



Wildland Urban Interface Wildfire Risk Reduction Plan

Development Standards and Guidance

Updated: June 2024 BC Wildfire Service



Table of Contents

Table of Figures.....	3
Table of Tables	3
Frequently Used Acronyms.....	4
Part 1 About the Document	5
1.1 Overview & Purpose	5
1.2 WRR Plan Outcome.....	5
1.3 Background	5
1.4 Audience	6
1.5 Roles and Responsibilities	6
1.5.1 Forest Professionals.....	7
1.5.2 Business Area Lead - Land Manager.....	7
1.5.3 BC Wildfire Service	7
1.5.4 Other Crown land Managers	7
1.5.5 Adjacent Jurisdiction Land Managers.....	8
1.5.6 First Nations, Communities, and Stakeholders.....	8
1.5.7 Stakeholders	8
1.6 How to Use This Guide.....	9
1.7 Updates and Feedback.....	9
1.8 Note on Terminology.....	9
Part 2 Introduction to WRR Plans.....	10
2.1 What is a WRR Plan?.....	10
2.2 Interactions with Other Plans	12
2.2.1 Community Wildfire Resiliency/Protection Plans	12
2.2.2 Existing Tactical/WRR Plans.....	13
2.2.3 Ecosystem Based Fire Management Plans	13
2.3 Fuel Management Objectives	14
2.4 Identifying Overlapping Land Management Objectives.....	14
Part 3 WRR Plan Development Process.....	16
3.1 Data Inventory and Information Collection	16
3.1.1 Fire Environment.....	16
3.1.2 Values	17
3.2 Data Analysis and Field Verification	17

3.2.1	Field Data Collection.....	18
3.2.2	When to Employ Additional Tools	18
3.3	Planning and Fuel Management Units.....	19
3.3.1	Planning Units – Tactical Scale.....	19
3.3.2	Fuel Management Units – Operational Scale	22
3.4	Considerations for WRRU and FTU Development.....	24
3.4.1	WRRU and FTU Location and Design.....	24
3.4.2	Other Considerations in Unit Development.....	25
3.5	Prioritizing Planning and Fuel Management Units	26
Part 4 WRR Plan Deliverable Standards.....		27
4.1	The WRR Plan Report.....	27
4.2	WRR Plan Output Table.....	27
Appendix A: Prerequisite Data and Information for WRR Planning		28
Spatial Data.....		28
DataBC Data Catalogue		28
Appendix B: Map and Spatial Data Standards.....		30
WRR Plan Map Standards		30
Spatial Data Standards.....		30

Table of Figures

Figure 1. Plan type and scale in relation to WRR Plans.	11
Figure 2. WUI WRR Plan Planning and Fuel Management Units.....	19
Figure 3. WUI WRR Plan Example. The upper graphic illustrates WRR Planning units and the lower graphic illustrates total chance operational fuel management planning within a WRRU.	24

Table of Tables

Table 1. A comparison between WUI WRR Plan and WRP Attributes.....	13
Table 2. WRR Plan spatial data deliverable standards.....	32
Table 3. Attribute Value Reference Table.....	35

Frequently Used Acronyms

ABC FP	Association of BC Forest Professionals
AMU	Assess-Monitored Unit
AOI	Area of Interest
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic
CI	Critical Infrastructure
CLWRR	Crown Land Wildfire Risk Reduction
CO	Community
CRI	Community Resiliency Investment
CWPP	Community Wildfire Protection Plan
CWRP	Community Wildfire Resiliency Plans
FB	Fuel break
FCFS	FireSmart Community Funding and Supports
FESBC	Forest Enhancement Society of British Columbia
FMP	Fire Management Plan
FMU	Fuel Management Unit
FOR	Ministry of Forests
FPBC	Forest Professionals BC
FRPA	Forest & Range Practices Act
FTU	Fuel Treatment Unit
GDB	Geodatabase
GIS	Geographic Information Systems
HQ	Headquarters
HVRA	Hazard, Vulnerability, Risk Analysis
ISI	Initial Spread Index
KMZ	Keyhole Markup Language, Zipped
MOF	Ministry of Forests
MRB	Mountain Resorts Branch
NP	Non-productive
PSTA	Provincial Strategic Threat Analysis
RSWAP	Resource Strategic Wildfire Allocation Protocol
SPU	Structure Protection Units
UBCM	Union of British Columbia Municipalities
VAR	Values at Risk
WMU	Wildfire Management Unit
WPO	Wildfire Prevention Officer
WRR	Wildfire Risk Reduction
WRRU	Wildfire Risk Reduction Unit
WUI	Wildland-Urban Interface

Part 1 About the Document

1.1 Overview & Purpose

The Wildland Urban Interface Wildfire Risk Reduction Plan development standards and guidance provides forest professionals with the direction, explanatory information, and resources necessary to develop Wildland Urban Interface (WUI) Wildfire Risk Reduction (WRR) Plans. The document aims for a consistent approach to fuel management planning and fuel management project prioritization within and adjacent to the WUI.

NOTE: Wildland Urban Interface Wildfire Risk Reduction Plans (herein referred to as WRR Plans) are the next generation of Tactical Plans. Tactical Plans were introduced in 2018, serving as the primary wildfire risk reduction planning mechanism for Provincial Crown land in the Wildland Urban Interface.

To better reflect the purpose of these plans, and to eliminate confusion with response/operational plans, the plan title and associated guidance and standards have been updated.

The document is broken up into 4 Parts:

1. [About the Document](#) – who the guide/standards are for and how should they use them.
2. [Introduction to WRR Plans](#) – what is a WRR Plan.
3. [WRR Plan Development Process](#) – how to prepare a WRR Plan
4. [WRR Plan Deliverable Standards](#) – standards for deliverables associated with WRR Plans

1.2 WRR Plan Outcome

The outcome is to provide provincial land managers with information relating to wildfire threat and risk within the project area, effectively **guiding the location, priority, and development of fuel management projects** on Provincial Crown land. This outcome is achieved through a total chance plan approach to provide situational awareness of wildfire risk across the entirety of the planning area. This includes assessment of all completed and planned fuel treatments in context of natural and human disturbances.

1.3 Background

WRR Plans are primarily funded through the Crown Land Wildfire Risk Reduction (CLWRR) under the [Community Resiliency Investment Program](#) (CRI), additional funding programs include, the Forest Enhancement Society of BC (FESBC). The CLWRR program stream is administered through the Ministry of Forests (FOR) in collaboration with BC Wildfire Service (BCWS) and Land Managers (e.g., Natural Resource Districts, BC Parks, Mountain Resorts Branch, etc.). WRR Plans focus on Provincial Crown land around communities and critical infrastructure. [Section 3.4.1.1](#) outlines how the Area of Interest (AOI) is defined for a WRR Plan. The [CLWRR Planning Guide](#) is located on the [BCWS Crown Land Wildfire Risk Reduction Webpage](#), WRR Plans are established for [WUI Risk Class 1 and 2 polygons](#) on Provincial Crown land.

1.4 Audience

This document is intended for use by forest professionals hired to develop WRR Plans. These standards are directed towards experienced professionals practicing within their scope. They are not meant to be used by the public or individuals that do not have adequate training and experience in both fire behaviour and forest management.

Fuel management falls under the scope of professional forestry as regulated by [the Forest Professionals of BC](#). Practicing members are entrusted to ensure that practices applied to forests, forest lands, forest resources, and forest ecosystems comply with legislative requirements, including the *Wildfire Act*, *the Forest and Range Practices Act*, *Park Act* etc. Assessments, plans, and prescriptions for fire and fuel management must meet the intended objectives as laid out in applicable legislation. In 2013 the ABCFP (now Forest Professionals BC) released [Interim Guidelines – Fire and Fuel Management](#) to provide Forest Professionals BC (FPBC) members with information and guidance to be considered when working in the area of fire and fuel management.

This document assumes that all other approaches to, and components within adhere to legal requirements and follow FPBC published [standards and practice guidelines](#), including, but not limited to:

- Standards of Professional Practice: Guidelines for Interpretation,
- Interim Guidelines – Fire and Fuel Management,
- Guidance for Professional Quality Field work, and
- Guidance for Professional Quality Rationales and Comments

1.5 Roles and Responsibilities

The successful development of a WRR Plan hinges on the integration, collaboration, and coordination between multiple parties and agencies. In most cases, WRR Plans are developed by a hired forest professional, led by a project team made up of:

- The Business Area Lead (e.g., MOF natural resource district staff)
- A representative from BCWS (e.g., Wildfire Prevention Officer (WPO))
- Representative land managers from overlapping jurisdictions (e.g., Mountain Resorts Branch and BC Parks staff)
- Adjacent Land Managers (regional districts, or municipal governments)
- Stakeholders (e.g., tenure holders, licensees, etc.)
- First Nation Communities

NOTE: This guide provides a foundational understanding of WRR Plan project teams' organizational structure and roles and responsibilities. However, each project will have unique circumstances and requirements. To ensure project planning and delivery success, the forest professional will need to refer to the associated contract for a detailed description of all aspects of the services they will be providing.

1.5.1 Forest Professionals

The hired forest professional will develop deliverables as directed by the project team and associated project contract. The forest professional hired to develop the WRR Plan must be within their scope of practice with regards to fuel management and fire behaviour expertise.

Generally, the hired forest professional's primary roles and responsibilities are to:

- Participate in consultation and meetings with all project team members, partners, and stakeholders as deemed necessary by the business area lead.
- Provide all deliverables associated with the WRR Plan of sufficient quality by the milestones outlined in the contract.
- Acquire all data and resources necessary for the successful completion of the WRR Plan.

1.5.2 Business Area Lead - Land Manager

The role of the Business Area Lead is to act as the contract and project manager. The business area lead is a land manager, most typically a Wildfire Risk Reduction program staff member at the FOR natural resource district. In some instances, if the plan AOI overlaps two natural resource districts, a regional Integrated Investment Specialist may act as a Business Area Lead. Or when a WRR Plan is developed under a funding regime outside of the CLWRR, the lead could be a Community Forest Area Land Manager.

The business area lead primary roles and responsibilities are to:

- Lead project and contract management.
- Coordinate, lead, and facilitate all engagement and consultation with project team, partners (Indigenous nations, adjacent jurisdiction land managers, etc.) and stakeholders.

1.5.3 BC Wildfire Service

The role of the BCWS representative is to provide subject matter expertise on fire behaviour and fuel management throughout the development of the WRR Plan. The BCWS representative is typically the WPO from the local fire centre.

The BCWS representative primary roles and responsibilities are to provide:

- Subject matter expertise for WRR objectives, fire behaviour, wildfire risk, and fuel management.
- Direction on process and methodology for plan development.
- Guidance on local fire environment, operational response considerations, and fire behaviour modeling.

1.5.4 Other Crown land Managers

While the WRR Plan project business area lead is typically a Ministry of Forest Natural Resource District staff working within the Wildfire Risk Reduction Program, other Crown land management authorities may overlap or coincide with the AOI; this can include BC Parks or Mountain Resorts Branch. Proactive engagement prior to initiation of a project with land managers whose jurisdiction is overlapped must occur to ensure alignment with current initiatives, legislation, policy, guidance, and best management practices.

In some instances, guiding legislation and management practices may differ. For example, in BC Parks, the BC protected area system is governed by several specific pieces of [legislation](#). While the business area leading the WRR Plan project will facilitate engagement with all applicable land managers, the forest professional developing the WRR Plan must also ensure all deliverables adhere to jurisdictional initiatives, legislation, policy, guidance, and best management practices as well as specific expectations of each land management authority.

1.5.5 Adjacent Jurisdiction Land Managers

Adjacent jurisdiction land managers will be tied into the project team by the Business Area lead as appropriate. This facilitates synergies between the WRR Plan and other ongoing land management and wildfire-related planning projects. Adjacent jurisdiction land managers may include:

- BC Parks
- Mountain Resorts Branch
- Indigenous communities
- Federal government
- Municipal government
- Other resource districts

1.5.6 First Nations, Communities, and Stakeholders

Indigenous communities whose traditional territories and interests overlap the AOI are to be partnered with. The successful development of a WRR Plan relies on the knowledge, expertise, and capacity of all partners, inclusive to First Nations local government, and stakeholders. Meaningful engagement with First Nations partners should occur throughout the development and implementation of WRR Plans to help shape development and prioritization of units and associated objectives and treatment activities. Partnership and engagement should continue through prescription development and implementation. Engagements and partnership development with First Nations, communities and stakeholders is led by the Business Area Lead and in many cases supported by other project team members.

1.5.7 Stakeholders

Early initial engagement and through the duration of WRR Plan development, with impacted stakeholders or interest groups is highly recommended. While most meaningful engagement happens at a finer scale during prescription development, information sharing at the WRR Plan stage provides foundational knowledge for both the stakeholders and WRR Plan project team. While information sharing is typically driven by the Business Area Lead, all members of the project team, including the forest professional hired to develop the WRR Plan, will have some level of involvement. The following is a list of key groups that should be contacted:

- Area-based tenures (Woodlots, community forests, First Nation Woodland Licenses)
- Licensees whose operating area overlaps with the AOI.
- Tenure holders (Guides, trappers, outfitters, etc.)

1.6 How to Use This Guide

Due to the complex nature of planning at larger scales, a variety of other tools and literature will need to be drawn upon when developing WRR Plans. Relevant information, additional standards, direction and/or background information that supports the development of WRR Plans are cited and linked throughout this guide.

The BCWS has developed a suite of tools to support fuel management that are located on the [BCWS Tools for Fuel Management](#) webpage. Forest professionals developing WRR Plans should be familiar with this webpage and experienced with any relevant tools and guidance found within.

Each AOI will have its own unique circumstance, therefore, a project team of diverse representatives reflective of the AOI is imperative to the plan's success. Some land managers tools, legislation, or best management practices may not be outlined in this guide and therefore proper consultation and integration with the project team is required to ensure the plan is based on local and applicable knowledge, legislation, and resources.

1.7 Updates and Feedback

This guide is an iterative document that will be reviewed and revised as needed to reflect any policy changes, new legislation, requests for additional content, or emerging science in fuel management. The latest version will be available on the [BCWS Tools for Fuel Management](#) webpage. Questions and suggestions regarding the document should be directed to: BCWSPrevention@gov.bc.ca or a WPO at your nearest Fire Centre.

1.8 Note on Terminology

Key terms used throughout this document have varying definitions and uses depending on the agency or jurisdiction. Please refer to the [BCWS Wildfire Glossary](#) for definitions of terminology applicable to wildfire and fuel management in British Columbia. If a term is not currently defined in the BCWS Wildfire Glossary, please defer to the most up to date [Canadian Interagency Forest Fire Centre glossary](#).

Part 2 Introduction to WRR Plans

In British Columbia, creating and maintaining fire resilient ecosystems and communities is fundamental to ensuring the long-term sustainability and health of our forests while also reducing the impacts of wildfire to those who live within the WUI. Fuel management activities can aid in achieving the above through the manipulation or reduction of living or dead vegetation in the various components of the forest and grassland fuel strata. Fuel management is an important part of wildfire prevention; if done correctly and maintained over time it can result in positive impacts on potential fire behaviour and suppression efficacy. Proper planning enables integration of fuel management activities into various community and land management planning.

2.1 What is a WRR Plan?

The purpose of a WRR Plan is to provide provincial land managers with information relating to wildfire threat and risk within the project area, effectively **guiding the location, priority, and development of fuel management projects** on Provincial Crown land.

Acting as a conduit between high-level strategic plans (e.g., landscape-level wildfire risk and threat analysis) and site-level operational plans (e.g., fuel management prescriptions), WRR Plans ensure alignment with broad forest, wildfire, and fuel management standards and policies.

A key outcome of WRR Plans is a prioritized list of fuel management units and higher-level planning units. These delineations assist decision making in the implementation of funding programs like the CLWRR and FESBC specific to fuel management activities within the WUI.

To achieve this outcome WRR Plans:

- Address and consider conflicting land management objectives while ensuring community resiliency is achieved.
- Align with other plans (e.g., Forest Landscape Plans, Forest Stewardship Plans, Community Wildfire Resiliency/Protection Plans, BC Parks ecologically based Fire Management Plans, BC Parks Management Plans and associated documents, MOF District Fire Management Plans, etc.).
- Identify and prioritize the values at risk (VAR).
- Identify the current and desired wildfire risk level to specified values (e.g., communities, critical infrastructure, human life, and safety).



Figure 1. Plan type and scale in relation to WRR Plans.

Higher-Level Strategic Plans

Higher-level strategic plans occur at regional, sub-regional, landscape, and/or watershed scales. These plans highlight resource management objectives and, in some cases, set legal direction. When developing and prioritizing units for fuel treatment in WRR Plans, consideration and integration of land management objectives outlined in applicable strategic plans is critical. This ensures wildfire resiliency and fuel management objectives align with legal requirements and responsibility area priorities. Some examples of higher-level plans include Forest Stewardship Plans, Forest Landscape Plans, and Land Use Plans (Sustainable Resource Management Plans and Land & Resource Management Plans).

Wildfire Risk Reduction Plans

WRR Plans analyze wildfire threat and risk to direct and prioritize fuel management opportunities on Provincial Crown land within the WUI. Land managers and those operating within and adjacent to Crown land in the WUI can use WRR Plans to assist in locating, prioritizing, and developing fuel management projects.

Site Level Operational Plans

Site Level Operational Plans are [fuel management prescriptions](#), [burn plans](#), maintenance and monitoring plans, site plans, etc. Fuel management prescriptions describe site conditions and the fuel treatment specifications prescribed to achieve desired fire behaviour outcomes.

2.2 Interactions with Other Plans

All other fuel and wildfire management plans that exist should be examined to determine linkages, avoid redundancies, and fill in any data gaps during the development of a WRR Plans. This includes historical plans and plans that overlap the project area or are spatially proximate to the project area.

NOTE: Some plans to consider referring to during the development of a WRR Plan include:

- Indigenous/First Nation Land Management Plans
- Community Wildfire Resiliency/Protection Plans
- Fire Management Plans
- Forest Landscape Plans
- Forest Stewardship Plans
- BC Parks ecologically based Fire Management Plans
- BC Parks Management Plans
- Adjacent and historical Tactical and/or WRR Plans
- Co-management plan with First Nations

Caution must be taken when considering implementation or incorporation of these existing plans as they may be outdated and/or not align with current standards. Establishment of or engagement with existing local [Community FireSmart and Resiliency Committee](#)'s or equivalent is strongly encouraged through this process.

2.2.1 Community Wildfire Resiliency/Protection Plans

In many cases, plans with respect to wildfire management already exist. A common plan completed by many local governments and First Nations communities is a Community Wildfire Resiliency Plan (CWRP) (historically, the Community Wildfire Protection Plan (CWPP)). CWRPs are designed to identify the wildfire risks within and surrounding a community and to examine possible ways to reduce those risks. The CWRP process allows communities to decide whether to include WRR planning on Crown land within one kilometer of the community as part of that process. CWPPs/CWRPs are generally limited to municipal or federal (Indian Reserve land) and provide actionable plans specific to each of the [7 FireSmart disciplines](#). Typically, Provincial Crown land fall outside the scope of a CWPP/CWRP and therefore **WRR Plans provide a coordinated and complimentary approach to the Provincial Crown lands surrounding municipal and federal boundaries**. In instances where a CWRP/CWPP has identified opportunities for fuel management on provincial Crown land these fuel treatment units should be reviewed and incorporated where it makes sense to do so.

Table 1. A comparison between WUI WRR Plan and WRP Attributes

Plan Type	WUI WRR Plan	CWRP/CWPP
Lead	<ul style="list-style-type: none"> Provincial Government 	<ul style="list-style-type: none"> Municipal Government, Regional Government, or Indigenous Community
WUI Scale	<ul style="list-style-type: none"> Entire WUI (+/- logistical bounds) 	<ul style="list-style-type: none"> 1km WUI
Administrative Scale	<ul style="list-style-type: none"> Provincial Crown Land 	<ul style="list-style-type: none"> Municipal Provincial Crown Land Federal/IR
Purpose	<ul style="list-style-type: none"> Fuel management planning mechanism for provincial land managers implemented through a total-chance planning approach 	<ul style="list-style-type: none"> Wildfire risk reduction planning mechanism for communities implemented through 7 FireSmart Disciplines
Outcome	<ul style="list-style-type: none"> Identification and prioritization of planning and fuel management units 	<ul style="list-style-type: none"> Identification and prioritization of actions local governments can take to become FireSmart (including prioritizing and planning fuel management units)
Funding Regimes	<ul style="list-style-type: none"> CLWRR 	<ul style="list-style-type: none"> FCFS
Temporal Scale	<ul style="list-style-type: none"> ~5 years 	<ul style="list-style-type: none"> ~5 years

2.2.2 Existing Tactical/WRR Plans

It's important to refer to adjacent tactical/WRR Plans to take advantage of opportunities to tie into and/or anchor from existing plan or fuel management units. In cases where a plan is being updated, a review of the historical plan is required to gain sufficient situational awareness.

2.2.3 Ecosystem Based Fire Management Plans

BC Parks (BCP) ecologically focused Fire Management Plans (FMP) provide a detailed and comprehensive guide to landscape level fire management within BC's protected areas ('protected area' refers to any Class A, B or C park, recreation area and conservancy as defined in the Park Act, protected areas established under the Environment and Land Use Act, and Ecological Reserves as established under the Ecological Reserves Act). They are an ecosystem-focused plan that guides long-term protected area management objectives by analyzing and identifying areas of opportunity for reintroducing fire to the landscape with prescribed and/or cultural fire, informs ecosystem restoration strategies in fire-adapted or fire-dependent ecosystems, guides wildfire prevention project planning using fuel management by assessing and prioritizing high risk areas for treatments and informs wildfire response within parks and protected areas to protect values at risk. In instances where a WRR Plan's AOI overlaps with or is adjacent to a protected area, it is imperative that BC Parks staff are communicated with in the initial planning stages to provide guidance and expectations.

2.3 Fuel Management Objectives

To achieve fuel management objectives significant planning work is required to understand wildfire risk. WRR Plans identify wildfire risk on a broad scale and identify and prioritize areas for fuel management. Effective fuel management should reduce wildfire intensity and increase suppression opportunities, thereby mitigating negative impacts to life, property, and other VAR.

Especially in the WUI, the intent of establishing a fuel treatment unit is to provide an opportunity for suppression that is part of a multi-barrier approach to reduce risk to values. **A fuel treatment in and of itself won't stop a wildfire under most conditions** – rather it is most effective in conjunction with other practices such as the [seven FireSmart disciplines](#).

Additionally, the effectiveness of a fuel treatment is dependent on two key factors:

1. Reducing fire behaviour potential to a specified fire behaviour outcome, and
2. the application of appropriate suppression tactics in a timely manner

To achieve these outcomes, identifying the potential fire behaviour that could occur in a specific area is a critical first step. In B.C. the desired fire behaviour targets should be based on the ability for suppression activities to occur, or the critical surface fire intensity (whichever is the lowest). The critical surface fire intensity can be determined using a combination of inputs including surface and crown fuel loading, to help determine the possibility of crowning under certain fire weather conditions.

The use of the [90th Percentile weather conditions](#) to drive fuel treatment targets links weather driven changes to the critical surface flame length, as well as help plan for treatment objectives. Wildfires that occur in the higher percentile weather are large-scale fires that occur under high winds, low fuel moisture with higher spread rates, and intensities where large-scale losses occur. Using the information supplied on the Tools for Fuel Management webpage there are directions on how to calculate this.

Fuel management activities can influence the amount, composition, and arrangement of fuels, which means they can modify the intensity, and in some cases the severity, of a wildfire. The size and spatial arrangement of fuel treatments across the land base are also fundamental to their overall effectiveness during wildfires and can be planned in several ways. Fuel treatments affect fire behaviour by modifying the stand structure (fuel strata) and fuel loads to specifications that meet the desired fire behaviour outcomes.

NOTE: For detailed guidance on fuel management practices and principles please refer to the most recent edition of the [Fuel Management Practices Guide](#) on the [BCWS Tools for Fuel Management](#) Webpage.

2.4 Identifying Overlapping Land Management Objectives

Overlapping land management objectives should be identified and considered during the WRR Plan development. Discussions should occur between the Business Area Lead and value managers to determine the most appropriate management of values identified as significant (based on scale and value type e.g., species at risk). Considerations around specific management strategies for values at the site-level are not a part of the WRR Plan and are determined during the operational plan phase. Further guidance around managing

overlapping objectives in fuel management projects can be found in the Fuel Management Practices Guide on the [BCWS Tools for Fuel Management](#) Webpage.

Part 3 WRR Plan Development Process

Part 3 outlines a proposed approach to the development of a WRR plan.

The phased approach for WRR Plan development is as follows:

1. Data Inventory and Information Collection
2. Data Analysis & Field Verification
3. Planning and Fuel Management Unit Development & Prioritization

Engagement is an overarching component of the plan development that is to be integrated into each phase. Engagement with the stakeholders and land managers identified in the Roles and Responsibilities section of this guide should occur upon project initiation and in many cases in alignment with project milestones. Engagement is led by the Business Area Lead and supported by the project team.

3.1 Data Inventory and Information Collection

When developing a WRR Plan the collection of data and information relevant to planning is a crucial initial step. Data and resources that must be collected and reviewed may include:

- Spatial data
- Other plans
- Guidance documents and planning standards

Spatial data sets that provide an understanding of the AOI's fire environment and associated VAR must be compiled and assessed. Please refer to [Appendix A](#) for a detailed list of spatial data layers. In most instances, much of the spatial data required can be accessed on the [DataBC Data Catalogue](#).

Any resource or wildfire related plans that overlap and/or run adjacent to the project area should be compiled and reviewed to ensure strategic alignment and capitalize on opportunities to synergize fuel and forest management initiatives. Additionally, WRR Plans must be developed in adherence to the most current provincial guidance and standards. Many of these documents are referenced throughout the guide.

3.1.1 Fire Environment

The successful completion of a WRR Plan requires a strong understanding of the AOI's fire environment, values at risk, and operational considerations pertaining to fire response as well as fuel and forest management. Fire environment factors, including their complexity, interactions and influence on fire behaviour outcomes will impact the identification and prioritization of planning and fuel management units. A non-exhaustive list of factors for which information and data must be compiled and analyzed includes:

- Stand characteristics, including composition, structure, connectivity, and forest health
- Natural disturbance types, including frequency and severity of predominant disturbance agents (e.g., wildfire, wind throw, forest pest and pathogen, etc.)
- Climate, fire weather and fire danger, with consideration of seasonality, and critical patterns
- Topographic influence, including position, slope aspect, and terrain

- Historical fire occurrence, including causal agents and patterns
- Anchoring features (e.g., lakes, roads, etc.)

3.1.2 Values

In finalizing the wildfire risk assessment, the interaction of the above fire environment inputs, the PSTA, and considerations from review of historic fire events with priority values must be completed. This will facilitate planning and fuel management unit prioritization.

The type of value, its spatial extent, the (positive or negative) impacts of a range of intensities of fire, and relative importance must all be established to finalize the wildfire risk assessment. Values are identified and prioritized based on a wildfire interaction with a value. The CLWRR program prioritizes wildfire risk reduction to **high-risk communities and critical infrastructure** on crown land in alignment with the British Columbia Emergency Management System (BCEMS).

Identification of other values that may impede fuel treatment implementation or be enhanced through fuel management activities is an important part of this process. This includes but is not limited to cultural, ecological, environmental, and resource values.

NOTE: Completing risk and vulnerability assessments is not required nor a fundable activity as part of the WRR Planning process. For larger communities or areas of contention, local wildfire risk assessments can be considered but approval is required from BC Wildfire Service and the land manager(s).

3.2 Data Analysis and Field Verification

Upon inventorying and reviewing of all pertinent data and information, an analysis of wildfire threat/risk is required to facilitate unit development and prioritization.

The analysis should include review of the data identified in **Appendix A** BCWS models such as the Provincial Strategic Threat Analysis (PSTA), WUI Risk Class Maps, etc. The PSTA will provide a strategic-level analysis of threat and the factors that contribute to it but acts only as a starting point to aid in the identification of areas where wildfire threat may need to be mitigated. In developing the WRR Plan certain areas of the AOI will need to be assessed to confirm that the PSTA reflects local wildfire threat and to ensure units are developed and prioritized based on the risk that is present.

NOTE: The assessor must not only focus on areas modelled as elevated wildfire threat, but also verify whether areas of lesser wildfire threat are accurate, especially in situations where planned mitigation activities are intended to leverage the potential resistance to fire spread such areas may represent.

3.2.1 Field Data Collection

Field verification consists of validating information on values, fuel type and fire threat (topography, wind patterns, proximity to value, etc.). The analysis and ground truthing process and intensity will differ based on the various factors such as the complexity of the AOI etc. The level of analysis or survey intensity to determine or validate risk, develop, and prioritize units, and determine treatment options will vary. The forest professional will develop a survey design, sampling methodology, and proposed sampling intensity to be reviewed and approved by the Business Area Lead and project team.

NOTE: Field data must be collected in accordance with the **Fuel Management Survey Data Collection Standard** found on the the [BCWS Tools for Fuel Management](#) Webpage.

3.2.1.1 BC Wildfire Fire Fuel Types Spatial Layer Verification

Provided the PSTA is disproportionately weighted towards head fire intensity, which in turn is governed in part by FBP fuels characterization, inaccuracies in fuel type assignment may result in misrepresentations of local wildfire threat. Spatial verification of the [BC Wildfire Fire Fuel Types](#) layer is required to determine whether modelled wildfire threat is reflective of in situ conditions.

3.2.2 When to Employ Additional Tools

In many cases the combined use of the PSTA, WUI risk class polygons, spatial data listed in [Appendix A](#) , and adequately trained forest professionals with experience in both fire behaviour and forest management should be sufficient in determining risk in the absence of additional modelling tools. However, due to their complexity, there may be circumstances where WRR plans require additional wildfire risk assessment and/or fuel treatment scenario analysis, outside of what is initially provided by BCWS. Many of the modelling products available require considerable set-up and data/information collection. Any, and all modelling must be done by competent, trained individuals that have a full understanding of the assumptions and limitations of the modeling approach.

NOTE: If additional modeling is considered a necessary component of the project, contact the BCWS representative, the business area lead, and BCWS Prevention HQ.

BCWS Prevention HQ must be contacted to evaluate and review all modelling requests pertaining to WRR Planning. For modelling requests, a minimum of one-month lead time is required. The project team and BCWS Prevention HQ will work with the forest professional to determine reasonable timelines to action requests.

BCWS Prevention HQ Email: BCWSPrevention@gov.bc.ca

3.3 Planning and Fuel Management Units

A key outcome of WRR Plans is the delineation and prioritization of planning and fuel management units. As illustrated in the figure below, the planning units include three scales:

- the area of interest (AOI),
- wildfire management units (WMU), and
- wildfire risk reduction units (WRRU).

Within identified WRRUs, fuel management units are identified as:

- fuel treatment units (FTU),
- assess-monitor units (AMU), or
- Non-Productive (NP).

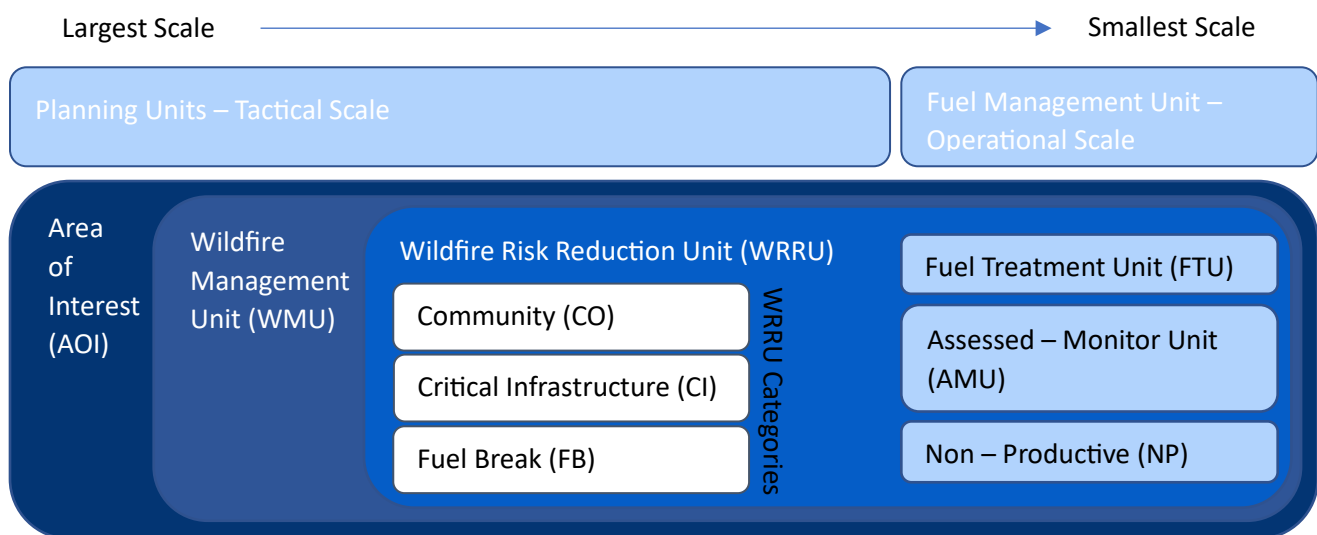


Figure 2. WUI WRR Plan Planning and Fuel Management Units

3.3.1 Planning Units – Tactical Scale

Intensity of planning within planning units will vary depending on many factors such as fuel types, topography, fire weather, and values. Planning for fuel management for the purposes of WRR is largely focused on the value and working outwards.

3.3.1.1 Area of Interest

PUROPOSE: The **AOI** is a **pre-identified planning unit** corresponding to the project area boundary of the WRR Plan. Based on the considerable size of most AOIs, it is understood that the entire AOI is not assessed for risk at the stand level as part of the WRR Plan process. Rather, a spatial analysis of the entire AOI is conducted to establish WMUs and WRRUs to provide a logical planning breakdown and identify areas to assess for risk.

DEVELOPMENT: The AOI is established by land managers and BCWS. In most cases the AOI falls within the bounds of WUI Risk Class 1 and 2 polygons, however, it may expand outside of these polygons to strategically account for:

- Logical topographic, weather, and fuel patterns that influence fire behaviour and may span outside of the WUI to some extent.
- Geographic proximity of communities.
- Administrative boundaries and other local/regional information necessary to identify an AOI that makes the most sense from a higher-level planning perspective.
- Overlap and adjacency to past, current, and proposed plans (CWRR/CWRP Plans, FLPs, BC Parks Ecologically Based Fire Management Plans, etc.)
- Areas of high or extreme PSTA threat class polygons that meet the <6 structure /km² density class not encompassed in WUI Risk Class 1 and 2 polygons.
- Existing features that present logical fuel break opportunities in reasonable proximity to WUI Risk Class 1 and 2 polygons.
- Areas identified as a high or extreme threat at the local level with updated data that has been field verified and approved by the project team.
- These areas must also have priority values based on Resource Strategic Wildfire Allocation Protocol (RSWAP) (e.g., communities, critical infrastructure) or are considered a priority for this type of planning.

In the instance where the forest professional developing the WRR Plan identifies that the AOI should be altered/expanded to best align with the considerations made above, they should inform the project team for consideration.

3.3.1.2 Wildfire Management Units

PURPOSE: WMUs are the next level of planning units established after the AOI during plan development. WMUs are administrative units designed to further delineate the AOI and facilitate strategic decision making for WRR planning. **WMUs delineate the AOI into units that consider fire weather history and patterns**, in doing so facilitate the identification and prioritization of WRRUs and fuel management units.

DEVELOPMENT: Determined during initial spatial analysis and fine-tuned as need be during subsequent phases. Their boundaries align with natural terrain features (e.g., watersheds), natural (lakes) or humanmade fuel breaks (highways), fire weather (e.g., prevailing winds), historical disturbance patterns and occurrence (wildfire, forest health, blowdown, etc.), and administrative boundaries.

3.3.1.3 Wildfire Risk Reduction Units

PURPOSE: Once WMUs have been established, WRRUs are developed, as the finest scale of planning units. WRRU development follows the total-chance planning approach, ensuring the entire area is considered to achieve short- and long-term management objectives. **WRRUs delineate priority areas** in which to manage for wildfire risk and/or support response activities opportunities over time. The objective of these planning units is to enhance community and critical infrastructure resilience and increase emergency response safety and efficacy. WRRUs intended purpose is to enhance community and critical infrastructure resilience is attained through creating a continuous (as possible) buffer around them.

WRRU boundaries must anchor to features that either reduce fire behaviour, impede fire growth, or where terrain is inoperable from a treatment or response perspective. In areas with an absence of a feature to anchor into, WRRU width determination should consider relevant fire behaviour factors such as potential wind, fuel type and continuity, short range spotting potential etc. Straight lines, isolated polygons and boundary widths without a sound rationale tied to fire behaviour potential should be avoided.

NOTE: The delineation of WRRUs does NOT imply a lack or absence of wildfire risk outside of the WRRU, nor should land managers infer that fuel or wildfire management planning or activities would not also be valuable in areas that occur outside of WRRUs.

Further following the total chance planning concept, WRRUs are to be assessed for risk and planned for in their entirety through spatial analysis and field verification. This means that the entirety of a WRRU should be classified into a type of FMU. To fully align with total chance planning, all levels of threat proximate to values (communities or critical infrastructure) should fall within a WRRU and be assessed. The development of WRRUs should not only focusing planning and assessment around a targeted fuel type, an approach that is subjective and may not consider potential threats of stands not historically deemed high threat.

Ultimately, the intent is that WRRUs facilitate the development and prioritization of Fuel Management Units which land managers and practitioners can integrate into higher-level plans (e.g., Forest Landscape/Stewardship Plans). WRRUs should occur anywhere there is a value and nearby eligible land to plan for, even if ultimately the area is untreatable – this process is to ensure risk and operability were assessed.

DEVELOPMENT: WRRUs should look to create a continuous buffer around the value. WRRU boundaries should be anchored to existing fire resilient features that could be used to facilitate response (roads, water features, ridgelines, etc.). Anchoring WRRUs and eventually FTUs aids in the creation of continuous fuel breaks over an area. In the absence of an appropriate anchoring feature within reasonable proximity, use terrain features or a contour line to bound the WRRU. WRRU boundaries may be best delineated independent of consideration of fuel type, as they are to align with features that from a fire behaviour perspective, are to not change over short timescales (<10 years).

Moreover, this means boundaries should rarely be completely straight or contain right angle corners, other than boundaries that run adjacent to non-eligible land. In cases where units run adjacent to other land ownership, coordination with adjacent land managers should occur to identify opportunities to create continuous fuel breaks.

Even in instances where the adjacent land presents large swaths of high threat land between the eligible land and the value at risk, a WRRU should still be established. **While FTUs within this WRRU may not be a high priority, they should still be identified.** This process can empower adjacent managers to pursue FireSmart and fuel management activities.

The following principles should facilitate the development of WRRUs:

- Using a value-out approach – by starting closest to the value and work out (e.g., property line)
- Anchoring logical natural and humanmade features (lakes, highways, etc.) to a distance that considers fire behaviour potential. In some cases, the width of a WRRU may exceed what is necessary to be treated in alignment with potential fire behaviour at the 90th percentile, however anchoring their borders remains a priority.
- Considering the influence on response operations in unit design and treatment recommendations (e.g., burn off operations, access, aerial suppression tactics etc.)
- Eliminating or reducing the instances of fuel wicks
- Considering fire weather (e.g., prevailing winds), historical disturbance patterns and occurrence (wildfire, forest health, blowdown, etc.), and administrative boundaries.

For the purposes of this planning process, WRRUs are to be categorized as one of the following:

Community (CO)

WRRUs on crown land specifically delineated adjacent to community and residential area meeting WRR funding structure density criteria.

Critical Infrastructure (CI)

Crown land directly adjacent to isolated CI meeting WRR funding criteria. A CI WRRU can only be established around critical infrastructure as defined below, in accordance with program funding criteria. Other infrastructure will be considered on a case-by-case basis with appropriate rationale, based on the approval of the project team.

For the purposes of a WRR Plan, Critical infrastructure is defined as:

assets owned by the Provincial government, local government, public institution (such as health authority or school district), First Nation or Treaty First Nation that are either:

1. Identified in a Local Authority Emergency Plans [Hazard, Risk & Vulnerability Analysis](#) and/or [Critical Infrastructure assessment](#) and/or are,
2. Essential to the health, safety, security or economic wellbeing of the community and the effective functioning of government (such as Fire Halls, Emergency Operations Centres, radio repeaters, etc.)

When developing CI WRRUs alignment with [FireSmart](#) CI ignition zone principles and design must be considered. CI WRRUs exceeding 100m in width should occur when anchoring logical natural and humanmade features (lakes, highways, etc.) is attainable. In some cases, the width of a WRRU may exceed what is necessary to be treated in alignment with potential fire behaviour at the 90th percentile, however anchoring their borders remains a priority.

Fuel break (FB)

Crown land that is identified as an operational control feature for wildfire response activities. The entire fuel break may be considered one FTU but could contain multiple stand types and risk levels and therefore may contain multiple FTUs and/or AMUs.

WRRU fuel breaks are linear features on the landscape that reside farther out from the value that provides opportunity for response operations to occur. WRRU fuel breaks are an existing barrier or change in fuel type (to one that is less flammable than that surrounding it), or a wide strip of land on which the native vegetation has been modified or cleared.

3.3.2 Fuel Management Units – Operational Scale

Once WRRU's are determined, Fuel Management Units can be established. To ensure total chance planning and avoid wildfire threat gaps, the entirety of Crown land within identified WRRUs must be assessed for fuel treatment or maintenance opportunities, including but not limited to:

- All mature stands, including mixed wood and deciduous.
- All existing cutblocks and plantations.
- All existing planned (as identified in existing plans) and implemented fuel treatment units.
- All existing land designations and reserves pertaining to resource value management (e.g., Ungulate Winter Ranges, Old Growth Management Areas, Wildlife Habitat Areas)

There are likely to be multiple FTUs and AMUs within an identified WRRU based on a typical scenario of a mosaic of stand types and past harvest activity (see example in Figure 3). As an example, a 1980's plantation that was prescribed burned and has high crown base height would likely be considered a lower threat, however it is still important to monitor this stand for changes over time and manage for WRR objectives over the next rotation.

3.3.2.1 Fuel Treatment Unit

PURPOSE: FTUs fall within identified WRRUs and are not stand alone units. FTUs are established based on the wildfire behaviour potential of the stand, likelihood of achieving desired fire behaviour outcomes and fuel management objectives. Existing fuel treatment units should be re-evaluated to make sure they meet current threat and treatment unit design principles.

DEVELOPMENT: To modify potential fire behaviour across broad landscapes, FTUs need to be strategically designed and placed within a WRRU to anticipate fire movement. This means considering local factors affecting spread patterns including wind patterns and topography. Further, taking advantage of pre-existing low threat conditions and access (both for treatment implementation and response personnel), can help maximize the effectiveness. If there are moderate, high, or extreme threat fuel type gaps between identified treatment units, a rationale for not treating them is required.

NOTE: When developing FTUs consider the factors detailed in the development of planning units above in addition to those described in the Fuel Management Practices Guide on the BCWS [Tools for Fuel Management](#) Webpage.

3.3.2.2 Assess-Monitor Unit

PURPOSE: AMUs are areas with the WRRU that have been assessed and determined to be either low threat or inoperable.

DEVELOPMENT: Areas not identified as an FTU because of one of the following reasons will be identified as an AMU and be accompanied by comprehensive rationale. The expectation is that **AMUs will be monitored** over time and that a monitoring plan is provided (e.g., triggers or timelines etc.).

1. **Operability Concern** – E.g., Slope, saturated soils etc. If an AMU is categorized as an operability concern, the rationale should flag whether this area is considered a wildfire threat. If the threat is high-to-extreme, the area should be identified as an FTU, and the operability concern flagged.
2. **Lower Threat** – E.g., Fuel characteristics (e.g., surface, ladder, and crown); position (distance to value, slope position, adjacent treatment/threat etc.);

3.3.2.3 Non-Productive (NP)

NPs are assessed areas that have been determined to be non-productive and therefore deemed to be without threat. These areas can often act as an anchor point depending on their size. Non-productive areas typically cannot support vegetation and tree establishment/growth. These are often landings, roads, gravel pits, etc.

Figure 3. Coming soon as additional resource on the [BCWS Tools for Fuel Management Webpage](#).

Figure 3. WUI WRR Plan Example. The upper graphic illustrates WRR Planning units and the lower graphic illustrates total chance operational fuel management planning within a WRRU.

3.4 Considerations for WRRU and FTU Development

The follow section provides a high-level summary of principles for consideration in the design and development of WRRUs and FTUs. This is not an exhaustive list of considerations and further information can be derived from the Fuel Management Practices guide.

Effective WRRUs and FTUs are strategically designed to modify fire behaviour and facilitate suppression. WRRU and FTU development and fuel management can be limited and impacted by local hazard, overlapping objectives, cost, land ownership, and accessibility. These factors are not necessarily climatically, topologically, or spatially driven as fire behaviour is, but are still paramount in consideration when developing units.

3.4.1 WRRU and FTU Location and Design

The location and design of a WRRU and FTUs should consider and incorporate the following principles on a unit-by-unit basis:

Anchoring: anchoring into fire resilient features facilitates the development of larger continuous fuel breaks. Utilizing these features can attain fuel management objectives more efficiently and potentially at lower investment. While features that are static in their fire resiliency are preferred (such as lakes, rivers, roads, and ridge tops), low flammability areas such as swamps or wetlands could also be suitable anchor points. When anchoring into more dynamic features such as deciduous stands or brush fields, consider how changes in climate may change these stands' ability to reduce fire behaviour or inhibit fire spread. Areas with low crown fire potential such as open stands or recently harvested cutblocks could also be anchored into, however must be prioritized for treatment to ensure they maintain characteristics that are not conducive to crown fires under 90th percentile fire weather conditions.

Placement proximity to VAR (i.e., community, critical infrastructure) unit location and design that considers position on the landscape in terms of wildfire threat and position in relation to the VAR is essential to its effectiveness during wildfire suppression operations. When managing priority values, units should be designed to treat from the VAR, outward. WRRU delineation should be prioritized directly adjacent to the value and prescribed treatments should be more intensive starting at the value.

Topography Consider factors such as elevation, slope, aspect, and topographic features (i.e., gullies, chimneys) and their associated influence on fire behaviour and wind patterns (i.e., diurnal wind shifts).

Winds Prevailing wind patterns influence wildfire trajectory and rate of spread. An understanding of prevailing wind patterns in conjunction with historical wildfire growth patterns and perimeters and the location of VARs should facilitate the placement of fuel treatment units. Wind vectoring due to factors such as topography, cold fronts, and diurnal winds can modify wind patterns and should be considered at the stand level in conjunction with prevailing wind patterns. Review of wind profiles during historical occurrences of elevated fire danger conditions should occur to further validate fuel treatment location and design.

Fuels Fuel treatments should target hazardous fuel types and capitalize on opportunities to anchor to non-fuel or low-flammability areas. In doing so, creating a larger, more spatially continuous reduction in fuel and fire behaviour. Complacency around perceived threat of certain fuel types should be avoided and detailed rationales that include descriptions of all fuel strata, conifer %, etc. within an AMU will be expected.

Response An objective of fuel management activities is to enable wildfire response through increased, access, response personnel safety, and aerial and ground suppression success.

Linear and Continuous Fuel Breaks Linear, anchored fuel breaks without sharp changes in direction provide the best opportunity to modify wildfire behaviour and provide suppression opportunities (i.e., planned ignitions). Linear and continuous units limit fuel wicks that may compromise the effectiveness of the fuel break through enabling wildfire to spread across the fuel break. When unavoidable, fuel wicks should be identified, and contingencies considered.

Size and Width Many factors must be considered in determining the appropriate width of a unit including adjacent fuel types, topography, anchoring opportunities, response times, spotting distance. Generally wider areas are more effective fuel treatments for moderating fire behavior than smaller areas, dependent upon:

- Orientation, dimensions, and position in relation to the VAR
- Treatment intensity and efficacy

NOTE: When developing FTUs consider the factors detailed in the development of planning units above in addition to those described in the Fuel Management Practices Guide on the BCWS [Tools for Fuel Management](#) Webpage.

Additionally, consider the use of [BCWS Initial Spread Index \(ISI\) Roses](#) when planning for the placement of fuel treatments. Each active BCWS weather station, with more than 5 years of data, has associated hourly roses for the months of April to October. Each rose shows the frequency of counts by wind direction with the frequency of the ISI values during that time period.

3.4.2 Other Considerations in Unit Development

Other considerations when developing units include:

- Identify opportunities for prescribed fire that, under suitable conditions, will provide ecological benefits, reduce fuel loading and reduce overall fire behaviour potential.
- The ecological impacts and site conduciveness for proposed fuel treatment outcomes that involve stand conversion to deciduous or more fire resilient species needs to be considered. Stocking standard should be conducive to WRR objectives and desired fire behaviour outcomes while still meeting the ecological suitability of the site (reference Chief Foresters guidance).
- Potential management options during operational planning, including commercial timber harvesting, ecosystem restoration, etc.
- Area-based tenure boundaries.
- Overlapping objectives (e.g., ecological values, constraints that preclude treatment etc.) in fuel break and FTU location, design, and method (commercial timber harvest, mechanical, prescribed fire, etc.).

- Consult with volume and area-based tenure/permit holders to ensure there are no conflicts with proposed WRR Planning and to look for opportunities to work together/create partnerships.

3.5 Prioritizing Planning and Fuel Management Units

Once all the units of a particular type (e.g., all WRRUs) have been developed they will need to be prioritized. A tiered approach for prioritizing units can be used (e.g., Tier 1, 2 and 3), and in most cases will be the most efficient option, particularly for plans with a considerable number of planning and fuel management units.

The following factors should be taken into consideration in the prioritization of all unit types:

- Risk Class
 - A WMU that resides in a risk class 1 polygon should be prioritized over a WMU that falls in risk class 2 polygon. When prioritizing two WMUs within the same risk class polygon, the WMU exhibiting the greater threat should be prioritized.
- High-extreme wildfire threat
- Prevailing wind, fire history patterns, fuel continuity etc.
- Crown land availability within WMU for treatment
- Proximity to and density of VAR
 - In the case of WRRUs, those closer to values at risk should be prioritized unless higher threat unit at a further distance has a greater potential to impact the value or provides the best opportunity to reduce the potential risk to the value.
- Historical and current fuel management and FireSmart activities.
- fuel treatment implementation cost.
- Prioritization level of the unit within which the respective unit resides (e.g., a WRRU within a priority 1 WMU vs a WRRU within a priority 2 WMU).

Specific to FTUs prioritization should consider (in addition to what is listed above):

- fuel type, forest stand structure, forest health
- operational feasibility,
- accessibility
- Fuel type between identified FTU and structures (considering threat, width, level of FireSmart activities conducted by property owner etc.)

NOTE: the following resources may supplement the unit prioritization process:

- The **Wildfire Threat Assessment Materials** on the [BCWS Tools for Fuel Management](#) Webpage. **While these materials can provide some context on threat and prioritization they do not fully determine all information required to establish FTUs or WRRUs.**
- The current edition of the **CLWRR Planning Guide** on the [BCWS CRI Program](#) Webpage. The planning guide provides a planning hierarchy for fuel management projects that can support unit prioritization.

Part 4 WRR Plan Deliverable Standards

The primary output from the WRR Planning process is the identification and prioritization of planning and fuel management units. This must be accompanied by rationales that clearly identify how risk was determined and planning and fuel management units where identified. This includes key fire weather and behaviour principles specific to the unit, that address location in relation to values with key overlapping objectives and values identified. The plan must also include a concise general description of the analyses performed, assumptions made, and the efforts made to validate the analyses. Clear descriptions of each stand designated as AMU, as well as a recommended monitoring strategy are also required. Plan deliverables include spatial data, output table (provincial template), and supporting supplemental text document.

4.1 The WRR Plan Report

The WRR Plan Report provides a high-level review of factors that relate to threat and risk determination and unit development and prioritization. This is not intended to describe existing, available information pertaining to the principles of fire behaviour, natural disturbance types, fire ecology, or forest silvics, etc. Rather, the report is intended to describe how these factors drove the wildfire risk analysis and unit design and prioritization. The Report should follow the flow and incorporate the key considerations outlined in the WUI WRR Plan Report Template on the [BCWS Tools for Fuel Management](#) Webpage.

4.2 WRR Plan Output Table

Once developed each unit type (WMU, WRRU, AMU, NP and/or FTU(s)) should be catalogued and prioritized in the templated WRR Plan Output Table excel spreadsheet on the [BCWS Tools for Fuel Management](#) Webpage. The Output Table template provides instructions on how to populate each spreadsheet tab associated to a unit type. The output table will summarize information pertaining to the identification, prioritization, and development of each unit of each type, a major deliverable of the WRR Plan. The output table is to be finalized and submitted in conjunction with the spatial data and supplemental text as these deliverables are required for full understanding and context of the output table.

Appendix A: Prerequisite Data and Information for WRR Planning

The following documents and tools may assist in WRR Planning (this list is not exhaustive, therefore engagement with the WRR Plan project team to ensure all information and plans pertinent to the successful development of a WRR Plan are collected and reviewed:

- Existing relevant plans (as discussed above)
- Relevant spatial layers (listed below)
- [Wind/ISI roses](#)

Spatial Data

DataBC Data Catalogue

The following datasets should be compiled and used during the wildfire threat/risk analysis and can be accessed via the [DataBC Data Catalogue](#):

1. [Publicly Available Critical Infrastructure Datasets](#)
 - i. NOTE: please refer to the WRR CI Data Catalogue on the FTP site for a list of applicable datasets. Please engage with the BCWS representative on the project team for further details on how these CI datasets are referenced in WUI WRR Plan development.
2. [Wildfire Risk Reduction \(group\)](#)
 - i. BC Wildfire Fuel Treatments
 - ii. BC Wildfire PSTA Fire Density
 - iii. BC Wildfire PSTA Fire Threat Rating
 - iv. BC Wildfire PSTA Head Fire Intensity
 - v. BC Wildfire PSTA Human Fire Density
 - vi. BC Wildfire PSTA Lightning Fire Density
 - vii. BC Wildfire PSTA Spotting Impact
 - viii. BC Wildfire Wildland Urban Interface Risk Class
 - ix. BC Wildfire WUI Human Interface Buffer
 - x. BC Wildfire Wildland Urban Interface 1km Buffer
 - xi. BC Wildfire Fire Fuel Types - Public
3. [Fire Locations - Current](#) and [Fire Perimeters - Current](#)
4. [Fire Incident Locations - Historical](#) and [Fire Perimeters - Historical](#)
5. [BC Wildfire Active Weather Stations](#)
6. **Fuel Treatments – Completed** [RESULTS - Activity Treatment Units](#)

Definition Query:

```
GEOMETRY_EXIST_IND = 'Y' AND RESULTS_IND = 'Y' AND (SILV_FUND_SOURCE_CODE  
IN ('CF', 'FEP', 'WRR') OR (SILV_FUND_SOURCE_CODE = 'FES' AND FIA_PROJECT_ID LIKE
```

'WR%')) AND SILV_BASE_CODE NOT IN('LB' , 'SU') AND (SILV_OBJECTIVE_CODE_1 IN ('FRE') OR SILV_OBJECTIVE_CODE_2 IN ('FRE') OR SILV_OBJECTIVE_CODE_3 IN ('FRE'))

7. **FESBC Wildfire Projects** (no spatial for Activities) [RESULTS - Openings svw](#)

Joined to [RESULTS - Activity Treatment Units](#) on OPENING_ID

Definition Query:

SILV_FUND_SOURCE_CODE = 'FES' AND GEOMETRY_EXIST_IND = 'N' AND
FIA_PROJECT_ID LIKE 'WR%'

8. **Prescribed Fire – Completed (last 20 years)** [RESULTS - Activity Treatment Units](#)

Definition Query:

SILV_TECHNIQUE_CODE = 'BU' AND SILV_METHOD_CODE = 'BROAD' AND
GEOMETRY_EXIST_IND = 'Y' AND ATU_COMPLETION_DATE >= timestamp '2002-01-01
00:00:00'

9. **Prescribed Fire within Opening (no spatial for Activities)** [RESULTS - Openings svw](#)

Joined to [RESULTS - Activity Treatment Units](#) on OPENING_ID

Definition Query:

WHSE_FOREST_VEGETATION.RSLT_ACTIVITY_TREATMENT_SVW.SILV_TECHNIQUE_CODE = 'BU' AND
WHSE_FOREST_VEGETATION.RSLT_ACTIVITY_TREATMENT_SVW.SILV_METHOD_CODE = 'BROAD' AND
WHSE_FOREST_VEGETATION.RSLT_ACTIVITY_TREATMENT_SVW.GEOMETRY_EXIST_IND = 'N' AND
WHSE_FOREST_VEGETATION.RSLT_ACTIVITY_TREATMENT_SVW.ATU_COMPLETION_DATE >= timestamp '2002-01-01 00:00:00'

10. **Fuel Treatments – Prescribed** [RESULTS - Activity Treatment Units](#)

Definition Query:

GEOMETRY_EXIST_IND = 'Y' AND RESULTS_IND = 'Y' AND (SILV_FUND_SOURCE_CODE IN ('CF', 'FEP', 'WRR') OR (SILV_FUND_SOURCE_CODE = 'FES' AND FIA_PROJECT_ID LIKE 'WR%')) AND SILV_BASE_CODE IN('LB' , 'SU') AND (SILV_OBJECTIVE_CODE_1 IN ('FRE') OR SILV_OBJECTIVE_CODE_2 IN ('FRE') OR SILV_OBJECTIVE_CODE_3 IN ('FRE'))

11. [WUI RiskClass products](#) developed for external clients and communities and are posted on the ftp site. Includes KMZ and PDF products.

Appendix B: Map and Spatial Data Standards

The following deliverables are to be submitted directly to the Business Area Lead:

- KMZ (planning and fuel management units; survey plots)
- Geodatabase (compressed into a zip file)
- WRR Plan Overview Maps
- Other maps deemed required by the WRR Plan project team

NOTE: An overview of Map and Spatial Data Standards is outlined below however the successful development of the map and spatial deliverables requires:

1. Adherence to the services and deliverable requirements outlined in the project contract.
2. Review the contents of the [WRR Standards FTP Site](#).

WRR Plan Map Standards

WRR Plan maps are to be submitted as a PDF at the appropriate scale (*compress map files to reduce unnecessary large file sizes*). An MXD template is available on the [WRR Standards FTP Site](#) to assist in meeting a specified standard. Maps are to be compatible with ESRI ArcGIS 10.6 – one for each licensing level (topology).

The following map content is required:

- Area of Interest (AOI), WMU, WRRU, fuel breaks, FTUs, AMUs, NP - labelled by unique ID
- Land status and tenure overlaps (e.g., range, area-based tenures, woodlots)
- Relevant Assessment Plot locations / labelled by Plot Number
- Previously completed fuel treatments if applicable (labelled by year)
- Key overlapping values of interest
- Descriptive title
- Project number and proponent name
- Date
- Scale (as text or scale bar)
- Reference data, including but not limited to roads, railways, transmission lines, pipelines, water bodies and rivers/creeks etc.
- North arrow
- Legend
- Map Disclaimer

Spatial Data Standards

Spatial Data deliverables are required as a compressed zip file geodatabase (GDB) and KMZ and are to be developed using the GDB template available on the [WRR Standards FTP Site](#). Spatial deliverables are to

be compatible with ESRI ArcGIS 10.6. The following list details spatial data requirements to be followed in consideration of the associated WRR Plan spatial data deliverable standards outlined in Table 1. WRR Plan spatial data deliverable standards.

Data Format and Naming Conventions:

- Data must be in a file GDB and KMZ format and must conform to the conventions for feature dataset names, feature class names, attribute names, and attribute values as identified in these accompanying tables. It is strongly recommended that you use the template GDB to facilitate meeting this requirement.
- GDB and KMZ names should adhere to this naming standard: WRR_<NR District>_<Project Number>

GDB Projection:

- [NAD 1983 BC Environment Albers \(EPSG:3005\)](#)

Data Quality:

- Submitted data must meet general data quality guidelines to ensure corporate data quality standards are met.
- Data with slivers, gaps between adjacent polygons, and geometry errors will not be accepted.

Additional notes:

- The Area of Interest boundary represents the total Project Area defined by unique Project Number.
- One single or multi part polygon must be submitted for each Planning or Fuel Management Unit; multiple single polygons cannot be associated to one Unit.
- AOI, WMU, WRRU, NP, FTU, and AMU spatial hectares must match the hectares stated on the maps and in the corresponding table(s)

Spatial deliverables in a file geodatabase and compressed into a zip file are to be posted to \\forwebfiles.nrs.bcgov\ftp\HPR\mof_internal\incoming\HQ\WRR and a note should be sent to BCWS Geospatial Services FLNR:EX BCWILDFIREGEO@gov.bc.ca.

Complementary maps (PDFs) and KMZs are to accompany the submission of the Plan to the local Fire Centre WRR contact and WRR Program Lead.

Table 2. WRR Plan spatial data deliverable standards.

Feature Layer Name	KMZ	Feature Layer Description	Mandatory Attributes	Attribute Description	Attribute Details (Data type, length)
AOI	YES	Project boundary defining planning area	PROJECT_NUMBER	Unique CL WRR Project Number; as assigned by BCWS and provided within the Allocation letters. Format: GOVWR<FC><###> e.g.: GOVWRCA001	Text, 10
			DATA_COLLECTION_DATE	Date spatial data was collected	Date (DD/MM/YYYY)
WMU	YES	Wildfire Management Unit: planning unit	PROJECT_NUMBER	As defined above	Text, 10
			WMU_NAME	Unique WM Unit name Format: <Geographic Area> e.g.: "Verdun" or "Green Lake"	Text, 25
			WMU_ID	Unique WM Unit ID Format: <TWO LETTERS of geographic area> e.g.: "VD" or "GL"	Text, 2
			LOCATION_NAME	WRR Plan Name	Text, 50
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			AREAHA	Area in hectares	Double
WRRU	YES		PROJECT_NUMBER	As defined above	Text, 10

		Wildfire Risk Reduction Unit: planning unit	WRRU_ID	Unique WRR Unit ID with WMU ID prefix Format: <WMU ID> "<CATEGORY code>" - "<##>" e.g.: "VD-CO-01", "VD-CI-01", "VD-FB-01"	Text, 8
			CATEGORY	Acceptable values: "COMMUNITY" or "CRITICAL INFRASTRUCTURE" or "FUELBREAK" ID codes: CO, CI, FB	Text, 25
			LOCATION_NAME	WRR Plan Name	Text, 50
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			AREAHA	Area in hectares	Double
FTU	YES	Fuel Treatment Unit: operational fuel management unit	PROJECT_NUMBER	As defined above	Text, 10
			FTU_ID	Unique FT Unit ID with WMU ID prefix Format: <WMU ID> "-FTU-" <##> e.g.: "VD-FTU-01"	Text, 10
			LOCATION_NAME	WRR Plan Name	Text, 50
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection. See <i>Attribute Value Reference Table</i> .	Text, 45
			AREAHA	Area in hectares	Double
AMU	YES		PROJECT_NUMBER	As defined above	Text, 10

		Assess and Monitor Unit: operational fuel management unit	AMU_ID	Unique AMU ID with WMU ID prefix Format: <WMU ID> "- AMU-"<##> e.g.: "VD-AMU-01"	Text, 10
			CATEGORY	Acceptable values: "OPERABILITY CONCERN" or "LOWER THREAT" Rationale to be included in output table deliverable	Text, 20
			LOCATION_NAME	WRR Plan Name	Text, 50
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection. See <i>Attribute Value Reference Table</i> .	Text, 45
			AREAHA	Area in hectares	Double
NP	Yes	Non-productive Unit	PROJECT_NUMBER	As defined above	Text, 10
			NP_ID	Unique NP ID with WMU ID prefix Format: <WMU ID> "-NP-"<##> e.g.: "VD-NP-01"	Text, 10
			LOCATION_NAME	WRR Plan Name	Text, 50
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection. See <i>Attribute Value Reference Table</i> .	Text, 45

			AREAHA	Area in hectares	Double
ASSESSMENT_ PLOT	YES	Field assessment plot locations	PROJECT_NUMBER	As defined above	Text, 10
			PLOT_NUMBER	Unique plot number corresponding to Assessment Worksheet	Text, 7
			DATA_COLLECTION_DATE	As defined above	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	As defined above	Text, 45
			COMMENTS	Any comments not included in accompanying table	Text, 255

Table 3. Attribute Value Reference Table

DATA_COLLECTION_METHOD	DESCRIPTION
Unknown	The data was acquired without details of the collection method.
Hand Sketch of any type	The data was hand sketched, either on an analog map or on-screen.
Non-corrected ground GPS	The data was captured with a GPS unit, at or near ground level, but was not post-processed or was captured with a GPS unit incapable of doing differential GPS.
Non-corrected airborne GPS	The data was captured with a GPS unit, using an airborne UAV or craft, but was not post-processed or was captured with a GPS unit incapable of doing differential GPS.
Corrected ground GPS	The data was captured with a differential GPS unit, at or near ground level, or was post-processed with information received from known reference stations to improve data accuracy.
Corrected airborne GPS	The data was captured with a differential GPS unit, using an airborne UAV or craft, or was post-processed with information received from known reference stations to improve data accuracy.

Digitized from aerial photo	The data was delineated from an orthophoto (aerial photography).
Processed IR image	The data was created using GIS analysis.
Processed scanned photo	The data was created using GIS analysis.
Derived from satellite imagery	The data was delineated from a satellite image.
Digitized from image	The data was delineated using photographs or images in stereo pairs.
Digitized other	The data was converted from an analog map into a digital format using a manual digitizing process.
Not Applicable	Use of this method assignment is discouraged unless none of the other methods apply.