

FUEL MANAGEMENT PRESCRIPTION TEMPLATE GUIDANCE

Provided by BC Wildfire Service

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1 PURPOSE

The purpose of this document is to provide direction to qualified registered professionals on fuel management components for stand level prescriptions that are being prepared for a wildfire risk reduction (WRR) objective (otherwise known as “fuel management prescriptions”) that are funded by the Forest Enhancement Society of BC (FESBC), the Community Resiliency Investment (CRI) program or other government programs (Economic Recovery). This document assumes that all other approaches to, and components within, the prescription meet legal requirements and follow Forest Professionals BC (FPBC) published guidance, specifically around quality prescription development 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](#).

For programs that are not funded through one of the above initiatives, this guide and associated template are recommended for use as a best management practice.

BC Wildfire Service (BCWS) has developed a suite of tools to support fuel management activities that are located on the [BCWS Tools for Fuel Management webpage](#). These tools and other direct supporting information are hyperlinked in this document.

This document is not meant to cover all aspects of fuel management and fire behaviour and is directed towards experienced professionals working well within their scope of practice as outlined in the 2013 ABCFP released [Interim Guidelines – Fire and Fuel Management](#);

“Practicing in the field of fire and fuels management requires a specific education and training in subjects such as, but not limited to: fire ecology, fire effects, fire behaviour, fire regimes, conditions classes, fuel types, fuel moisture content, fire suppression, prescribed burning, fire behaviour modelling, and fire weather in addition to forestry subject. Education provided at post-secondary school is insufficient and often additional expertise is obtained through experience fighting wildfires or working with a competent forest professional already practicing in the field.”

2 PRINCIPLES

The primary objective of any fuel treatment is fuel reduction to effectively reduce the potential fire behaviour over an area to a level that allows for the best chance of a successful suppression opportunity by wildfire crews (i.e. direct attack firefighting, establishment of sprinkler lines, burn-out/burn off operations). Fuel treatments should be planned through a higher-level planning process such as the CLWRR Tactical Plan or Community Wildfire Resiliency Plan where design considerations at multiple (community or landscape) scales can be determined in addition to interactions with other values. Fuel treatments are generally located within the wildland urban interface (WUI) but may be applied across the landscape either for an isolated value (e.g. critical infrastructure) with a specific community risk reduction objective, or as a predetermined control line from which to action future wildfires (fuel break). Akin to the FireSmart® Structure Ignition Zone principles, the priority should always be to treat closest to the value first, then stratify outward. It is the expectation that fuel treatments meet basic design principles, fire behaviour targets, legal requirements, and other considerations outlined below. When the primary objective is for habitat, ecosystem restoration or an ecosystem resiliency outcome and the secondary or tertiary objective is for fuel management, then other targets for fire behaviour

may be applied that are consistent with the primary objective.

A fuel management prescription is a document that describes existing conditions in an identified area, and recommends fuel management activities that will reduce potential fire behaviour. It is expected that the prescribed *post treatment* stand conditions will result in reduced potential fire behaviour, such as a decrease in surface fire intensity and rate of spread, crown fire initiation and spread, and the potential for sustained ignition. **Fuel management prescriptions must ensure a cost effective and measurable reduction in expected fire behaviour with the consideration and management of other values on the landscape** (e.g. ungulate winter range, visual requirements, etc.).

Fuel management prescriptions should be consistent with all the principles outlined below and meet government objectives for fuel management. Understanding the desired future condition for a treatment area is critical for long term success and must be part of the prescription. Fuel management prescriptions need to be reviewed after two years to ensure consistency and relevance with updated legislation, First Nations consultation, prescription standards, and new activities (e.g. prescribed fire).

Fuel management prescriptions need to consider the balance among potential fire behaviour implications, resource values, and conservation values to meet legislative and non-statutory requirements in relation to their proximity to communities and values at risk (e.g. treatments closest to the value are treated more intensively). Fuel management treatments occur on various jurisdictional lands and require a sound understanding of each land managers' mandate and legislation in order to prepare a sound prescription (e.g. conservation areas, municipal and First Nations lands). For example, BC Parks has developed a template to support prescribing foresters to work with BC Parks in recognition of the unique legislation and mandate for BC Parks. For more information on legislation, policies, planning and values within BC Parks, please utilize the specific BC Parks Template and Guidance and the BC Parks Team.

A team approach is required with land managers, BCWS, prescribing, and qualified professionals working together to determine the final outcomes. Consultation with the appropriate authorizations' government staff is required during the development of the prescriptions and all permits need to be in place prior to any and all activities. Permitting options must consider all existing tenures and land management objectives, including other variables such as fibre utilization, tenure type, ownership, legal objectives, cut control, timber supply review and many other factors that control or limit tree removal, according to the tenure.

A sound fuel management prescription follows three guiding principles:

- Prescribes specific and measurable targets for fire behaviour reduction;
- Contains site specific considerations tied to WRR objectives; and
- Meets with other legal, resource management and non-statutory objectives including First Nation engagement and consultation requirements.

Due to the complexities associated with planning for and prescribing fuel treatments, it is fundamental to build the planning team early on to ensure that land and values managers, BCWS fire behaviour expertise, and qualified professionals are working together to design, locate and identify objectives. Prescribing Foresters and other qualified professionals (RP Biologist, Professional Agrologists etc.) working with the agency (B.C. Parks, MOF) are required to work

with the Fire Centre Wildfire Prevention Officer (contact information located on the [Tools for Fuel Management website](#)) for technical input to ensure that the prescription outcomes are consistent with government objectives for fuel management.

2.1 SPECIFIC AND MEASUREABLE TARGETS FOR FIRE BEHAVIOUR REDUCTION

For each treatment unit, specific and measurable fuel reduction targets are described so that post treatment outcomes can be measured and verified.

1. Prescribed fuel reduction targets should be sufficient to be effective to meet treatment objectives of reduced fire behaviour under 90th Percentile Fire Weather Index Conditions (FFMC, ISI, BUI), which is available on the Tools for Fuel Management webpage. The shortest range of most recent 90th percentile fire weather index conditions data available should be used unless rationale is provided.
2. Reducing forest stand structure fuel loading and continuity to effectively affect fire behaviour **prioritizes surface and ladder fuel modification and reduction over canopy modification¹**:
 - a. Reducing the potential for sustained ignition and crown fire initiation by reducing surface fuel loading to achieve potential surface fire intensity levels below the critical surface fire intensity threshold, to a maximum of 2,000 kilowatts per metre (kW/m).
 - b. Increasing the vertical spacing between surface fuels and tree crowns through a reduction in ladder fuels (fuel strata gap) to reduce potential for crown fire ignition to render a higher critical surface fire intensity threshold.
 - c. Reducing crown closure and crown bulk density (volume/density/basal area/stems per hectare) as necessary to reduce crown fire spread rate and potential (e.g. spotting) and to encourage crown to surface fire transition. This is only applicable in specific forest types and will vary depending on site circumstances.

2.2 SITE SPECIFIC CONSIDERATIONS TIED TO (WRR) OBJECTIVES

Wildfire risk reduction fuel treatments do not stop wildfire spread; they are successful by supporting suppression by designing treatments that are anchored, accessible, and defensible. This is achieved through defined fuel management objectives that consider the unique features of the site such as terrain and fuel attributes, fire behaviour potential, and proximity to communities and other values.

Anchored and Accessible: Ties the treatment to low or non-flammable areas to provide safety for responders and allows access to defend the space.

Defensible: A fuel break or fuel treatment area is not expected to stop a wildfire that is approaching, but to transition the crown fire to the surface where wildfire crews have greater chance of suppression success. A plan for suppression should be considered when designing a fuel break.

¹ Martinson, Erik J.; Omi, Philip N. 2013. Fuel treatments and fire severity: A metanalysis. Res. Pap. RMRS-RP-103WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 38 p.

A prescription should always consider how the potential treatment area fits within the landscape and existing Higher-Level Plans, as well as existing treatments or pre-identified anchors on the land base. It should also consider future maintenance treatment requirements. Fuel treatment location design maximizes opportunities to anchor to non-fuel or low flammability areas such as water bodies, wetlands, and roads and provides adequate breaks in continuous fuels (e.g. wildlife tree patches, riparian reserves etc.). Riparian, deciduous, and wetter sites should be considered differently as there are multiple ecosystem benefits associated with them.

Accessible treatment areas ensure ability to move resources when there is fire on the land base. It ties into how you plan to defend from it: foot traffic, 4wd access, fire engines, air support, etc.

1. [BEC](#) and [fuel types](#): Treatments are appropriate for the given Biogeoclimatic Ecosystem Classification (BEC) zone, sub zone and/or site series and consider factors such as rate of decay for slash and retaining suitable residual species that are resilient to the post treatment conditions, including but not limited to natural disturbance (wildfire, insect, disease, and windthrow). For example, best management practices for fuel treatments in the [Coast and Mountains and the Georgia Depression Eco provinces](#) are outlined in the linked guidance document above.

2. Site specific variability: A prescription considers the unique variability that exists in each stand, including but not limited to vertical fuel strata, horizontal fuel continuity, extent of the surrounding fuel, fire weather components, topography, and values at risk. These should be stratified out if required.

Fuel treatment **widths** must be adjusted to account for topographic effect (slope) on fire behaviour and the consideration of the potential fire behaviour associated with the untreated adjacent fuel type. The treatment area will be managed to the 2,000 kW/m or critical surface fire thresholds as stated above.

3. Zoned approach: This applies to both fuel treatment units and fuel breaks. Treatment targets utilize a zoned approach generally within 2 kilometers of the value; fuels are more intensively treated to prioritize wildfire risk reduction closest to the value at risk (to below the critical surface fire intensity threshold, up to a maximum of 2,000 kW/m within at least 100m). This allows for application of different management goals (e.g. WRR, recreation, cultural or preservation of rare ecosystems) and subsequently less intense treatments further out that seek to balance all resource and land management objectives.

For fuel breaks, any width in excess of the zonation defined above, the subsequent zoned area may prescribe reduced fire behaviour associated with surface fires to below the critical surface fire intensity threshold, up to a maximum of 4,000 kW/m.

4. Safety and response: Fuel treatments consider firefighter safety as a primary objective including consideration for rate of spread (fine flashy fuels) and mobility (road access, easy walking, etc.) for fire fighters. Fire intensities beyond 2,000 kW/m reduces efficiency and effectiveness of ground crews and compromises firefighter safety on the fireline. Contact the Fire Centre BCWS Wildfire Prevention Officer for more information on whether there are additional targets and measurables regarding surface fuel loading and crown base height.

3 FUEL MANAGEMENT TEMPLATE REQUIREMENTS

The prescription must identify treatment unit objectives and measurables for the modification of fire behaviour (head fire intensity, crown fire initiation and spread, spotting, etc.) that will guide the development of fuel treatment targets consistent with the principles described above. The Fuel Management Prescription Template is available for the development of prescriptions on the [Tools for Fuel Management Webpage](#) and is a useful tool that can help to meet the content requirements laid on in this guide. The [Critical Surface Fire Intensity Worksheet](#) must be attached for rationale.

3.1 FMP Section A – PROJECT IDENTIFICATION

This section denotes the legal and physical boundaries of the prescription, the authority to proceed, and any linkages to higher level plans. This information must be included in the prescription.

PROJECT ID AND UNIT ID: Identify the treatment unit and any associated fuel management projects.

LAND OR TENURE HOLDER: Identify the legal occupant of the area, or the person authorized to carry out works on the area. This could be the owner of fee-simple land, the tenure or lease-holder in the case of occupied crown land, or an authorized official in the case of vacant crown land.

LATITUDE/LONGITUDE: Include to the nearest 1/00 minute. This information can be found at the following site: <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/web-based-mapping/imapbc>

GEOGRAPHIC DESCRIPTION: Use a familiar and identifiable unit, such as “Lower Lemon Creek Valley” or “Champion Lakes Campgrounds”.

HIGHER-LEVEL PLAN(s): Identify any public document that sets standards for land management in the area, such as “Kootenay- Boundary Land Use Plan”, or the internal document such as “Kikomun Creek Provincial Park Ecosystem Restoration Plan”. Another example would be a Woodlot License Plan or Community Forest Management Plan, etc., that is associated with the area and incorporated into the prescription. Identify specific unit(s) (i.e. Landscape Units) related to this prescription if applicable. If no plan exists, enter “N/A”.

MAP REFERENCE NUMBER: State the 1:20 000 TRIM number, such as “082F 031”. This information can be found at [here](#) by selecting “Add DataBC layers”, and under “Base Maps” select “Mapsheet Grid (1:20,000)”. Zoom in to area and use “Point Identity” tool to scroll over the area and get map reference.

3.2 FMP Section B – FUEL TREATMENT PROJECT DESCRIPTION

Fuel management objectives must be specified and will drive the rationale for treatment unit placement and treatment method selection. Common WRR objectives may include but are not limited to public safety, critical infrastructure resilience, range improvement, ecosystem restoration, recreation, and wildlife habitat. Fuel management objectives need to:

1. Provide a rationale for the fuel treatment with specified objectives (e.g. improved suppression opportunities around communities by reducing the potential for crown fire initiation).
2. Describe fuel management specific strategies and methods that outline how the treatment units are designed to be anchored, accessible and defensible as well as designed according to expected fire spread and intensity.
3. Provide clearly defined objectives and measurable target conditions for fuel management that include measurable fuel load reduction targets and measures for expected fire behaviour outcomes post treatment (e.g. reducing crown fire initiation potential by XX and rate of spread by XX from the adjacent stand by reducing surface fuel loading to XX and increasing height to live crown to XX).
4. Include relevant supporting details such as fire history including any historical fire dependence of the ecosystem, approximate fire cycle and return interval (regime), probability of ignition and spread, fuel type and continuity including stand structure, weather trends (i.e. prevailing winds), PSTA that support the treatment as a priority to mitigate negative impacts to the identified values at risk to help build the rationale.
5. Address legal objectives such as ungulate winter range, grassland benchmarks, visual quality, and recreation; and describe the associated management considerations. Indicate how the prescription seeks to balance the objectives or support through common desired future conditions while meeting the targets.

3.3 FMP Section C - FUEL TREATMENT UNIT SUMMARY TREATMENT UNIT SUMMARY

This section provides a summary of the fuel treatment unit area, proposed treatments, and general physical description.

NET AREA: Identify the net area to be treated, excluding areas such as water bodies, roads, areas removed from the treatment area, etc.

GROSS AREA: Identify the total area covered by the prescription.

LEAVE AREAS: State the area retained/reserved within the treatment boundaries to meet specific objectives/values outlined in this prescription (i.e. wildlife tree reserve (WTR), wildlife feature protection, etc.).

Non-Productive (NP): State the total area that is considered non-productive (i.e. rock outcrops, permanent roads or landings, etc.).

NET AREA REFORESTATION (NAR): State the area requiring reforestation.

TREATMENT REGIME: List the proposed treatments in the order they will occur (e.g. spacing, pruning, hand piling, pile burning).

GENERAL DESCRIPTION: Describe the treatment area and its boundaries in the context of the local terrain including terrain characteristics (e.g. flat, rolling, etc.) or features; any landscape/topographic limitations to wildfire; and any other physical characteristics not included in Section D Site Characteristics. For example: "The fuel treatment unit (FTU) is

uniformly sloped with a few rocky outcrops that were excluded from the net treatment area. The FTU is located between the Chapman Road and the lake, being bounded on the east by Deep Creek and on the west by the BC Hydro campground”.

3.4 FMP Section D - SITE CHARACTERISTICS

CFFBPS FUEL TYPE: Identify the Canadian Forest Fire Behaviour Prediction System (CFFBPS) fuel type for each treatment area. The CFFBPS includes 17 fuel types that are used in fire behaviour prediction work in British Columbia. If you do not know the reference fuel type for your area, contact your nearest [Fire Centre](#) or Zone Office for assistance.

TIMBER TYPE: Enter major tree species and percent species composition. For example, Fd7 Lw3 (Py) denotes a stand dominated by Douglas fir (70%) followed by Western larch (30%), with a minor component (<10% which is denoted in brackets) of Yellow pine.

FUEL TYPE DETERMINATION: State how fuel type was determined (i.e. Fuel Spatial layer). If fuel type was determined by other means or was not the best fit upon ground truthing, provide a rationale and methodology (if applicable) and attach photos.

REPRESENTATIVE WEATHER STATION: Identify the representative weather station used to support calculations within this prescription. Describe what makes this weather station the most representative.

3.5 FMP Section E - SOIL CHARACTERISTICS

This section summarizes specific soil characteristics used in making planning decisions around soil conservation. Completing this section is essential in all treatments that contain heavy equipment operations or any treatment that may impact soil conservation or other values in, or adjacent to, the treatment unit.

SOIL TEXTURE: Enter the soil texture class (e.g. sand, silt, clay, loam).

DUFF DEPTH: Enter the average depth (cm) of the organic material between the top of the mineral soil and the top of the forest floor, including the “L layer” (unmodified litter), the “F layer” (partially decomposed, lighter organic material), and the “H layer” (highly modified, darker organic material).

COARSE FRAGMENT CONTENT: Provide a visual estimate of the percentage of particles > 2mm in diameter (gravels, cobbles, stones) that are present in the soil profile (by volume).

SOIL DISTURBANCE LIMIT: Enter the soil disturbance limit as per the objective under FRPA (*Forest and Range Practices Act*) for soil conservation.

SOIL HAZARD RATING: Identify the sensitivity of the treatment unit to: soil compaction, surface soil erosion, and soil displacement (Low, Moderate, High, and Very High).

Guidance Document: [Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook](#)

3.6 FMP Section F - VALUES – FOREST AND RANGE PRACTICES ACT

Fuel management prescriptions must recognize and address overlapping legal and non-statutory objectives relevant to the prescribed area (e.g., mule deer winter range, BC Parks land management, First Nations interests) in conjunction with fuel management objectives, strategies, and methods. Note: overlapping objectives **should be identified and reconciled at the initial higher-level or [WRR Tactical Planning](#) stage** when determining strategic placements and design of potential fuel treatments.

Prescriptions must consider all of the following;

1. Where 'overlapping legal objectives' exist that have not been reconciled through a previous planning exercise, resolution is required prior to final prescription approval. Ideally resolution should be sought early in the prescription planning phase to minimize investment in planning that will have to change to address overlapping objectives. This may involve further consideration to the physical location of the treatment area, adapting boundary location & size of treatment areas, and/or revised focus on removal of specific components of the stand and fuel structure. Ensuring that the right qualified professionals (e.g. Habitat Biologist) are part of the team is paramount.
 - a. When overlapping objectives are encountered in fuel treatments (e.g minimum of 100m for fuel break or 100% of the fuel polygon areas around communities), consideration should be given to modify land management objectives to the extent required to meet the fire behaviour outcome and targets.
 - b. Where the public value of WRR implementation is seen to outweigh other established legal values, the development of a detailed rationale will support the process, should the land manager agree on this approach.
 - c. BC Parks and Protected area legislation is unique in that it is specific to each individual park and protected area and based on the specific values and uses that are defined. These values and uses are described in the individual park or protected area strategic management planning documents (management plan, purpose statement and zoning plan, or direction statement). Within BC parks and protected area boundaries, specific park values require further discussion with BCWS and the land manager. In these circumstances, a variance **may be necessary** to meet BC parks and protected area legislation, Conservation Policy, and impact assessment processes.
2. Identifies relevant non-statutory objectives such as SAR and best management practices.
3. Seeks to align with other forest stand improvement and collaborative management opportunities to maximize cost effectiveness. Such as MDWR or SAR habitat in dryer ecosystems with forest encroachment where stand improvements are meeting multiple objectives. Opportunities should focus on identification of management objectives that have similar desired future conditions required for wildfire mitigation, such as ecosystem restoration objectives in NDT4 ecosystems. This will also provide opportunities for accessing/leveraging of additional funding to support wildfire mitigation initiatives.
4. The timing of treatments to avoid impacts such as bird nesting windows and ground disturbance.
5. Prioritizing the retention of large size trees to increase resiliency to wildfire and forest health factors and the resiliency of broadleaf trees. The Fire Management Stocking Standards Guidance (under [Fuel Management Stocking Standards](#)) provides a summary of the fire resistance and fire

resiliency characteristics of all trees in B.C.

6. Meets the [Chief Forester's Guidance for Coarse Woody Debris](#) "*lower amounts of CWD are appropriate where fire hazard is high*" (pg. 2), the [Chief Forester's Guidance on CWD Management Wildfire Mitigation Treatments](#) and/or other applicable guidance. BC Parks doesn't have a specific CWD policy, but the Conservation Policy references the importance of CWD, and guidance will be park- and project- specific.

7. Meets provincial and local land manager requirements for [First Nations Consultation](#). This includes consideration of DRIPA legislation as well as the Modernized Land Use Planning framework. It is also important to contact local Natural Resource District staff for information and direction on details to include in referrals. Engagement and info sharing should be included in all phases of a Fuel Management project.

8. Minimizes the creation of new roads or trails during treatment design and if the opportunity is there, roads, trails and access should be reduced post treatment.

9. Targets fibre utilization as a primary debris management strategy when consistent with objectives of the prescription. Where surface fuel reduction targets cannot be achieved through fibre utilization, additional activities are prescribed to manage material (e.g. broadcast or pile burning, etc.). Opportunities to access carbon sequestration funding should also be investigated to reduce or eliminate the need to burn debris resulting from fuel treatments.

10. When prescribed fire is part of the prescription treatments, considers future Burn Plan development where an identified containment area may span beyond the identified treatment unit boundary. It is beneficial to include the proposed containment area boundaries at the prescription phase to inform operational treatment planning. Boundary locations may need to be adjusted as a result of the referral process.

11. Units are designed to consider the full lifespan of the treatment (e.g. logical burn units for maintenance burns and/or appropriate Fire Management Stocking Standards) and to avoid undesirable consequences such as:

- a. Increased forest health risk post treatment.
- b. Significant reduction in fuel moisture content and susceptibility to wind in the understory.
- c. Unacceptable windthrow levels post treatment.
- d. Excessive overstory thinning, grass or shrub ingrowth and surface fuel loading (e.g. chipping).
 - 1. Mortality along treatment unit edge exposed to wildfire from adjacent stands.
 - 2. Creation of conditions favourable to establishment or proliferation of noxious or invasive weeds.

3.7 FMP Section G - OTHER STATUTORY AND NON-STATUTORY CONSIDERATIONS

This section identifies additional considerations not addressed in any section above. Any points or areas of concern identified should be mapped if possible.

ENGAGEMENT AND CONSULTATION – FIRST NATIONS: Identify all First Nations whose traditional territory falls within the prescription area and list any concerns brought forward from the consultation process and how those concerns are

being addressed. If no feedback was provided from the band, then state so. State whether or not the consultation processes is complete and provide details (i.e. date referral process complete, etc.). Attach all relevant documentation.

CONSULTATION – GENERAL: Describe the scale of consultation (local, regional), the method (notice, poll, survey, meetings) and the details of any meetings to be scheduled. Attached any specific details and describe how any specific concerns have been addressed within the prescription. Some level of public consultation should occur if the treatment area is: subject to public use; contains a value of concern as identified in a management plan, higher level plan, etc.; adjacent to private property; or is highly visible from major transportation routes.

EXISTING TENURE HOLDERS: Identify existing tenure holders in the proposed treatment areas that include Forest Tenure Holders, Range Tenure Holders and Guide Outfitters. Ensure adequate consultation and attach all written comments received.

PRIVATE PROPERTY: Indicate whether or not there is private property adjacent to the treatment unit(s), or any specific concerns expressed by the landowner or community, and what measures have been taken or are recommended to inform and educate landowners regarding the proposed treatment and FireSmart.

SMOKE MANAGEMENT: Ensure compliance with all relevant legislation (i.e. Environment Management Act and Open Burning Smoke Control Regulations) and existing Smoke Management Plans. State any existing plans and any requirements to ensure consistency with objectives.

List the minimum venting indices required, the source of your venting forecasts, and any special measures in place to manage smoke (e.g. roadside warning signs, flag-persons at night, special burning equipment, curing slash prior to burning, etc.).

SAFETY: Describe any safety concerns within and adjacent to the treatment unit and specific measures required to ensure worker safety (i.e. steep slopes, danger trees, etc.).

UTILITIES: List any utilities (i.e. gas or other pipelines, hydro lines, etc.) located in, or adjacent to, the treatment area and describe any concerns and requirements regarding communication, procedures, and safety.

ACCESS CONTROL: Describe any specific access concerns and requirements, including any post treatment measures required to limit access to the area.

TRAFFIC CONTROL: Describe any measures that will be required to ensure traffic safety through the unit (e.g. flag-persons, traffic control signs, spotters for fallers or skidders working near roadside, etc.)

OTHER: List other issues not addressed above and describe any specific requirements.

3.8 FMP Section H - FUEL LOADING AND TREATMENT SPECIFICATIONS

This section describes the existing and desired characteristics of the forest stand within the treatment unit. This information is essential in ensuring the prescription is meeting the established objectives with measurable specifications. In all cases, data should be collected in

accordance with the principles outlined in the most recent version of the [BCWS Fuel Management Survey Data Collection Standards](#) to a level that provides sufficient and accurate data required to determine the desired treatment specifications, measured fuel loading, and assist with harvest/treatment planning and valuation (if applicable).

3.8.1 FMP Section H.1 – FUEL TREATMENT DESCRIPTION

TREATMENT SPECIFICATIONS SUMMARY: TREE REMOVAL/RETENTION STRATEGY BY SIZE/SPECIES: For each treatment unit, summarize the tree removal/retention strategy by size/species specifications that are outlined throughout the stand and stock table. For example: “Retain all Yellow pine (25 sph), Western larch (30 sph), hardwoods (15 sph), and 50% of Douglas fir greater than 40 cm (15 sph). Remove all Douglas fir below 40 cm dbh, 50% of Douglas fir greater than 40 cm dbh, and all Lodgepole pine. Target density = 85 sph, with an acceptable range of 60 – 110 sph.”

TREATMENT SPECIFICATION RATIONALE: Provide a summary for the following:

- Silviculture system prescribed (e.g. thinning, vs. clearcut etc.)
- treatment specifications determination (e.g. pruning heights, thinning density, and surface fuel removal targets etc.), this includes describing any models or tools used including input numbers such as indices used.
- Design principles incorporated or considered (e.g. width, anchoring etc.)
- Reserves or retention consideration and management
- Local nuances that influenced Weather station selection or fuel type changes

If retention or reserves are being maintained, a description of retention strategy and associated fire behaviour outcomes including a summary of adjacent fuel types and values at risk. Include consideration of site-specific fire behaviour components, **fire history / regime**, design, and anchoring of treatment units.

Key supporting documentation should be attached or submitted.

3.8.2 FMP Section H.2 - STAND FUEL LOADING

The Stand and Stock table (SST) (See Appendix) is required for all FTU and should include both pre- and post-treatment density measures. In some specific circumstances such as no timber cutting or clear-cut logging the Stand and Stock Table Summary may provide the minimum required information rather than the full SST. Please confirm with your local WPO that the SST is not required if you feel the Summary Table is sufficient. Include the last five lines of the Stand and Stock table here as a summary.

3.8.3 FMP Section H.3 - SURFACE FUEL LOADING

Provide the dry weight of combustible materials per unit area and describe the distribution (i.e. scattered, continuous, elevated, etc.). Recommended units are kilograms per square metre

(kg/m² or tonnes per hectare (tonnes/ha) (0.5 kg/m² is equivalent to 5 tonnes/ha).

Describe the composition and the continuity of surface fuel including the:

- duff depth,
- moisture type,
- vegetative material composition including grass fuel types,
- % cover of fine woody material ≤ 7.0 cm in diameter,
- % cover of large diameter woody material > 7.0 cm – 20.0 cm in diameter, and
- % cover of coarse woody debris material > 20.0 cm in diameter.

Describe methods for determining this value at the pre- and post-treatment stages.

For a treatment to be effective under 90th percentile fire weather conditions, loading of dead, fine woody surface fuel ≤ 7.0 cm in diameter must generate surface fire intensity less than 2,000 kW/m or if the critical surface fire intensity is less than 2,000 kW/m, then below that threshold for the critical surface intensity. When including surface fuel loading in the prescription, it is expected that fine woody debris ≤ 7.0 cm in diameter, large diameter woody debris > 7.0 cm – ≤ 20.0 cm in diameter and coarse woody debris > 20.0 cm in diameter ^[OBJ1] or kg/m², these will be done separately.

Surface fuel management should be focused on fine woody debris < 7.0 cm in diameter as this is the largest contributor to fire behaviour. The critical surface fire intensity should be considered when determining how much woody fuel is prescribed to be removed from site. Larger diameter dead woody surface fuels generally have a less significant contribution to fire behaviour, depending on arrangement and continuity, thus may receive reduced focus when managing surface fuel loading. This approach maintains consistency with the [Chief Forester's Guidance on Coarse Woody Debris Management](#) and the [Chief Forester's Guidance on CWD Management Wildfire Mitigation Treatments](#). Chipping in areas may cause increased surface fuel loading and create more of a hazard within the treatment. If chipping is being done, a plan for removal or burning of the chips should be in place. Fire behaviour must be kept under 2,000 kW/m when determining a debris management strategy.

As an alternative, surface fuel loading associated with all treated areas will need to meet the intent of '[A Guide to Hazard Assessment and Abatement in British Columbia](#)' for areas in the severe category. The expectation is areas are lowered below the rating of "severe" for the Fuel Hazard Threshold. Standard within this 2012 Guidelines apply to the management of post harvest debris associated with fuel management activities. Fuel management treatments will meet the 5t/ha target for surface fuel loading of fine woody debris ≤ 7.0 cm outlined within the hazard abatement guide. The Guide does provide "flexibility for forest professionals to set site specific targets for fuel loading" or vary from the guide, assuming they are operating within their scope of practice and provide a specific written rationale.

Conducting fire hazard assessments and developing fire hazard abatement strategies and prescriptions falls under the scope of practice of a forest professional, as defined in the Forest Professionals B.C. (FPBC) Interim Guidelines – Fire and Fuel Management. Forest professionals who conduct fire hazard assessments must be working within their scope of practice and be competent (as defined in PFBC Bylaw 12: Standards of Professional Practice).

Note: the requirement to meet timelines associated with Fire Hazard Assessment and Abatement as defined in the Wildfire Regulation (Div. 2, Sec. 11) apply to fuel management treatments.

3.8.4 FMP Section H.4 - CROWN CLOSURE AND CANOPY BULK DENSITY

Describe the stand in terms of canopy bulk density through the vertical profile as well as crown closure. Removing overstory trees results in a reduction of canopy bulk density and subsequent crown fire behaviour.

However, final outcomes are related to where in the canopy the reduction occurs. Estimate the percentage of the crown touching and effectively blocking sunlight from reaching the forest floor. If there is a deciduous component to the stand, provide percent of crown closure for both the live and dead components.

3.8.5 FMP Section H.5 - BIODIVERSITY AND FOREST HEALTH CONSIDERATIONS AND TARGETS

COARSE WOODY DEBRIS (CWD): Describe existing and target sph and distribution. The prescribed target CWD should reduce the wildfire hazard while also meeting stand level biodiversity objectives under FRPA (more detail regarding this should be found under the “Values” section).

Guidance document: [*Chief Forester’s Guidance on Coarse Woody Debris Management*](#)

WILDLIFE TREE RETENTION TARGET: Specify any retention objectives and targets for each treatment unit. Provide greater detail in the “Values” section of this document under “Biodiversity – Stand level”.

FOREST HEALTH: Describe any identified forest health concerns in the area and mitigation measures relevant to treatment design including post treatment risks such as windthrow, beetles (e.g. Fd beetle), root rot, etc. Provide details on Pest / Infection agent, species affected, incidence rating, mortality, and targets.

3.9 FMP Section I – TREATMENT DESCRIPTION

This section describes the various phases of the proposed treatments, including techniques, targets/specifications, timing, and variations between treatment units. Sufficient detail is required to ensure transparency with prescription objectives and the management of identified values and concerns.

Note: *All treatments that occur on crown land require proper authorizations and licenses when the cutting, damaging, destroying and/or removal of crown timber are proposed.*

MERCHANTABLE TIMBER CUTTING

This section focuses specifically on the removal of merchantable timber that is subject to pricing (stumpage) and potential reforestation obligations. Ensure all targets/specifications and timing requirements are detailed along with any variations between treatment units (i.e. silvicultural system, winter logging, etc.).

Note: *Boundaries, leave areas, riparian reserve zones, machine free zones, etc., should be adequately ribboned, and mapped. If not done so at the prescription stage, this needs to be stated clearly in the “Outstanding Works” section of this document.*

ROADS, LANDINGS AND TRAILS: Describe how the treatment unit will be accessed and developed (e.g. existing roads or new construction, skid trails, etc.); the standards and locations of required new construction; and the deactivation requirements and techniques of

roads, landings and trails upon project completion. All roads and access structures must be mapped, have proper approval (e.g. road permits and road use agreements), and meet provincial standards.

FELLING: Describe the method (e.g. hand, feller buncher) and whether tops and branches will be bucked in place or processed roadside.

YARDING/SKIDDING: Describe the method (e.g. skid-trails, hoe-chucking, high-lead) and the type of equipment (rubber-tire skidder, forwarder, backhoe, grapple yarder, etc.). Include any additional measures or restrictions.

LOADING/HAULING: Describe the equipment to be used, the location (e.g. roadside, landings), and the timing (concurrent with logging, decked for a period of time, etc.). Include any critical timelines, such as beetle flights, soft ground restrictions, etc.

SLASH DISPOSAL: Describe the actions that will be taken to ensure that the hazard and risk created by tree removal is reduced to an acceptable standard.

Guidance Document: [A Guide to Fuel Hazard Assessment and Abatement in British Columbia](#)

SPECIAL MEASURES: Describe any measures that will be taken to address the objectives, targets or Values that are not listed above (e.g. no-work-zones to protect critical habitat, variable spacing along riparian areas to “feather” the boundaries, etc.)

STAND MODIFICATION TREATMENTS

This section describes the treatment phases for each FTU including post treatment targets and associated fire behaviour outcomes (e.g. surface fire flame length to avoid crown fire). Enough detail is required to ensure transparency with prescription objectives and the management of identified values and concerns. BCWS has developed a [Fuel Treatment Design Wildfire Intensity Tool](#) (Critical Surface Intensity Worksheet) that can be used to support the determination of wildfire intensities for surface fuel components.

BRUSHING: Provide details such as target species and size for removal, as well as desired post-treatment density.

PRUNING: Describe the current stand’s crown base height/fuel strata gap and the target crown base height/fuel strata gap, and the live crown ratio that will result.

DEBRIS MANAGEMENT: Describe activities to achieve the target surface fuel outcomes including the fire behaviour targets on page 3 (90th percentile weather) and surface fuel loading, section 3.2.5. If prescribed fire (i.e. broadcast and/or under burning) is being prescribed, a contingency activity should be identified should a suitable burn window not materialize. Surface fuel targets need to be specified in the prescription, but methods to achieve them are more operational and should only be presented as recommendations. Please refer to the [Tools for Fuel Management Webpage](#).

PRESCRIBED BURNING: For treatment units where resource management open fire is in a fuel management prescription, an operational burn plan must be completed using the [BCWS Burn Plan Template](#). A prescription must accompany the operational burn plan. **The prescription should include the historical fire dependence of the ecosystem, approximate fire cycle and return interval.** Generally, the prescription should include the pre-fire fuel conditions, objectives, desired

effect(s) of the prescribed fire (i.e. desired amount of duff consumption; surface fuel reduction targets: type and size of material to be consumed, % burn coverage, crown fraction burned or desired tree mortality, crown base height targets; acceptable % leave tree mortality; % acceptable understory survival, etc.), and fire effects monitoring. Provide a specific, measurable, realistic, and time- bound range of outcomes for each of these objectives, so that burn objectives are achievable and can be easily incorporated into a prescribed fire burn plan.

FTU design should include logical burn units to incorporate natural, existing, or other control lines to be utilized during implementation of the burn. Development of these burn units should be considered and carried out during the implementation of earlier phases of operational treatments to maximize efficiencies and help set up the treatment unit for subsequent burning.

The objectives of the fuel management and burn plan prescription(s) determine which Fire Effects variables to be monitored during prescribed burn implementation. It is important that Fire Effects indicators, such as fire severity, are consistently measured across projects when possible. A tool that can be utilized by fire practitioners to measure burn severity is the Burn Severity Table found on page 110 of the US National Park Service [Fire Monitoring Handbook](#).

While B.C. doesn't currently have standard guidance on monitoring Fire Effects, there are external guidance documents available to help fire practitioners determine best sampling methodology and monitoring protocols to evaluate their burn objectives. When possible, a qualified FEMO (fire effects monitor) should be included in the burn operation to collect information such as onsite weather, fire behaviour, fuel conditions and smoke information. Guidance documents currently used by many FEMOs in Canada to aid in planning their monitoring efforts are the US National Park Service [Fire Monitoring Handbook](#), the National Wildfire Coordinating Group [Fire Effects Guide](#) and the Alaska Wildland Fire Coordinating Group [Fire Effects Monitoring Protocol](#).

The Containment Area that will be incorporated within the prescribed fire burn plan should be identified on the prescription map and attached to the prescription.

OTHER: Describe any treatment not specifically listed above or under prescribed burning; including the method, and the target results, and how debris will be disposed of (e.g., pile burning, chipping, composting, or biomass utilization). Explain how the treatment will meet the objectives of the prescription while addressing the identified values and issues.

AUTHORIZATION AND TIMBER TENURE

State any authorization and timber tenure requirements that need be in place prior to treatment start-up. "Other" can include local government if on municipal land, and utilities (gas, hydro, etc.) if required.

3.10 FMP Section J - POST TREATMENT

This section addresses silviculture obligations and the effects of the proposed treatments over time including post treatment activities and maintenance treatments.

EXPECTED VEGETATION RESPONSE: Describe the amount and type of vegetation expected to occupy the site over time because of the treatment(s).

ADDITIONAL MONITORING / MAINTENANCE PLAN: Include a maintenance plan based on the

length of time the treatment will be effective in achieving the fire behaviour targets and outcomes. This section will include treatment objectives and triggers such as increased fuel load (kg/m^2) or a reduction in inter tree spacing. Treatments should be monitored and re-treated at the most economical time frame. For example, it may be more economical to use prescribed fire to maintain forest encroachment while the regen is small enough to kill with understory fire. Once regeneration or grass loading is too advanced, a mechanical treatment will have to be conducted, which may be more expensive. This can be said for hand/mechanical treatments where an increased amount or larger debris is more expensive to treat and remove. Any prescribed maintenance treatment activity(s) not already identified in the treatment specifications should be described here to ensure that it is included within referral and consultation processes. (i.e. prescribed fire).

POST TREATMENT REPORT: Post treatment reporting should be thought about during the prescription development. During the treatment phase of the project as well as post treatment, monitoring by the practicing forester or qualified professional is important to ensure that the treatment meets the targets of the prescription and additional values on site are managed for. Measurement of post treatment surface fuel loading is critical due to the potential for additional debris accumulation from the treatment activities themselves. Ensure that a post treatment report is completed after initial treatment is done. Stems/ha, surface fuel loading (t/ha or kg/m^2), before and after photos, as well as crown base height, all must be included in the post-treatment report. See the [BCWS Fuel Management Survey Data Collection Standard](#) for more details.

SILVICULTURE OBLIGATIONS: In prescriptions where silvicultural obligations exist, develop the appropriate Fire Management Stocking Standards and request approval by the Natural Resource District Manager if required. Provide details around silviculture obligations (e.g. planting, stand tending, free to grow) if applicable. See Appendix Two of the Fire Management Stocking Standards Guidance (under [Fuel Management Stocking Standards](#)) for information on the fire resistance/resilience characteristics of common tree species used for reforestation in BC. Think about:

- a. Regenerating with deciduous species or mixed wood that have higher moisture content foliage and live stems, are less flammable, have reduced fire intensity, and have less crowning potential at most times of the year.
- a. Regenerating with fire resilient conifers (e.g. Larch, Douglas fir, Ponderosa pine) at low densities. Widely spaced trees reduce both the crown bulk density and the continuity of crown fuels, making crown fires unlikely however, care must be exercised with excessive crown spacing as it increases in stand wind speeds and solar radiation to the surface fuel bed.

PLANTING: Provide specific planting specifications not found in the stocking standards table. Any ribboning required should also be stated in the “Outstanding Works” section if not completed at the time of the prescription.

3.11 FMP Section K - OUTSTANDING WORKS

Describe any outstanding work required prior to treatment (e.g. assessments, ribboning, authorization and tenure acquisition, sowing request, etc.). It is expected that the majority of work required for the prescribed treatment(s) will be completed at the prescription stage. If this

is not possible it is expected that the local government, land manager and the Wildfire Prevention Officer (WPO) are informed and that details are provided in this section.

3.12 FMP Section M - ATTACHMENTS

If professional assessments were completed, indicate the date the report was completed and the professional who completed the work, and incorporate supporting assessment into the final prescription package. Also include any other documents required to support your prescription such as Stand & Stock Tables, site photos, etc.

4 STAND and STOCK TABLE APPENDIX

This Appendix describes the existing and desired characteristics of the forest stand within the treatment area. This information is essential in ensuring the prescription meets the established objectives with measurable specifications. Stems per hectare (sph) data is required; and where volume based data is required, the volume-per-hectare section should be populated along with the sph for the understory layers. In all cases, the stand should be sampled to a level that provides sufficient and accurate data required to determine the desired treatment specifications, estimate fuel loading, and to assist with harvest/treatment planning and valuation (if applicable.) **A professional volume estimate is required when merchantable tree cutting is prescribed and a timber cruise should be considered when cutting $>50 \text{ m}^3/\text{ha}$ or $>500 \text{ m}^3$ in total.**

SPECIES AND DIAMETER CLASS: Fill in a separate line for each species by layer / diameter class. Use appropriate diameter classes to ensure adequate data for treatment specifications and for fire behaviour model inputs. Include total dead potential and total live.

CROWN BASE HEIGHT: Record the conifer Crown Base Height (CBH). CBH is a measure from the ground to the live or dead crown coniferous canopy layers. CBH should be measured to the lowest point of the hanging branch. Dead crowns are only measured when they are of sufficient density to allow vertical wildfire to spread. Individual dead limbs should not be considered. Full whorls of dead limbs, especially with needles and fine branches or volatile mosses or lichens should be considered as part of the live crown in this measurement.

TREE AGE / HEIGHT: Record the average tree age and height for each species within each diameter class. Age is an estimate only in order to better understand the stand as a whole.

STEMS AND VOLUME PER HECTARE: Existing, cut and leave number of stems per hectare (sph) are required. Where merchantable timber cutting is prescribed, also populate the volume per hectare section for all merchantable diameter classes.

5 MAPPING STANDARDS

Include the following georeferenced map(s) that is accompanied with KML or shapefiles as detailed below:

- Overview: General overview map of the project boundary in relation to communities and other major features and base data should be geo-located.

BCWS Fuel Management Prescription Guidance

- Fuel Treatment Prescription Map.
- PDF map accompanying the KML or shapefiles.
- Previously treated and disturbed areas (blowdown, insect, and disease, etc.) in close proximity to the treatment area.
- Any important legal boundaries

Maps and spatial data are to follow the requirements outlined in the Appendix “Requirements for Maps & Spatial Data” of the most recently published “FireSmart Community Funding & Supports Program & Application Guide” which can be found on the UBCM website.

<https://www.ubcm.ca/cri/firesmart-community-funding-supports>

Note: *If features or areas discussed above are not labeled, they should be included in the legend. A separate harvesting, road building, or planting map may be required depending on the treatment.*