

COMMUNITY WILDFIRE RESILIENCY PLAN 2024



City of Merritt

February 2025

Submitted by:

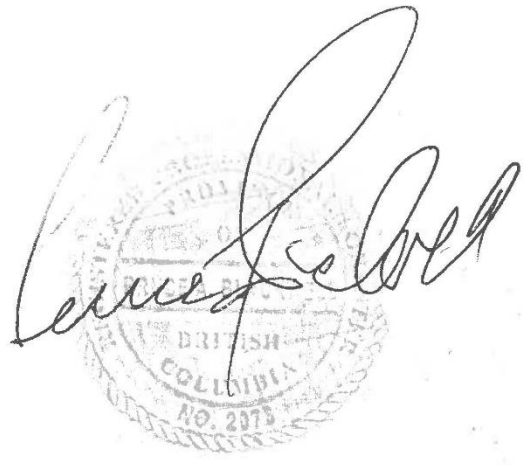
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EXECUTIVE SUMMARY

In April 2024, B.A. Blackwell and Associates Ltd. was retained to assist the City of Merritt ('Merritt', the 'City') in creating a Community Wildfire Resiliency Plan (CWRP). This CWRP builds off of Merritt's 2015 (updated 2019) Community Wildfire Protection Plan. Like a CWPP, a CWRP is both a localized risk assessment and an action plan to improve wildfire resiliency in a region. CWRPs aim to develop strategic recommendations based on the seven FireSmart® principles (Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Cross-Training, Emergency Planning, and Vegetation Management) to assist communities in improving safety and reducing the risk of damage to property and critical infrastructure from wildfires.

The Area of Interest for this plan is Merritt's municipal boundary. The CWRP provides Merritt with an updated action plan to mitigate wildfire risk to the community. The plan can be used to guide the improvement or development of emergency and evacuation plans, emergency response, communication and education programs, bylaw development, and the management of potentially hazardous vegetation within the Eligible Wildland Urban Interface (WUI).

In the nine years since the completion of Merritt's last community wildfire plan, major progress along the FireSmart Roadmap¹ has been achieved. Merritt has retained a FireSmart Coordinator for the past seven years as part of the Merritt Fire Rescue Department. The position is now supported with funding under the Union of BC Municipalities (UBCM) FireSmart Community Funding and Supports (FCFS) program. The staff capacity offered by this dedicated position has allowed Merritt to offer free Home Ignition Zone assessments to residents, deliver community FireSmart presentations and workshops, and expand on FireSmart-specific public education campaigns. Additionally, the FireSmart Coordinator and Fire Chief have worked together to achieve fuel management treatments in several areas of municipal land, including a popular goat grazing program in Central Park. In 2022, a new Official Community Plan was completed with a comprehensive set of FireSmart policies, including a new Wildfire Development Permit Area. In acknowledgement of their many years of dedicated efforts across all FireSmart disciplines, FireSmart BC presented Merritt with the Community Resiliency Recognition Award in 2023. For their FireSmart education program, the next steps for Merritt are to continue to build up and expand on successful initiatives. At the same time, Merritt should consider piloting new FireSmart education activities based on new fundable activities under the UBCM FCFS program.

Another important next step is for Merritt to implement planned activities to build the capacity of their emergency management program, as the community continues to recover from the floods of 2021. This includes training municipal staff enrolled in the Emergency Operations Centre (EOC), and updating all relevant plans and bylaws to align with the new provincial *Emergency and Disaster Management Act*. Regular tabletop exercises with EOC staff will continue to strengthen the capacity of this group.

Merritt has an established history of working with First Nations and BCWS through incident response and a local fuel management working group. The close proximity of the Merritt Fire Zone base has helped the

¹ <https://firesmartbc.ca/resource/the-firesmart-roadmap/>

municipality foster strong relationships with BCWS staff. It is recommended that Merritt formalize some of these connections through the creation of a local Community FireSmart and Resiliency Committee to advance initiatives specific to the City. With a well-trained and experienced fire department, and the additional capacity of the FireSmart Coordinator, Merritt is in a strong position to take on more advanced projects through this committee. This could include hosting cross-training sessions with surrounding communities; engaging with industrial and agricultural operators who own private land in the interface; and leading or promoting interagency initiatives to complete fuel management treatments in the areas around their Eligible WUI.

This plan puts forward recommendations for fuel management treatments and maintenance of previously treated areas in the municipality. These are areas on Crown Provincial land within the 1 km Eligible WUI. In some locations, fuel management treatment may be led by the municipality. In others, it is more suitable for the municipality to work with Crown Land Wildfire Risk Reduction staff to achieve wildfire risk reduction objectives.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. Recommendations and action items within this plan should be considered a toolbox of options to help reduce the wildfire threat to Merritt. The City 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.

Recommendations and action items are presented in Table 1 below and are more thoroughly discussed in their appropriate sections within the document.

Table 1. Community Wildfire Resiliency Plan Recommendations

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
1	Education	High	Continue funding a FireSmart Coordinator position for the municipality.	Staff are key to implementing FireSmart activities and CWRP recommendations in the community, and mandatory under 2024 funding requirements.	City of Merritt FireSmart Coordinator	Ongoing	Sufficient capacity to deliver and grow FireSmart program	CRI FCFS funding
2	Education	High	Engage with local agriculture and ranching operators to promote wildfire preparedness and offer specific resources.	FireSmart BC has created templates for completing 'Farm and Ranch Wildfire Plans,' which help operators and producers plan for actions they can take before, during, and after a wildfire to protect their businesses. FireSmart BC also provides resources to support individuals developing these plans for their operations. Merritt should promote the importance of wildfire preparedness, including the use of these plans, and the availability of supporting resources to complete them.	City of Merritt FireSmart Coordinator	3 Years	Number of properties with a completed Wildfire Plan increase	CRI FCFS funding (FireSmart Coordinator time)
3	Education	High	Engage with rural acreage property owners, to promote FireSmart vegetation management techniques.	Vegetation management strategies on larger parcels of private property are different from small parcels located in the town centre, and residents may need education and support about where and how to best direct their efforts.	City of Merritt FireSmart Coordinator	Ongoing	Materials created and residents on acreages / medium-holdings contacted	CRI FCFS funding (FireSmart Coordinator time)
4	Education	High	Promote the FireSmart Canada Neighborhood Recognition Program in priority neighborhoods.	Where neighborhoods are more remote, or where lots are small and structure density is high, acting as a neighborhood may be the most efficient way to achieve FireSmart outcomes. Home Ignition Zones often overlap between properties, which means that a collective, neighborhood-wide approach can be the most effective. The Neighborhood Recognition program supports a small-scale FireSmart approach for neighbourhoods consisting of 5-50 homes. The Merritt FireSmart Coordinator could identify community champions to spearhead community organization.	City of Merritt FireSmart Coordinator	Ongoing	One or more neighbourhoods participate in the FireSmart Neighbourhood Recognition Program	CRI FCFS funding (FireSmart Coordinator time)
5	Education	Moderate	Work with BC Wildfire Service (BCWS), and/or	Communicate information on campfire bans, fines, and the risk of igniting wildfires by leaving a campfire unattended.	City of Merritt FireSmart	2 years	Signs placed at strategic locations	Not eligible for CRI FCFS funding; Merritt

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
			BC Recreation Sites & Trails, to install wildfire danger signs at high use trail heads or recreation sites.	Signs can be installed on existing fire danger rating signs, at mountain bike network trailheads (in consultation with local trail managers), and/or at the beginning of FSRs.	Coordinator (BC Recreation Sites and Trails, BCWS)		in coordination with BC Recreation Sites and Trails and/or BCWS	funding, or other agency funding (i.e., MoF/BCWS, depending on results of engagement)
6	Education	Moderate	Continue working with the local school district to promote the use of FireSmart BC Education Program materials.	Share FireSmart principles in local schools, through presentations by FireSmart and Merritt Fire Rescue Department (MFRD) members and the use of the updated FireSmart BC Education Program materials. This is a resource for educators teaching grades K-12. It introduces students to FireSmart concepts, including how to make homes and communities more resilient to wildfire. Resources are aligned with the BC school curriculum and are free for download from the FireSmart website.	City of Merritt FireSmart Coordinator (School District staff, Merritt Fire Rescue)	1 year and ongoing	Number of presentations in schools annually	Education materials available free of charge on FireSmart website
7	Education	Moderate	Complete a FireSmart demonstration project on Merritt community assets and/or critical infrastructure that displays FireSmart practices and principles to the public.	A demonstration of FireSmart principles can increase resident awareness while protecting community assets or infrastructure. Consider a landscaping demonstration, to showcase the aesthetic and practical value of FireSmart plant choices. A demonstration project can provide a focal point for other events and engagement – such as an opening day ‘launch’ event, social media coverage during design and construction, and an attraction for local media attention. Adding in signage describing landscaping and/or building retrofits can make this a showcase for residents year after year.	Merritt FireSmart Coordinator (Merritt Public Works superintendent)	3 years and ongoing	FireSmart upgrades made to a community asset and educational signage installed	CRI FCFS funding.
8	Education	Low	Report FireSmart milestones in the City of Merritt Annual Report to celebrate accomplishments of the program.	Number of home ignition zone assessments, new program initiatives, and grant money spent on critical infrastructure upgrades could all be reported.	City of Merritt FireSmart Coordinator (Corporate Communications)	Annually	Coverage in annual report occurs	City of Merritt funding

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
9	Education	High	Implement planned community chipping days, promoting the removal and replacement of cedar hedges.	Cedar and juniper hedges are particularly hazardous vegetation from a FireSmart perspective and are common throughout the municipality. This hazard merits a public education initiative specifically promoting the removal of these shrubs. Consider offering chipping and disposal and concurrently promote the FireSmart Plant Program to educate residents about appropriate replacement vegetation.	City of Merritt FireSmart Coordinator	1 year and/or ongoing	Promotional initiatives occur	CRI FCFS funding (FireSmart Coordinator time)
10	Education	Moderate	Engage local mountain bike associations to pilot an 'Adopt-A-Trail' program, similar to a successful initiative run in the Resort Municipality of Whistler.	Develop guidelines showing how to reduce hazardous fuel accumulations when building or maintaining trails. Offer to install signage recognizing individuals who register to clean up trails according to these guidelines.	City of Merritt FireSmart Coordinator	3 years	Guidelines developed and outreach to associations occur	CRI FCFS funding (FireSmart Coordinator time)
11	Education	High	Help interested community members access Neighborhood Champion training.	An engaged and informed Neighborhood Champion is the first step in the Neighborhood Recognition Program. Organizing and completing FireSmart work at the neighborhood level can be a highly effective way to protect groups of homes together. The FireSmart Coordinator can reach out to community groups to share information about this program to potential leaders.	City of Merritt FireSmart Coordinator	1-3 years	Neighbourhood Champions identified and trained	CRI FCFS funding (FireSmart Coordinator time)
12	Legislation and Planning	High	Complete updates to Merritt's Emergency Plan, along with associated documents.	The current Emergency Plan is outdated, and a new version is in the process of being drafted. As part of the new Emergency Plan, a Business Continuity Plan and Hazard, Risk and Vulnerability Analysis will also be created. The City of Merritt should prioritize the timely completion of all of these documents.	City of Merritt Emergency Program Coordinator (consultant as required)	1-3 years	Completed Emergency Plan, Business Continuity Plan, and Hazard Risk and Vulnerability Analysis	UBCM Community Emergency Preparedness Fund (funding obtained)
13	Legislation and Planning	High	Update Merritt's Evacuation Plan.	The current Evacuation Plan primarily describes the role of the RCMP in coordinating an evacuation from the community. It should be updated to include several other factors and considerations as described in Section 5.2	City of Merritt Emergency Program Coordinator	2 years	Updated Evacuation Plan	UBCM Community Emergency Preparedness Fund

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
					(consultant as required)			
14	Legislation and Planning	Moderate	Update the Emergency Measures bylaw.	An updated bylaw should be drafted to reflect the new <i>Emergency and Disaster Management Act</i> , recently passed by the provincial government.	City of Merritt (Emergency Program Coordinator)	2 years	Bylaw updated	City of Merritt funding
15	Development Considerations	Moderate	Complete FireSmart assessments of critical infrastructure.	Critical infrastructure and community assets provide essential or important community functions. FireSmart assessments of these locations allow for site-specific mitigation actions. Assessments provide the basis for CRI funding for follow-up FireSmart renovations or upgrades.	MFRD (FireSmart Coordinator and/or LFRs)	1 year	Critical infrastructure assessments	CRI FCFS funding
16	Development Considerations	Moderate	Complete upgrades to critical infrastructure based on the results of completed assessments.	It is important to increase the structural resiliency of local government-owned critical infrastructure – including landscaping in the surrounding area – based on FireSmart principles.	City of Merritt FireSmart Coordinator (Merritt Public Works superintendent)	1 year and ongoing	New critical infrastructure and all critical infrastructure renovations are FireSmart	Local government funding, and/or CRI FCFS funding (available for specific building upgrades as recommended by the critical infrastructure assessments)
17	Cross-training	Low	Continue working with BCWS to inventory and identify options for upgrading wildfire-specific equipment.	Based on results of inventory, continue to seek funding for upgrades and deficits. Fire departments can be first to respond to interface wildfires and proper equipment is required for an effective response. When available, seek funding through Community Emergency Preparedness Fund (CEPF) and/or FCFS to upgrade equipment.	MFRD (BCWS)	1 year and ongoing	Fire department obtains required wildland equipment	UBCM CEPF
18	Cross-training	High	Maintain or expand the level of fire department member training for interface wildfire scenarios.	As department personnel changes and/or grows, ensure new hires obtain SPP-WFF1 certification and/or additional wildland firefighting certifications, such as S-185, S-231, WSP-115, or task force leader.	MFRD	Annual	All members are trained in SPP-WFF1 and refresh the course annually	Compensation for course instructor/facilitation of spring training courses; CRI FCFS funding

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19	Cross-training	Moderate	Continue attending the annual Wildfire Resiliency and Training Summit.	MFRD staff, especially the FireSmart Coordinator, should continue to attend this event. Participation will contribute to the exchange of knowledge about FireSmart BC programming with other municipalities. There is a training program, which includes hands-on activities for fire department members only. There is also a conference program, which is a conventional series of presentations and panel discussions that can be attended by municipal staff and fire department members.	Merritt FireSmart Coordinator (MFRD)	Annual	Attendance at 2025 Summit	CRI FCFS funding
20	Cross-training	Moderate	Ensure Structural Protection Unit equipment and member training certifications are kept up to date.	To meet provincial standards for deployment, Structural Protection Units must be up-to-date with a specific equipment inventory, and members must hold appropriate training certifications. Merritt should ensure these remain current.	MFRD	Ongoing	Training certifications and inventory match provincial standard	CRI FCFS funding available to build up SPU equipment inventory and for training courses.
21	Cross-training	Moderate	Continue participating in cross-training exercises with BCWS.	Crews should familiarize and practice with each other's equipment and address any incompatibilities. Focus on communications and equipment compatibilities between response groups. Where possible, expand these exercises to include fire departments in Thompson-Nicola Regional District (TNRD).	MFRD	Annual	Exercise(s) occur	CRI FCFS funding (meetings or tabletop exercises only) or City of Merritt funding (for live drills).
22	Cross-training	Moderate	Continue to provide Local FireSmart Representative (LFR) training to members of MFRD	Continue to increase the capacity of MFRD to provide Home Ignition Zone Assessments to members of the community.	Merritt FireSmart Coordinator (MFRD)	Ongoing	Additional members are certified as LFRs	CRI FCFS funding
23	Cross-training	Moderate	Offer Wildfire Risk Reduction Basics courses to members enrolled as Emergency Operations Centre (EOC) staff members	Further training will support EOC members in understanding the rationale behind first responders' actions in a wildfire event and support a coordinated and effective response.	Merritt Emergency Program Coordinator	3 years	Municipal staff trained	CRI FCFS funding
24	Cross-training	Moderate	Consider training FireSmart Coordinator as	This training will enable the City to offer Wildfire Mitigation Program assessments - these are more personalized, and at a higher level of detail. Residents with BCAA home	City of Merritt FireSmart Coordinator	2 years	FireSmart Coordinator trained	CRI FCFS funding

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			a Wildfire Mitigation Specialist	insurance who mitigate their risks according to a Wildfire Mitigation Program assessment may be eligible for an insurance discount.				
25	Cross-training	High	Consider hosting a formal joint training event with BCWS and/or other local fire departments (TNRD, Lower Nicola Indian Band [LNIB])	This is an opportunity to practice specific scenarios that require multi-agency coordination and focus on skills development that may not occur when working together on mutual aid calls.	MFRD (TNRD, LNIB)	2 years	Training event held	CRI FCFS funding for table exercises only.
26	Interagency Cooperation	High	Host regular Community FireSmart and Resiliency Committee (CFRC) meetings.	Merritt should host regular meetings to review progress on CWRP action items and plan the upcoming year's initiatives with different departments. Additionally, inviting BCWS and Ministry of Forests' Crown Land Wildfire Risk Reduction (CL WRR) program staff to participate periodically will help facilitate fuel management projects on Crown land adjacent to Merritt's Eligible WUI.	City of Merritt FireSmart Coordinator (CFRC members)	Ongoing	Meetings occur	CRI FCFS funding.
27	Interagency Cooperation	High	Continue engaging with the Fuels Technical Committee.	Besides hosting their own CFRC meetings, Merritt should continue to attend the Fuels Technical Committee meetings to build relationships with First Nations, continue to learn about initiatives happening outside Merritt, and support fuel management projects of mutual benefit to Merritt and surrounding communities.	City of Merritt FireSmart Coordinator (CFRC members)	Ongoing	Meetings occur	CRI FCFS funding.
28	Interagency Cooperation	Moderate	Engage with private landowners in the area to share information about fuel management activities and emergency planning that may be of mutual interest.	Specifically, build connections with local ranchland owners who own large properties adjacent to the Merritt Eligible WUI. Learning about wildfire risk reduction activities that they may be undertaking will benefit MFRD and/or BCWS staff who may be tasked with response on their property.	MFRD (BCWS)	2 years	Outreach and communications occur	Municipal funding.
29	Interagency Cooperation	High	Ensure fire service contracts are up to date.	Merritt provides fire department services to several adjacent areas under contract. Contracts should be periodically reviewed to ensure they reflect current conditions, issues and capacity in both communities.	MFRD	2 years	Review and/or revisions occur	Municipal funding.

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
30	Interagency Cooperation	High	Invite First Nations to identify cultural values at risk within the Eligible WUI that are vulnerable to wildfire.	Identifying cultural values that may be impacted by wildfire or by suppression tactics ahead of time can help first responders protect these values during an incident. MFRD should reach out to First Nations, potentially as part of the pre-incident planning work, to identify areas they wish to share information about.	MFRD	2 years	Outreach and communications occur; values mapped.	CRI FCFS funding.
31	Interagency Cooperation	Moderate	Work with industrial partners to ensure all best practices are followed in the storage of hog fuel to avoid preventable spontaneous combustion incidents	Several interface wildfire incidents have occurred when hog fuel piles have spontaneously combusted. Merritt should reach out to industrial partners to ensure that any risks possible can be mitigated to reduce this likelihood in the future.	Merritt Fire Rescue (FireSmart Coordinator)	1 year	Outreach and communications occur; best practices are followed.	CRI FCFS funding.
32	Emergency Planning	High	Hold regular tabletop exercises of the Emergency and Evacuation Plans.	Desktop exercises can allow staff members to practice their roles and responsibilities in an emergency response scenario. These are recommended to ensure communication and response is as efficient and effective as possible. Ensure third parties who may be involved in EOC activations are included in this training.	City of Merritt Emergency Program Coordinator (MFRD, RCMP, other first responders)	Bi-annual	Exercises occur	CRI FCFS funding (meetings and tabletop exercises only)
33	Emergency Planning	High	Ensure all EOC staff complete appropriate training.	Staff members should report the completion of required training to the Emergency Program Coordinator, so that required and outstanding certifications can be tracked. Renewal dates for certifications should also be tracked.	City of Merritt Emergency Program Coordinator	1 year	Training certifications complete	UBCM Community Emergency Preparedness Fund
34	Emergency Planning	High	Continue to promote the Voyent Alert! System.	Clear, consistent, concise, and quick communication during an emergency event are integral to an effective response.	City of Merritt Emergency Program Coordinator (MFRD)	Ongoing	Promotional initiatives continue (e.g., social media posts, comments in news releases)	City of Merritt funding

Item #	FireSmart Discipline	Priority	Recommendation	Comment	Lead (Involved)	Timeframe	Metric for Success	Funding Source
35	Emergency Planning	High	Complete a wildfire pre-incident plan.	Map essential wildfire response information in an accessible format that can be used by MFRD and shared with other first responders. Consider engaging with other municipalities in the Okanagan that have completed a wildfire incident pre-plan (e.g., Penticton) to obtain information about a method and approach to this project.	MFRD (Fire Chief) (BCWS, consultant as required)	5 years	Essential locations and features in wildland areas are mapped and product is available for use.	CRI FCFS funding
36	Emergency Planning	Moderate	Promote the installation of visible and reflective address signs.	Address signs allow for faster and more direct response to specific properties by first responders during an emergency.	City of Merritt Emergency Program Coordinator (MFRD)	Ongoing	Majority of properties have reflective, visible addresses	CRI FCFS funding for incremental staff hours to host promotional campaign.
37	Emergency Planning	Moderate	Schedule regular updates of this Community Wildfire Resiliency Plan.	A current and acceptable CWRP is required for funding under the CRI FCFS program. Update the wildfire threat for areas with completed fuel treatments and identify additional areas for treatment.	City of Merritt FireSmart Coordinator	5 years – 2029 update	Merritt always has a current and acceptable CWRP	CRI FCFS funding
38	Emergency Planning	Moderate	Seek out opportunities to build relationships with First Nations communities.	Strong connections with nearby communities will increase capacity to effectively respond to emergencies. Attending CFRC meetings and working with other municipal staff who have stronger relationships with local First Nations communities are two ways Merritt Emergency Program staff may build these connections up.	City of Merritt Emergency Program Coordinator	Ongoing	Opportunities identified and pursued.	Municipal funding.
39	Vegetation Management	High	Support residents in disposing of green waste and vegetation from landscaping.	This could include promoting the free disposal of yard waste at the nearby transfer station. Or, consider facilitating community clean up days - placing bins in key neighborhoods where residents can drop off yard waste and/or offering chipping services.	City of Merritt FireSmart Coordinator	Ongoing	Event(s) offering use of bin and chipper hosted in the community.	Local government funding for administrative time. CRI FCFS funding for FireSmart Coordinator time, and for waiving tipping fees at landfills.

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40	Vegetation Management	High	Complete prescriptions and fuel management treatment for proposed treatment units within the Eligible WUI.	Complete in order of priority, working with WRR or BCWS to facilitate treatment as described in Section 11.7. For fuel treatment units outside the Eligible WUI, advocate to Ministry of Forests CL WRR staff for completion of fuel treatments.	City of Merritt FireSmart Coordinator (MFRD, BCWS and/or CL WRR)	5 years	Prescription(s) completed and/or treatment(s) implemented	CRI FCFS funding
41	Vegetation Management	Moderate	Develop program to help seniors and/or vulnerable populations complete FireSmart work on their property.	The FCFS 2024 program has made this an eligible activity for funding. An HIZ assessment is required, and works must follow the recommendations of the assessment. Consider hiring seasonal / student workers to support these projects during summer months.	City of Merritt FireSmart Coordinator	2 years and ongoing	Program offered and promoted	CRI FCFS funding.

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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
CFRC	Community FireSmart and Resiliency Committee
CI	Critical Infrastructure
CL WRR	Crown Land Wildfire Risk Reduction
CRI	Community Resiliency Investment program
CWPP	Community Wildfire Protection Plan
CWRP	Community Wildfire Resiliency Plan
DPA	Development Permit Area
EMCR	Emergency Management & Climate Readiness British Columbia
FBPS	Fire Behaviour Prediction System
FCFS	FireSmart Community Funding and Supports program
FESBC	Forest Enhancement Society of British Columbia
FPA	Fire Protection Area
HIZ	Home Ignition Zone
HRVA	Hazard, Risk and Vulnerability Analysis
ISI	Initial Spread Index
MOF	Ministry of Forests
NDT	Natural Disturbance Type
PSTA	Provincial Strategic Threat Assessment
OCP	Official Community Plan
RDKB	Regional District of Kootenay Boundary
UBCM	Union of British Columbia Municipalities
VAR	Values at risk
WRR	Wildfire Risk Reduction program
WUI	Wildland urban interface

SECTION 1: INTRODUCTION

1.1 OVERVIEW

In April 2024, B.A. Blackwell and Associates Ltd. was retained to assist the City of Merritt ('Merritt', 'City') in preparing a Community Wildfire Resiliency Plan (CWRP). This CWRP revisits the areas assessed in Merritt's 2015 Community Wildfire Protection Plan (CWPP), but with a focus on updated BC Wildfire Service (BCWS) fuel type mapping, an improved wildfire threat analysis methodology, and a focus on the seven FireSmart® disciplines.² This plan accounts for progress along the FireSmart Roadmap³ that has occurred in the past nine years, and takes advantage of the newest community wildfire planning framework in BC.

The Community Wildfire Resiliency Plan (CWRP) is the latest evolution in community wildfire planning in British Columbia. 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 2023 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.

CWRPs are individually tailored to address the needs of different communities in response to their size, their capacity, and the unique threats that they face, and incorporate the latest understandings of wildfire risk and resiliency. The goal is to provide Merritt with a concrete action plan towards enhanced wildfire resiliency.

1.2 PLAN GOALS

This CWRP identifies the level of interface wildfire risk in Merritt and gives the community a current and accurate understanding of the threats to human life, infrastructure, and other values at risk from wildfire. This CWRP is intended to serve as a framework to guide the implementation of specific strategies to:

- Increase the efficacy of fire suppression and emergency response;
- Reduce potential impacts and losses to property and critical infrastructure from wildfire; and
- Reduce wildfire behavior threat within the community.

To help accomplish the above strategies, this CWRP will provide Merritt with:

- An assessment of wildfire risk to the community;

² Education, Legislation & Planning, Development Considerations, Interagency Cooperation, Cross-Training, Emergency Planning and Vegetation Management

³ <https://firesmartbc.ca/resource/the-firesmart-roadmap/>

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

CWRPs are funded in BC by the Union of BC Municipalities (UBCM) under the Community Resiliency Investment (CRI) FireSmart Community Funding and Supports Program (FCFS). Per funding requirements, this CWRP is completed according to the newest 2023 CWRP template.

1.3 PLAN DEVELOPMENT SUMMARY

Although the entire municipality is considered the 'Area of Interest' (AOI), the planning for this CWRP was based on the wildland-urban interface (WUI) of Merritt. The WUI is generally understood as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.⁴ For the purpose of this CWRP, the WUI represents a one-kilometer buffer around areas with a certain density of structures (≥ 6 structures per km^2) within the AOI. This concept is explained in more detail in Section 10.1, and the WUI area for this plan is illustrated on Map 1.

The CWRP process consists of five general phases:

- Consultation with the Community FireSmart and Resiliency Committee (CFRC) and project stakeholders.
- Review of relevant plans and legislation regarding emergency response and wildfire (Section 2).
- Community description and identification of values at risk (Section 3).
- Assessment of the local wildfire risk (Section 4).
- Analysis and action plan for each of the seven FireSmart disciplines (Section 5).

⁴ FireSmart Canada. 'What is the wildland urban interface?' <https://firesmartcanada.ca/about-firesmart-2/the-wildland-urban-interface-wui/>

SECTION 2: RELATIONSHIP TO OTHER PLANS

Wildfire resiliency is influenced by all aspects of community planning. As a result, there are many plans that relate to a CWRP. The intent of this section is to review all relevant local and higher-level plans and legislation to identify any sections that are relevant to community wildfire planning for Merritt.

2.1 LOCAL AUTHORITY EMERGENCY PLAN

Emergency preparedness and response is guided by higher level emergency management legislation. In November 2023, the provincial *Emergency Program Act* was repealed by the *Emergency and Disaster Management Act*. Like the Emergency Program Act, the Emergency and Disaster Management Act identifies the roles of the province and municipalities in implementing emergency plans, declaring states of emergency and coordinating post-disaster relief programs. The updated legislation addresses pandemics, security threats and climate change. It expands the focus of emergency programs beyond incident response to the four phases of emergency management: mitigation, preparation, response and recovery.⁵

The *Emergency Measures Bylaw* (2002) and Merritt's Emergency Plan are two key documents which authorize and guide emergency response in the community. The *Emergency Measures Bylaw* (2002) authorizes the municipality to respond to major incidents. The Emergency Plan (2005) provides the policies and procedures for responding to, and recovering from emergencies. It is currently being updated to comply with the new provincial legislation and reflect changes in the community over the last two decades. Updates are also proposed for the community's Evacuation Plan. These initiatives and other emergency preparedness work the municipality is undertaking are further described in Section 11.6.

2.2 LINKAGES TO OTHER CWPPS/CWRPS

City of Merritt Community Wildfire Protection Plan (2015)

In 2015, B.A. Blackwell & Associates completed a Community Wildfire Protection Plan (CWPP) for the City of Merritt. Recommendations were made relating to:

- Communication and education
- Structure protection
- Emergency response
- Fuel management

Some of the observations and recommendations made in the 2015 plan remain relevant, and these are discussed in Section 5. Recommendations that were not fulfilled were reviewed, and some were adapted

⁵ Emergency management Legislation: <https://www2.gov.bc.ca/gov/content/safety/emergency-management/emergency-management/legislation-and-regulations/modernizing-epa>

into recommendations made throughout this plan. However, since 2019 when the last report was written, aspects of the Merritt community context have changed. New understandings of FireSmart principles have emerged, funding is structured differently, and new standards for CWRP writing and reporting have also been developed. As a result, some recommendations that were not fulfilled since 2015 are no longer relevant for consideration. However, recommendations on the following topics remain important and have been revisited in this plan:

- Developing and expanding the FireSmart education program.
- Protecting critical infrastructure for the city through structural upgrades and vegetation management.
- Evacuation planning and refining emergency management planning.
- Partnership and collaboration with external groups for emergency planning and fuel management objectives.

In 2019, the CWPP was updated to incorporate the results of a wildfire hazard assessment on several parcels of land at the southeast end of the municipality. The amendment recommended fuel management treatment occur in two areas, but this has not been completed (additional details in Section 11.7).

Thompson-Nicola Regional District Community Wildfire Resiliency Plans (2023)

The Thompson-Nicola Regional District (TNRD) had a series of CWRPs completed in 2023, including a plan for Electoral Areas M & N, which are adjacent to the municipal boundaries of Merritt. Wildfire planning in the regional district is linked to wildfire planning in Merritt due to close jurisdictional proximities, the need for inter-agency cooperation during emergencies, and mutual aid agreements between Merritt Fire Rescue Department and the regional district fire departments. Additionally, Merritt Fire Rescue Department's response area extends to the Lower Nicola area in the TNRD.

Key recommendations in the TNRD's CWRPs included expanding on FireSmart public education and outreach, enhancing partnerships with member municipalities, First Nations, BC Wildfire Service (BCWS) and Wildfire Risk Reduction (WRR) program staff, as well as implementing fuel management in some key locations. Fuel management treatments were not recommended close to Merritt.

2.3 LINKAGES TO OTHER PLANS

Official Community Plan

An Official Community Plan (OCP) is an expression of the objectives and policies of the local government and provides long-term guidance for land use and development in Merritt. Table 2 below summarizes relevant policies within Merritt's OCP, which was updated in 2022.⁶ Robust recognition of wildfire hazard in the current OCP reflects Merritt's progress along the FireSmart Roadmap towards the 'Integration' of

⁶ City of Merritt. *Official Community Plan (2022)*: <https://www.merritt.ca/ocp/>

FireSmart concepts into municipal plans and policies (Section 6: FireSmart Roadmap and CWRP Action Plan).

Table 2. Summary of Official Community Plan objectives and policies related to community wildfire resiliency planning.

Section	Policy Description & Relationship To CWRP
Section 6 'Our Relationships'	• Policy 6.1.2 states that the City should acknowledge the Nle?kepmx and Syilx Nations and their connection to this land. • Policy 6.1.4 states the City should work with local First Nations to establish a development referral process. • <i>Community wildfire resiliency activities undertaken as part of this plan should align with City initiatives for relationship building and reconciliation with First Nations communities. A referral process developed by the City may apply to fuel management activities.</i>
Section 9 'Our Environment'	• Policy 9.1.6 recommends that the City work with the TNRD and other partners to monitor and manage invasive species. • Several policies describe initiatives to promote xeriscaping within the City with the intent of reducing water demand from domestic irrigation. This includes publishing a list of recommended drought-tolerant plants (Policies 9.2.10, 9.2.11, 9.2.12, 9.2.13). • Policy 9.2.27 mandates the City increase the urban tree canopy with tree species that are diverse, drought-tolerant, and fire-resistant. • Several policies mandate the City to respond to severe smoke hazards, to protect public health (9.1.13, 9.2.44, 9.2.45, 9.2.46, 9.2.47, 9.2.48) • <i>Initiatives to monitor and manage invasive species may need to be considered in the completion of fuel management treatments on municipal land.</i> • <i>Xeriscaping guidelines should follow FireSmart landscaping recommendations, and recommended drought-tolerant plants should not be highly flammable. This CWRP makes recommendations for promoting residential FireSmart landscaping that are compatible with OCP policies (Section 11.7).</i> • <i>City tree planting initiatives utilizing low-flammability species are proactively aligned with FireSmart guidelines.</i> • <i>Severe smoke hazards are an additional risk to communities related to wildfire. City initiatives to mitigate this risk align with the 'Emergency Planning' FireSmart Discipline.</i>
Section 10 'Our Safety and Resiliency'	• Several policies relate to supporting funding, staff, and new facilities for Merritt Fire Department (10.7.1, 10.7.3). • Policy 10.8.2 mandates the development, testing, and regular updates of the Community Evacuation Plan. • Several policies relate to developing a coordinated, trained, and robustly staffed EOC (10.8.4, 10.8.5, 10.8.6) • Several policies mandate the City to ensuring the Emergency Plan provides sufficient guidance to staff, and is regularly updated (10.8.9, 10.8.10, 10.8.11).

Section	Policy Description & Relationship To CWRP
	• Ensuring Merritt Fire Department and the Merritt EOC are well staffed and resourced supports emergency response capacity and aligns with the 'Emergency Planning' FireSmart Discipline. • Ensuring plans are up-to-date, regularly tested, and provide appropriate guidance is an important emergency preparedness action. • In alignment with the above policies, this CWRP recommends continually updating and testing emergency plans and policies (Section 11.6).
Section 12 'Development Permit Areas'	• Section 12.10 - DPA 10: Wildfire Hazards - focuses on guidelines pertaining to wildfire risk management, in designated wildland urban interface areas. • Section 12.10.1 states that DPA 10 is designated under the following categories of Section 488 (1) of the Local Government Act: (b) Protection of development from hazardous conditions. • Section 12.10.2 states that DPA 10 guidelines apply to all development on parcels within DPA 10, as shown on Appendix K. • DPA 10 guidelines include the following topics: ○ Development Conditions ○ Site Planning ○ Landscaping ○ Building Design • Section 12.10.4 states that guidelines are intended to: • Mitigate the risk to people and property from wildfire hazards • Minimize the risk of fire to the City's wildland areas • Promote activities to reduce wildfire hazards while addressing environmental issues • In Section 12, there are also multiple Development Permit Areas which regulate design and aesthetics for new buildings in different areas of the municipality. While not strictly related to interface wildfire risk, these DPAs also provide guidelines in congruence with FireSmart principles. • Section 12.10 relates to the 'Development Considerations' and 'Legislation and Planning' FireSmart Disciplines, as it specifically requires the use of FireSmart construction and landscaping standards in interface areas.

Provincial Plans and Legislation

Table 3 below lists higher-level plans and legislation relevant to wildfire planning and risk mitigation within Merritt. Land and resource use plans help guide where and how activities like resource extraction and infrastructure development occurs on the landscape, which affects both wildfire threat and consequence. Fuel management prescriptions and burn plans must also address these plans as they relate to on-the-ground restrictions and policies for forest modification. These plans also provide some direction on where and how to conduct fuel management, prescribed burning and fire suppression.

Table 3. Higher level plans and relevant legislation

Plan / Legislation	Description and Relationship to CWRP
BC Provincial Open Burning Smoke Control Regulation (2019)	The Open Burning Smoke Control Regulation governs open burning for land clearing, forestry operations and silviculture, wildlife habitat enhancement, and community wildfire risk reduction. <i>Merritt is located in a High Smoke Sensitivity Zone – resulting in the strictest rules and regulations for open burning.</i> <i>OBSCR includes provisions for eased setbacks and requirements for open burning that is strictly related to an approved plan for community wildfire risk reduction (Division 2), or when utilizing an air-curtain incinerator (Division 5)</i> <i>All open burning within Merritt’s WUI must comply with OBSCR as well as the Fire and Safety Regulations Bylaw</i>
Government Action Regulation Orders (various)	Legal objectives which must be met in the completion of forestry activities on Crown Provincial land. <i>The Eligible WUI overlaps with ungulate winter range for mule deer, and several non-legal old growth management areas</i>
Old Growth Management Area Guidance – Thompson Okanagan (2007)	This document provides guidance for managing areas identified as contributing to old growth and biodiversity objectives in several timber supply areas (TSAs), including the Merritt TSA. This document corresponds with legal direction described in the 2004 <i>Order Establishing Provincial Non-Spatial Old Growth Objectives</i>.

SECTION 3: COMMUNITY DESCRIPTION

This section defines the planning area and provides general demographic information about Merritt, plus additional context regarding the surrounding area. An understanding of population trends, land use patterns, and values at risk can help best direct FireSmart outreach and risk mitigation activities.

3.1 AREA OF INTEREST AND ELIGIBLE WILDLAND URBAN INTERFACE

The Area of Interest (AOI) for Merritt’s CWRP is its municipal boundary, which is the area in which Merritt is eligible to pursue provincial FireSmart funding through the Union of BC Municipalities (UBCM) FireSmart Community Funding and Supports (FCFS) program.

The Wildland-Urban Interface (WUI) is defined by FireSmart Canada as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.⁷ For the purpose of the FCFS program, the ‘WUI’ is considered only as the area 1 km from a structure density class greater than 6 per km². Due to the structure density of the unincorporated communities outside Merritt’s municipal boundary, the WUI extends both south and northwest away from the AOI. Thus, the ‘Eligible WUI’ for Merritt’s CWRP, is created by ‘clipping’ the WUI to a maximum distance of one-kilometre from

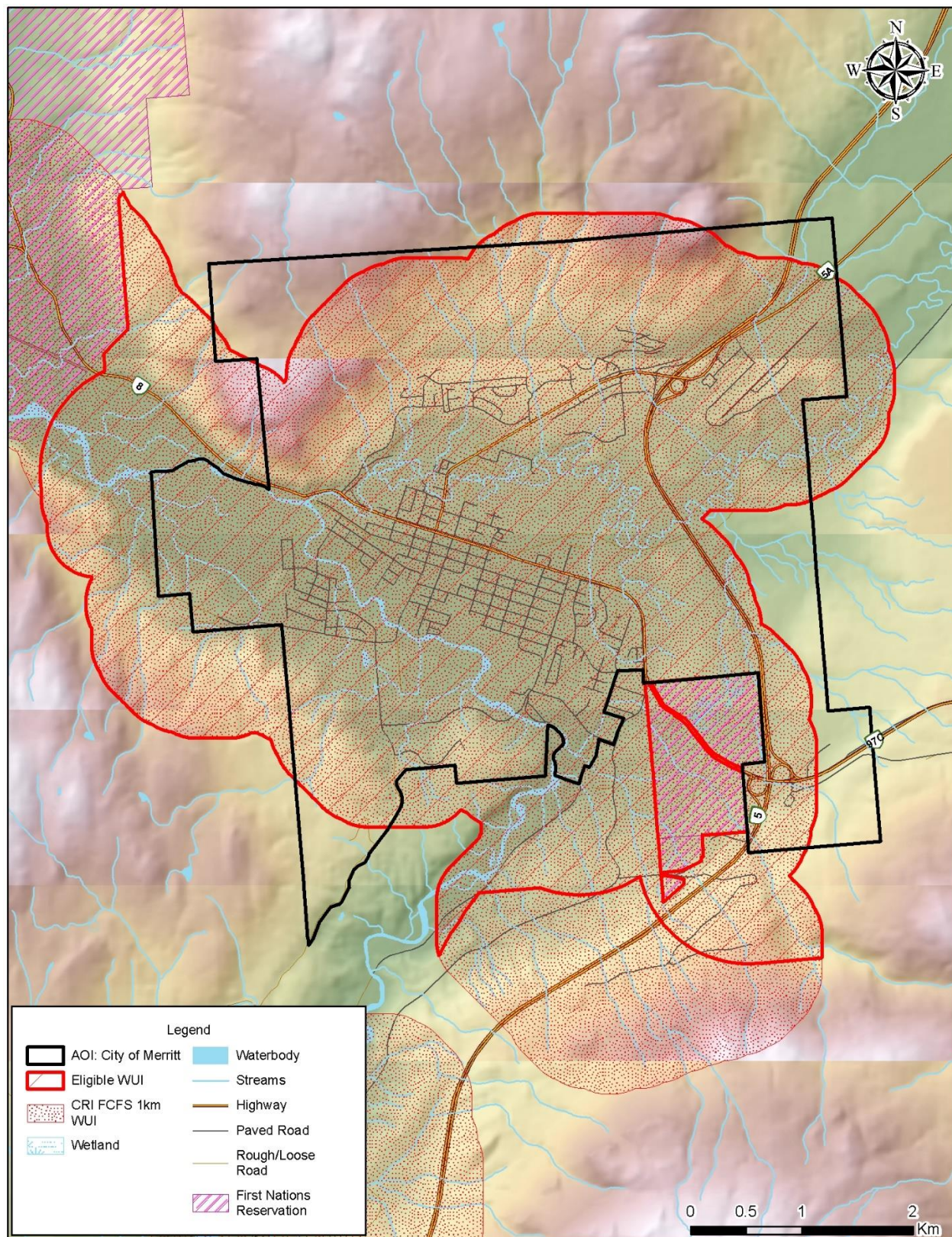
⁷ FireSmart Canada. ‘What is the wildland urban interface?’ <https://firesmartcanada.ca/about-firesmart-2/the-wildland-urban-interface-wui/>

the AOI (and removing any First Nation reservation land). This focusses the CWRP, and Merritt's attention, on the community and WUI surrounding it that has the most effect on Merritt itself.

Due to their close proximity, Lower Nicola Indian band (Joeyaska 2) and Cook's Ferry Indian Band (Antko 21) lands both have an influence on the interface, even though they were excluded from the Eligible WUI area. Private land also overlaps the Eligible WUI – large parcels are located on the south and west sides of the Eligible WUI. Some of this area is the former Tolko mill site, and some parcels are held by commercial agriculture and ranching operators. A large proportion is part of the Agricultural Land Reserve. A significant amount of the Crown land that overlaps the Eligible WUI is managed by BC Recreation Sites & Trails.

Table 4. Land ownership within the City of Merritt Eligible WUI.

Land Ownership	Area (Ha)	Percent of EWUI (%)
Crown Agency	19.9	1%
Crown Provincial	928.4	28%
Federal	0.7	<1%
Mixed Ownership	0.1	<1%
Municipal	154.3	5%
Private	1932.4	58%
Unclassified	40.0	1%
Untitled Provincial	259.9	8%



Map 1. City of Merritt's CWRP Area of Interest and Eligible WUI.

3.2 COMMUNITY INFORMATION

The City of Merritt is located in the Nicola Valley, at the confluence of the Nicola and Coldwater Rivers. The municipality extends south from banks of the Coldwater River to the forested slopes above the 'Bench' neighborhood and is located adjacent to two major highway interchanges which connect the Okanagan and Southern Interior with the Lower Mainland. Merritt is located in the traditional and unceded territory of the Nleʔkepmx and Syilx peoples. Lower Nicola Indian Band is the closest First Nations community to Merritt, with several areas of reserve land adjacent to the municipal boundaries. Shackan, Nooaitch, Upper Nicola, and Cook's Ferry Indian Bands are also located nearby, and are important regional partners.

Merritt serves as a commercial and service hub for the surrounding areas. Nicola Valley Hospital, Merritt Secondary School, several government services offices, and the Nicola Valley Institute of Technology are all situated in the town. Primary industries in the community include ranching, forestry, transportation and tourism. The municipality provides all key services to residents including fire protection, emergency management, planning and development, bylaw enforcement, and water and sewer treatment. Policing is provided by the Royal Canadian Mounted Police (RCMP).

According to the 2021 census, Merritt's population has declined slightly (-1%) since the previous CWPP was written to the current population of 7,051 residents.⁸ No large-scale neighborhood developments or expansions have occurred since 2015. Existing development is primarily concentrated in suburban neighborhoods close to the town centre, with some rural residential areas at the outskirts. Most of the housing stock in these areas are single-detached homes, owned by residents.

While other communities have seen home ownership trend downwards, in Merritt the proportion of people who own their home has modestly increased (+6%) since 2016.⁸ This demographic may be particularly receptive to implementing FireSmart activities on their property, as ownership can be a barrier that prevents residents from altering their home or landscaping. However, with a moderate median income and with a higher proportion of seniors in the community, programs that compensate and support residents in taking on FireSmart upgrades may be worth implementing (Section 11.1, Section 11.7).

The OCP contains numerous policies promoting the construction of new residences, both by densifying existing neighborhoods and by building in undeveloped areas such as Middlesboro and the Ranchlands area near Exit 286 from Highway 5. These policies are aligned with the Thompson-Nicola Regional District's Regional Growth Strategy and are part of a broader plan to attract newcomers to the community. The region is expected to see growth in the coming decades, with the population projected to grow from 8,362 to 12,081 by 2041.⁹ Housing, planning and community development are further discussed in Section 11.3.

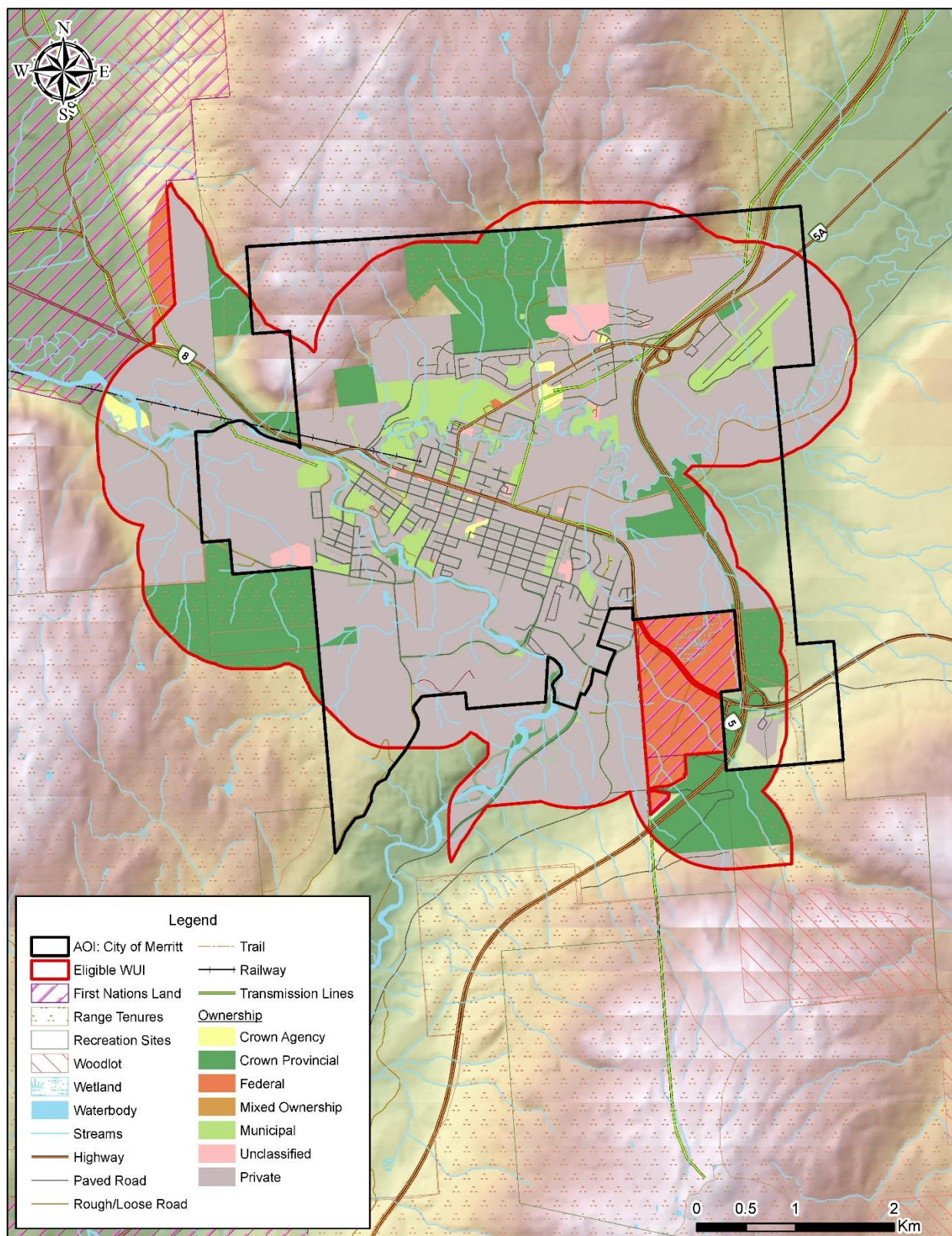
⁸ Statistics Canada. 2023. (table). *Census Profile*. 2021 Census of Population. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E> (accessed July 31, 2024).

⁹ City of Merritt. (2022). *Official Community Plan*.

Table 5. City of Merritt socio-economic statistics.¹⁰

Metric	Value
Total Population	7,051
Population percentage change between 2016 - 2021	-1.2%
Population density (people/km ²)	270.7
Average Age (years)	46.3
Average household size	2.3
Employment rate	46.6%
Median total income of household (2020)	\$70,000
Total private dwellings	3,149
Private dwellings occupied by usual residents	2,975
Single-detached housing units (proportion of housing stock)	65%
Semi-detached housing units (including row house)	15%
Apartment (including in duplex)	10%
Moveable dwelling	9%

¹⁰ Statistics Canada. (2023). *Census Profile*. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E>



Map 2. Ownership and tenures within Merritt CWRP Eligible WUI.

Fire Department Resources

Firefighting services in the city are provided by Merritt Fire Rescue Department (MFRD). There is one fire hall, centrally located in town and recently renovated to provide sufficient capacity for the department. MFRD is a full-service fire department as laid out by the structure firefighter minimum training standards. All members are National Fire Protection Association (NFPA) 1001 firefighters or working towards their certification. The NFPA 1001 standard identifies the minimum job performance requirements for career and volunteer firefighters whose duties are primarily structural in nature.

MFRD is a composite department with six full-time staff, including the Fire Chief, Prevention Officer, Training Officer, FireSmart Coordinator, and two fire technicians. Additionally, there are six work experience firefighters who live at the fire hall and 23 paid-on-call. As a composite department, recruitment and retention are a major challenge. Changing demographics, time commitments, and limited awareness in the community are contributing factors to declining in volunteerism.¹¹ At the same time, MFRD staff have seen an increasingly demanding and complex workload as medical call-outs have risen and wildfires and floods have challenged the community. At current rates, the department is not able to grow its staff numbers long term. Campaigning to recruit new paid-on-call MFRD members has been an important priority in the past few years and continues to be looking ahead.

In terms of equipment, MFRD is sufficiently resourced for an interface fire response and no deficiencies were noted as a concern by the CFRC. Table 6 below details the capacity and wildland equipment available to MFRD. The bush truck is scheduled to be replaced in 2024 with a Type 6 wildland truck that will have enhanced firefighting capabilities compared with the previous unit.¹² The Structural Protection Unit was acquired in 2022 and is compliant with interagency agreement requirements. It is a significant asset for the department, providing resources to safeguard homes and critical infrastructure.¹¹

Table 6. Merritt Fire Rescue Department capacity, training, and equipment

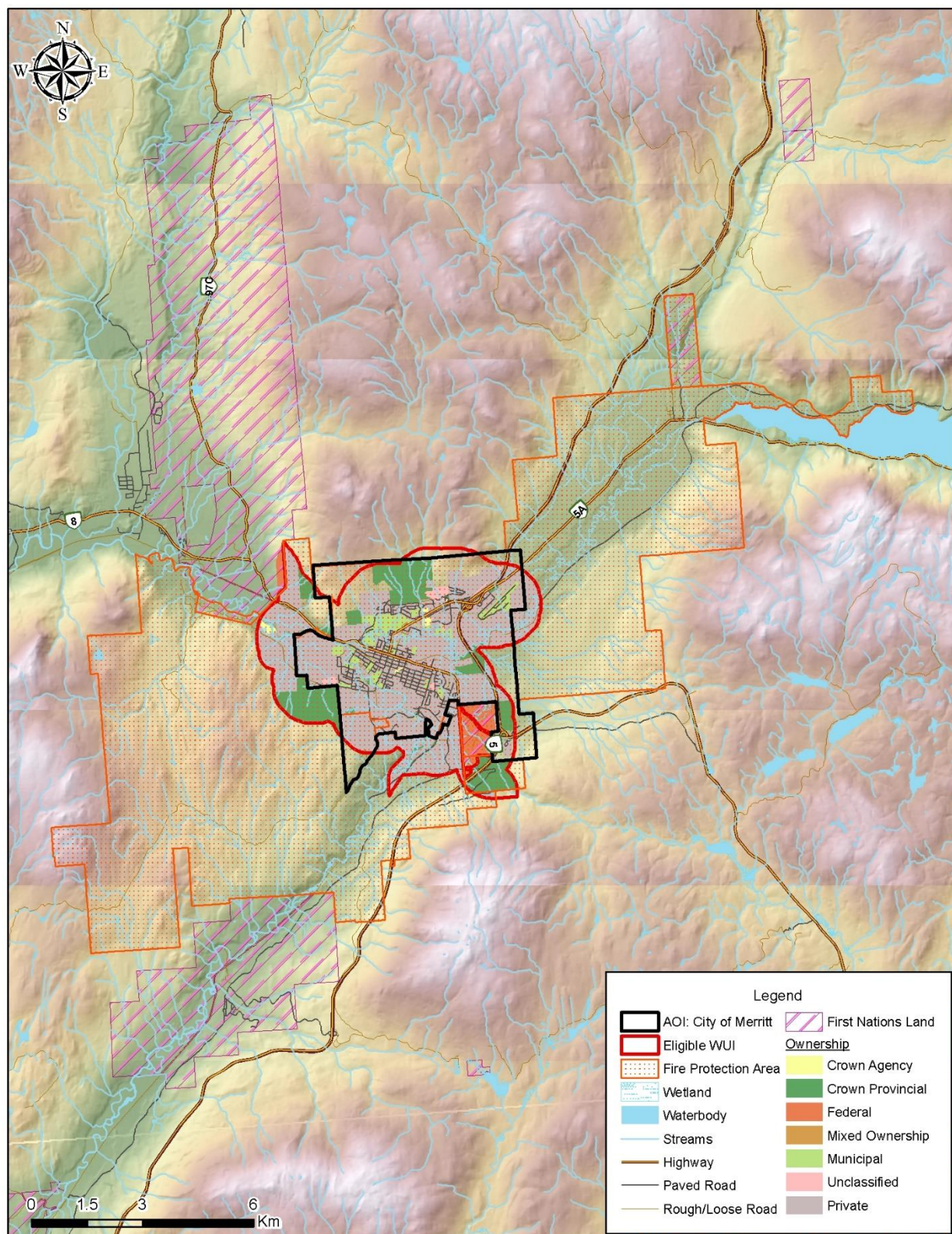
Wildland Equipment	Structural Firefighting Inventory
• BB4 pumps (2) • B2X pump (1) • High volume pumps (2) • Mark 3 pump (1) • FireBozz sprinklers (4) • Type 6 bush truck • Structure Protection Unit • PPE for all department members	• Type 1 fire engines (2) • Quint ladder truck (1) • Type 1 tactical tender (1) • Rescue truck (1) • Command vehicles (2)

The MFRD response area is shown on Map 3. MFRD is contracted to provide fire protection services to areas of Thompson Nicola Regional District (TNRD), including Lower Nicola, portions of Upper Nicola, as well as to Lower Nicola Indian Band (LNIB) and Cook's Ferry Indian Band Reserve lands. Contracts are currently in negotiation with LNIB and Cook's Ferry to re-evaluate service provision. In 2023, the

¹¹ 2022 City of Merritt Annual Report.

¹² 2023 City of Merritt Annual Report.

department expanded its service area to include Lower Nicola and Miller Estates in Electoral Area M of the Thompson-Nicola Regional District, adding structural fire protection to an additional 482 addresses.¹²



Map 3. Merritt Fire Rescue Department Fire Protection Area.

Emergency Management Program

The City of Merritt manages its own emergency management program, as mandated by the provincial *Emergency and Disaster Management Act*. Merritt prepares emergency plans, declares states of local emergency, issues evacuation alerts, orders, and rescinds, and establishes an Emergency Operations Centre (EOC) as required. The City's Emergency Plan and associated Evacuation Plan is scheduled for an update in 2024, along with the Hazard, Risk and Vulnerability Assessment. As part of this update, a training and exercise plan has been developed for staff enrolled as potential EOC members. A new facility was recently constructed near the airport to serve as a permanent EOC location, and funding has been obtained to equip it.

Neighborhood Overview

During CWRP development, FireSmart vulnerability and resilience factors for Merritt were noted (Table 7). This incorporates field observations, local risk assessments, and background information gathered through research and municipal staff contributions. For consistency with other planning activities, these observations have been organized into the neighborhoods identified in the Official Community Plan, as shown in Table 7.

Table 7: FireSmart vulnerability and resilience factors within Merritt

Neighbourhood	Vulnerabilities	Resilience Factors
Airport	- Abundant grassy fuels intermingle with structures. - Coniferous vegetation common in residential landscaping. - Spontaneous combustion at the hog fuel yard has occurred, challenging suppression efforts.	- Most values at lower slope positions - Good access / egress onto highways - Located on valley bottom not on slopes, and in close proximity to Nicola River. - Mostly new commercial structures made of cement, stucco, steel.
Bench, North Bench, Grandview	- Some homes positioned on and at tops of slopes. - In some areas, grass creates pathways from wildland areas into neighborhoods and Home Ignition Zones. - Coniferous vegetation common in residential landscaping - Many homes have combustible elements to them.	- Developed areas, golf course and mowed grass in Central Park are features that disrupt continuity of fuels. - Fuel treatments at perimeter of neighborhood have reduced the hazard of these forest fuels. - Established hydrant network and easy access to structures on residential streets.

Neighbourhood	Vulnerabilities	Resilience Factors
City Centre, Diamond Vale, Riverside	- Many homes on small lots, which restrict ability to create defensible space according to FireSmart principles - Coniferous vegetation common in residential landscaping - Most homes constructed with combustible siding, fencing and/or decking that are vulnerable to ember showers. - Spontaneous combustion at the hog fuel yard has occurred, challenging suppression efforts. - Fire department frequently called out to ignitions near Coldwater Trail.	- High density developed area with little coverage of natural vegetation - not in the interface. - Flat terrain. - Established hydrant network and easy access to structures on residential streets.
Colletville	- Close proximity to continuous forest fuels. - Coniferous vegetation common in residential landscaping - Most homes constructed with combustible siding, fencing and/or decking.	- Irrigated fields disrupt continuity of fuels in this neighborhood. - Established hydrant network and easy access to homes on residential streets.
Middlesboro	- Proposed subdivisions on Midday Valley Road have one-way access/ egress, and are surrounded by natural vegetation (grasslands). - Hazardous values at risk present in nearby industrial areas. - Some hydrants offer lower pressure in this area	- Grass fuels that predominate in this area are potentially less costly and/or challenging for landowners to manage. - Opportunity to build new structures and homes according to FireSmart principles
Ranchlands	- Proposed development is in close proximity to continuous forest fuels near Godey Creek trails. - Nearby on Fox Farm Road, homes are located at top of slopes, and surrounded by continuous forest fuels. - Nearby on Coldwater Road, rural residential properties have significant coverage of grass, and some mature conifer trees.	- Opportunity to build new structures and homes according to FireSmart principles. - Cultural and prescribed burning on LNIB lands (Joeyaska) has reduced hazardous fuel loading in this area. - FESBC and historic BCWS fuel management have reduced hazardous fuel loading in some locations near Fox Farm Road.

3.3 VALUES AT RISK

Values at risk are the human or natural resources that could be negatively impacted by a wildfire. This section outlines community assets, critical infrastructure and resource values in the City of Merritt.

3.3.1 CRITICAL INFRASTRUCTURE

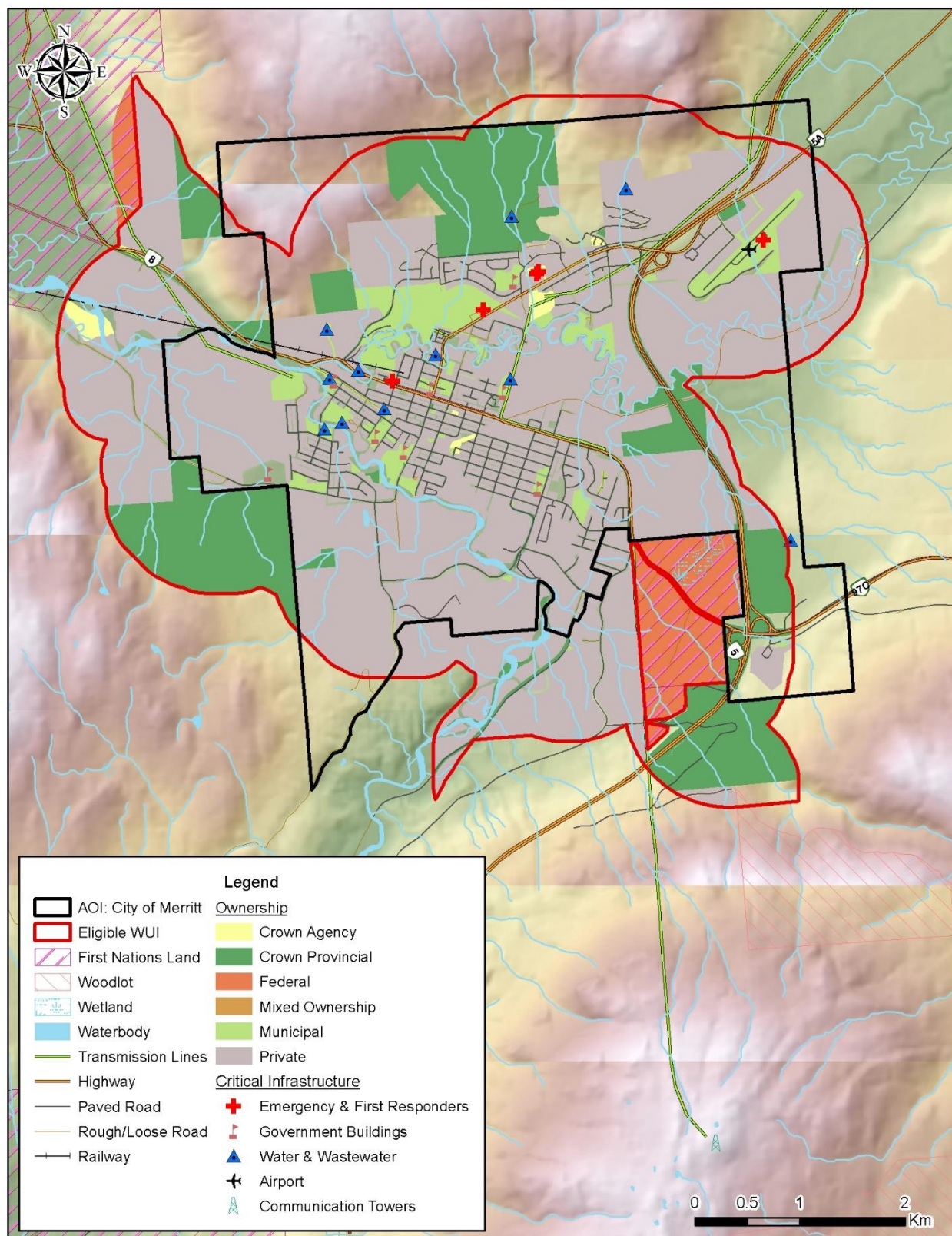
Protection of critical infrastructure and other values at risk during a wildfire event is an important consideration for emergency response effectiveness, ensuring that coordinated evacuation can occur if necessary and that essential services can be maintained or restored quickly in an emergency.

Critical infrastructure can be defined as assets that are essential for the functioning of government and society.¹³ Critical infrastructure is shown on Map 4, and Table 8 summarizes municipal critical infrastructure identified in the Eligible WUI. Private utilities or facilities are not included in the summary. Interagency collaboration for management of values at risk outside the Eligible WUI or the municipality's jurisdiction is discussed further in Section 11.4. Cultural, environmental, and other resource values are displayed on Map 5.

Table 8. Inventory of critical infrastructure and community assets in the City of Merritt.

Type	Structure
Emergency & First Responders	Fire Hall
	RCMP Station
	BC Emergency Health Services
	Nicola Valley Hospital
	Emergency Operations Centre
Government Buildings	City Hall
	Kengard Learning Centre
	Colletville Elementary School
	Diamond Vale Elementary School
	Merritt Bench Elementary School
	Merritt Secondary School
Water & Wastewater	Lift Station (4)
	Water Treatment Facility
	Pump Station (1)
	Water Reservoir (4)
Other	Airport

¹³ Emergency Management & Climate Readiness BC. (2016). *British Columbia Emergency Management System*. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bcems/bcems_guide.pdf



Map 4. Community assets and critical infrastructure within the City of Merritt.

3.3.2 ELECTRICAL POWER

Wildfires have the potential to impact electrical service by causing disruption in network distribution directly or indirectly. Heat from flames or fallen trees associated with a fire event may cause power outages. The 2021 wildfire season caused outages for residents in the Okanagan Shuswap that ranged from hours to days.^{14,15} Disruptions also occurred for residents between Osoyoos and Oliver in 2021 as BC Hydro and Fortis BC cut power to facilitate safe access for BCWS crews to work on the Nk'Mip Creek fire.¹⁶ Robust emergency planning and back-up power for key systems, such as the EOC, Emergency Support Service (ESS) centre(s), and water and wastewater systems, are therefore important to increase community resilience. Vulnerabilities for secondary power sources, which should also be considered, include mechanical failure, potentially insufficient power supply should a wide-scale outage occur, and fuel shortage in the event of long outages.

BC Hydro provides electrical service in Merritt through a network of transmission and distribution lines. Transmission lines enter the municipality from the northeast and northwest, passing through a substation located across from Central Park. Secondary power distribution is provided by overhead distribution lines and some underground subdivision servicing. Distribution and transmission infrastructure can be vulnerable to wildfire, especially in the interface, as intense heat from burning vegetation can damage lines, and wooden poles are susceptible to damage from fire.

BC Hydro manages vegetation around facilities and rights of way for transmission lines and distribution lines according to integrated vegetation management plans which are renewed and updated periodically.^{17,18} BC Hydro operates various risk management programs for their infrastructure, with an overall emergency management program based on best practices, including the requirements of the provincial *Emergency and Disaster Management Act*.

3.3.3 WATER AND SEWAGE

The functionality of critical water and sewage infrastructure can be impacted by an interface wildfire event as a result of emergency power cuts or physical damage. Infrastructure may be located in forested or interface areas which increase its vulnerability.

¹⁴ Black Press Media Staff. "Power returns to Salmon Arm, remains out for Mara Lake area." Vernon Morning Star. 20 July 2021. <https://www.vernonmorningstar.com/news/downtown-salmon-arm-and-areas-of-shuswap-in-the-dark/>;

¹⁵ Harmel, Isabella. "Grass fire in West Kelowna causes power outage." Kelowna Capital News. 7 July 2021. <https://www.kelownacapnews.com/news/grass-fire-in-west-kelowna-causes-power-outage/>

¹⁶ NowMedia Staff. "UPDATE: Nk'Mip Creek wildfire no longer be considered a wildfire of note." Kelowna Now. 4 September 2021. https://www.kelownanow.com/watercooler/news/news/Wildfire/Wildfire_sparks_between_Osoyoos_and_Oliver/

¹⁷ BC Hydro. (2021). Integrated Vegetation Management Plan For Control of Vegetation at BC Hydro Facilities. <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/safety/facilities-pmp-final-confirmed-sept-16-posted.pdf>

¹⁸ BC Hydro. (2021). Integrated Vegetation Management Plan For BC Hydro Transmission and Distribution Power Line Corridors. <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/safety/powerline-ivmp-2022-2027-confirmed-nov-2-2022.pdf>

Merritt provides residents with water and wastewater services through infrastructure it owns and operates. The city's water supply is obtained from the Merritt Aquifer via five pump stations. At each well station water is disinfected with chlorine and UV treatments and then distributed to four reservoirs where it is stored. In the event of a power outage the two pump stations and disinfection building at Voght Street have backup generators. The city also maintains a full network of fire hydrants, as well as a wastewater treatment facility at the public works yard.¹⁹

The Merritt Aquifer and the city water infrastructure can provide quality drinking water at sufficient capacity for the present and projected future population of the city.²⁰ Annual reporting and water system studies have not identified major deficiencies in the quality or repair of infrastructure. It should be noted that the 2012 Water Utility Master Plan identified "likely" deficiencies in fire flow in parts of the City, but this has not been further investigated or confirmed.²⁰ CFRC members noted that there are a few areas in town that offer lower pressures, including north of Sunflower Avenue, west of Mountain Drive, Logan Lane, Midday Valley Road, and the airport runway. Overall, the hydrant network serves the needs of MFRD.

While the Merritt Aquifer can provide abundant drinking water to the community throughout most of the year, water conservation frequently becomes an issue during the summer. This is because groundwater withdrawal is a contributing factor to the increasingly severe drought conditions that have impacted the Coldwater River in the past decades. The Coldwater River naturally loses water throughout the year to the Merritt Aquifer, and it recharges the aquifer when the city pumps water from it. During the peak drought season, the city's water use exacerbates low flow conditions, which alongside high stream temperatures, have threatened the health of the river ecosystem and fish populations.²¹ In response, Merritt has pursued numerous measures to reduce domestic water consumption, including public outreach, promoting xeriscaping, and implementing watering restrictions.²¹

The implications of these issues for community wildfire resiliency include the following:

- Merritt has access to a sufficient and reliable water source for structural firefighting purposes, now and for the foreseeable future.
- Surface water sources that can be used to pump from to suppress wildfires may become more scarce or unreliable in the future, as the effects of climate change interact with pressures from increased development. (Section 10.1.2)
- The Coldwater River may be increasingly vulnerable to other disturbances, including the effects of wildfires (Section 9.3.5)

¹⁹ City of Merritt. (2019). *Community Water System*.

²⁰ City of Merritt (2012). *Water Utility Master Plan*. https://www.merritt.ca/wp-content/uploads/2020/06/2012_city_of_merritt_water_utility_master_plan.pdf

²¹ City of Merritt. (2021). *Open letter on perceived water shortages in Merritt*. <https://www.merritt.ca/wp-content/uploads/2021/02/Open-Letter-Water.pdf>

3.3.4 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders. Protecting hazardous values from fires can limit the extent of interface fire disasters. Anywhere combustible materials, explosive chemicals, gas, or oil is stored can be considered a hazardous value. Most farms and industrial sites can be considered hazardous values.

Fortis BC operates underground pipelines that transmit and distribute natural gas to the municipality. The transmission pipeline enters the community on the northwest corner, running parallel to Highway 8. In the event of a wildfire, FortisBC will work with local and provincial emergency responders and employ their own emergency response protocols, including shutting down compressor stations, if required.²²

3.3.5 ENVIRONMENTAL VALUES

Merritt and the surrounding area are characterized by many important environmental values that may be impacted by wildfire and also may be impacted by fuel management treatments designed to mitigate the threat of wildfire. This includes:

- Winter range for moose and mule deer
- Occurrences of, and habitat for species at risk
- Old growth management areas (non-legal designations)
- Aquatic and riparian ecosystems of the Nicola Watershed

Occurrences of species and ecosystems at risk were identified through the B.C. Conservation Data Center. Red- and blue-listed species occurrences are displayed on Map 5. Critical habitat for federally listed species at risk also overlap with the Eligible WUI – specifically for Williamson’s sapsucker (*Sphyrapicus thyroideus*), Lewis’ woodpecker (*Melanerpes lewis*), and the American badger (*Taxidea taxus jeffersonii*). Site level plans must identify potential impacts to ecosystems or species at risk and may require rationales or mitigation measures for treatment in some areas.

Merritt is located at the confluence of the Coldwater and Nicola Rivers, and at the centre of the Nicola Watershed. The Nicola River is a tributary of the Thompson, and an important contributor of early-run Chinook (*O. tshawtscha*), coho (*O. kisutch*), and steelhead (*O. mykiss*) to the Fraser River system.²³ The Coldwater River is an important tributary to the Nicola and supports these species as well as numerous other fish populations. A comprehensive inventory of the Coldwater River was completed in 2009 and found an overall ‘High’ Aquatic Habitat Index value.²⁴

²² FortisBC. *Wildfires and evacuations*. Retrieved from: <https://www.fortisbc.com/safety-outages/preparing-for-emergencies/wildfires-and-evacuations>

²³ Pacific Salmon Foundation. (2007). *Development of an annual salmonid productivity assessment program for the Nicola River watershed*. <https://psf.ca/wp-content/uploads/2021/10/Download-PDF756-1.pdf>

²⁴ Ecoscape Environmental Consultants Ltd. (2021). *Coldwater River inventory, mapping and aquatic habitat index*. <https://tnccollaborative.org/resources/coldwater-river-sensitive-habitat-inventory/>

Extensive watershed planning has been completed for the Nicola Watershed, to address First Nations' and stakeholders concerns regarding the threats to water quality, quantity, riparian habitat, and fish populations. Some of the main issues identified in one of the more recent roundtables included:²⁵

- Insufficient water for irrigation and fish populations
- New development pressures with increasing water demand
- Inadequate groundwater regulations
- Economic impacts to surface water license holders during periods of water extraction restrictions
- Poor water quality from land-based activities

Challenges to the health of the watershed are relevant to identify in this plan, because the related and contributing issues associated with them are directly tied to the local threat of wildfire. The following are some of the issues where watershed management and community wildfire resiliency overlap:

- Ignitions that begin in the WUI, can become fires that spread to forests within the watershed, contributing to a loss of forest cover.
- Reduced forest cover in the watershed influences many inter-connected ecosystem processes, with effects including increased sediment loading, and altered peak runoff rates and timing of flows.²⁶
- Changes to the quantity, and timing of water flow as a result of wildfire events can impact riparian and aquatic habitat quality.

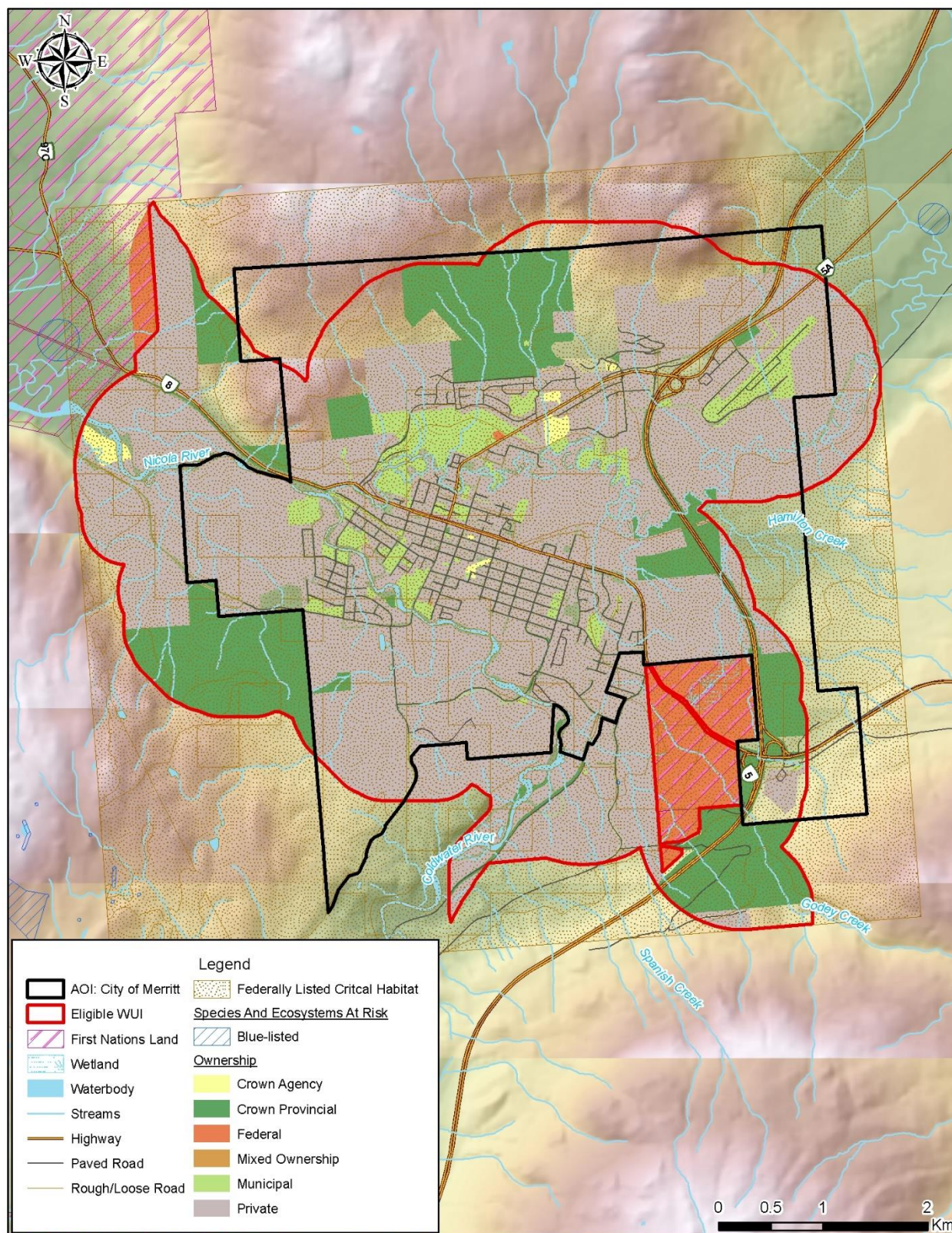
Another key concern in the region is the spread of invasive species, which can threaten at-risk ecosystems and compromise habitat for species at risk. Many sites in the local area have a high cover of invasive plants. The Invasive Species Council of BC has published best management practices for roadside and forestry work that should be adhered to when completing fuel management treatments.²⁷

²⁵ ESSA Technologies Ltd. and Fraser Basin Council. (2019). Nicola Watershed Characterization: a preliminary evaluation of watershed issues and priority recommendations for the Nicola Forum.

https://www.fraserbasin.bc.ca/Library/TR_Nicola/Nicola_Characterization_Report_Final.pdf

²⁶ Jordan, P. (2015). *Post-wildfire debris flows in southern British Columbia, Canada*. International Journal of Wildland Fire 25(3)322-336.

²⁷ https://bcinvasives.ca/wp-content/uploads/2021/01/Forestry_OperationsFINAL_04_24_2019.pdf



Map 5. Environmental values at risk within the City of Merritt's Eligible WUI.

3.3.6 CULTURAL HERITAGE VALUES

Merritt overlaps the traditional territory of the Nleʔkepmx and Syilx peoples, and there is potential for archaeological sites to be found within municipal boundaries. Known archaeological sites are recorded by the Archaeology Branch and protected under the Heritage Conservation Act, which applies on both public and private lands.

There are also cultural heritage values present in the Eligible WUI that are not mapped. In their OCP, Merritt has committed to working with First Nations communities to recognize Indigenous history and culture in the community, in part through identifying and signposting culturally significant sites. The Upper Nicola Band's (UNB) CWRP identifies archaeological sites, traditional use sites, historic buildings and artifacts, and heritage trails as cultural heritage resources, while recognizing that all areas surrounding the community hold significance as well.

Cultural and heritage values have the potential to be impacted by wildfire, or by wildfire suppression techniques, through physical damage or alteration. The UNB CWRP notes the importance for firefighting agencies (structural or wildland) to collaborate with Indigenous communities and together identify cultural values before, during, and after wildfires. A successful example of this collaboration occurred when UNB and BCWS worked together during the White Rock Lake fire in 2021 to ensure fireguards were constructed to avoid or minimally impact culturally sensitive sites.

Cultural heritage values may also be impacted during fuel management treatment operations. Merritt should continue to consult with First Nations well before development and implementation of any fuel management prescription of treatment in the area to allow for meaningful review and input. Assessments may be required to ensure that known or unknown cultural resources are not inadvertently damaged or destroyed, and that First Nations strategies for land management in their traditional territory are complied with.

3.3.7 OTHER RESOURCE VALUES

Several other resource values are present in the municipality, including Crown land tenures, recreational values, and some government and transportation structures. Forestry, farming, and mining have been important sectors of the regional economy for several decades. Licensees carry out forestry activities on Crown land within and beyond the Eligible WUI. Ranching occurs on range tenures on Crown land as well as on private landholdings.

Recreation and tourism are other important values in Merritt and are becoming increasingly important sectors of the local economy. Several music festivals are hosted annually in the municipality. There is mountain biking, hiking, and off-road vehicle trail networks on all sides of the community. Recreational sites and provincial parks alongside lakes and rivers nearby see frequent recreational traffic as well.

SECTION 4: WILDFIRE RISK ASSESSMENT

This section summarizes the factors that contribute to local wildfire risk in the City of Merritt's Eligible WUI. The wildfire risk assessment provides a decision support tool to determine the most effective wildfire risk reduction actions and opportunities to increase community resilience.

The relationship between wildfire risk and wildfire threat can be summarized as follows:

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

Where:

Wildfire Risk is the potential losses incurred to human life, property, and critical infrastructure 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, areas of high biodiversity, etc.).

Probability is the likelihood of fire occurring in an area and that area's ability to ignite, spread, and consume organic material in the forest – its *wildfire threat*. Wildfire threat is driven by three major components of the wildfire environment, often referred to as the 'fire behaviour triangle' (Figure 1):

- Fuel - loading, size and shape, arrangement (horizontal and vertical), compactness, chemical properties, and fuel moisture (Section 10.1.1)
- Weather – temperature, relative humidity, wind speed, and direction and rainfall (Section 10.1.2)
- Topography - slope (increase/ decrease rate of spread), and aspect (fuel dryness) (Section 10.1.3)



Figure 1. The fire behaviour triangle is made up of three factors that produce different wildfire characteristics.

4.1 LOCAL WILDFIRE ENVIRONMENT & FIRE HISTORY SUMMARY

The ecological context of wildfire and the role of fire in the local ecosystem under both current and historical conditions is an important basis for understanding the current and future wildfire threat to a community.

4.1.1 FUEL

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.

Natural areas and green spaces in the WUI are comprised of several different ecosystem types. On the valley bottom and the hot, dry bases of slopes (BBxh2 and PPxh2 biogeoclimatic zones – Section 4.1.4), grassland ecosystems predominate. Non-native and native (bluebunch wheatgrass, rough fescue) grass species co-mingle in these areas. Open, well-spaced stands of mature ponderosa pine are present, interspersed with non-vegetated talus slopes, exposed rock outcrops and cliffs. Moisture-seeking water birch and red-osier dogwood occupy the banks of the Nicola and Coldwater Rivers.

On warm and dry aspects, Douglas-fir trees begin to appear mid-slope in gullies and water-receiving depressions, becoming more dominant as elevation increases (IDFxh biogeoclimatic zone – Section 4.1.4). On cool, north-facing slopes, Douglas-fir-leading forests extend nearly to the valley bottom. In these locations, pinegrass and drought-tolerant shrubs replace bluebunch wheatgrass on the forest floor.

Some of the most hazardous forest fuels in the Eligible WUI include these Douglas-fir forests. Historically, low-severity wildfires helped to maintain these ecosystems by reducing conifer encroachment. In some sites, fire exclusion has converted former grassland or sparsely treed areas to multi-layered forests. It has also contributed to ingrowth of understory saplings and seedlings within mature forest stands. This increases ladder fuel continuity, especially on steep slopes, promoting higher intensity fire behaviour.

Grassland fuels are also a concern in many areas of the municipality, where widely spaced trees with open canopies allow for a thick grassy understory to develop. When wind driven, grass fires can have very rapid rates of spread, considerable flame heights, and are capable of igniting structures. The configuration of these fuels increases the hazard associated with them, as they often extend continuously from the interface into the community itself on medians, rights-of-way, and residential lots.

Fuel Types

The Canadian Forest Fire Behaviour Prediction System was used to assess forest stand and structure characteristics as they relate to wildfire behaviour potential. This system outlines sixteen 'fuel types,' which are distinctive forest structure types, each associated with different fire behaviour characteristics

under defined conditions.²⁸ Fuel types were confirmed or updated during fieldwork for all public land within the Eligible WUI. The results of this classification process, and the verified fuel types that were determined to compose the forests and green spaces within the Eligible WUI, are shown below on Map 6.

Table 9 lists the percentage of area by fuel type in the Eligible WUI. As described above, a large portion of the WUI encompasses grasslands. These areas were assigned an 'O-1b' fuel type. The second most prevalent type of vegetation is open, dry forest, with abundant understory grass growth. These were assigned a 'C-7' fuel type. A small amount of denser forest stands were identified in the WUI and were assigned a 'C-3' fuel type. This is considered the most hazardous forest structure in the Eligible WUI, capable of supporting a crown fire under the right conditions. Typically, these forests are characterized by dense, ingrown stands of Douglas-fir trees.

Finally, a significant proportion of area within the City of Merritt is privately owned, including large rural residential parcels and agricultural landholdings. Verifying fuel types of private land is outside the scope of this plan. However, risk can be assessed through FireSmart Home Ignition Zone Assessments, which can be completed by Local FireSmart Representatives (see Section 11.1).

²⁸ Forestry Canada Fire Danger Group. (1992). *Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3*.



Figure 2. Examples of C-3 fuel types.

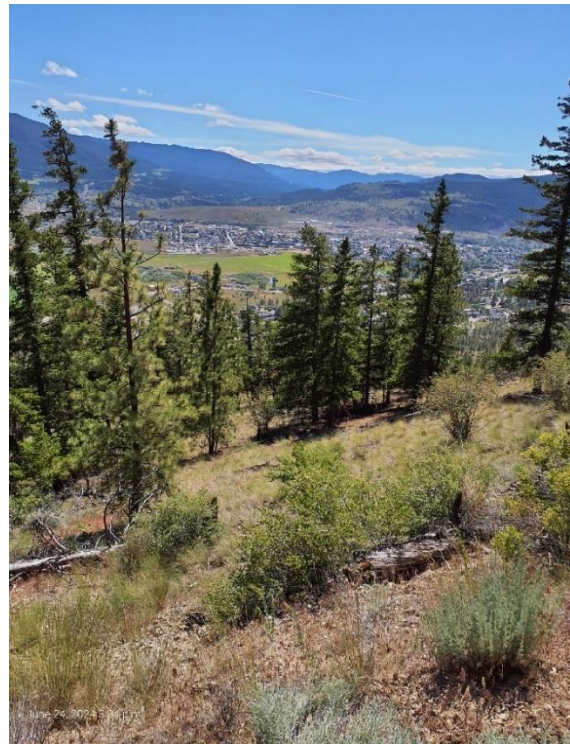
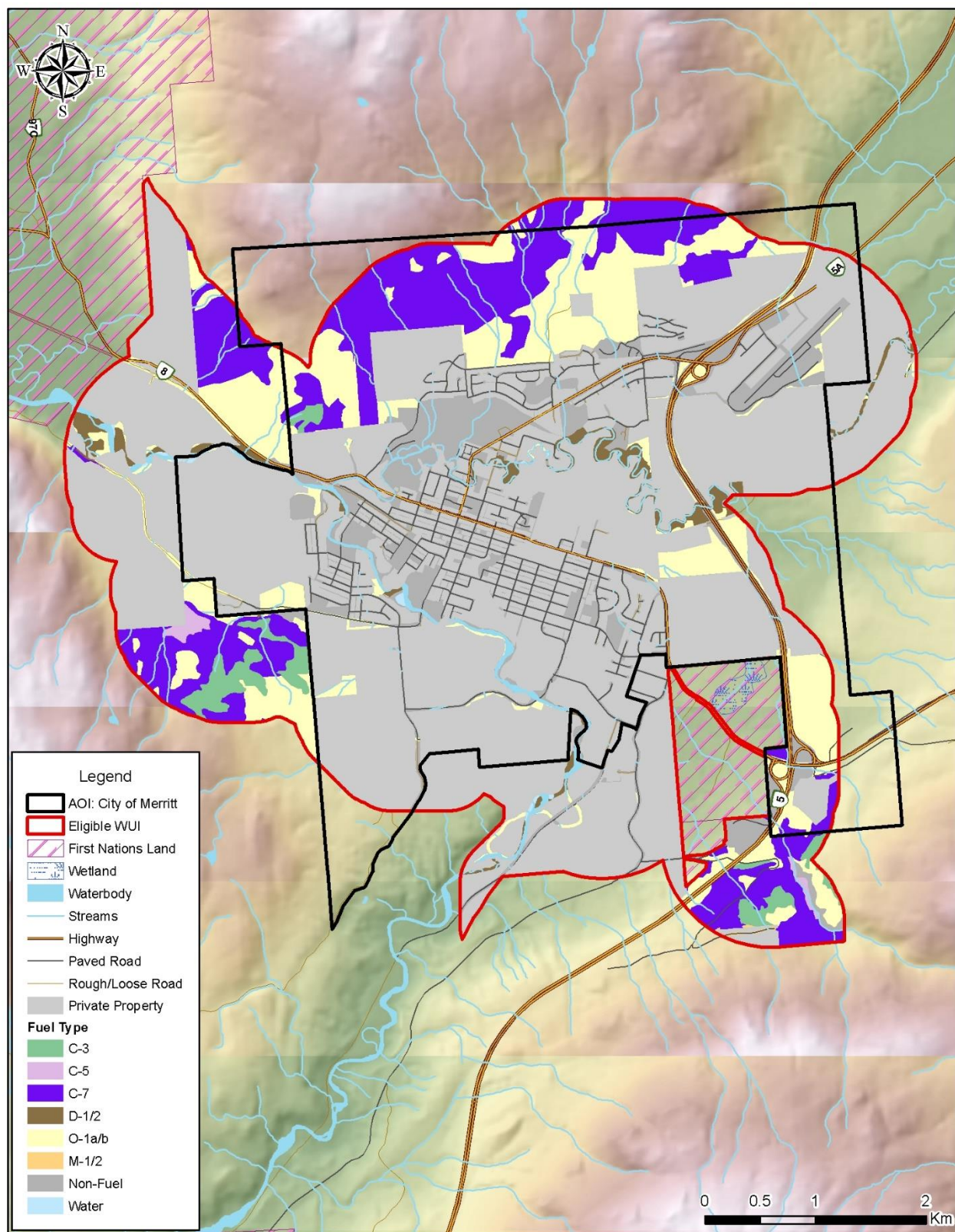


Figure 3. Examples of C-7 (right) and O-1a/b (left) fuel types.

Table 9. Fuel types in the Eligible WUI (public land only).

Fuel Type	Area (ha)	Percentage of Public Land (%)
C-3	50	4%
C-5	9	1%
C-7	408	30%
D-1/2	55	4%
M-1/2	1	<1%
O-1a/b	438	32%
N	413	30%
W	28	NA
<i>Private/No Data</i>	<i>1932</i>	<i>NA</i>



Map 6. Fuel types in the Merritt Eligible WUI.

4.1.2 WEATHER

Since fire danger varies from year to year, historical weather data can provide information on the number and distribution of days when the Eligible WUI is typically subject to high fire danger conditions. The Canadian Forest Fire Danger Rating System has 5 Danger Class ratings ranging from 1 (Very Low) to 5 (Extreme). 'High fire danger' includes Danger Class 4 (High) and 5 (Extreme). The Danger class days as reported by the local 'Merritt HUB 2' station were summarized to indicate fire weather conditions in the Eligible WUI and are shown in Figure 4. The weather station is situated at the local airport, on the valley bottom, representative of the warmest and driest conditions in the area (BGxw1 and PPxh2).

During the fire season fire danger ratings are predominantly Moderate or higher. On average, the greatest numbers of High Danger Class days generally occur during July and August, and most extreme fire weather is experienced in July. After August the probability of 'extreme' danger class days declines, but there are still significant numbers of 'high' danger class days that occur through to the end of October.

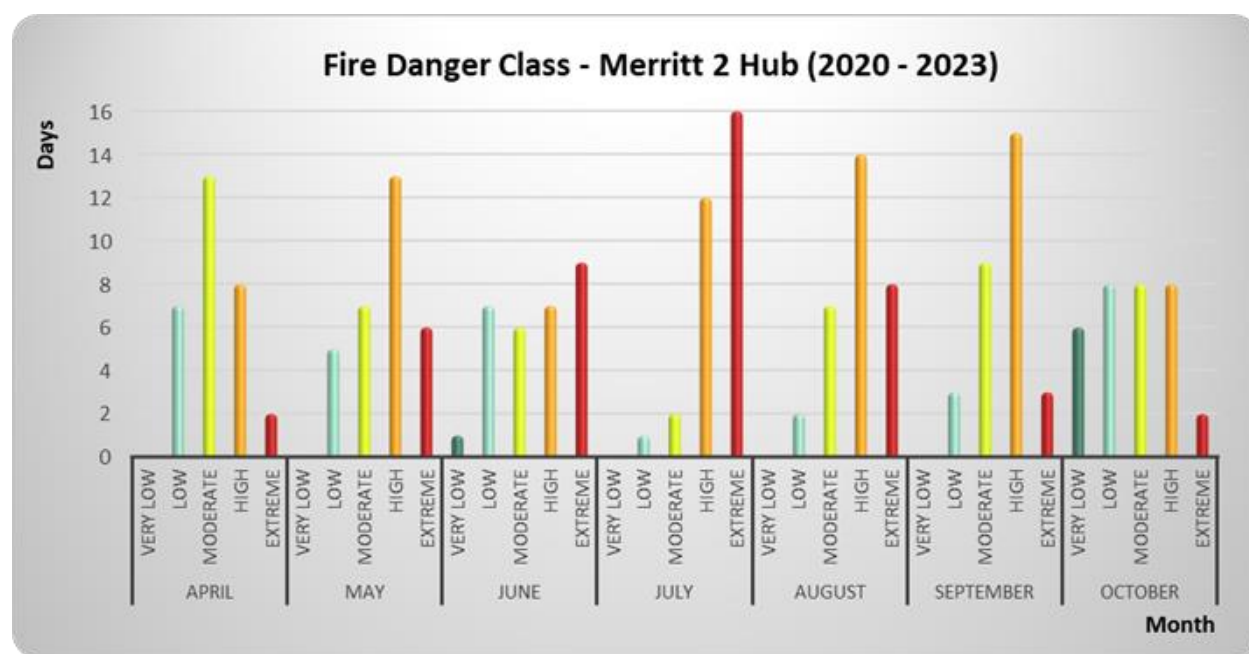


Figure 4. Average number of danger class days recorded by month at Merritt HUB 2 BCWS weather station.

Hourly wind speed and direction is also recorded at BCWS weather stations. Data is publicly available in the form of Initial Spread Index data.²⁹ The Initial Spread Index (ISI) is a numeric rating of the expected rate of fire spread that combines the effects of wind speed and fine fuel moisture, which is 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.

²⁹ Government of British Columbia. 2023. *Fire and fuel management*. <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management>

Figure 5 displays daily average, and monthly average Initial Spread Index values and wind direction between April and October for the Merritt Hub 2 fire weather station. The length of each segment in the graphic indicates the proportion of days where winds occur from that cardinal direction and the color indicates ISI value. High ISI values indicate strong winds and/or low humidity, so are expected to peak in the summertime, as depicted in the graphic. A high ISI value is a good indicator that BCWS ground crews may have control difficulties, as the fire is likely to have a high rate of spread.³⁰ Unsurprisingly, monthly data shows July and August are peak fire behaviour months. In August, the mean ISI value is 9.2, and in July is 10.1.

Throughout the fire season, there is a strong pattern of predominant southwesterly winds represented in the data. This trend was also confirmed by BC Wildfire staff, who also noted that passing cold fronts typically come from the opposite direction – north or northwest. Cold fronts may also be accompanied by wind, dry lightning, and no decrease in temperature, which can intensify fire behaviour or produce new starts. Since Merritt is situated on an open floodplain and surrounded by moderately rolling hills, it is a generally windy location and daily windspeeds of 20 km/hr are not uncommon during the fire season. In combination with the semi-arid climate, this can produce very high ISI values (30-39) in July and August.

³⁰ BC Wildfire Service. 2020. *Wildfire Season Outlook – mid-month update – July 24, 2020*. Retrieved from: <https://nr.civicweb.net/document/166218/>

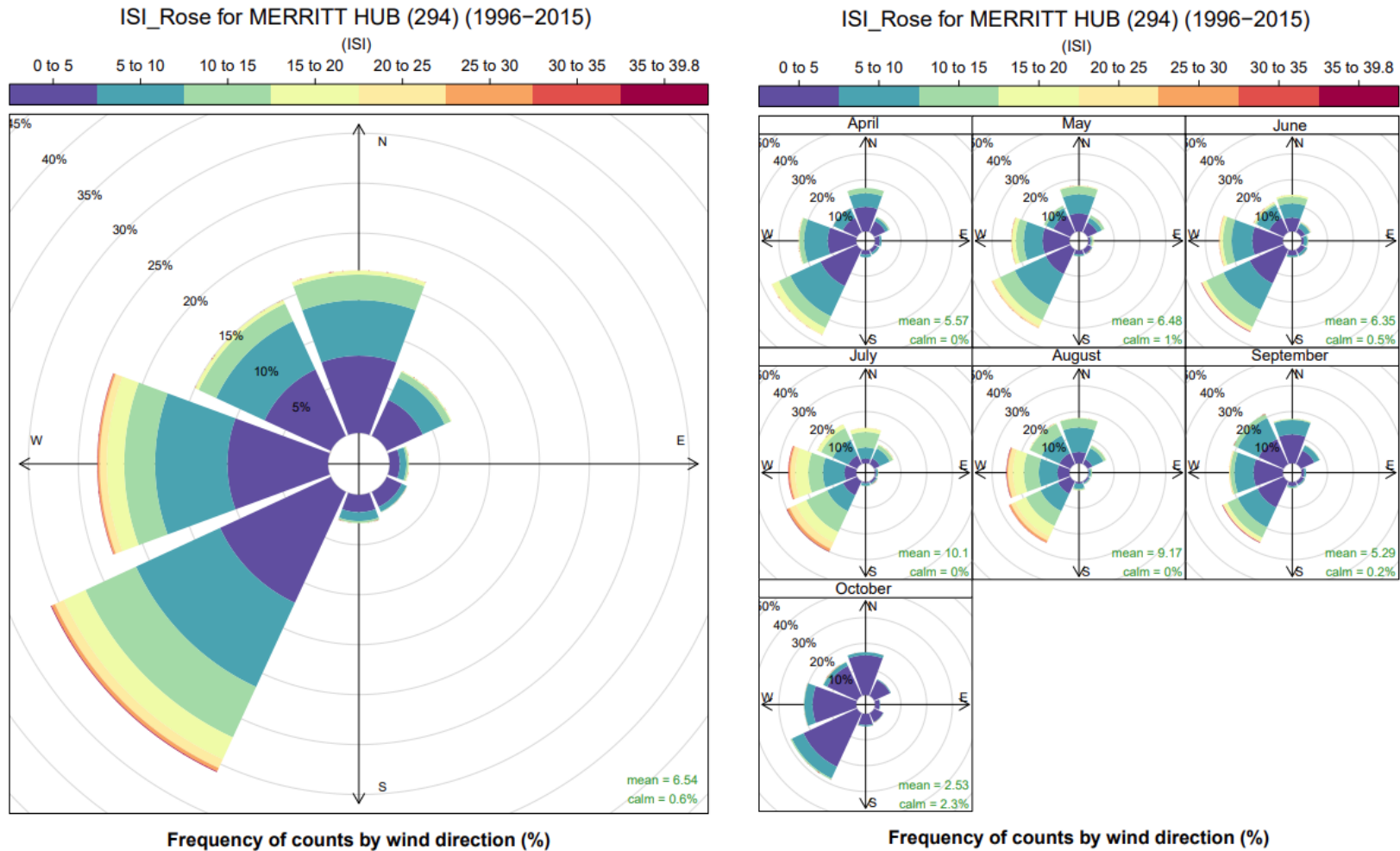


Figure 5. Average daily (left) and monthly (right) wind speed and direction from April to October for the Merritt Hub 2 weather station.

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.³¹ 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.³² Despite the uncertainties, trends within the data are visible.

Climate scientists expect that the warming global climate will trend towards wildfires that are increasingly larger, more intense, and more difficult to control; it is likely that these fires will be more threatening throughout the wildland-urban interface due to increased potential fire behaviour, fire season length, and fire severity. Researchers studying the relationship between climate change and potential impacts of wildfires to Canadian forests have found that:

- Fuel moisture is sensitive to temperature change, and projected spring precipitation increases will be insufficient to counteract the impacts of the projected summer precipitation decreases and increases in temperature. Results conclude that future conditions will include drier fuels and a higher frequency of extreme fire weather days.³³
- The future daily fire severity rating (a seasonally cumulative value) is expected to have higher peak levels, and head fire intensity is expected to increase significantly in western Canada. The length of fire seasons is expected to increase, and the increase will be most pronounced in the northern hemisphere. Fire season severity seems to be sensitive to increasing global temperatures; larger and more intense fires are expected, and fire management will become more challenging.^{34,35}

4.1.3 TOPOGRAPHY

Slope steepness affects the trajectory and rate of spread of a fire, while slope position relates to the ability of a fire to gain momentum uphill. Other factors of topography that influence fire behavior include aspect, elevation, and the configuration of features on the landscape that can restrict (i.e., water bodies, slope

³¹ Flannigan, M.D et al. 2009. *Implications of changing climate for global wildland fire*. International Journal of Wildland Fire 18, 483-507.

³² 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.

³³ Flannigan, M.D., B.M. Wotton, G.A. Marshall, W.J. deGroot, J. Johnston, N. Jurko, A.S. Cantin. 2016. *Fuel moisture sensitivity to temperature and precipitation: climate change implications*. Climatic Change (2016) 134: 59-71. Retrieved from: <https://link.springer.com/content/pdf/10.1007%2Fs10584-015-1521-0.pdf>.

³⁴ Flannigan, M.D., A.S. Cantin, W.J. de Groot, M. Wotton, A. Newbery, L.M. Gowman. 2013. *Global wildland fire season severity in the 21st century*. Forest Ecology and Management (2013) 294: 54 - 61.

³⁵ Jandt, R. 2013. *Alaska Fire Science Consortium Research Brief*. 2013-3.

breaks) or drive (i.e. narrow draws, uniform slopes) the movement of a wildfire. Table 10³⁶ shows the percent of Eligible WUI by slope percent class and those classes' fire behavior implications.

Table 10. Slope percentage and fire behaviour implications.

Slope	Percent of Eligible WUI	Fire Behaviour Implications
<20%	71%	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	12%	Steeper slopes tilt flames upward, beginning to preheat fuel and increase rate of spread.
31-45%	12%	Flames are tilted upward, preheating fuels and directing flames towards fuels upslope. High rate of spread.
46-60%	4%	Flames are tilted upward, preheating fuels and directing flames towards fuels upslope. Very high rate of spread.
>60%	1%	Flames are tilted upwards, preheating fuels and directing flames towards fuels further upslope. Extreme rate of spread.

The majority of the Eligible WUI is located on slopes <20% and will likely not experience accelerated rates of spread due to topography alone. Considering slope-effect independently, some of the Eligible WUI may experience high to extreme rates of spread. When slope percentage is considered in context with a value's position on a slope, the overall risk can change dramatically. For example, a value located on the upper third of a steep slope could be exposed to fires that begin downslope and spread rapidly uphill. Table 11³⁷ summarizes the fire behaviour implications of slope position.

Table 11. Slope position of values-at-risk and fire behaviour implications.

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

³⁶ Adapted from Table 4: Slope Percentage and Fire Behaviour Implications; "Determining Wildfire Threat and Risk at a Local Level"; Tools for Fuel Management website (<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/fuel-management>)

³⁷ Copied from Table 5: Slope Position of Value and Fire Behaviour Implications; "Determining Wildfire Threat and Risk at a Local Level"; Tools for Fuel Management website (<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/fuel-management>)

Slope aspect can also affect fire behaviour. The direction a slope faces changes both the average temperature and humidity through differing lengths of exposure to direct sunlight. In turn this influences vegetation communities that form and fuel moisture content. South and southwest facing areas, such as the slopes leading up to the Tom Lacey trail, are typically the warmest and driest.

The City of Merritt is situated in the Nicola Basin, amongst the gently rolling uplands of the Thompson Plateau. Hilltops and peaks are low relief, and at the confluence of the Nicola and Coldwater Rivers the valley is broad and shallow. The community is located on the valley bottom and the river floodplain, which is flat and has few topographic restrictions for development. Short, steep, rocky outcrops, and long, continuous, forested slopes lead up to the hills that surround the community on all sides.

The implications of topography in the Eligible WUI are that the Merritt town centre is situated in a lower risk position where in the event of a wildfire, rates of spread would not be accelerated by steep slopes further allowing easier access to residences by first responders. Homes located on crests, knolls, or small hilltops with vegetation downslope are at increased risk, comparatively. This type of development is more common at the outskirts of the municipality on larger acreages, as well as at the north end of town.

4.1.4 WILDFIRE HISTORY

Natural Disturbance Regime

The Eligible WUI can be characterized using the Biogeoclimatic Ecosystem Classification (BEC) system, which classifies the province into zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. These subzones define the climate of the area, and are associated with a Natural Disturbance Type that indicates the frequency and severity of pre-colonial disturbance events.

Most of Merritt's Eligible WUI is located on the flat valley bottom and situated within the Nicola Very Dry Warm Bunchgrass subzone (BGxw1). The transition to the Thompson Very Dry Hot Ponderosa Pine subzone (PPxh2) is largely a function of changes in soil texture that promote tree growth; the climate is largely the same as the BGxw1. Moving upslope, a smaller proportion of the Eligible WUI transitions to the slightly cooler and moister Thompson Very Dry Hot Interior Douglas-fir subzone (IDFxh2) (Map 7, Table 12).

Table 12. Biogeoclimatic zones, subzones, and variants found within the Eligible WUI.

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent of Eligible WUI
BGxw1 - Nicola Very Dry Warm Bunchgrass	NDT4	1868	53%
IDFxh2 - Thompson Very Dry Hot Interior Douglas-fir	NDT4	257	7%
PPxh2 - Thompson Very Dry Hot Ponderosa Pine	NDT4	1211	35%

All these subzones are associated with Natural Disturbance Type 4 (NDT4). NDT4 represents ecosystems that historically experienced frequent, low-intensity fires that burned understory vegetation and woody debris but produced little mortality in mature plants and trees. This fire regime had the effect of regulating the amount of surface fuel build-up and reducing the number of small, sapling-size regenerating trees. The variable intensity and frequency of these types of fires across the landscape promoted mosaics uneven-aged forests and grassy or shrubby openings that naturally restrict the spread of large, severe fires. Low-intensity fires likely occurred every 4 to 50 years in NDT4 ecosystems historically. Larger stand-initiating crown fires may have been rarer but historically occurred at intervals ranging from 150 to 250 years.³⁸

Many low-intensity fires occurred naturally, through lightning strike ignition. However, traditionally, Indigenous communities throughout the southern interior of British Columbia widely used controlled, low-intensity burns to manage the open forest and grassland ecosystems of their traditional territories.³⁹

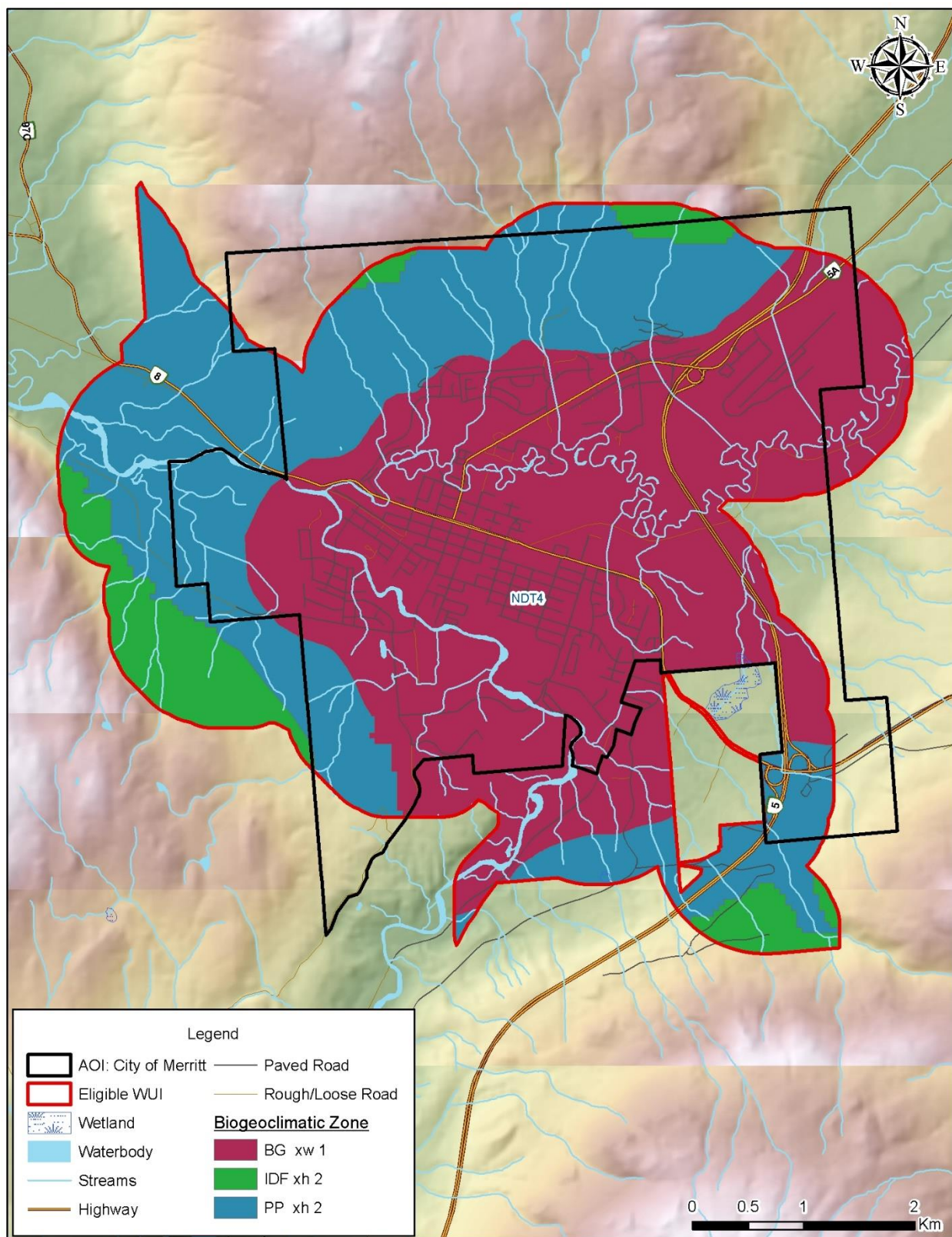
The recent (i.e., 1950's onwards) exclusion of fire, combined with other land use activities, has altered potential fire behaviour in many of the dry forest ecosystems that share this Natural Disturbance Type classification. Fire suppression has promoted encroachment of conifers onto historic grasslands, and ingrowth of younger understory trees in older forests. At higher tree densities, ladder fuels are more continuous, surface fuel loading increases, and overall stand health may decline due to competition for resources. The introduction of highly flammable invasive grass species (e.g., cheatgrass) has also altered the composition of fuels. All together these factors can increase the intensity of potential fire behaviour.

It should be noted that the Natural Disturbance Type classification is useful for describing the historical disturbance pattern typical for an area; however, fire history is complex and highly variable across space and time for many ecosystems.⁴⁰ In the future, climate change may alter BEC and associated NDT distributions.

³⁸ Forest Practices Code. *BC Biodiversity Guidebook*. 1995. <https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf>

³⁹ Syilx – Okanagan Nation Alliance. 2022. *Prescribed Burns*. <https://www.syilx.org/projects/prescribed-burns/>

⁴⁰ Hall, E. (2010). *Maintaining Fire in British Columbia's Ecosystems: An Ecological Perspective*. Report submitted to the Wildfire Management Branch, Ministry of Forests and Range.



Map 7. Biogeoclimatic zones in the Eligible WUI.

Historic Wildfire Occurrences

Historical fire ignition and perimeter data for the AOI and the surrounding area are depicted below on Map 8. Based on the BCWS' historical fire ignition dataset,⁴¹ most ignitions within the Merritt area have been human-caused, but with a large proportion (40%) of fires attributed to lightning as well. There have been 825 recorded ignitions in the surrounding area (within five-kilometers of municipal boundaries) since 1950, with 266 of these having ignited inside the AOI.

Small and medium-sized burns regularly occur on the outskirts of the Eligible WUI and beyond. Within the Eligible WUI, human-caused ignitions pose the highest wildfire ignition threat. Common concerns from local officials consist of landowners open burning on their property, abandoned campfires, and fire starts near major highways associated with vehicle incidents, or discarded cigarettes. Hog fuel piles at industrial sites have spontaneously combusted numerous times over the last five years, resulting in complex interface fire incidents that have required mutual aid support.⁴²

Regardless of the cause, most wildfires that have burned in the Eligible WUI in the last 50 years were suppressed before they reached a substantial size (see Map 8). However, several extreme wildfire events that greatly exceed historical precedents have recently occurred near Merritt. In August of 2021, the Lytton Creek Complex burned within 20 km of the community. This was the same fire that destroyed most of the structures in the Village of Lytton earlier in the season. The entire City of Merritt was issued an evacuation alert, local officials prepared evacuation strategies, and additional firefighting resources were dispatched to the city.⁴³ The Lytton Creek Complex burned approximately 83,470 ha altogether. In addition to the Village of Lytton, structures on lands administered by Lytton First Nation and the slopes above Nicomen Band reserves were burned.⁴⁴ While most of the critical damage caused by this fire occurred on the west side, there were also areas along the southeast perimeter of the fire closer to Merritt that were severely burned.⁴⁵

The same year, the July Mountain wildfire burned along Highway 5, 45 km southwest of Merritt. Highway 5 was temporarily closed in mid-August because of the fire burning across the road. It was approximately 19,335 ha in size and burned approximately 15% of the Coldwater River watershed. Preliminary assessments of the watershed noted that the riparian zone along the river floodplain burned less severely, and as a result did not predict severe downstream effects, or risks to the Coldwater Road.⁴⁶

⁴¹ Data Catalogue BC. <https://catalogue.data.gov.bc.ca/dataset/bc-wildfire-fire-incident-locations-historical>

⁴² Merritt Herald. (2015). *Two hog fuel fires in one day last week*. <https://www.merrittherald.com/two-hog-fuel-fires-in-one-day-last-week/>.

⁴³ City of Merritt Facebook page. <https://www.facebook.com/CityofMerritt/>

⁴⁴ Institute for Catastrophic Loss Reduction. (2022). An examination of the Lytton, British Columbia wildland-urban fire destruction: summary report to the British Columbia FireSmart Committee. <https://firesmartbc.ca/wp-content/uploads/2022/05/An-examination-of-the-Lytton-BC-wildland-urban-fire-destruction.pdf>

⁴⁵ Data Catalogue BC. <https://catalogue.data.gov.bc.ca/dataset/fire-burn-severity-historical>

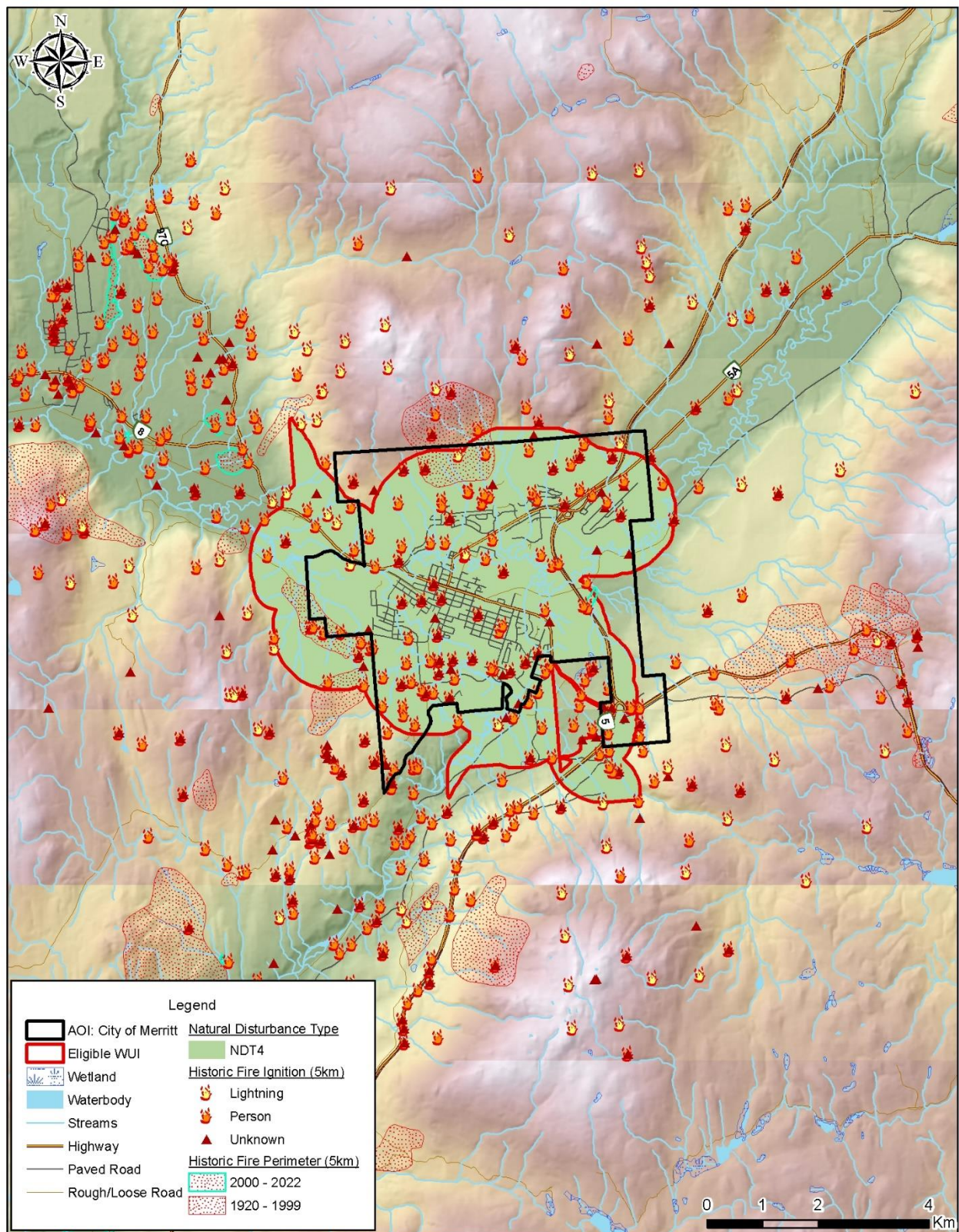
⁴⁶ Ministry of Forests. (2021). K61882 July Mountain fire post-wildfire natural hazard risk assessment. <https://pwnhr-bcgov03.hub.arcgis.com/pages/assessments-explorer>

In 2021, due to the intense fire activity within the Thompson-Nicola Regional District (TNRD), an Emergency Support Services reception location was opened at Merritt Civic Centre. Services were offered to evacuees from other areas throughout the summer, except for a temporary closure that occurred when the city was put on evacuation alert in August. The TNRD's Mobile Resiliency Centre was also staged in Merritt, and hosted Service BC and the Red Cross staff.⁴⁷

Since 2017, the province has seen increasingly severe wildfire seasons. 2017, 2018, and then 2023 seasons have each succeeded the other for largest areas of land burned. In 2023, more than 2.84 million hectares of land was burned by wildfires, which is double the last record, and totalled what would historically be expected over a decade. Provincial fire suppression costs exceeded an estimated \$817 million. In the Kamloops Fire Centre over 200,00 ha burned. Elevated drought codes occurring in the fall of 2022 carried over into the spring of 2023, where early season heatwaves accelerated snowmelt and dried fuels. In June, July and August, temperatures significantly above historical averages set the stage for extreme fire behaviour and exponential rates of spread.⁴⁸

⁴⁷ TNRD: <https://www.tnrd.ca/2021/07/page/4/>

⁴⁸ BCWS. *Wildfire Season Summary*. 2023. <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary#Provincial%20Statistics>



Map 8. Historical fire ignitions (1950-2024) and fire perimeters (1919-2024) within and adjacent to the Eligible WUI.

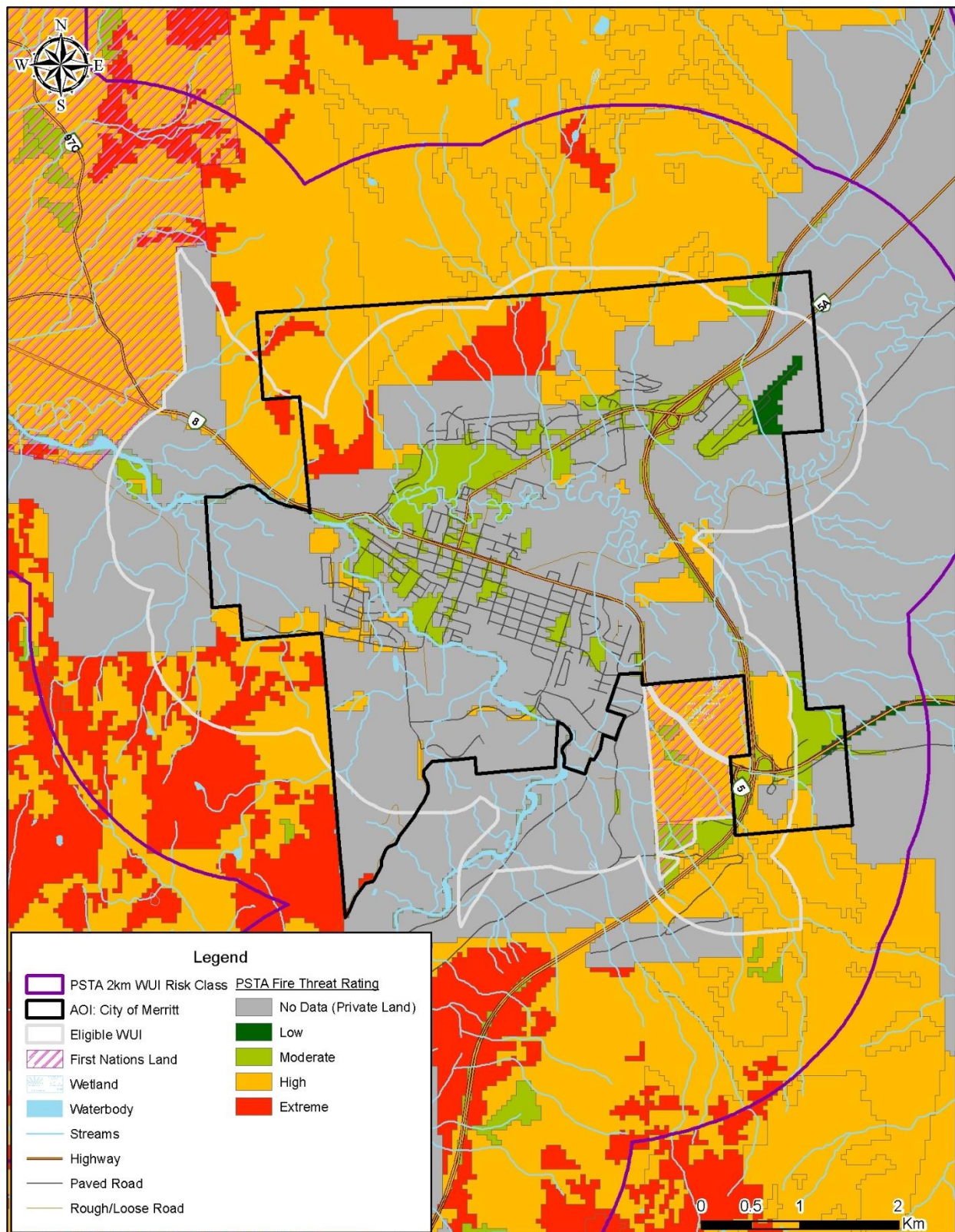
4.2 RISK FRAMEWORK AND RISK CLASS MAPS

Provincial Strategic Threat Analysis

The Provincial Strategic Threat Analysis (PSTA) is a series of publicly-available spatial layers that map wildfire threat and risk around the province.⁴⁹ The PSTA is a starting place from which more detailed local threat assessments can be performed (Section 4.3). PSTA data also supports the development of FireSmart funding applications under the UBCM FCFS program.

The PSTA Fire Threat Rating integrates combines three key fire behaviour inputs: fire density; head fire intensity, and spotting impact. Notably, this threat analysis does not extend onto private land. In addition to the PSTA, BCWS developed the WUI Risk Class Framework, which defines the WUI based on a two-kilometer buffer around a specified structure density. The WUI Risk Class Framework combines with threat ratings from the PSTA to produce weighted risk class polygons – with “1” being the highest relative risk in the province and “5” being the lowest. The City of Merritt has a WUI Risk Class of “1”. Although this represents the historic approach to defining the WUI in BC, this process doesn’t account for non-structural values that may be considered values at risk for a community, highlighting the importance of local community wildfire planning. The PSTA Fire Threat Rating and WUI Risk Class Rating of Merritt is shown in Map 9 on the following page.

⁴⁹ British Columbia. 2021 Update: Provincial Strategic Threat Analysis (PTSA).
<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/psta>



Map 9. Merritt PSTA Fire Threat Rating and WUI Risk Class Rating

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 risk class* (structural sub-component). The local wildfire threat assessment process includes several key steps as outlined in Appendix D: Local Wildfire Risk Assessment Process and are summarized as follows:

- **Fuel type attribute assessment** – ground truthing/verification and updating as required to develop a local fuel type map (Section 10.1.1)
- **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). Wind speed, wind direction, and fine fuel moisture conditions influence wildfire trajectory and rate of spread.
- **Consideration of topography in relation to values** (Section 10.1.3) – 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 Assessment (WTA) plots were completed over a number of field days in June 2024 in conjunction with verification of fuel types (see Appendix D-1: Fuel Typing Methodology and Limitations). Field assessment locations were prioritized based upon:

- **Proximity to values at risk:** Field assessments were clustered in the intermix and interface, as well as around critical infrastructure.
- **Prevailing fire season winds:** More field time was spent assessing areas upwind of values at risk, especially in potential locations for landscape-level fuel breaks.
- **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.
- **Observations:** Additional areas potentially not recognized prior to field work were visually identified as hazardous and assessed during the week.
- **Verifying provincial classification:** Areas classified as high threat in the provincial PSTA dataset, or with an uncommon fuel type, were assessed to ground-truth the fuel type and threat, even if they were relatively far from values.

Wildfire Threat Class Analysis

Classes of the wildfire 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.
- **Extreme:** Continuous forested land that will support intermittent or continuous crown fires.

The results of the wildfire threat class analysis are shown on Map 10 and in Table 13 below. The local threat analysis shows that approximately 13% of the assessable public land in the WUI is classified as extreme fire behavior threat. These areas are primarily correlated with the dense Douglas-fir dominated forest stands described in Section 10.1.1, but also where slopes are steep and have a south or west aspect – for example above the Bench on the north side of town. Approximately 14% of the assessable public land is classified as a high fire behaviour threat – mostly correlated with open Douglas-fir or ponderosa pine stands, where thick grassy surface fuels can promote rapid rates of spread. Moderate wildfire threat classes mostly overlap areas where slope gradient is negligible and vegetation is solely shrub or grass.

Table 13: Fire threat summary for the WUI

Wildfire Threat			
Threat Class	Hectares	Percentage of Eligible WUI	% of Assessable Public Land (excluding water)
Extreme	202	6%	13%
High	222	6%	14%
Moderate	524	15%	33%
Low	426	12%	2%
Very Low/No Threat (Water)	28	1%	-
No Data (Private Land)	1932	55%	-

WUI Risk Analysis

In this analysis, WUI Risk is quantified when the Wildfire Threat (see above) is assessed as high or extreme, causing potential of unacceptable wildfire risk when near communities and developments. WUI Risk Classes are described below:

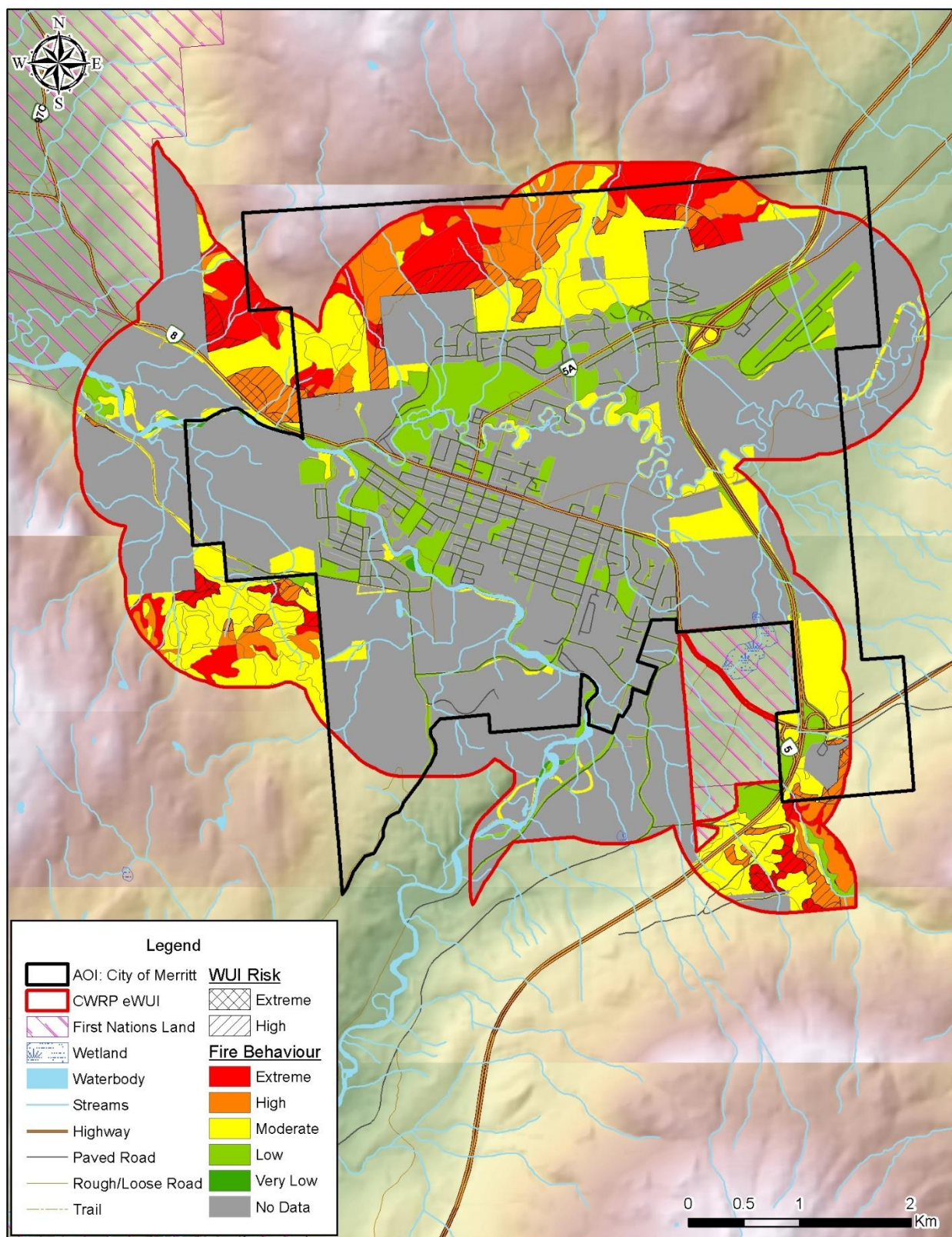
- **Low:** The high or extreme threat is sufficiently distant from developments, having no direct impact on the community and is located over 2 km from structures.

- **Moderate:** The high or extreme threat is sufficiently distant from developments, having no direct impact on the community and is located 500 m to 2 km distance from structures.
- **High:** The high or extreme threat has potential to directly impact a community or development and is located 200m to 500m from structures.
- **Extreme:** The high or extreme threat has potential to directly impact a community or development and is located within 200m from structures.

Table 14 and Map 10 summarize the WUI Risk Classes in Merritt. The highest risk areas are on the Bench, and near Exit 286 from Highway 5, where vegetation and topography align to present a considerable threat to adjacent infrastructure. It should be noted that these risk classes were developed in relation to existing structures – as new development occurs and the interface is extended, this pattern of risk will change.

Table 14: WUI threat class ratings

WUI Risk			
Risk Class	Hectares	Percentage of Entire WUI	Percentage of Assessable Public Land
Extreme	20	1%	1%
High	118	3%	8%
N/A (Moderate, Low, Very Low Fire Behavior)	1265	36%	81%
No Data (Private Land)	1932	55%	-



Map 10. Merritt Local Fire Threat and WUI Risk Rating

4.4 HAZARD, RISK, AND VULNERABILITY ASSESSMENT

The Hazard, Risk and Vulnerability Analysis that local governments undertake as part of the legislative requirements to develop an Emergency Plan may provide additional locally derived information about critical infrastructure important to the community.⁵⁰ Emergency Management & Climate Readiness BC supports this by providing the Critical Infrastructure Assessment Tool.⁵¹

The purpose of a Hazard, Risk and Vulnerability Assessment 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 report 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.⁵²

An update to Merritt's Hazard, Risk and Vulnerability Assessment is planned alongside a broader Emergency Plan update soon.

⁵⁰ UBCM. 2020. *Community Wildfire Resiliency Plan Instruction Guide*. <https://www.ubcm.ca/sites/default/files/2021-05/2021%20CWRP%20Supplemental%20Instruction%20Guide.pdf>

⁵¹ 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>

⁵² 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 DISCIPLINES

FireSmart is the nationally accepted set of principles, practices, and programs for reducing losses from wildfire.⁵³ FireSmart concepts, including recommended FireSmart guidelines,⁵⁴ have been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000. FireSmart is founded in standards published by the National Fire Protection Association.

FireSmart includes seven disciplines, which provide a sound framework for reducing wildfire risk to communities:

- Education
- Legislation and Planning
- Development Considerations
- Interagency Cooperation
- Cross-Training
- Emergency Planning
- Vegetation Management

The following parts of this section provide information on each FireSmart discipline. FireSmart activities that Merritt has already implemented and recommended actions to strengthen programming are discussed. Recommendations are summarized in the Executive Summary (Table 1. Community Wildfire Resiliency Plan Recommendations). Most actions are fundable through the Union of BC Municipalities (UBCM) FireSmart Community Funding and Supports (FCFS) program.

The overarching goal of FireSmart is to encourage communities and citizens to adopt practices that will mitigate the negative impacts of wildfire to assets on public and private property. While this responsibility must be shared between many entities including residents, industry, businesses, and governments,⁵⁵ a critical issue is homes' and structures' vulnerability to ignition during wildfires, particularly from ember showers. Firebrands (i.e. small pieces of burning debris) can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate in densities exceeding 600 embers per square meter. Combustible materials surrounding homes (the FireSmart Home Ignition Zone) can create fire pathways that allow spot fires, ignited by embers, to carry flames into contact with the structure. As a result, risk mitigation actions on private properties are emphasized.

⁵³ FireSmart is the registered trademark held by the Partners in Protection Association.

⁵⁴ FireSmart guidelines first published in the 1999 manual "*FireSmart: Protecting Your Community from Wildfire*", with a second edition published in 2003. The most recent "*FireSmart Begins at Home Manual*" is available at <https://firesmartcanada.ca/resources/>. The "*British Columbia FireSmart Begins at Home Manual*" provides detailed guidance and is available at BC FireSmart: https://firesmartbc.ca/wp-content/uploads/2019/09/FireSmart_Booklet_web-Updated.pdf

⁵⁵ <https://www.firesmartcanada.ca>

5.1 EDUCATION

Description

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. A successful public education campaign that builds awareness and understanding among residents and visitors can support the implementation of projects related to other FireSmart disciplines. FireSmart education activities constitute the ‘engagement’ phase of the FireSmart Roadmap and are the foundation for progress towards resiliency.

Analysis

The City of Merritt has significantly ramped up efforts to establish a FireSmart education strategy since the last CWPP was written, establishing a comprehensive program of public engagement. For the past seven years, a member of the Merritt Fire Rescue Department (MFRD) has been employed as a FireSmart Coordinator and has led FireSmart education initiatives in the community. Four other department members are trained as Local FireSmart Representatives, supporting the FireSmart Coordinator in offering Home Ignition Zone Assessments to residents. In 2024 alone, over 80 assessments were completed.

Merritt uses several platforms to reach residents and stakeholders, including radio ads, social media, and written articles. Door-knocking campaigns also occur to share information about fire danger and fire bans, as well as pop-up FireSmart informational sessions at various community events.⁵⁶ Permanent pages are located on the Merritt website with FireSmart resources. Other successful initiatives include the following:

- K-12 FireSmart Education Program
- Wildfire Preparedness Day event, with over 400 attendees in 2024
- ‘Reduce Your Wildfire Risk’ workshops, occurring regularly over the years
- Community Sprinkler Program
- FireSmart Plant Program with Purity Feeds
- FireSmart rebate program

The main challenge for Merritt’s public education initiatives is gaining buy-in from members of the public who are not yet engaged with FireSmart. The proportion of the population who is aware of FireSmart principles recognizes the importance of taking action to reduce wildfire risk to their homes. However, providing information to residents who have not been reached by the initiatives listed above remains a barrier. Public interest tends to peak after extreme wildfire events and recede when fire danger is low or moderate. Finding new channels to reach this remaining audience should be the focus going forward.

⁵⁶ City of Merritt. (2022). Community Resiliency Recognition Award application. <https://pub-merritt.escribemeetings.com/filestream.ashx?DocumentId=10196>

Action Planning

The priority for Merritt should be to maintain the resources allocated to successful FireSmart programming, while piloting new initiatives to engage with audiences that have not yet been reached, such as the following:

- Increasing passive educational activities, such as FireSmart upgrades or landscaping for community assets, and signage installed at completed fuel treatments. Showcasing examples of FireSmart principles in high-visibility locations within the community can reach residents that are not attracted to family events or workshops.
- Engage local mountain bike associations to pilot an ‘Adopt-A-Trail’ program, similar to a successful initiative run in the Resort Municipality of Whistler.⁵⁷ Develop educational guidelines that describe how to reduce hazardous fuel accumulations when building or maintaining trails. Offer to install signage recognizing individuals who register to clean up trails according to these guidelines.
- Reach out to community leaders to evaluate interest in and/or pilot the FireSmart Neighborhood Recognition Program. Sharing information through known community leaders and established organizations, such as stratas, may be an efficient way to target at-risk areas. The FireSmart Neighborhood Recognition program can be a highly effective way to achieve FireSmart outcomes – neighborhood clean-up efforts can systematically address vegetation of concern, and include often overlooked areas like boulevards, rights-of-way, and fence lines to reduce fire pathways between homes.
- Customize outreach to specifically target residents, commercial businesses or small-scale agricultural operators in more rural areas. These demographics are important to engage with specifically, since the risks and wildfire suppression responses to these areas will likely differ. There may be large expanses of natural vegetation on private property, hazardous substances on site (agricultural properties may store chemical fertilizers, pesticides, silage or feed, etc.), or livestock to evacuate. The Farm & Ranch Wildfire Preparedness Program may be an appropriate tool to promote to agricultural operators in the area. The Merritt FireSmart Coordinator should consider working with the Thompson-Nicola Regional District (TNRD) FireSmart Coordinator to reach residents both living within Merritt’s Eligible WUI and beyond the municipal boundaries.

To efficiently use limited resources, it is important for the program to stay flexible – adapting outreach methods to suit specific areas and continuing to celebrate and build on success stories. The City of Merritt should track their educational programming as activities are completed, to understand changes in attendance and uptake over time. This will help the FireSmart Coordinator identify activities to expand on, areas to focus their attention to, and initiatives that do not suit the community’s needs.

A summary of recommendations related to FireSmart education is detailed in Table 1 of the Executive Summary.

⁵⁷ SSISC. Whistler, Adopt-a-Trail 2022 Recap. <https://ssisc.ca/adopt-a-trail-2022-recap/>

5.2 LEGISLATION AND PLANNING

Description

Reviewing bylaws through a wildfire lens to assess where they inadvertently promote conditions that may contribute to fire spread (i.e., restrictions on vegetation management), and determining where bylaws can be updated or strengthened to reduce wildfire risk to development can help accomplish the goal of a more wildfire resilient community.

Analysis

Merritt has several bylaws that together provide strong fire prevention regulation. Since the last CWPP was completed, a new Official Community Plan (OCP) has been developed (2022) and a new Fire and Safety Regulations Bylaw (2019) has been passed which have substantially updated the planning and bylaw framework of the municipality with regards to wildfire risk. Merritt has amended their Zoning Bylaw to restrict the use of cedar shrubs in new landscaping development and has added a Wildfire Development Permit Area in their new OCP to guide building construction in interface areas of the community. The OCP is reviewed in detail in Section 8.3, and the Wildfire Development Permit Area in Section 5.3. Bylaws relevant to different aspects of community wildfire resiliency are reviewed in Table 15.

One important opportunity to strengthen Merritt's planning and bylaw framework is completion of scheduled updates to the Emergency Measures bylaw and the Emergency Plan. The current Emergency Plan dates from 2005, and the Emergency Measures Bylaw dates from 2002. Both documents reflect the requirements, issues and conditions of the *Emergency Program Act* legislation, which has now been repealed. Merritt is now developing a new Emergency Plan. It will reflect changes to municipal roles and responsibilities legislated by the *Emergency and Disaster Management Act* (2023). Several supplementary documents also need to be completed to accompany the new Emergency Plan, including a Business Continuity Plan, and a Hazard Risk and Vulnerability Analysis. Finally, the City's Evacuation Plan is not considered sufficiently detailed, as it was developed by the RCMP detachment to guide the agency's own actions in facilitating an evacuation. Guidelines for how other parties and resources might assist should be incorporated.

Table 15. City of Merritt bylaws that relate to community wildfire resiliency activities.

Bylaw	Policy Description & Relationship To CWRP
Fire Rescue Department Establishment Bylaw 1904, 2005.	This bylaw establishes the Merritt Fire Rescue Department, and outlines the roles of the Fire Chief, Deputy Chief, and other members. It further details the fire protection area boundaries and empowers the department to enter into mutual aid agreements with other agencies. <i>The operating procedures and jurisdiction for Merritt Fire Rescue Department are a crucial component of wildfire response in the community.</i>

Bylaw	Policy Description & Relationship To CWRP
Parks Regulation Bylaw 2054, 2008	This bylaw details prohibited behaviour in City of Merritt parks, including improperly disposing of lit matches, or cigarettes, and smoking. <i>Banning smoking within public parks reduces the likelihood of human-caused ignitions on municipal land.</i>
Fire and Safety Regulations Bylaw No. 2272, 2019	This bylaw details prohibited behaviour under different circumstances related to structure fires, for the purposes of protecting public safety. Relevant provisions include: • Empowering the Fire Chief to take action to mitigate hazardous conditions on private property, including ordering the removal of hazardous items. • Regulation of sale of fireworks. • Ordering visible display of home address numbers. • Regulation of private water supply systems and private roads, such that they are usable by fire department apparatuses. • Ordering the appropriate maintenance of fire hydrants situated on private property, by the owner. • Detailing outdoor burning regulations within municipal boundaries. Prescribed burns are permitted under specific circumstances. <i>The regulations and powers given to the Fire Chief in this bylaw cover the major interface and wildfire risks that should be considered; however, CFRC members noted that enforcement mechanisms for fire risk infractions are considered lacking.</i>
Zoning Bylaw	This establishes zones and regulates land use and density within those zones in the City of Merritt. • Section 7 prohibits landscaping with cedar shrubs. <i>This prevents flammable vegetation unsuited for Merritt's climate to be planted.</i>
Emergency Measures Bylaw No. 1725, 2002.	This bylaw establishes the Emergency Executive Committee, and Emergency Program Coordinator positions. It empowers Mayor and Council to take special actions when a declaration of a state of local emergency is made. <i>The operating procedures for the Emergency Management Program are a crucial component of wildfire response in the community; however, this bylaw has not been revised since the new Emergency and Disaster Management Act was passed and should be brought up to date with this legislation.</i>

Action Planning

The Community FireSmart and Resiliency Committee (CFRC) noted that occasional issues with compliance and enforcement of the fire prevention bylaw occurs. These issues mostly relate to landowners burning debris on their property without a permit or during a fire ban, or transient individuals who are likely not aware of fire danger and/or not following regular precautions. CFRC members noted that updating the language within the bylaw to allow enforcement of fire risk infractions would help address this issue.

To address the identified issues with emergency management plans and bylaws, Merritt should continue with the updates to the Emergency Plan currently being undertaken. Merritt should continue seeking funding and support to complete the Business Continuity Plan and Hazard Risk and Vulnerability Assessment and update the Evacuation Plan and Emergency Measures bylaw. Merritt should also consider updating the Fire and Safety Regulations Bylaw to increase enforcement of fire risk infractions.

A summary of recommendations related to legislation and planning is detailed in Table 1 of the Executive Summary.

5.3 DEVELOPMENT CONSIDERATIONS

Description

Introduced in Section 11.2, there are important structure and neighbourhood design features that can be regulated through land use planning and the development processes to mitigate the risk of impacts to a community by wildfire. In this context, development refers to any aspect of the built environment, including structures (homes, businesses, accessory structures), attachments to structures (fences, decks), critical facilities (hospitals, schools), and critical infrastructure (roads, bridges). Related considerations include:

- Location of development in relation to high hazard forested vegetation, steep slopes, and other geographical features that contribute to extreme fire behavior (See Section 10.1.3 and 10.1.1)
- Vehicle access and egress;
- Availability and adequacy of water supply for firefighting;
- Type of construction materials on structures and attachments;
- Lot size and structure density;
- Design guidelines and architectural standards;
- Addressing and street signage; and,
- Landscaping, screening, and buffering.

A key policy tool that can be used to regulate development and facilitate the adoption of FireSmart best practices is through Development Permit Areas. These are geographic areas, defined in the Official Community Plan, where special conditions must be met, or construction or building design practices must be adhered to, to obtain a development permit. Pursuant to Section 5 of the 2015 BC Building Act, municipalities may not establish technical regulations related to buildings in their Building Bylaw. As a result, Development Permit Areas are commonly used to enact FireSmart requirements for new buildings (and specific renovations of existing buildings) and subdivision development.

Analysis

Some of the newer homes and developments in Merritt have been built with a higher consideration of FireSmart practices regarding materials and design principles (e.g., asphalt roof, gravel or xeriscaped front yards), yet many older homes and buildings in the community have low FireSmart compliance. FireSmart

compliance combines structural and landscaping attributes – both of which can be controlled during the development phase. The most commonly noted issues with older homes included wooden or vinyl siding or decking, and combustible debris or materials stored directly adjacent to the building. Close to both old and new builds, the presence of highly flammable vegetation is common, either as the result of landscaping decisions (e.g., cedar, juniper), or in some cases a lack of maintenance (e.g., dead shrubs, long grass). Highly-flammable or unmaintained vegetation can provide a continuous pathway between buildings for either a structural fire or a wildfire to spread through.

The newly updated Official Community Plan comprehensively considers wildfire resiliency and emergency management. A Wildfire Development Permit Area was implemented as part of the plan as well, and includes the following components:

- Development conditions, which provide restrictive covenants and land transfer standards (e.g., for parkland dedications) with regards to wildfire hazard mitigation.
- Site planning guidelines, with building placement and layout specifications.
- Landscaping guidelines that require the use of FireSmart principles regarding fuel management, planting, and maintenance.
- Building design guidelines that require the use of FireSmart standard materials and design for roofing, cladding, doors, windows, decking, soffits and other exterior components.

The Wildfire Development Permit Area (DPA) encompasses a significant proportion of the community (shown in Figure 6, adapted from the Official Community Plan). It includes key areas of proposed development, but excludes most of the established townsite, thus limiting the use of this policy tool to influence changes to existing housing stock. The Official Community Plan was published in early 2022, so it is still new to Merritt, and the effects of this policy may not yet be visible in the community. However, it is an important addition to the planning and policy toolbox, especially as numerous development plans for interface areas are planned for the near future. These include the following:

- **Ranchlands** – a commercial centre is proposed for the former site of the visitor information centre, adjacent to Highway 5. Additional residential development is proposed for parcels to the east, adjacent to Highway 97C. It should be noted that the Wildfire DPA does not overlap this area, but several other DPAs which guide the form and appearance of development in the zone do, and they include some FireSmart provisions.
- **Middlesboro** – subdivision and construction of residential dwellings are proposed for several lots along Midday Valley Road.
- Residential developments are also planned for Nicholson Avenue and north of Peregrine Way.

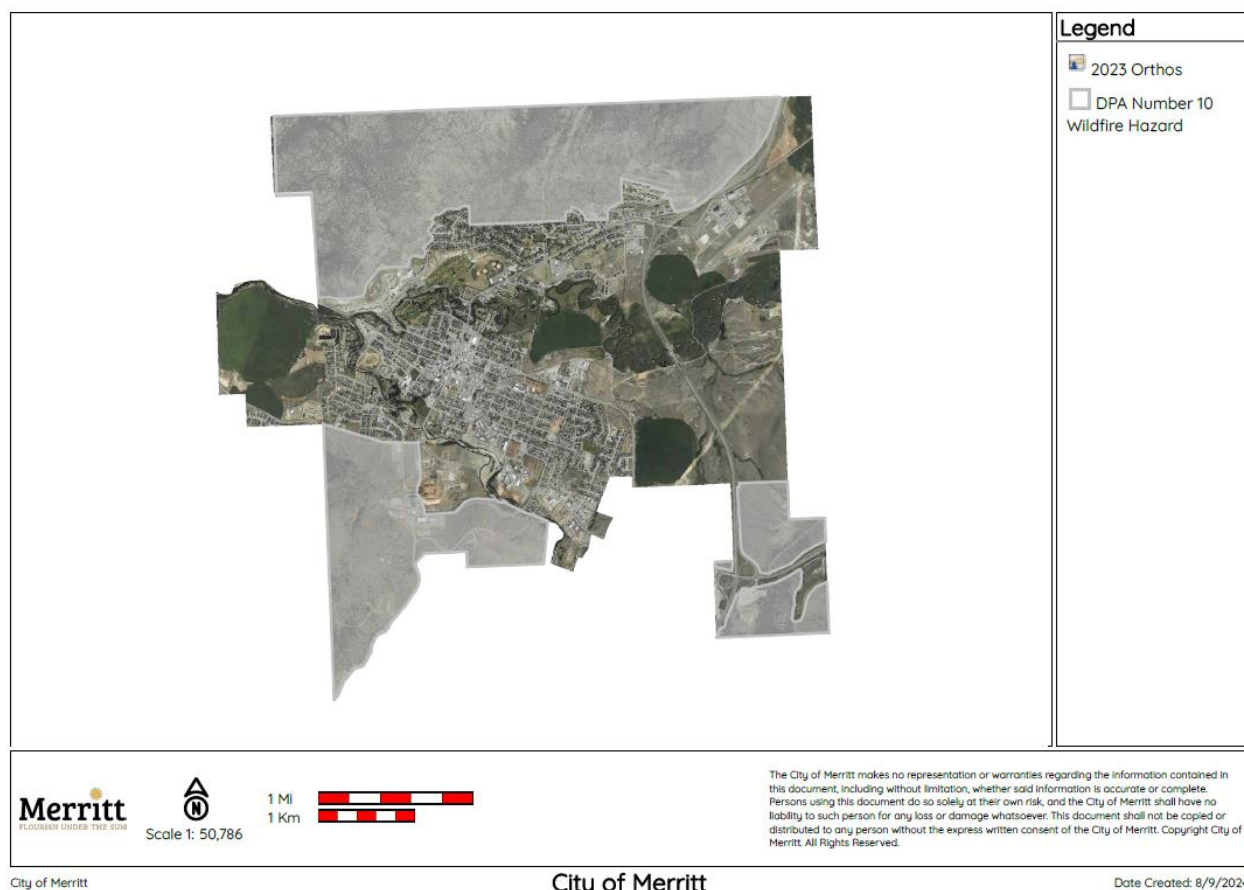


Figure 6. Wildfire development permit area for the City of Merritt (<https://www.merritt.ca/maps/>)

Action Planning

As new development begins in interface areas, the City should monitor and evaluate the implementation of the new Development Permit Area policies during all phases of construction, and after building is complete. Consider assessing their efficacy in achieving the goals and objectives of the Official Community Plan. As needed, update and revise language in the Official Community Plan to strengthen or adapt these policies. Residential construction adjacent to Gateway 286 is outside the Wildfire DPA but will be constructed according to guidelines that include a requirement for FireSmart façades and roofing. The amended zoning bylaw prohibiting cedar shrub installation would also apply to this area. The effects of these policies, while not as strict as the Wildfire DPA regulations, may still produce a resilient neighborhood – assessing this may be of interest to the municipality.

A summary of recommendations related to FireSmart education is detailed in Table 1 of the Executive Summary.

5.4 INTERAGENCY COOPERATION

Description

The goal of interagency cooperation is to approach community wildfire resiliency planning from a landscape-level, multi-agency perspective. Coordination and cooperation are required to develop an effective CWRP and be prepared in the event of a wildfire. When planning occurs only within single agencies or departments, the potential for efforts to be duplicated increases. Inter-agency cooperation increases the ability of local governments to plan for and respond to emergencies effectively. Working together with adjacent jurisdictions can help increase awareness of different agencies' priorities and concerns.

A Community FireSmart and Resiliency Committee (CFRC) is recommended as part of the CWRP development process.⁵⁸ A CFRC reflects the key planners and responders most involved in local FireSmart, wildfire resiliency planning, wildfire and emergency response, and land management specific to the WUI. Committees such as this foster collaborative problem solving and planning and delineate required roles and actions during times of emergency response.

Analysis

The City of Merritt has taken steps to cooperate and plan collaboratively with adjacent jurisdictions and land management agencies. There are mutual aid agreements in place between Merritt Fire Rescue Department (MFRD), Lower Nicola Indian Band's (LNIB) fire department and Logan Lake Fire Department which are utilized approximately six times per year. MFRD also uses LNIB's burn building training facility, and there are plans to host a joint training session for the departments in the future. MFRD and LNIB together attend annual FortisBC and BC Hydro response training events.

There is also a good working relationship with BC Wildfire Service (BCWS) at the Merritt Fire Zone. MFRD has attended Trans Mountain training events and public education events with BCWS. MFRD and BCWS work together on local interface fires, and MFRD has also worked with BCWS crews across the province on larger wildland fires in other jurisdictions. MFRD was deployed in 2017 (Clearwater, Cache Creek, Quesnel, Williams Lake, Clinton, Loon Lake), 2019 (Penticton), 2020 (Oliver), 2021 (Logan Lake, Lytton), and 2022 (West Kelowna).⁵³

Beyond joint response activities with BCWS and other local fire departments, Merritt has also participated in the local Fuel Management Technical Working Committee, which includes members of UNB, LNIB, Shackan, Nooaitch, and Cook's Ferry Indian Bands together with Ministry of Forests Crown Land Wildfire Risk Reduction (CL WRR) and BCWS staff. Together this group has tackled extensive cultural and prescribed burning projects on First Nations land throughout the Nicola Valley, completing over 200 ha of prescribed burning in 2024 alone. Many of these burns have occurred in areas close to Merritt and also

⁵⁸ Starting in 2024, UBCM CRI funding for the FireSmart Community Funding and Supports program will be contingent on having an active CFRC.

benefit the city. BCWS staff noted that multi-year agreements established between First Nations and Fire Zone staff have allowed for larger projects to be implemented. As part of the committee Merritt has voiced support, shared information, and worked on relationship building with all participants.

While there have been many successful examples of interagency cooperation initiatives in the last five years, there are some areas where increased engagement could benefit all parties. Examples include the following:

- While MFRD and BCWS have an extensive history working together on incident response, collaboration on fuel management projects could be strengthened. MFRD has long advocated for fuel management treatments around infrastructure on Iron Mountain and an important step in completing this work is regular contact with Ministry of Forests Wildfire Risk Reduction staff members.⁵⁹ And, while a highly successful prescribed burning program has occurred on First Nations land around Merritt, this has not yet been implemented on Crown Provincial land within the City's Eligible WUI at a larger scale.
- MFRD has worked extensively to build relationships with First Nations on community wildfire resiliency projects. However, connections between Merritt's Emergency Management Program and First Nations are not yet as strong.
- Douglas Lake Ranch and Nicola Valley Ranch are two important private landowners in the area who have not yet been engaged with. The state of planning and preparation on these properties is unknown, although they overlap and extend beyond Merritt's Eligible WUI. Furthermore, the Nicola Valley Ranch also overlaps with Merritt Fire Rescue Department's Fire Protection Area.

Action Planning

While Merritt's participation in the Fuels Management Technical Committee provides many of the benefits a CFRC would, the City should consider establishing a committee that addresses conditions and issues specific to the City of Merritt. For the development of this CWRP, Merritt municipal staff, MFRD, WRR and BCWS staff, and members of UNB, LNIB, Nooaitch, Shackan, and Cook's Ferry Indian Bands were consulted. Ongoing engagement with these parties is recommended. A Merritt-specific CFRC would help track the progress on community wildfire resiliency work managed by different departments or agencies and help strengthen relationships between members of different agencies that are not yet well connected.

Recommendations and action items that Merritt can implement to increase interagency cooperation are listed in Table 1 of the Executive Summary.

⁵⁹ Per personal correspondence with CFRC members.

5.5 CROSS-TRAINING

Description

All staff and agency partners who are expected to participate in the development and implementation of this plan, or participate in wildfire response and recovery, should be appropriately trained. Cross-training ensures that municipal staff are aware of wildfire specifics and wildfire response, that structural firefighters are experienced and trained with wildfire behaviour and suppression, and that wildfire fighters are experienced and trained with structure protection.

Analysis

MFRD is an experienced team with considerable training and exposure to interface wildfire suppression. All members complete and annually refresh SPP-WFF1 (Wildland Firefighter – Level 1) as well as SPP-115 (Wildland Structure Protection Program) certifications, which allow for skilled use of Structure Protection Units. The department hosts in-house wildland firefighting skills training sessions regularly. Department officers also hold Engine Boss certifications, and four members of the department are trained as Local FireSmart Representatives. As described in Section 11.4, MFRD has been regularly deployed to wildland fires across the province, which serve as valuable informal cross-training opportunities for the department.

Together with a robust equipment inventory and sufficient water resources (Section 9.2), MFRD is generally well-equipped to respond to interface wildfires within their response area. Recruiting and retaining personnel were the greatest challenges MFRD reported (Section 9.2). Volunteerism has declined over several years, and the current retention rate is not sufficient to allow the department to grow their staff numbers over the long-term. The department has several initiatives to combat this issue, including hosting work-experience firefighters at the hall, and campaigning actively twice a year to attract new members.

In addition to fire department members, Emergency Operations Centre (EOC) staff are crucial personnel that may provide support in a wildfire event, and it is important they are appropriately trained. The Merritt EOC has been activated several times over the past five years, including during the COVID-19 pandemic, the Lytton Creek wildfire, and the 2021 floods. These serious and complex events illustrate the importance of comprehensive training and preparation of municipal staff, in order to support an effective response.

Not all staff enrolled to participate in the EOC are fully trained. However, as part of the updates to the City of Merritt's emergency management program, a training and exercise plan has been developed to build staff capacity. One tabletop exercise was held in 2024 already, with the goal of increasing the frequency of these activities. Funding has been obtained to deliver courses to staff over the next year, which include:

- Locally hosting EOC Essentials for as many municipal staff as possible

- Section leads and 10 secondary staff attending in-person training events outside the community
- MFRD hosting Incident Command System 100 and 200 courses for all staff.

Action Planning

Building EOC staff capacity by implementing the training schedule is an important next step for Merritt. Completed certifications should be tracked so that staff can renew their training in a timely fashion and new hires are onboarded appropriately. Once required training is complete, Merritt may consider offering Wildfire Risk Reduction basics courses to municipal staff members who have not yet been engaged on FireSmart topics. This will help ensure a thorough understanding as to the rationale behind different suppression and response activities in the event of a wildfire. Merritt should also continue with its plans to host EOC tabletop exercises. In addition to EOC staff, first responder agencies like MFRD, the RCMP, Nicola Valley Search and Rescue, and Nicola Valley Emergency Social Services, and Lower Nicola Fire Department should be invited to attend.

MFRD has a robust training program offered to its department members, and as they seek to recruit new members, they should maintain these training standards. As the FireSmart education program grows, MFRD should consider training more members as Local FireSmart Representatives, to help the FireSmart Coordinator in outreach activities. This will also benefit the department with increased awareness of evidence-based FireSmart best practices. MFRD should continue with plans to train the FireSmart Coordinator as a Wildfire Mitigation Specialist, as well as other department members as Wildfire Mitigation Specialists in the future. This would allow the department to offer Wildfire Mitigation Program assessments, which provide a higher level of detail compared with Home Ignition Zone assessments.

Recommendations related to cross-training and fire department resources are listed in Table 1 of the Executive Summary.

5.6 EMERGENCY PLANNING

Deployment of provincial wildfire resources occurs based on the Provincial Coordination Plan for Wildland Urban Interface Fires,⁶⁰ which may result in BCWS resource availability becoming scarce 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. Wildfires that threaten human life, structures, and critical infrastructure are extremely complex and dynamic incidents to respond to, which can involve multiple concurrent emergency response events. All phases of an emergency response (mitigation, preparation, response, and recovery) should have significant pre-planning in place, or a WUI incident is likely to overwhelm resources and render them ineffective.

Emergency response procedures in Merritt are guided by the Emergency Plan, and Emergency Measures Bylaw (Section 5.2). See Section 5.5 for additional information on EOC staff training, and see Section 3.2 for an introduction to the roles and responsibilities of the program. The function of a CWRP is to provide wildfire-related guidance for emergency planning by the City of Merritt, pre-incident planning by local firefighters, and to propose levels of service for emergency readiness, called “Wildfire Preparedness Condition Level” by the province.

5.6.1 PRE-INCIDENT PLANNING

Description

Pre-incident plans are one component of emergency planning, and part of the *Preparation* phase of comprehensive emergency planning. A pre-incident plan is a compilation of essential fire management information needed to save valuable time during fire suppression operations.

It might take the form of a brief document, or a map, or both, and include access/egress information. The purpose of these plans is to share key information about the community with other agencies who otherwise would not have access to this local context. This could include the following topics (grouped by the related Incident Command System categories):

- Command: Authority, constraints, structural protection needs, management constraints.
- 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.
- Logistics: Base camp locations, roads and trails, utility and communications critical infrastructure.
- Planning: Maps showing locations of neighbourhoods, vegetation and fuel, fuel treatment areas, hazards, critical infrastructure, archaeology and environmentally sensitive areas, water sources, access/egress.

⁶⁰ Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. Retrieved from: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf

Analysis

A useful case study of what pre-incident planning can look like includes the City of Penticton, who completed a detailed mapping project over three years in the WUI of their community. Fire department members gathered key information such as variations in topography, fuel types, water supply locations, potential safety zones, refuge areas, types of roads (width, surface, etc.), and locations of keys to open specific gates. Once the data was collected, the city's GIS team used this information to map the entirety of the community, and the completed maps were uploaded into an app that could be accessed by department members and shared with third parties, like other fire departments responding under a mutual aid agreement, or BCWS.⁶¹ The City of Merritt may wish to consider a similar approach in creating a pre-incident plan for their community, although there may be some unique features and considerations. Merritt may also wish to seek information or collaborate with third parties, like BCWS.

5.6.2 WILDFIRE PREPAREDNESS CONDITION LEVEL

Description

MFRD, in conjunction with the CFRC and local government partners, could also consider developing local daily action guidelines based on expected fire weather conditions. These guidelines would specify different tasks for fire department members or other municipal staff to complete based on the fire danger class day. The intent of adopting these guidelines would be incremental preparation of municipal staff as fire danger increases, to support a rapid and effective response by all required staff in the event of an interface wildfire. Fire danger classes are discussed further in Section 4.1.2.

Analysis

Table 16 provides a template of local daily action guidelines, that can be further customized to suit the needs of Merritt.

Table 16. Example of a Wildfire Preparedness Condition Guide⁶²

Fire Danger Rating	Action Guidelines
LOW	- All Merritt staff on normal shifts. - Direct community members to BCWS (or MFRD's webpage) for fire danger rating info.
MODERATE	- All Merritt staff on normal shifts. - Information gathering and dissemination through Merritt's internal or external CFRC. - Regional fire situation evaluated. - Direct community members to BCWS (or MFRD's webpage) for fire danger rating, update fire danger signs in the community.
HIGH	- All Merritt staff on normal shifts. - Regional fire situation evaluated. - Merritt EOC staff notified of Fire Danger Rating.

⁶¹ https://www.iclr.org/wp-content/uploads/2021/04/14_cities_adapt_wildfire_pennticton.pdf

⁶² 2023 CWRP Template

Fire Danger Rating	Action Guidelines
	- Daily fire behavior advisory issued. - Establish weekly communications with the internal or external CFRC. - Update fire danger rating signs in the community, and/or post updates on social media and MFRD's webpage.
EXTREME	- Same conditions as 'High' Danger Rating. - Merritt EOC staff considered for level 1 activation standby. - Wildfire Incident Command Team members considered for stand-by / extended shifts.
FIRE(S) ONGOING	- All conditions apply as for Extreme (regardless of actual fire danger rating). - Mobilize EOC support if evacuation is possible, or if fire event requires additional support. - Implement Evacuation Alerts and Orders based on fire behaviour prediction and under the direction of the EOC or BCWS.

5.6.3 RECOVERY PLANNING

Description

Under the new *Emergency and Disaster Management Act*, municipalities are authorized to make use of recovery-focused emergency powers. Accordingly, it is important to plan for this important pillar of emergency management.

Analysis

When complete, Merritt's 2024 Emergency Plan will address response as well as recovery. A Recovery Operations Centre may be established to provide command and control, coordination and resource management to recovery efforts. A Recovery Operations Centre would follow the same general operational guidelines used by the EOC but applied in a recovery context.

As part of emergency recovery, Merritt will also work with the Nicola Valley Emergency Support Services (NVESS) to provide Emergency Support Services to affected residents. NVESS is a volunteer organization that provides temporary services including food, clothing and shelter to support the wellbeing of people displaced in an emergency. The Merritt & Nicola Valley 2024 ESS Plan outlines the administration of the program, relationship with Merritt EOC, activation and deactivation procedures. It also includes a training plan and exercise plan.⁶³

Action Planning

Merritt should continue to support the critical functions of the NVESS by helping coordinate training courses for members, promoting volunteerism with the organization, and celebrating its

⁶³ Merritt & Nicola Valley ESS. (2024). *ESS Plan*. <https://www.merritt.ca/wp-content/uploads/2024/06/MNVESS-Plan-Public-Version.pdf>

accomplishments. Maintaining strong relationships with volunteers and leaders is key and including this organization in pre-season meetings of the CFRC that may occur is recommended.

5.7 VEGETATION AND FUELS MANAGEMENT

As discussed in Section 4.1, fuel is the only aspect of the fire behavior triangle that can be modified to reduce wildfire threat. Vegetation management reduces potential wildfire intensity and ember exposure to people, infrastructure, structures, and other values through manipulation of both the natural and cultivated vegetation within or adjacent to structures and the 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: residential FireSmart landscaping, or fuel management treatments.

5.7.1 FIRESMART LANDSCAPING

Description

Residential FireSmart landscaping refers to the removal, reduction, or conversion of flammable plants to create more fire-resistant areas in the FireSmart Immediate, Intermediate, and Extended Zones (Figure 7).



Figure 7. FireSmart home ignition zone

Analysis

When it comes to supporting residential FireSmart, Merritt has focused primarily on community engagement through offering Wildfire Mitigation Program assessments, distributing educational material, and promoting FireSmart at community events. However, several initiatives have been piloted by the municipality. Off-site waste disposal locations, like bins located in neighborhoods throughout the community, have been installed. A rebate program has been offered, structured on a first-come first-serve basis with up to \$5,000 available for each applicant. In 2025, the municipality is seeking to pilot a chipping program to encourage the removal and replacement of cedars and conifer hedging in the municipality, which are prevalent. It should be noted that the floods of 2021 had long-lasting impacts on the municipality. Many residents are still recovering, and allocating resources to larger wildfire risk reduction projects may be challenging -- the City should continue to offer programming that financially supports residents in making FireSmart upgrades to their property.

Action Planning

It is recommended the municipality continue to build and expand on existing initiatives for residents. This plan identified several additional ways that residential FireSmart vegetation management could be supported by the City of Merritt:

- Continue to promote the free tipping offered at the local Thompson Nicola Regional District.
- Host the planned community chipping days to encourage residents to adopt FireSmart landscaping.
- Offer a program to support elderly, disabled and/or other vulnerable populations in completing FireSmart work on their property.
- Promote and facilitate a neighbourhood FireSmart BBQ/clean-up day; this event can count towards FireSmart Canada Neighbourhood Recognition.

5.7.2 FUEL TREATMENTS

Description

Fuel management treatments change the structure and/or reduce the quantity of forest and grassland fuels in an area. This reduces the rate of spread and head fire intensity of fires and enhances the likelihood of successful fire suppression. Fuel management treatments may be linear fuel breaks or polygon treatments for discrete areas, typically outside of the Home Ignition Zone. The intent of establishing fuel treatments is to modify fire behaviour, and they should be designed to keep surface fires on the ground to avoid them from becoming more dangerous crown fires.

An additional important objective of fuel treatments is to increase the feasibility, safety, and efficacy of suppression activities. Fuel treatments can be “anchor points,” or strategic locations where fire control

line construction can start or finish.⁶⁴ Decreasing the rate of spread and head fire intensity means that ground crews are more likely to be able to access the area and successfully implement fire control tactics with the use of hand tools, water delivery systems, and/or heavy equipment. In contrast, where hazardous forest fuels promote more intense fire behaviour, fire control options become more limited, and ground crew access may not be possible, or is staged further away. The application of appropriate suppression tactics in a timely manner with sufficient resources is essential for fuel treatments to be effective. To increase the efficacy of fuel treatments, FireSmart standards should be applied to structures and their associated vegetation and other fuels to reduce the risk of structures igniting. Fuel treatment units require periodic maintenance to retain their effectiveness.

Analysis

Several fuel management treatment projects have been undertaken in the municipality. Completed treatments were comprehensively reviewed and are documented on Map 11. Some of this work was completed in-kind by BCWS Merritt Fire Zone crews. Other projects were managed by the municipality, who obtained funding from CRI FCFS to support this work. The largest fuel management projects completed in the municipality were done in the late 1990s and early 2000s, led by Tom Lacey. There are now opportunities to complete maintenance work to support the continued efficacy of these fuel treatments.

Action Planning

Based on this review and on observations gathered through field work, maintenance recommendations for existing fuel treatments and locations for additional fuel management treatment units were developed. New fuel management treatment units are displayed on Map 11. Table 17 describes the intent and rationale behind each of the proposed fuel management treatment units.

For Treatment Units (TUs) B, C, and F, it is recommended that the City of Merritt, as the proponent, seek funding to complete fuel management treatment through the UBCM FCFS program. The recommended next steps to complete fuel management treatment are as follows:

- A qualified professional (RPF) should review and/or revise prescription document to ensure it is up to date.
- A BCWS Wildfire Prevention Officer should then confirm the document is acceptable as the basis of a UBCM FCFS program application.
- Land managers or tenure holders with jurisdiction in the proposed treatment areas should be engaged and confirm that proposed works are acceptable – prior to application for grant funding. Rele
- Forest fuel management maintenance treatments should occur.

⁶⁴ BC Wildfire Service. 2020. 2020 Fuel Management Prescription Guidance. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_fuel_management_prescription_guidance_final.pdf

- Qualified personnel should prepare a burn plan or other plan for grass fuel reduction (e.g., grazing) for appropriate areas within the treatment units.
- Prescribed fire and/or grass fuel reduction treatment should occur.

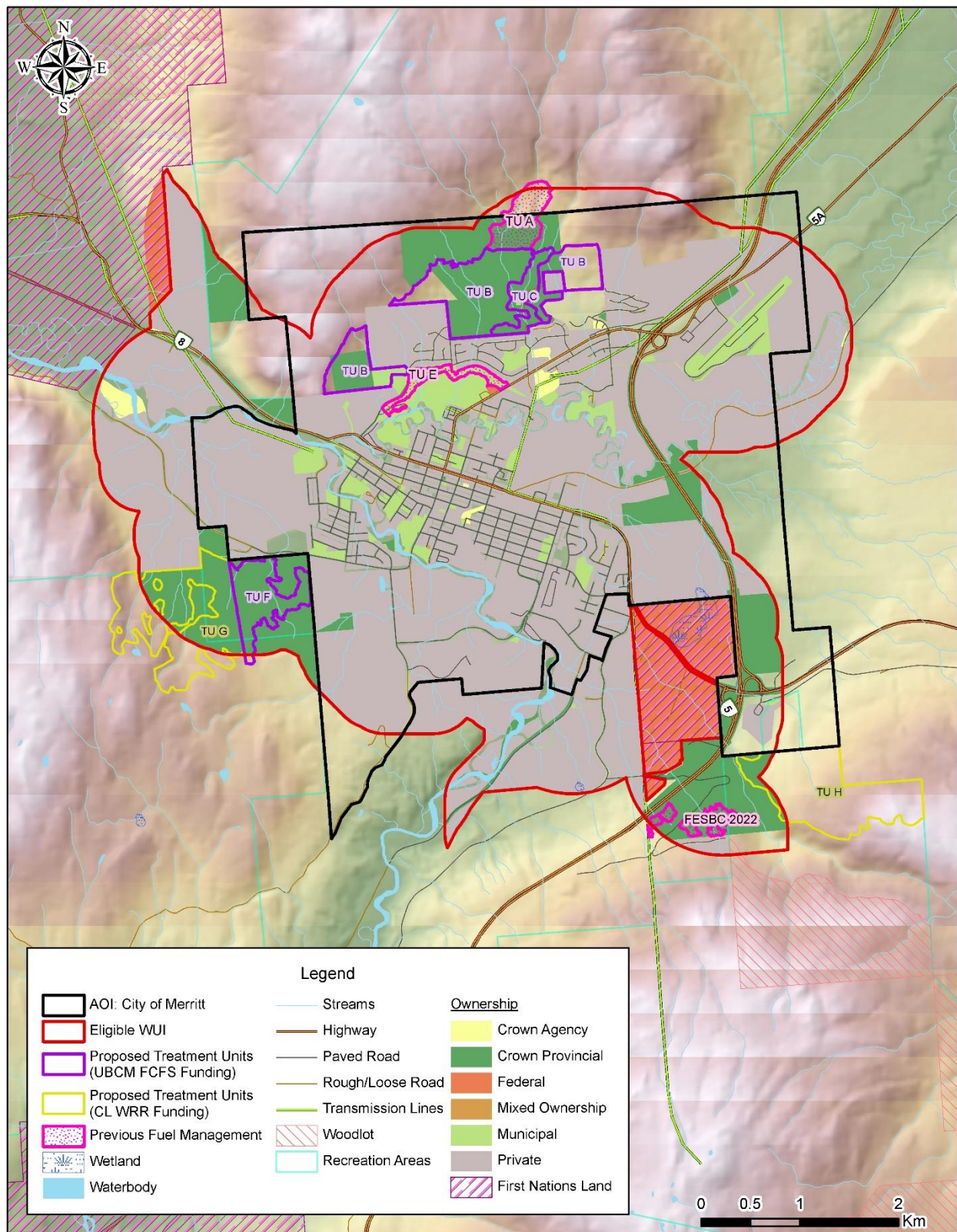
For TU G and H, **it is recommended that the City of Merritt, advocate for Ministry of Forests Crown Land Wildfire Risk Reduction (CL WRR) program staff to lead fuel management treatment.** The recommended next steps to complete fuel management treatment in these locations are:

- City of Merritt identifies this prescription treatment unit to CL WRR staff and advocates for completion of treatment in this location.
- CL WRR staff should complete a more detailed site-level assessment to identify suitable prescription areas.
- CL WRR staff should lead and complete fuel management treatments in prescribed locations, engaging with land managers in the areas.

Table 17. Proposed Fuel Treatment Units in the City of Merritt’s WUI

Name	Total Area (ha)	Wildfire Behavior Threat (ha)				Recommended Funding Source	Description & Rationale	Constraints
		Extreme	High	Mod	Low			
TU C	18.02	0.00	0.00	18.03	0.01	UBCM FCFS	This treatment unit was identified in a prescription written in 2018 for the City of Merritt, based on findings from the 2015 CWPP. It is located in the Bench area of the city, which has been a priority target for first responders for fuel management reduction for many years. Risk factors which increase the hazard for this area include: • Close proximity of neighborhoods to continuous forest stands; • Warm south-facing slopes where fuels cure more quickly; • Extensive grassy surface fuels that are receptive to ember ignitions; and • Moderately sloping and gullied terrain that may accelerate rates of spread. The prescription noted that this area historically had been treated with different methods, but that maintenance was required to ensure forest fuels remain in a state that does not promote severe wildfire behaviour. To date this prescribed maintenance work has not yet been completed. Past maintenance work has included: mechanical thinning to remove beetle-killed timber, hand-thinning by BCWS crews to reduce wildfire risk, pruning retained trees to remove ladder fuels, hand piling and burning, and spot prescribed burning. Currently the stands are characterized by open to patchy ponderosa pine stands with a component of Douglas-fir at the north end of the unit; abundant grassy surface fuels; minor coverage of drought-tolerant shrubs; and negligible coarse or fine woody debris loading. Field work for this CWRP supported key findings in the prescription document – namely, that the average density across the stands in this area is acceptable (300-400 SPH), but that ingress of saplings and seedlings and low crown base heights on retained trees contribute to patches of ladder fuels that should be treated. The prescription suggests that removal of mature trees is not required to achieve wildfire risk reduction objectives and recommends that prescribed burning take place to reduce grassy fuel loading - CWRP field work also supports this.	The 2018 prescription that identifies this treatment unit describes FRPA values that overlap the prescription area and constrain treatment activities. While the overall stand data for the prescription is considered current and the prescribed treatments remain appropriate for the site, the prescription document should be revisited to ensure these site constraints remain accurate and no land planning changes have occurred in the area. For a fuel management treatment funded by the CRI FCFS program, a program officer and/or BCWS Wildfire Prevention Officer may need to be engaged to confirm the prescription is acceptable and up to date. It should also be noted that the prescription recommends prescribed fire treatment. It should be noted that the configuration of private land in the area will likely affect burn planning, because CRI FCFS does not currently fund fuel treatment on private land. Boundaries will likely have to be defined for prescribed burn units that avoid these private land areas.
TU B	123.49	17.74	41.34	63.10	0.50			
TU F	39.44	6.22	8.46	23.29	0.19	UBCM FCFS	This treatment unit was identified in a prescription written in 2018 for the City of Merritt, based on findings from the 2015 CWPP. It is located to the south and upslope of the Colletville / Logan Lane neighborhoods in Merritt. Risk factors which increase the hazard for this area include: • Close proximity of neighborhoods to continuous forest stands; • Moister, cooler, north facing slopes that promote more tree growth; • Denser Douglas-fir forests with high ladder fuel continuity; • Extensive grassy surface fuels where surface fires can spread rapidly; and • Steep continuous slopes, and gullied terrain that accelerate rates of spread. At the time of prescription writing, this area had never been treated. Prescribed treatment included thinning (target density of 350-400 SPH), pruning, disposal of debris through piling and burning, and prescribed spot burning to remove grass build up. To date this work has partially been completed by BCWS crews – progress was interrupted by 2021 flooding. Approximately 25% of the area has been pruned and/or thinned, and debris piles have not yet been burned. Field work assessments for this CWRP support the characterization of forest stands and the recommended treatment regime in the prescription document.	The 2018 prescription that identifies this treatment unit describes FRPA values that overlap the prescription area and constrain treatment activities. While the overall stand data for the prescription is considered current and the prescribed treatments remain appropriate for the site, the prescription document should be revisited to ensure these site constraints remain accurate and no land planning changes have occurred in the area. For a fuel management treatment funded by the CRI FCFS program, a program officer and/or BCWS Wildfire Prevention Officer may need to be engaged to confirm the prescription is acceptable and up to date. Additional considerations: Steep slopes are a constraint to access on this site, with many rocky knolls and outcrops, and long unbroken slopes. Many unsanctioned trails traverse the area and are not shown on prescription maps. ATV access is possible in many locations.
TU G	108.14	20.89	6.39	30.55	0.00	CL WRR	This treatment area was not identified in the 2015 CWPP or in any previous prescriptions. It overlaps untreated and unmanaged forest land adjacent to Unit F above the Colletville / Logan Lane neighborhood. Similar to Unit F, the forest is characterized as a dense (1400-1700 sph) Douglas-fir dominant stand, with some ponderosa pine on the rocky, dry openings and along the lower slopes. Stands range from moderately open to dense, and ladder fuels range from patchy to well-integrated. Surface fuel loading is minor, with patches of hazardous accumulations, and surface vegetation is comprised of continuous grass. TU G partially overlaps and extends beyond the Eligible WUI. As such, this treatment unit is identified for the purposes of funding and treatment through the Crown Land Wildfire Risk Reduction program (CL WRR). The City of Merritt should engage with program leads in the Cascades Natural Resource District to advocate for the	This fuel management treatment unit is located on Crown Provincial land, within a recreation polygon managed by Recreation Sites and Trails BC. Site planning and treatment must occur in partnership with the land manager and with the support of the Natural Resource District. Rocky and steep slopes may require additional consideration. Overlaps with Coutlee Plateau mountain bike and off-road vehicle trails. Close proximity in some locations to residences. Located in a high smoke sensitivity zone. Overlap with:

Name	Total Area (ha)	Wildfire Behavior Threat (ha)				Recommended Funding Source	Description & Rationale	Constraints
		Extreme	High	Mod	Low			
							inclusion of this fuel management treatment area in their plans. The northern boundary abuts the edge of development in Colletville; the eastern boundary abuts TU F, and the western boundary abuts non-treed openings. Segments of the southwestern edges of this treatment unit abut a forest service road on Coutlee plateau. Due to the size of the polygon, the entirety of this treatment unit is not likely suitable for site planning in one phase. Additionally, net down or alteration of the area identified in this plan will likely occur if a more detailed assessment takes place. However, several factors rationalize fuel management planning or treatment in this location: • Located perpendicular to prevailing southwesterly winds, and buffering southwestern neighborhoods in Merritt; • At the landscape level, the treatment unit overlaps a hillside with significant areas of unburned and undisturbed fuels; • The forest area is unmanaged except for recreation purposes – so harvesting will not occur to create discontinuity in the existing forest structure; and • The north-facing slope aspect promotes ingress of saplings and seedlings and denser forest structures with heavier fuel loading.	• Critical habitat for Lewis’ woodpecker (<i>Melanerpes lewis</i>), Williamson’s sapsucker (<i>Sphyrapicus thyroideus</i>), American badger (<i>Taxidea taxus jeffersonii</i>) • Ungulate winter range (Order # u-3-003) • Non-legal old growth management areas • Multiple Forest Development Units and range tenures
TU H	99.45	3.45	5.46	0.01	0.00	CL WRR	This treatment area was not identified in the 2015 CWPP or in any previous prescriptions. It overlaps untreated and unmanaged forest land adjacent to the Godey Creek trailhead. TU F extends beyond the Eligible WUI. As such, this treatment unit is identified for the purposes of funding and treatment through the Crown Land Wildfire Risk Reduction program (CL WRR). The City of Merritt should engage with program leads in the Cascades Natural Resource District to advocate for the inclusion of this fuel management treatment area in their plans. Forests are characterized by stands of dense, ingrown and suppressed Douglas-fir (800-1700 sph); where mortality occurs, fine and large woody debris accumulations are present. In some locations canopy closure is lower and stands are more open, promoting shrub growth. Overall, surface vegetation is predominantly comprised of pinegrass. The northern boundary abuts private property adjacent to the Gateway 286 development and a future residential neighborhood. The southern boundary extends along the top of a tallus slope leading down to Godey Creek. Due to the size of the polygon, the entirety of this treatment unit is not likely suitable for site planning in one phase. Additionally, net down or alteration of the area identified in this plan will likely occur if a more detailed assessment takes place. However, several risk factors rationalize fuel management planning or treatment in this location: • Located perpendicular to prevailing southwesterly winds and proposed development as well as major transportation corridor (Hwy 97C); • At the landscape level, the treatment unit overlaps a hillside with significant areas of unburned and undisturbed fuels; • The forest area is unmanaged except for recreation purposes – so harvesting will not occur to create discontinuity in the existing forest structure; and • The north- and east-facing slope aspect promotes ingress of saplings and seedlings and denser forest structures with heavier fuel loading.	This fuel management treatment unit is located on Crown Provincial land, within a recreation polygon managed by Recreation Sites and Trails BC. Site planning and treatment must occur in partnership with the land manager and with the support of the Natural Resource District. Rocky and steep slopes may require additional consideration. Overlaps with Iron Mountain bike and off-road vehicle trails. Close proximity in some locations to residences. Located in a high smoke sensitivity zone. Overlap with: • Ungulate winter range (Order # u-3-003) • Non-legal old growth management areas • Critical habitat for American badger (<i>Taxidea taqxus jeffersonii</i>) • Multiple Forest Development Units and range tenures



Map 11. Proposed Fuel Treatments Units for City of Merritt

SECTION 6: FIRESMART ROADMAP AND CWRP ACTION PLAN

6.1 FIRESMART ROADMAP

The FireSmart Roadmap is a concept that demonstrates how no two communities will follow the same path towards increased community wildfire resiliency, but that actions progress along four sequential phases. Some activities, including education, may appear in multiple phases but should reflect progression in terms of the community's understanding and adoption of FireSmart principles.⁶⁵



Figure 8. Illustration of the FireSmart Roadmap concept.

Prior to the first phase, FireSmart BC recommends that three foundational elements are in place:

- A FireSmart Coordinator
- A Community Wildfire Resiliency Plan
- A Community FireSmart and Resiliency Committee

Merritt has all three elements in place, and has progressed through the engagement and initiative stage, into the integration and expansion phases. Examples of activities completed and ongoing under each phase, with comments and suggested next steps (included in the CWRP Action Plan) include:

⁶⁵ Community Resiliency Investment. (2023). *FireSmart Community Funding and Supports Supplemental Instruction Guide*. Retrieved from: <https://www.ubcm.ca/funding-programs/local-government-program-services/community-resiliency-investment/firesmart-0>

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Table 18. Summary of Merritt's progress along the FireSmart Roadmap

FireSmart Roadmap Stage	Current Status	Community Response	Recommended Next Steps
1 – Engagement	Fire Department personnel have been trained as Local FireSmart Representatives and has retained a FireSmart Coordinator for over 5 years. Merritt is actively delivering FireSmart education programming through print resources and in-person events.	General acceptance of importance of FireSmart with some demographics not yet taking action to implement FireSmart principles.	Continue efforts and focus on highest-risk neighborhoods, leveraging existing community groups if possible.
2 – Initiative	Merritt has multiple FireSmart initiatives that have been established for several years including: K-12 school programming, Wildfire Preparedness Day, HIZ assessments, and cross-training with BCWS.	Family events and activities are popular; renovations and upgrades of private property are slower to occur.	Continue to offer incentives, rebates, and support for residents to make changes to their homes. Expand initiatives related to FireSmart landscaping.
3 – Integration	New Official Community Plan includes Wildfire DPA and multiple other policies considering wildfire risk in the community.	Community response to be determined over time.	Monitor, assess and adjust policies as required.
4 – Expansion	Completion and maintenance of fuel management treatments around the community.	N/A	Obtain funding and work with Crown Land WRR, BCWS, and the Fuels Technical Committee to treat priority areas.

Table 1 in the Executive Summary details the Action Plan for Merritt. Each Action Item is a prioritized recommendation supported with a rationale, suggested lead agency, expected timeframe, resources required (funding, staff capacity), and metric for success. The corresponding Roadmap phase is also noted.

6.2 TRACKING, REPORTING, AND UPDATES

As Merritt works towards implementation of this plan, consider scheduling an annual review of progress made towards each action item/recommendation. Tracking and reporting will create accountability and also help with future funding applications. Consider reporting accomplishments and successes of the FireSmart program (for example, number of members trained, number of assessments completed) in a brief annual report that can be shared with the public and serve to further FireSmart engagement.

Merritt should prepare for a five-year comprehensive review/update of the entire plan. A current CWRP (typically 5 years or less) is presently a requirement of the FCFS program. The update should review the entire plan and consider how risk has changed based on any recent wildfires, vegetation management works completed, significant changes to the built environment due to growth and development, economic changes, or other factors that would influence the overall success of the plan. This would also include a detailed analysis of all completed fuel management treatments within the planning area with an updated status and/or a maintenance plan.

APPENDIX A: HOME IGNITION ZONE

Home and Critical Infrastructure Ignition Zones

Multiple studies have shown that the principal factors that contribute to structure loss by wildfire are the structure's characteristics and immediate surroundings. The area that determines the ignition potential of a structure is referred to (for residences) as the Home Ignition Zone or (for critical infrastructure) the Critical Infrastructure Ignition Zone.^{66,67} Both the Home Ignition Zone and Critical Infrastructure Ignition Zone include the structure itself and four concentric, progressively wider zones out to 30 m from the structure (Figure 7). More details can be found in the FireSmart Manual.⁶⁸

During extreme wildfire events, most home destruction results from low-intensity surface fires, usually ignited by embers. Embers can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate within the Home Ignition Zone or Critical Infrastructure Ignition Zone in densities that can exceed 600 embers per square meter. Combustible materials found within the Home Ignition Zones or Critical Infrastructure Ignition Zones to create fire 'pathways', allowing surface fires ignited by embers to spread and carry flames into contact with structures.

Because ignitability of the Home Ignition Zone or Critical Infrastructure Ignition Zone is the main factor driving structure loss, the intensity and rate of spread of wildfires beyond the community does not always correspond to a high potential of loss or damage. 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.⁶⁴ Extreme wildfire conditions do not necessarily result in WUI fire disasters.⁶⁹ 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 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.

Community Zone

The Community Zone encompasses all non-Provincial Crown public land within the municipal boundary, that is beyond 30 metres from private structures.⁷⁰ Vegetation management planning and implementation on most Community Zone lands should be directed through a formal fuel management prescription developed by a forest professional with wildfire vegetation management within their scope

⁶⁶ 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.

⁶⁷ Cohen, J. *Preventing Disaster Home Ignitability in the Wildland-urban Interface*. Journal of Forestry. p 15 - 21.

⁶⁸ <https://firesmartcanada.ca/> and https://firesmartbc.ca/wp-content/uploads/2019/09/FireSmart_Booklet_web-Updated.pdf

⁶⁹ Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Accessed online 1 June, 2016 at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/>.

⁷⁰ Community Resiliency Investment. *FireSmart Community Wildfire Resilience Plan Instruction Guide*. Retrieved from: <https://www.ubcm.ca/sites/default/files/2021-05/2021%20CWRP%20Supplemental%20Instruction%20Guide.pdf>

of practice⁷¹. Depending on the results of FireSmart Structure Ignition Zone assessments on individual structures, vegetation management may be required beyond 30 metres and up to 100 metres (FireSmart Priority Zone 3) on larger private parcels. Municipal parks, trails, and outdoor event spaces are all part of the Community Zone. Often Community Zone lands see high use by the public, which increases accidental ignition potential and risk to properties surrounding them.

Landscape Zone

The Landscape Zone encompasses provincial Crown lands that are located outside the municipal boundary. Vegetation (fuel) management planning and implementation is primarily the responsibility of the provincial government, working collaboratively to align landscape objectives with the CWRP objectives.⁷⁰ Vegetation management planning and implementation in the Landscape Zone and on all forested provincial Crown lands must be directed through a formal fuel management prescription developed by a forest professional with wildfire vegetation management within their scope of practice.⁷⁰

Fire hazard in the WUI is partly dictated by the proximity of fuel to developed areas. Fuels closest to the community pose a higher hazard, compared to fuels that are further from values at risk. It is recommended that fuels closest to structures or developed areas are prioritized for treatment first, in order to reduce the risk closest to the community. Continuity of fuel treatment is an important consideration, which can be ensured by reducing fuels from the edge of the community outward. Table 19⁷² describes the classes associated with proximity of fuels to the interface.

Table 19. Proximity to the interface

Proximity to the Interface	Descriptor*	Explanation
WUI 100 <i>Home Ignition Zone, Critical Infrastructure Ignition Zone, and Community Zones</i>	(0-100m)	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 <i>Community and Landscape Zones</i>	(100-500m)	Treatment would affect wildfire behaviour approaching a value, as well as the wildfire's ability to impact the value with short- to medium- range spotting; should also provide suppression opportunities near a value.
WUI 1000 <i>Landscape Zone</i>	(500-1000m)	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.
<i>Landscape Zone</i>	>1000m	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.

⁷¹ <https://firesmartcanada.ca/> and https://firesmartbc.ca/wp-content/uploads/2019/09/FireSmart_Booklet_web-Updated.pdf

⁷² Copied from Table 3: Proximity to the Interface; “Determining Wildfire Threat and Risk at a Local Level”; Tools for Fuel Management website (<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/fuel-management>)

APPENDIX B: WILDFIRE THREAT ASSESSMENT PLOTS AND PHOTOS

Provided separately as PDF package.

APPENDIX C: REQUIRED MAPS FOR CWRPS

The three below listed maps, with specific spatial data, labels, and tables, as described in the 2023 FCFS Program & Application Guide, Appendix 8, are provided separately as a PDF package.

- Map 1: Area of Interest (AOI) and VAR
- Map 2: Local Fire Risk
- Map 3: Proposed Fuel Treatment Units

APPENDIX D: LOCAL WILDFIRE RISK ASSESSMENT PROCESS

The Wildfire Threat Assessment results that are described in Section 10.3 were obtained through a process consisting of the following steps:

- Updating fuel typing through in-situ verification (field work) and orthophotography.
- Updating structural data using in-situ verification, spatial data, and orthophotography.
- In-situ observations of wildland fuels and completion of Wildfire Threat Assessment worksheets.
- Wildfire threat spatial analysis to produce mapping and statistics described in Section 4.3, using updated fuel typing, updated structural data, and Wildfire Threat Assessment worksheet results.

This appendix provides methodological information for each of the above steps to produce the Wildfire Threat Assessment, as follows:

- Further details on fuel typing update methodology are provided in Appendix D-1: Fuel Typing Methodology and Limitations
- Wildfire Risk Assessment plot worksheets are provided in Appendix B.
- Wildfire threat spatial analysis methodology to produce results reported in Section 10.3 is detailed in the following sections:
 - Appendix D-2: Wildfire Fire Threat Spatial Analysis Methodology, and
 - Appendix D-3: WUI Risk Spatial Analysis Methodology.

APPENDIX D-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.⁷³ Fuel typing is recognized as a blend of art and science. Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been used within BC, with continual improvement and refinement, for 20 years.⁷⁴

There are significant limitations with the fuel typing system which should be recognized:

- The fuel typing system is designed to describe fuels which sometimes do not occur within the Area of Interest
- Fuel types cannot fully, and accurately capture the natural variability within a polygon
- The data used to create initial fuel types, also has limitations.⁶⁹

⁷³ Forestry Canada Fire Danger Group. (1992). *Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3*.

⁷⁴ 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.

Given these limitations, the following should be considered when using fuel type maps and information, to plan community wildfire resiliency projects:

- Fuel typing further from the developed areas of the study generally has a lower confidence.
- 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.
- Forested ecosystems are dynamic and change over time: fuels accumulate, stands fill in with regeneration, and forest health outbreaks occur.
- Regular monitoring of fuel types and wildfire risk assessment should occur every 5-10 years to determine the need for updated assessments.

Fuel types found within the WUI were listed and discussed in in Section 10.1.1.

APPENDIX D-2: WILDFIRE FIRE THREAT SPATIAL ANALYSIS METHODOLOGY

Source Data

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 Lightning Fire Density
- PSTA Human Fire Density
- Head Fire Intensity
- WUI Human Interface Buffer (2 km 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 Service.

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.

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 20 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 20. 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 components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
	No	
Live and Dead Coniferous Crown Closure	No	
Live and Dead Conifer Crown Base height	No	
Live and Dead suppressed and Understory Conifers	No	
Forest health	No	
Continuous forest/slash cover within 2km	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	Elevation model was used to determine slope.
Slope	Yes	
Terrain	No	
Landscape/ topographic limitations to wildfire spread	No	
Structural Subcomponent		
Position of structure/ community on slope	No	Too difficult to quantify – this is a relative value.
Type of development	No	Too difficult to analyze spatially.

WUI Threat Sheet Attribute	Used in Analysis?	Comment
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 21 below summarizes the components and scores to determine the Fire Threat.

Table 21. 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	25
	C-6	
	M-1/2, >75% conifer	20
	C-7	
	M-3/4, <50% dead fir	15
	M-1/2, 50-75% conifer	
	M-1/2, 25-50% conifer	10
	C-5	
	O-1a/b	
	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

Attribute	Indicator	Score
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.

APPENDIX D-3: WUI RISK SPATIAL ANALYSIS METHODOLOGY

To determine the WUI Risk score, only the distance to structures is used. Buffer distance classes are determined (<200m, 200m-500m and >500m) but only for polygons that had a 'high' or 'extreme' Fire Threat score from the previous, assessment. To determine WUI Risk, polygons within 200 m of structures are rated as 'extreme', within 500 m are rated as 'high', and within 2 km are 'moderate'. Distances over that are rated 'low.' WUI Risk Classes and associated assumed scores are summer below in Table 32.

Table 22. WUI Risk Classes and their associated summed scores

WUI Risk Class	Score
Very Low	0
Low	0-35
Moderate	35-55
High ⁷⁵	55-65
Extreme	>65

⁷⁵ WUI risk is only assessed for polygons with wildfire threat ratings of high or extreme.