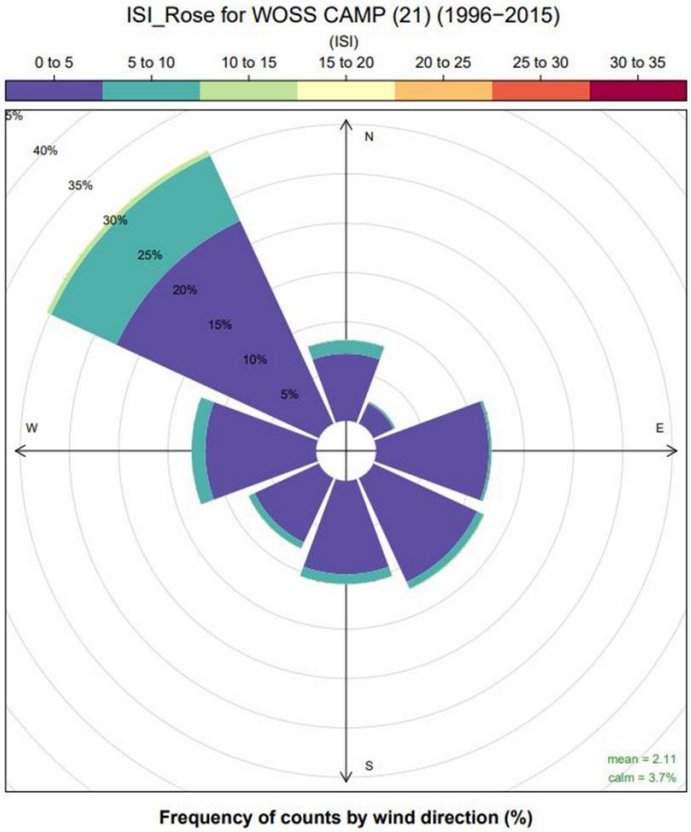


Figure 5. Woss Camp Daily ISI rose averages[55]

[55] Province of British Columbia. Daily ISI Roses. Available from: https://www.for.gov.bc.ca/ftp/HPR/external/!publish/Website/ISI%20Roses/Daily_ISI_Roses/ISI%20Roses%20Coastal%20Fire%20Centre%20(July%202016).pdf

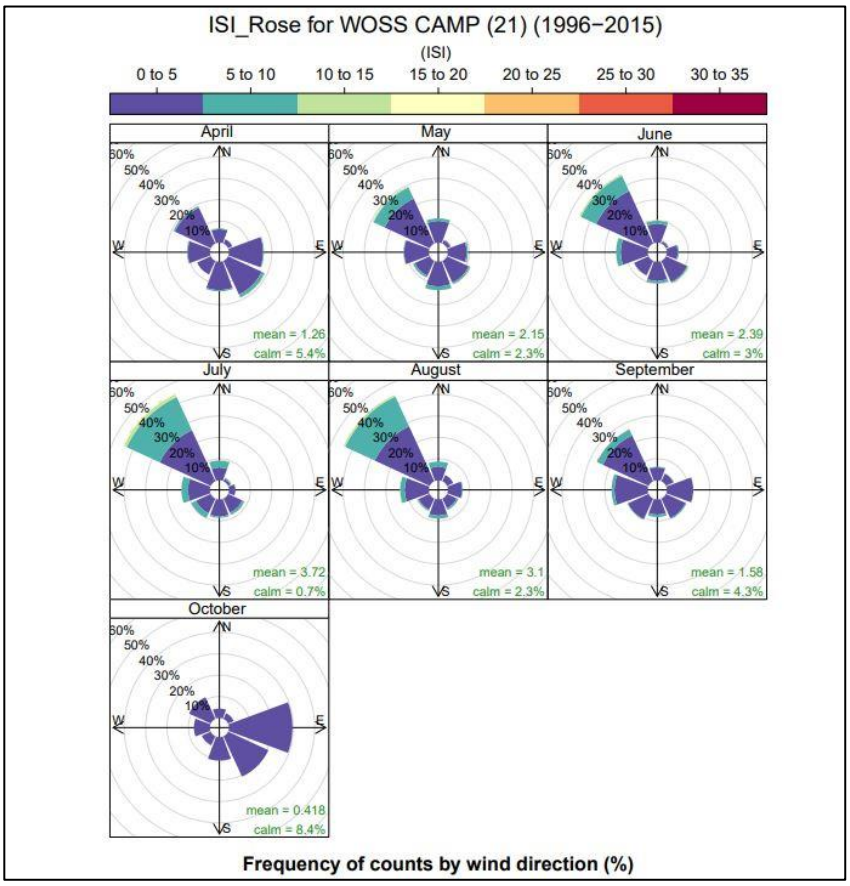


Figure 6. Woss Camp Monthly ISI rose averages[56]

[56] Province of British Columbia. Housrlu ISI Roses. Available from: https://www.for.gov.bc.ca/ftp/HPR/external/!publish/Website/ISI%20Roses/Daily_ISI_Roses/ISI%20Roses%20Coastal%20Fire%20Centre%20(July%202016).pdf

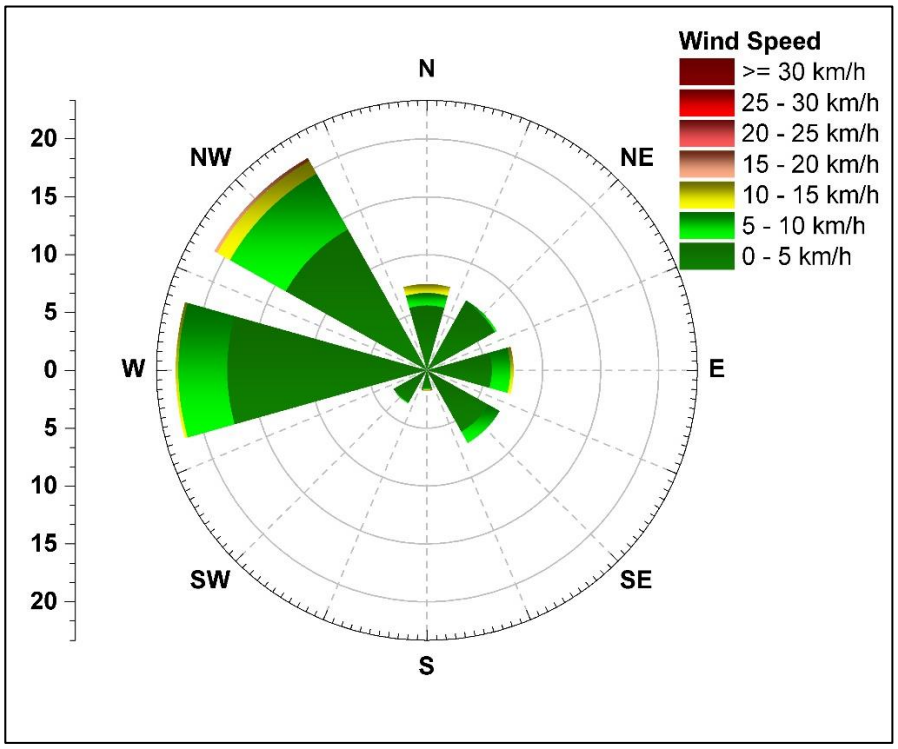


Figure 7. TS Burman Daily ISI rose averages

6.2 APPENDIX B: WUI RISK ASSESSMENT - WORKSHEETS AND PHOTOS

Provided separately as PDF package.

6.3 APPENDIX C: MAPS

Provided separately as PDF package.