Operational Services Contract

CONTRACT FILE NO: EBL2025TU1-2	THIS AGREEMENT DATED FOR REFERENCE THE DAY (including 'nd' 'rd' or 'th' as applicable) DAY OF MONTH, 20YR.
PROJECT DESCRIPTION: TYPE 1 FUEL TREATMENT UNITS - EAST BARRIERE LAKE	

BETWEEN:

Lower North Thompson Community Forest Society
Box 983, 573 Barkley Road
Barriere, BC
V0E 1E0

Phone Number: **(250) 672-1941**
LNTCFS Representative: **Mike Francis**
E-mail Address: **LNTCFSociety@telus.net**

(the "LNTCFS")

AND:

Full LEGAL name of Contractor/Company
Physical & Mailing Address (including Postal Code)

Phone Number: (Area Code) Phone No .....FAX Number: (Area Code) Fax No
Business E-mail Address: Contractor's Email Address

Contractor Representative: Contractor Representative's name
Business Number: Contractor's Business Number for taxation purposes
WorkSafe BC and/or Personal Optional Protection Number: WCB / POP No.

(the "Contractor")

referred herein to as "the Parties".

WHEREAS:

A. The LNTCFS requires the Work described in this Agreement to be carried out for its benefit.

B. The Contractor is prepared to do the Work.

C. The LNTCFS and the Contractor have agreed that the Work shall be carried out in accordance with Contract Documents.

Accordingly, the Parties agree as follows:

ARTICLE 1 DEFINITIONS

1.01 In this document, the following words have the following meanings:

(a) "**Agreement**" means the agreement between the Parties as set out in the Contract Documents;

(b) "**Amending Document**" means an *NRS600 Contract Modification Agreement* form or another standard form of similar nature specified by the LNTCFS;

(c) "**Assessment**" means a pre-estimate of damages incurred by the LNTCFS as a result of the Contractor's failure to perform, unsatisfactory performance or other non-compliance with the provisions of this Agreement;

(d) "**Changed Condition**" means a materially changed physical condition at the Work Area which was not foreseen by the Contractor and which would not have been reasonably foreseen by a reasonable contractor who, before submitting its tender, conducted a thorough investigation of the work to be done to complete the Work, including a thorough inspection of the Work Area and review of all information available from the LNTCFS to persons wishing to submit tenders, but does not include any weather conditions or natural events;

(e) "**Contract Documents**" means those documents described in ***Section 2.01*** and the Work Progress Plan;

(f) "**Contract Price**" means the total amount payable to the Contractor for satisfactory performance of the Work, as set out in Schedule 'B';

(g) "**Contractor Representative**" means a person designated pursuant to ***Section 5.05***;

(h) "**Environmental Damage**" means:
   i. slumping or sliding of land;
   ii. inordinate soil disturbance; or
   iii. other damage to the environment which the LNTCFS considers significant.

(i) "**Equitable Adjustment**" means a fair and reasonable adjustment negotiated by the Parties to;
   i. the Contract Price; or
   ii. the time within which the Work is to be performed;

(j) "**Fiscal Year**" means the period from April 1 to the next March 31 inclusive;

(k) "**Incorporated Material**" means any material in existence prior to the start of the Term or developed independently of this Agreement, and that is incorporated or embedded in the Produced Material by the Contractor or a Subcontractor;

(l) "**Material**" means the Produced Material and the Received Material;

(m) "**LNTCFS Representative**" means a person appointed pursuant to ***Section 5.01***;

(n) "**Occupied Area**" means any Work Area, camp or rest area, or any other area occupied by the Contractor for the purposes of this Agreement;

(o) "**Payment Area**" means a portion of a Work Area as specified in the Work Progress Plan which contains a specified amount of scheduled Work;

(p) "**Performance Security**" means the security provided by the Contractor in accordance with ***Article 4***;

(q) "**Produced Material**" means records, software and other material, whether complete or not, that, as a result of this Agreement, are produced or provided by the Contractor or a Subcontractor and includes the Incorporated Material;

(r) "**Received Material**" means records, software and other material, whether complete or not, that, as a result of this Agreement, are received by the Contractor or a Subcontractor from the LNTCFS or any other person;

(s) "**Subcontractor**" means a person, firm or corporation contracting with the Contractor to perform a part or parts of the Work, or to supply products worked to a special design according to the Agreement, but does not include one who merely supplies products not so worked;

(t) "**Shortfall**" means the difference between total Contract Price and the amount paid to the Contractor for Work satisfactorily completed;

(u) "**Term**" means the period of time this Agreement is in force pursuant to ***Article 3***;

(v) "**Work**" means all labour, supervision, administration, materials, transportation, supplies, tools, equipment and such other services and materials necessary or desirable to perform the services described in the Contract Documents, and includes any services which are not expressly described, but which are nevertheless necessary for the proper execution of the work;

(w) "**Work Area**" means the area shown outlined on the attached maps;

(x) "**Work Day**" means every day of the week except Saturday, Sunday and statutory holidays; and

(y) "**Work Progress Plan**" means the plan developed on a form approved by the LNTCFS and submitted to the LNTCFS Representative for approval which outlines the scope, timing, location and any other requirements of the Work.

1.02 If any of the words in ***Section 1.01*** are used in any other Contract Document, they have the same meaning as in this document unless the context dictates otherwise.

1.03 Words or abbreviations which have well known technical or trade meanings are used in the Contract Documents in accordance with those recognized meanings.

1.04 The headings of the clauses of this Agreement have been inserted for reference only and do not define, limit, alter or enlarge the meaning of any provision of this Agreement.

ARTICLE 2 CONTRACT DOCUMENTS AND MODIFICATIONS

Contract Documents

2.01 The attached schedules are applicable to and form part of this Agreement:

Schedule	Title
Schedule "A"	Services
Schedule "B"	Payment
Schedule "C"	Safe Certification Requirements Schedule
Schedule "D"	Insurance
Schedule “E”	Safety Conditions Schedule
Schedule “F”	Prime Contractor Agreement
Schedule “G”	Subcontracting
Appendix A	EBL Fuel Management Prescription
Appendix B	EBL Fuel Management Prescription Maps
Appendix C	Section 52 Authorization example
Appendix D	Operational Treatment Pre-Work Checklist
Appendix E	Operational Treatment Manual Falling Verification Form
Appendix F	Fuel Management Survey Data Collection Standard
Appendix G	BCWS Line Intersect Calculator
Appendix H	Work Progress Plan

Amending Documents

2.02 No modification of this Agreement is effective unless it is in writing and signed by, or on behalf of, the Parties.

Interpretation

2.03 Any reference in the Contract Documents to a manual or a form means a manual or form published by or for the LNTCFS and includes every amendment of such manual or form and any manual or form published from time to time in substitution for them or replacement of such manual or form.

2.04 In the event of a conflict between the Contract Documents, the terms of this Document supersede all other Documents. In the event of a conflict between alike Contract Documents of different dates, the Document of later date prevails.

ARTICLE 3 TERM OF CONTRACT AND COMMENCEMENT OF WORK

3.01 The Term of this Agreement is from June 1st, 2025 to March 31, 2026 inclusive, and work shall proceed in accordance with the Work Progress Plan.

3.02 The Contractor shall not conduct any Work until the LNTCFS notifies the Contractor to commence work.

3.03 The Contractor shall commence Work within 5 calendar days from the date specified in the Notice to Commence Work and regardless of the date of execution or delivery of this Agreement, the Contractor must provide the Services during the Term.

3.04 Time is of the essence in this Agreement and, without limitation, will remain of the essence after any modification or extension of this Agreement, whether or not expressly restated in the document effecting the modification or extension.

3.05 Subject to satisfactory performance by the Contractor and availability of funding by the LNTCFS, the Parties may agree in writing to extend this Agreement for a further term of 12 months to a maximum of two terms. Should the option to renew be exercised it is expected that the Contractor's bid rate or bid price in the preceding term will remain unchanged in the subsequent term, unless, in the LNTCFS's sole opinion, a negotiated rate change is warranted. All other terms and conditions of the original contract shall remain unchagned, and in full force and effect.

ARTICLE 4 CONTRACT PERFORMANCE SECURITIES

4.01 Upon request of the LNTCFS, the Contractor shall furnish Performance Security in the amount specified by and in a form and manner acceptable to the LNTCFS as security for the faithful performance by the Contractor of all Work.

4.02 The LNTCFS may retain any Performance Security until all Work has been completed in accordance with this Agreement. The Performance Security is subject to forfeiture, at the discretion of the LNTCFS, if the Contractor fails to perform or to comply with this Agreement.

4.03 If the Contractor fails to perform or comply with this Agreement, the LNTCFS may, in addition to terminating the Agreement and claiming the Performance Security, pursue any other remedies available to it under this Agreement or the laws of the LNTCFS of British Columbia.

4.04 Should the Parties agree to renew this Agreement for a further term, the LNTCFS shall calculate the Contract Performance Security for the renewed term as follows:

(a) where the Tender documents specified the Contract Performance Security as a fixed dollar amount, the amount shall remain unaltered unless the contract value for the renewed term varies by more than 10% of that of the preceding term, in which case the security requirement shall be varied up or down by the same percentage.

(b) where the Tender documents specified the Contract Performance Security as a percentage of the total contract value, the amount for the renewed term shall be determined by multiplying that percentage on the renewed contract value, except that where this amount is between 90 and 110% of the preceding term's amount, the Contract Performance Security requirement shall remain unaltered.

Should the amount of Contract Performance Security decline by more than 10% between two terms, the LNTCFS shall return the amount in excess of 10% following, in its sole discretion, satisfactory performance of the Contractor in the preceding term and in accordance with provisions specified elsewhere for the return of performance security. Where the amount of Contract Performance Security increases by more than 10% between two terms, the LNTCFS shall inform the Contractor in writing of the

increased amount and the Contractor shall deliver this amount in an acceptable form at least ten Work Days prior to the commencement of work in the forthcoming term.

ARTICLE 5 PARTY REPRESENTATIVES

LNTCFS Representative

5.01 The LNTCFS shall appoint a LNTCFS Representative who shall have full authority to act on behalf of the LNTCFS in connection with this Agreement.

5.02 Upon commencement of this Agreement, the LNTCFS shall notify the Contractor of the name of the LNTCFS Representative.

5.03 The LNTCFS may substitute a LNTCFS Representative at any time, and shall immediately notify the Contractor of the change.

5.04 The LNTCFS Representative may require the Contractor to do anything necessary to satisfy the LNTCFS Representative that the Work is being performed in accordance with the Contract Documents.

Contractor Representative

5.05 The Contractor shall appoint a Contractor Representative fluent in English, who shall:

(a) have full authority to act on behalf of the Contractor in connection with the Work and the Agreement; and

(b) be available to the LNTCFS Representative, when requested, and be present at all times at any site where the Work is carried out.

5.06 Upon entering into this Agreement, the Contractor shall notify the LNTCFS of the name, address and telephone number of the Contractor Representative appointed pursuant to ***Section 5.05***.

5.07 The Contractor shall not substitute a Contractor Representative without the written consent of the LNTCFS Representative.

5.08 If, in the reasonable opinion of the LNTCFS Representative, the Contractor Representative is not suitably experienced or is unable to properly supervise the Work or communicate with the LNTCFS Representative, then the Contractor shall, upon receipt of written notice from the LNTCFS Representative, replace that representative and immediately notify the LNTCFS of that change.

5.09 All Work carried out by the Contractor or the Subcontractor must be under the direct and continuous supervision of the Contractor or the Contractor Representative.

ARTICLE 6 STANDARDS OF PERFORMANCE AND WORK PROGRESS

Work Progress Plan

6.01 The Contractor Representative shall meet with the LNTCFS Representative before the commencement of Work to:

(a) inspect the Work Area, and

(b) review the Contract Documents and work performance requirements.

6.02 The Work Progress Plan may divide the scheduled Work into Payment Areas. Where no Payment Areas are approved the entire Work Area shall be considered to be one Payment Area.

6.03 The Work shall proceed in accordance with the Work Progress Plan.

Standards of Performance

6.04 The Contractor acknowledges it has satisfied itself to:

(a) the nature and magnitude of the Work; and

(b) the general character, quality and quantity of the equipment and materials required to execute and complete the Work.

Any failure by the Contractor to discover matters which affect or could affect the Work does not relieve the Contractor from its obligations under this Agreement or otherwise affect the Contract Price.

6.05 The Contractor shall at all times exercise the standard of care, skill and diligence normally exercised and observed by persons engaged in the performance of activities similar to the Work.

Continuity and Suspension of Work

6.06 The actual date the Work may commence is dependent upon the weather and completion of the Work Progress Plan. Once commenced, Work shall be continuous except as provided for in Section 6.09.

6.07 If the LNTCFS reasonably decides that weather or other conditions make it unsuitable for Work to proceed, it may suspend operations for a specified or an indefinite period, and it may require the Contractor remain available for up to five (5) consecutive Work Days to resume work as specified by the LNTCFS. If the suspension exceeds twenty-four (24) hours the Parties shall negotiate an Equitable Adjustment to the Contract Price to compensate the Contractor for reasonable and substantiated out-of-pocket costs incurred during the suspension.

6.08 In the event operations are suspended under ***Section 6.07***, the Term may be extended by a length of time agreed to by the Parties.

6.09 If the LNTCFS, having suspended Work pursuant to ***Section 6.07***, does not permit Work to resume within five (5) Work Days, either Party may, by giving written notice to the other Party, terminate this Contract without penalty. Neither Party is liable for compensation of any kind arising out of the suspension of operations. Payment shall be made for all Work satisfactorily performed before the suspension of Work.

6.10 A suspension pursuant to ***Section 6.07*** to be effective must be in writing and delivered to the Contractor by a method provided for in ***Section 15.06***.

ARTICLE 7 INDEMNIFICATION AND INSURANCE

Indemnity

7.01 You must indemnify and save harmless the LNTCFS and its employees and agents from any loss, claim (including any claims of infringement of third party intellectual property rights), damage award, action, cause of action, cost or expense that the LNTCFS or any of its employees or agents may sustain, incur, suffer or be put to at any time either before or after this Agreement ends, (each a "Loss"), to the extent the Loss is directly or indirectly caused or contributed to by:

(a) any act or omission by you or your agents, employees, officers, directors or Subcontractors in connection with this Agreement; or

(b) any representation or warranty by you being or becoming untrue or incorrect.

7.02 Neither the LNTCFS nor its LNTCFS Representative in charge, its agents, authorized representatives, or employees are personally liable for any act performed in the discharge of any duty imposed or in the exercise of any power or authority conferred upon them by, or within the scope of, the Agreement if it can be demonstrated that all reasonable care was exercised in the conduct of the operations; in all such matters these persons act solely as agents and representatives of the LNTCFS.

7.03 Neither the LNTCFS nor any of its employees, authorized representatives, or agents are liable to the Contractor or the Contractor's employees or agents for any injury, loss, or damage however occasioned

to any of them or their equipment or livestock while being transported or conveyed in any vessel, boat, aircraft owned or operated by the LNTCFS, and the Contractor shall not undertake claims against the LNTCFS, its employees, authorized representatives, or agents to recover any such injury, loss or damage either on its own behalf or on behalf of its employees or agents. The Contractor shall indemnify and save harmless the LNTCFS, its employees, authorized representatives, or agents from any such claims initiated by the Contractor's employees, subcontractors, servants, or agents.

Insurance

7.04 During the Term, the Contractor shall pay and maintain insurance coverage as specified in writing by the LNTCFS from time to time.

ARTICLE 8 PROTECTION OF WORK AND PROPERTY

General

8.01 The Contractor shall protect the LNTCFS's property from damage and is responsible for damage which may arise as the result of the Contractor's operations under the Agreement, except damage which occurs as a result of the acts or omissions of the LNTCFS or its other contractors, agents and employees.

Protection of the Environment

8.02 If the Contractor encounters circumstances such as weather conditions or site factors where the Contractor knows or should reasonably know that proceeding with the Work may, directly or indirectly, cause Environmental Damage, the Contractor shall:

(a) immediately suspend such Work;

(b) immediately advise the LNTCFS of the suspension and circumstances;

(c) not proceed with such Work until the LNTCFS so instructs; and

(d) upon the LNTCFS's instruction to proceed with such Work, do so in accordance with the LNTCFS's instructions.

8.03 The Contractor shall not be deemed to be in breach of this Agreement for suspending Work pursuant to ***Section 8.02***.

Fire Protection

8.04 The Contractor shall:

(a) take every precaution to prevent unintentional fire from occurring on or about the Work Area,

(b) ensure that no person burns any debris on or about the Work Area unless authorized under a **Burning Reference Number** issued by the Ministry of Forests, BC Wildfire Services, and

(c) ensure that, with respect to smoking,

(i) no person smokes except in areas that are free of or fully cleared of all flammable material,
(ii) no burning material falls outside cleared areas, and
(iii) all burning material is completely extinguished before leaving cleared areas.

ARTICLE 9 COMPLIANCE WITH THE LAW

9.01 This Agreement is governed by, and is to be interpreted and construed in accordance with, the laws of the Provence of British Columbia, including, but not limited to, the *Employment Standards Act* and its Regulations.

9.02 The Contractor shall comply with, and must ensure that any Subcontractors comply with, all applicable occupational health and safety laws in relation to the performance of the Contractor's obligations under

this Agreement, including the *Workers Compensation Act* in British Columbia or similar laws in other jurisdictions.

9.03 Without limiting ***Section 9.02***, the Contractor:

(a) may be considered the "Prime Contractor" for the Work, as described in the attached **Safety Conditions Schedule**, and as such shall enter into a Prime Contractor Agreement and carry out the duties as described therein;

(b) shall be solely responsible for safety at the Work Area;

(c) shall, at its own expense, provide the necessary **WorkSafe BC** compensation coverage for itself, all workers and any shareholders, directors, partners or other individuals employed or engaged in the performance of the Work and shall ensure all approved Subcontractors obtain WorkSafe BC coverage;

(d) if the Contractor or its Subcontractors do not have the benefit of mandatory workers compensation coverage under the *Workers Compensation Act*, then the Contractor shall ensure that it and its Subcontractors apply for and obtain **Personal Optional Protection** under the *Workers Compensation Act*;

(e) shall be responsible for and pay for all fines, assessments, penalties, and levies made or imposed under the *Workers' Compensation Act* and regulations relating in any way to the Work;

(f) upon request, provide the LNTCFS with evidence of compliance with ***Section 9.03 (c) and (d);***

(g) shall promptly pay all persons employed or engaged in the execution of the Work; and

(h) shall obtain all licences and permits required by law to carry out the Work, unless obtained by the LNTCFS and provided to the Contractor before commencement of the Work, and provide the LNTCFS with proof of having obtained those licences or permits.

9.04 Nothing in this Agreement shall relieve the Contractor from its responsibility to comply with all applicable provisions of the *Forest & Range Practices Act* and its regulations.

9.05 The Parties hereby irrevocably submits to the exclusive jurisdiction of the courts of the Provence of British Columbia for any action, suit or any other proceeding arising out of or relating to this Agreement and any other agreement or instrument mentioned therein or any of the transactions contemplated thereby.

ARTICLE 10 CHANGED CONDITION

10.01 If a Changed Condition occurs during the course of the Work, the following applies:

(a) The Parties shall immediately advise each other of particulars of the Changed Condition and the Contractor Representative and the LNTCFS Representative shall meet to attempt to deal with the condition.

(b) If the Changed Condition is so substantial that amending the Agreement to deal with the change would change the essential nature of the Work, then either Party may elect not to proceed with the Work any further and the contract shall be brought to an end. If either Party so elects, the Contractor shall be entitled to receive payment for any Work which the Contractor has satisfactorily completed, and shall be entitled to no further payment.

ARTICLE 11 INSPECTION AND ACCEPTANCE

Request for Inspection and Acceptance

11.01 The Contractor shall, upon completing all Work within a Payment Area, promptly request that the LNTCFS inspect and determine the acceptability of the Work. The request must be in writing, may take the form of an invoice, and, must be delivered to the LNTCFS by a method provided for in ***Section 15.06***.

Inspection by the LNTCFS

11.02 The LNTCFS shall, following receipt of the Contractor's request for inspection and acceptance, promptly inspect and determine the acceptability of the Work performed in the Payment Area. Work shall be

inspected in accordance with the Contract Documents. The LNTCFS is not obliged to make any determination of acceptability before receiving the written request.

11.03 The Contractor is encouraged, but not required, to observe inspections while they are underway.

11.04 The LNTCFS shall provide the Contractor with a copy of inspection results.

11.05 The LNTCFS reserves the right to inspect, at all times during the Term and without notice to the Contractor, any Work performed.

11.06 The Contractor shall pay the LNTCFS, on demand, all direct and indirect additional inspection costs incurred because Payment Areas were not fully completed by the time specified in the Contractor's request for inspection and acceptance.

11.07 Inspections are conducted by the LNTCFS in order to determine compliance with the provisions of this Agreement and to provide the basis for calculating the payment due. These inspections are conducted for the sole benefit of the LNTCFS, and do not release the Contractor from the responsibility of providing quality control measures to assure that the Work strictly complies with this Agreement.

Re-Inspection

11.08 If the results of an inspection are unacceptable to the Contractor, it may, if it does so within three (3) Work Days of receiving the inspection results, request the LNTCFS re-inspect the Work.

11.09 If the Contractor requests a re-inspection of the Work, the LNTCFS shall perform the re-inspection at a time mutually agreed to by the Parties, but in any event no later than ten (10) Work Days after receiving the request.

11.10 The results of the re-inspection shall be used to determine payment and shall be final and binding.

11.11 The Contractor shall pay the LNTCFS's costs of the re-inspection only if the difference in Work quality between the original inspection and the re-inspection is less than ten percent (10%) of the original inspection results.

11.12 If the LNTCFS bears the costs of the re-inspection, it shall also pay the Contractor, if they are present for the entire re-inspection, the sum of two hundred and fifty dollars ($250.00) for time spent re-inspecting.

ARTICLE 12 MEASUREMENT AND PAYMENT

Payment

12.01 If the Contractor complies with this Agreement, the LNTCFS shall pay the Contractor for all Work at the rates [inclusive of taxes paid or payable by the Contractor to a supplier but exclusive of any applicable Provincial Sales Tax (PST) that the Contractor is required to charge the LNTCFS as a taxable transaction and the Goods and Services Tax (GST)] and times described in ***Schedule B*** and we are not obliged to pay you more than the maximum amount or dollar limit specified in ***Schedule B***.

12.02 Expenses, if payable, will be exclusive of GST or other applicable tax paid or payable to the extent the Contractor is entitled to claim credits (including GST input tax credits), rebates, refunds or remissions of the tax from the relevant taxation authorities.

12.03 The LNTCFS will pay any applicable taxes payable under law or agreement with the relevant taxation authorities. Invoices must show the calculation of any applicable taxes (excluding taxes paid directly by the Contractor to a supplier and which were inclusive in the bid price) to be paid as a separate line item and expenses must be listed chronologically, be in reasonable detail and with dates of all expenses claimed with receipts or copies of receipts, where applicable, attached.

12.04 Our obligation to pay money to you is subject to the *Financial Administration Act*, which makes that obligation subject to an appropriation being available in the fiscal year of the LNTCFS during which payment becomes due.

12.05 Unless otherwise specified in this Agreement, all references to money are to Canadian dollars.

Payment Initiation

12.06 The LNTCFS shall upon acceptance of the Work within a Payment Area, promptly initiate a payment.

Holdback

12.07 The LNTCFS is not obliged to advance to the Contractor more than ninety percent (90%) of the calculated amount of any payment. The ten percent (10%) holdback shall be retained for forty (40) calendar days after the completion, or earlier termination, of all Work and interest is not payable on the amount held back by the LNTCFS.

12.08 The LNTCFS is authorized, but not obliged, to apply the holdback funds as follows:

(a) firstly, to any unpaid government agencies;

(b) secondly, to the Contractor's and Subcontractor's unpaid workers, Subcontractors and material suppliers; and

(c) thirdly, as security for the correction of any breach of, or for payment of any Assessment provided for in, this Agreement.

Payment for Part Performance

12.09 If this Agreement expires or is terminated before completion of the Work, the LNTCFS shall only pay for that portion of the Work completed to the satisfaction of the LNTCFS before the said expiration or termination.

Method of Measurement

12.10 All linear and area measurements under this Agreement are measured on the horizontal plane, unless specified otherwise in an attached Schedule.

Remeasurements

12.11 If the calculation of a payment depends upon the area completed, and if the Contractor believes the area used in calculating that payment is incorrect, the Contractor may request the LNTCFS remeasure the Payment Area. The request shall be delivered in writing to the LNTCFS, within three (3) Work Days of the Contractor receiving a copy of the payment calculation for the Payment Area in question.

12.12 If the LNTCFS's remeasurement indicates that the originally specified area was correct within five percent (5%), the original measurement will be used and the Contractor will pay for the cost of the remeasurement. If the difference between measurements exceeds five percent (5%), payment will be based on the second measurement without charge for the remeasurement.

Appropriation

12.13 Despite any other provision of this Agreement, the LNTCFS’s obligation to pay the Contractor, pursuant to this Agreement, is subject to its continued receipt and availability of funding for the Project.

ARTICLE 13 NON-COMPLIANCE AND TERMINATION

Termination by the LNTCFS

13.01 The LNTCFS may, at its sole discretion, terminate this Agreement at any time, and no claim may be made by the Contractor for any losses occasioned by that termination if the termination:

(a) occurs before the LNTCFS notifies the Contractor to commence Work;

(b) is caused by an Act of God, unsuitable weather, natural disaster, withdrawal of labour in labour disputes, or any other unforeseeable causes over which the LNTCFS has no direct control; or

(c) is caused by an Event of Default.

Mutual Termination

13.02 This Agreement may be terminated at any time by the mutual consent of the Parties.

Contract Performance Security

13.03 If the LNTCFS terminates this Agreement, the Contract Performance Security will only be returned to the Contractor if the termination is occasioned by an Act of God, unsuitable weather, natural disaster, withdrawal of labour in labour disputes, or any other unforseeable cause clearly beyond the control of the Contractor.

Non-Compliance with Agreement Provisions

13.04 An "Event of Default" means any of the following:

(a) failure to perform any of the Contractor's obligations under this Agreement, or

(b) any representation or warranty made by the Contractor in this Agreement (including as part of any competitive process resulting in this Agreement being entered into) is untrue or incorrect, or

(c) an Insolvency Event, which means any of the following;

(i) an order is made, a resolution is passed or a petition is filed, for the Contractor's liquidation or winding up,
(ii) the Contractor commits an act of bankruptcy, makes an assignment for the benefit of its creditors or otherwise acknowledges its insolvency,
(iii) a bankruptcy petition is filed or presented against the Contractor or a proposal under the *Bankruptcy and Insolvency Act* (Canada) is made by the Contractor,
(iv) a compromise or arrangement is proposed in respect of the Contractor under the *Companies' Creditors Arrangement Act* (Canada),
(v) a receiver or receiver-manager is appointed for any of the Contractor's property, or
(vi) the Contractor ceases, in our reasonable opinion, to carry on business as a going concern.

13.05 On the happening of an Event of Default, or at any time thereafter, the LNTCFS may, at its option, by written notice to the Contractor do any one or more of the following:

(a) require that the Event of Default be remedied within a time period specified in the notice;

(b) require the Contractor to re-work the area to the LNTCFS's satisfaction within a time period specified in the notice;

(c) impose other requirements on the Contractor to deal with the alleged failure of compliance within a time period specified in the notice;

(d) pursue any remedy or take any other action available to us at law or in equity; or

(e) impose an Assessment if such an Assessment is provided for in the Contract Documents;

(f) require the Contractor to do no further Work until the alleged failure of compliance is dealt with according to the LNTCFS's requirements; and

(g) by written notice to you, terminate this Agreement with immediate effect or on a future date specified in the notice, subject to the expiration of any time period specified under ***Section 13.05(a***).

These remedies shall be in addition to and not instead of any other remedy which the LNTCFS may have with respect to the Contractor's breach of this Agreement.

13.06 No failure or delay on the LNTCFS's part to exercise its rights in relation to an Event of Default will constitute a waiver of such rights.

13.07 If you become aware that an Event of Default has occurred or anticipates that an Event of Default is likely to occur, you must promptly notify us of the particulars of the Event of Default or anticipated Event of Default. A notice under this section as to the occurrence of an Event of Default must also specify the steps you propose to take to address, or prevent recurrence of, the Event of Default. A notice under this section as to an anticipated Event of Default must specify the steps you propose to take to prevent the occurrence of the anticipated Event of Default.

13.08 Where the Contractor has reworked an area the LNTCFS shall inspect any re-worked area and the results of the inspection shall supersede any previous inspection results. The Contractor shall pay the LNTCFS's costs of the inspection.

13.09 For the purposes of imposing an Assessment, the LNTCFS need not notify the Contractor before imposing an Assessment.

13.10 If the LNTCFS imposes an Assessment on the Contractor, the Assessment may be collected by deduction from a payment under this Agreement, any Contract Performance Security or from any holdback.

13.11 If the Contractor does not agree with the LNTCFS that there has been a failure to comply, the Contractor shall comply with any and all of the requirements imposed by the LNTCFS, but the Contractor shall have the right to seek compensation from the LNTCFS under ***Article 14***, if there in fact was no failure to comply.

ARTICLE 14 DISPUTE RESOLUTION

14.01 If a dispute occurs between the Parties concerning any matter governed by this Agreement, the disputing Party shall promptly advise the other Party and the Parties together shall use all reasonable efforts to resolve the dispute informally.

14.02 If the Parties are unable to resolve the dispute informally, within five (5) Work Days, the Contractor shall then give Notice, within ten (10) Work Days, of the complaint to the LNTCFS Representative, which particulars shall include the following:

(a) a detailed description of the nature of the complaint;

(b) a list of the relevant provisions of the Contract Documents; and

(c) an evaluation by the Contractor of the matters in dispute.

14.03 The LNTCFS shall, within twenty (20) Work Days of receipt by the LNTCFS Representative of the written particulars, give the Contractor a decision, in writing, of one of the following:

(a) that the LNTCFS accepts the position of the Contractor; or

(b) that the LNTCFS rejects the position of the Contractor.

14.04 If the LNTCFS accepts the position of the Contractor, the Parties shall enter into an Amending Document to reflect the Agreement.

14.05 If the LNTCFS rejects the position of the Contractor, the Parties shall proceed to mediation with a mutually agreed upon third party. If the dispute is not resolved within fifteen (15) Work Days of appointment of the mediator, then the Parties may, if they both agree, proceed to arbitration pursuant to the *Commercial Arbitration Act*.

14.06 If the matter in dispute is not resolved promptly pursuant to ***Section 14.01***, the LNTCFS Representative may give to the Contractor instructions that in his or her opinion are necessary to provide for the proper performance of the Work and to prevent delays.

14.07 If the Contractor receives instructions pursuant to ***Section 14.06***, the Contractor shall act immediately to carry out the Work pursuant to the instructions, but any Work performed by the Contractor in this respect shall be without prejudice to any claim the Contractor may have concerning the dispute.

14.08 Nothing in this Article precludes either Party from having a dispute resolved by a court of competent jurisdiction, although no steps shall be taken by either Party to initiate legal proceedings until after the process described in ***Sections 14.01*** through ***14.03*** has been completed.

ARTICLE 15 MISCELLANEOUS

Confidentiality

15.01 The Contractor will treat as confidential and will not, without the prior written consent of the LNTCFS, disclose or permit to be disclosed or used, either before or after the expiration or sooner termination of this Agreement, all information supplied to, accessed or obtained by, or which comes to the knowledge of the Contractor or a Subcontractor (whether verbally, electronically or otherwise) as a result of this Agreement except if the disclosure is necessary to enable the Contractor to fulfill its obligations or to comply with applicable laws or if it is information that is generally known to the public other than as a result of a breach of this Agreement.

Contractor Status

15.02 In relation to the performance of your obligations under this Agreement, you are an independent contractor and not our:

(a) employee or partner; or
(b) agent except as may be expressly provided for in this Agreement.

You must not act or purport to act contrary to this section.

15.03 The Contractor shall accept instructions from the LNTCFS, but the Contractor is not subject to the control of the LNTCFS in respect of the manner in which instructions are carried out.

15.04 The Contractor shall not purport to commit the LNTCFS to the payment of any money to any person.

15.05 The Contractor shall ensure all personnel hired by the Contractor to perform the Work are at all times employees of the Contractor and not of the LNTCFS. The Contractor is solely responsible for arranging reliefs and substitutions, pay, supervision, discipline, employment insurance, leave and all other matters arising out of the relationship of employer and employee.

Notices

15.06 Any notice or document required to be given under this Agreement shall be conclusively deemed to be validly given or delivered to and received by the Parties at the work site or at the address, facsimile, or email address specified on the first page of this Agreement (or at such other address as either Party may from time to time designate by notice in writing to the other):

(a) if hand delivered to the Party or the specified Party representative, on the date of that personal delivery;
(b) if prepaid post and if mailed during any period when normal postal services prevail, on the fifth business day after its mailing;
(c) if delivered by courier service, on the fifth business day after collection by the courier service;
(d) if sent by facsimile or electronic transmission, on the day of transmittal unless transmitted after the normal business hours of the addressee or on a day that is not a Work Day, in which case it will be deemed to be received on the next following Work Day.

Non-Waiver

15.07 A waiver of any term or breach of this Agreement is effective only if it is in writing and signed by, or on behalf of, the waiving Party and is not a waiver of any other term or breach.

Contractor-Furnished Facilities

15.08 Except where specified otherwise in the Contract Documents, the Contractor shall undertake all Work and furnish at its cost all labour, equipment, supervision, transportation, supplies and incidentals necessary to perform the Work.

Unsuitable Workers

15.09 The Contractor must provide a sufficient number of persons to perform the Work and shall ensure all persons are fully instructed and supervised, legally entitled to work in Canada, competent, English literate, efficient, qualified by education, adequately trained, and experienced to carry out the tasks to which each is assigned.

15.10 The Contractor shall, upon request of the LNTCFS Representative, remove any person it employs for purposes of the Agreement who, in the reasonable opinion of the LNTCFS, is incompetent or has conducted himself or herself improperly, and the Contractor shall not permit a person who has been so removed to perform any further Work.

Survival of Terms

15.11 All terms of this Agreement in favour of the LNTCFS and all rights and remedies of the LNTCFS, either at law or in equity, survive the expiry or sooner termination of this Agreement subject to any applicable limitation period prescribed by law.

Material and Intellectual Property

15.12 If the Contractor receives a request for access to any of the Material from a person other than the LNTCFS, and this Agreement does not require or authorize the Contractor to provide that access, the Contractor must promptly advise the person to make the request to the LNTCFS.

15.13 The LNTCFS exclusively owns all property rights in the Material that are not intellectual property rights. Any equipment property the LNTCFS may provide to the Contractor or a Subcontractor is the LNTCFS's exclusive property. The Contractor must deliver any Material or equipment property to us immediately following expiration of this Agreement, or sooner upon our request, in the same condition it was supplied to the Contractor, excepting always loss or damage attributable to reasonable wear or tear.

15.14 The LNTCFS exclusively owns all intellectual property rights, including copyright in:

(a) Received Material the Contractor receives from the LNTCFS, and

(b) Produced Material, other than any Incorporated Material.

Upon the LNTCFS's request, the Contractor must deliver to the LNTCFS documents satisfactory to the LNTCFS that irrevocably waives in the LNTCFS's favour any moral rights that the Contractor (or its employees) or a Subcontractor (or its employees) may have in the Produced Material and confirm the vesting in the LNTCFS of the copyright in the Produced Material, other than any Incorporated Material,

15.15 Upon any Incorporated Material being embedded or incorporated in the Produced Material and to the extent that it remains so embedded or incorporated, you grant the LNTCFS:

(a) a non-exclusive, perpetual, irrevocable, royalty-free, worldwide license to exercise, in respect of that Incorporated Material, the rights set out in the *Copyright Act* (Canada), including the right to use, reproduce, modify, publish and distribute that Incorporated Material; and

(b) the right to sublicense or assign to third-parties any or all of the rights granted to the LNTCFS under ***section 15.15(a)***.

Conflict of Interest

15.16 The Contractor shall not perform any service to any other person, firm or corporation in circumstances which, in the reasonable opinion of the LNTCFS, could give rise to a conflict of interest between the Contractor's obligations to that person and the Contractor's obligation under this Agreement.

Site Clean Up

15.17 The Contractor shall maintain the Occupied Areas free from any accumulations of waste products or debris, other than that caused by the LNTCFS or other contractors.

15.18 Upon the Contractor vacating any Occupied Area, the LNTCFS Representative shall inspect the area to determine, at his or her sole discretion, whether or not the area was left in an acceptable condition.

15.19 If the LNTCFS Representative determines the Contractor left the Occupied Area in an unacceptable condition, the LNTCFS may repair the area and charge the entire cost of the repairs to the Contractor.

Camping and Parking

15.20 Use of Provincial sites by the Contractor or the Contractor's employees or agents for the purposes of lodgings, camping or trailer parking in connection with Work under this Agreement, is permitted only with the prior written approval of:

(a) on recreational sites, a representative of the Ministry of Forests, Recreation Sites and Trails Branch;

(b) on other Provincial Crown forest land including roads and landings, a representative of the Province with the authority to grant such approval.;

Such use, if approved, shall be at the Contractor's own expense, if any. The approval may be revised or revoked at any time by the LNTCFS.

Powers Cumulative

15.21 The powers set out in the Contract Documents for the LNTCFS to enforce the Contractor's compliance with this Agreement may be exercised separately, concurrently or cumulatively.

Agreement Execution

15.22 This Agreement may be entered into by a separate copy of this Agreement being executed by, or on behalf of, each party and that executed copy being delivered to the other party by a method provided for in ***Section 15.06*** or any other method agreed to by the parties.

Non-transferable

15.23 The Contractor must not assign any of its rights or obligations under this Agreement without the LNTCFS's prior written consent. Upon providing written notice to the Contractor, the LNTCFS may assign to any person any of the LNTCFS's rights or obligations under this Agreement.

Representations and Warranties

15.24 As at the date this Agreement is executed and delivered by, or on behalf of, the Parties, the Contractor represents and warrants, except to the extent it has previously disclosed otherwise in writing to the LNTCFS,:

(a) all information, statements, documents and reports furnished or submitted by it to the LNTCFS in connection with this Agreement (including as part of any competitive process resulting in this Agreement being entered into) are in all material respects true and correct; and

(b) if the Contractor is not an individual:

i) it has the power and capacity to enter into this Agreement and to observe, perform and comply with the terms of this Agreement and all necessary corporate or other proceedings have been taken and done to authorize the execution and delivery of this Agreement by, or on its behalf, and

ii) this Agreement has been legally and properly executed by the Contractor, or on its behalf, and is legally binding upon and enforceable against the Contractor in accordance with its terms.

15.25 The Parties hereto have duly executed this Agreement.

SIGNED AND DELIVERED on behalf of the LNTCFS by an authorized representative of the LNTCFS	**SIGNED AND DELIVERED** by or on behalf of the Contractor (or by an authorized signatory of the Contractor if a corporation)
(Authorized LNTCFS Signatory) Printed Name	(Contractor or Authorized Signatory) Printed Name
Dated this _____ day of _____, 20___	Dated this _____ day of _____, 20___

Operational Services Contract

OPERATIONAL SERVICES CONTRACT

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(Note to Contract Manager**: with this section highlighted, press PF9, select "Update Page Numbers Only" and okay**.)

Schedule A – Services

Attachment to the Agreement with for the Type 1 Fuel Management Treatments in the East Barriere Lake Treatment Area.

1. THE SERVICES

1.01 The contractor shall provide the following Services:

(a) The contract must complete all tree thinning, ladder fuel management, surface fuel cleanup and danger tree falling as indicated within this contract.

1.02 Outcomes:

(a) Through the delivery of the Services the LNTCFS wishes to realize the following outcomes and, without limiting the obligation of the Contractor to comply with other provisions of this Part, the Contractor must use commercially reasonable efforts to it: to manage forest fuels of the 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).

(b) The parties acknowledge that the Contractor does not warrant that these outcomes will be achieved.

1.03 Fuel Management Prescription

(a) The pre-treatment stand conditions and treatment objectives are described in the East Barriere Lake Fuel Management Prescription (**Appendix A**).

1.04 Treatment Area(s)

(a) The following Type 1 Fuel Treatment Units (FTU) are identified in **Appendix B** East Barriere Lake Fuel Management Prescription.

Fuel Treatment Unit	Net Area (ha)
TU 1	6.2
TU2 Sections South of East Barriere FSR Only	16.3
TOTAL:	**22.5**

(b) The Contractor must not complete any treatments outside of the treatment area boundaries. It is the Contractor's responsibility to ensure that workers are within the boundaries. If required, it is the Contractor's responsibility to hang additional ribbons.

1.05 Safety

(a) The Contractor must immediately notify the LNTCFS Representative if unsafe conditions are identified at any time.

(b) The Contractor must immediately correct unsafe conditions or must promptly restrict access into the area until the hazard has been resolved.

(c) The project area is used by the members of the public for a variety of uses and the Contractor must ensure their safety during operations. The Contractor must control public access to the work area which must include providing adequate barriers and signage.

1.06 Authorization

(a) Cutting and the removal of timber or material from the site must be conducted according to Section 52 Authorization (**Appendix C**).

(b) Cancellation or suspension of the applicable authorization(s) may result in the cancellation or suspension of this Contract.

1.07 Pre-Work Meeting:

(a) Upon entering into this contract, the Contractor and the LNTCFS Representative, must have a pre-work meeting to review all requirements and conditions pertaining to this contract. A completed **Operational Treatment Pre-Work Checklist** as amended from time to time and attached as **Appendix D** must be signed by both parties as part of the meeting.

1.08 Timing

(a) To reduce environmental damage the Contractor must adhere to the following the operational timing restrictions:

(i) Any machine piling must occur during frozen ground conditions.

(b) To reduce disturbance to the nearby community the Contractor must adhere to following daily and hourly work restrictions:

(i) No machine or chainsaw operation before 0800 or after 1800.

1.09 Manual Falling

(a) The Contractor must ensure that all manual falling of trees measured greater than 6 inches in diameter at stump height are to be undertaken by fallers certified by *BC Forest Safety Council* (BCFSC), the *Canadian Association of Geophysical Contractors* (CAGC formally ENFORM) or the *BCWS Faller Certification Program*. A qualified Falling Supervisor must be designated for all forestry related hand falling activities and for all non-forestry related hand falling activities taking place. Both fallers and supervisors must be qualified for the slope and timber conditions being addressed. A completed **Operational Treatment Manual Falling Verification Form** as amended from time to time and attached as ***Appendix E*** must be provided by the Contractor to the LNTCFS Representative to confirm certifications and qualifications prior to manual falling work commencing.

1.10 Danger Trees:

(a) The Contractor must ensure that before work commences, a full assessment is complete by a *Certified Wildlife/Danger Tree Assessor* for any suspected danger trees considered for retention.

(b) Any suspect trees assessed as "safe" and left standing must be documented, marked, mapped and communicated to the workers and the LNTCFS Representative.

1.11 Conifer Thinning

(a) The Contractor must complete all thinning according to the specifications indicated in the Section 52 Authorization (**Appendix C**).

Tree Falling (>12.5 cm DBH)

Layer 1 tree falling will be completed as follows:

- Remove all dead or dangerous stems, except high-value wildlife trees specifically marked for retention by a WorkSafe BC Certified Danger Tree Assessor,
- Retain all live Layer 1 trees >12.5 cm DBH,
- Retain all deciduous trees/ shrubs,
- Retain all "W" marked wildlife trees, except those that have been assessed and marked danger trees.

Understory Spacing (<12.5 cm DBH)

Layer 2, 3, and 4 conifer spacing will be completed as follows:

- Remove dead and supressed layer 2, 3, and 4 conifer stems; remove all non-layer 1 Cedar >50cm height at time of treatment,
- Remove all understory conifer stems within the 5.0m dripline of Layer 1 leave trees,
- Retain all understory conifer stems outside the 5.0m of the dripline of Layer 1 leave trees that have good form, health, and vigour - minimum inter-tree distance of 3.0m from other non-layer 1 trees.

(b) The Contractor must not damage any live deciduous trees that are to be reserved from cutting. Any anticipated deciduous cutting or damage must be discussed beforehand with the LNTCFS Representative.

(c) The Contractor must complete thinning in a manner that minimizes damage to retained trees. If a tree cannot be felled without damaging a retained tree, the tree must be reviewed by the LNTCFS Representative before falling.

(d) The Contractor must ensure that cut stumps are no higher than 10 cm measured from highest point of the ground around the base of the tree. The cut angle must be as close to horizontal as possible (to a maximum angle of 15 degrees or less from horizontal). Any broken stumps, whether natural or unnatural, must also be cut to these specifications.

(e) The Contactor must use the following thinning equipment unless otherwise approved by the LNTCFS Representative:

i) Chainsaw

ii) Brushsaw

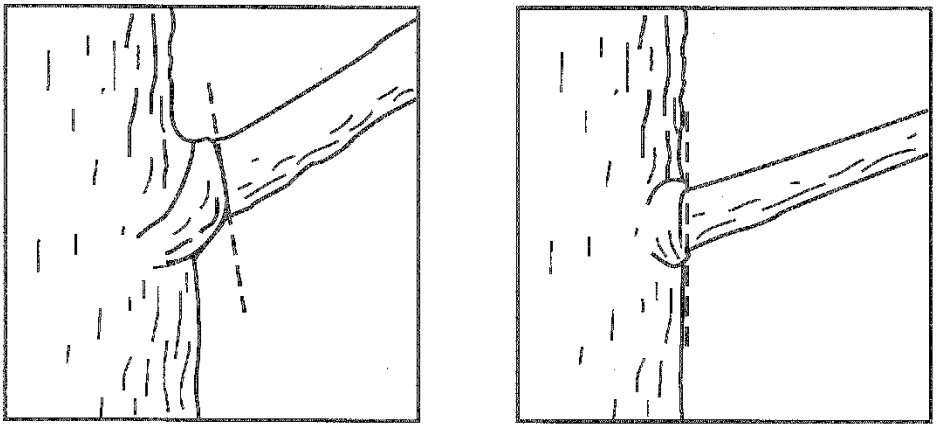
1.12 Pruning

(a) The Contractor must prune all retained tree stems. Trees must be pruned to 3 m measured from the ground to the lowest point of the branch or a maximum of 50% of the tree height, whichever is less.

(b) The Contactor must use the following pruning equipment unless otherwise approved by the LNTCFS Representative:

i) Pole saw

(c) The Contractor must prune all branches at the branch collar, with a clean, straight cut as depicted below without scarring the main trunk of the tree:



1.13 Surface Fuel Loading Reduction:

(a) The Contractor must dispose of all treatment debris (pruning material, cutting slash, etc.) and existing woody debris by removal from the site **OR** burning to the specifications below.

EBL Type 1 (TU1 to TU4)

Diameter class	Existing (t/ha)	Target (t/ha)
Fine woody fuel ≤7 cm	~14	≤11
Large Diameter woody fuel >7cm - ≤20cm	~24	≤20
Coarse woody fuel >20cm	~108	≤20

1.14 Biodiversity Coarse Woody Debris (CWD) Retention:

(a) The Contractor must retain CWD >30 cm in diameter as full-length logs (or with a minimum length of 3 m) to a maximum of 19 per hectare. CWD must be distributed randomly, >5 m apart, flush to the ground with limbs removed. All other CWD will be disposed of by burning.

1.15 Debris Pile Construction:

(a) The Contractor must construct debris piles with fine fuel on the bottom and larger diameter material stacked on top or leaned onto the outside of the fine fuels to promote ignition. Piles must not include stumps, rocks, or dirt.

1. Fine fuels on bottom

2. Larger fuels on top of fine fuels (orient materials in same direction)

(b) The Contractor must construct debris piles that are less than 2 meters in height and 3 meters in width.

(c) The Contractor must ensure that debris pile edges are located far enough away from standing trees where no scorching of boles or canopies occurs. Specific site conditions, such as steep slopes, may require a further distance to prevent scorching.

(d) The Contractor must only construct debris piles within the treatment area boundary and not within internal net-out areas such as wildlife tree retention areas.

(e) The Contractor must ensure that debris pile edges are at least 5.0 meters away from any retained coarse woody debris, recreation trails, waterlines, streams, and treatment unit boundaries.

(f) The Contractor must ensure that debris pile edges are at least 10.0 meters away from the edge of any utility lines and poles.

(g) The Contractor must not construct any debris piles on old stumps or squirrel caches.

1.16 Debris Pile Burning:

(a) The Contractor must complete burning in accordance with the most up-to-date version of the *Wildfire Act, Open Burning Smoke Control Regulations* (OBSCR) and any applicable Regional District bylaws.

(b) The Contractor must only burn material after the Contractor has a valid **Burn Registration Number**. A Burning Registration Number can be obtained by calling the **BC Wildfire Service** (BCWS) at 1-888-797-1717.

(c) The Contractor must only burn material when daily venting requirements are met.

(d) The Contractor must notify the LNTCFS Representative the day before the ignition of any piles and then on a daily basis when piles are proposed to be burned.

(e) The Contractor must ensure that the fire is intense enough to consume all material within the pile. The Contractor must tend piles during burning to ensure all material is consumed. Any unconsumed material may only remain if approved by the LNTCFS Representative.

(f) The Contractor must verify and document that all piles have been fully consumed prior to the end of the term of this contract.

1.17 Roads, Trails and Landings:

(a) The Contractor must adhere to Section 52 Authorization (**Appendix C**) for all:

i) existing road, trail and landing use,
ii) and rehabilitation or deactivation requirements.

(b) The Contractor must receive approval from the LNTCFS Representative before any additional road, trail and landing construction or existing infrastructure use.

1.18 Soils:

(a) The Contractor must protect the soil during operations. The shrub, herb/forb and grass layers are to be left as undisturbed as much possible during operations unless otherwise directed by the LNTCFS Representative.

1.19 Invasive Plants:

(a) The Contractor must report all invasive plants and noxious weeds not identified in the pre-work to the LNTCFS Representative.

(b) In areas where invasive plants have been identified and discussed with the LNTCFS Representative, the Contractor must complete work in invasive plant-free areas first, before moving into areas where invasive plants are present.

(c) The Contractor must clean all equipment before entering into the project area.

(d) The Contractor must avoid areas of high invasive plant infestation.

1.20 Infrastructure:

(a) The LNTCFS Representative must be notified of any damage to existing infrastructure caused by the Contractor.

(b) The Contractor must repair all damage, at their own expense, to infrastructure (e.g., fences, water intakes, etc.) to the same state as before the damage occurred.

1.21 Cultural and archaeological values:

(a) The Contractor must stop work in any area where cultural or archaeological resource values not previously identified are found. The Contractor must immediately contact the LNTCFS Representative and work will not continue in the affected area until it is approved by the LNTCFS Representative.

1.22 Failure to Meet Obligations

(a) Where, in the opinion of the LNTCFS, the Contractor has failed to perform or comply with any of its obligations under this Agreement, the LNTCFS may, in its sole discretion, impose as assessment as liquidated damages as follows:

Obligation and Issue	Assessment Rate
Failure to complete on or before a completion date specified in the Work Progress Plan for the Work	$250 per day

Failure to complete on or before the completion date specified in a Notice to the Contractor for any re-work.	$250 per day
Failure to attend a scheduled meeting.	$250 per meeting

2. FIELD INSPECTION AND PAYMENT METHOD

2.01 Inspection Plots

(a) Inspection plots will be completed by the LNTCFS Representative based on the principles in the **Fuel Management Survey Data Collection Standard** as amended from time to time and attached as **Appendix F**.

(b) The inspection plots will be completed at a density determined by the LNTCFS Representative's discretion.

(c) Thinning, pruning and reforestation plots will be completed with a 0.01 ha fixed area plot using a 5.64 m plot cord from the plot centre.

(d) Surface fuel loading data will be collected using line transects and estimates will be calculated using the **BCWS Line Intersect Calculator** worksheet as amended from time to time and attached as **Appendix G**.

(e) Inspection plot establishment will be completed by iPad.

(f) A general walkthrough will also be completed to assess all other objectives of the treatment.

E.g., for the completion of pile burning, biodiversity targets (CWD retention, wildfire tree retention), road rehabilitation etc.

2.02 Work Monitoring

(a) As per the Work Progress Plan, the Contractor must start within the **Initial Work Monitoring Area** (as determined by the LNTCFS Representative) within one treatment area only. The LNTCFS Representative will monitor the works to determine whether work will continue. Unsatisfactory work could result in Contract cancellation.

(b) If work under Clause (a) is satisfactory, the LNTCFS Representative will allow work to continue outside of the **Initial Work Monitoring Area**, but within the same treatment area. The LNTCFS Representative will continue to monitor the works to determine whether work will continue. Unsatisfactory work could result in Contract cancellation.

(c) Clause (b) will continue in force until such time as the LNTCFS Representative determines work can proceed on further treatment areas according to the Work Progress Plan.

2.03 Conifer Thinning Quality Monitoring

(a) Payment for thinning will be based on inspection plots.

(b) At each plot the following will be determined:
- i) the total number of retained trees,
- ii) the height and angle of stumps from thinned trees,
- iii) evidence of damage to nearby retained trees due to thinning activities.

(c) The post thinning leave tree density per plot is determined by the target leave tree density per hectare and the inspection plot size.

E.g., for a target density of 500 stems per hectare and a plot size of 5.64 m in diameter (0.01 ha), there will be a target of leave 5 trees per plot.

(d) The total post-thinning density of the number of leave trees per hectare is calculated as follows:

$$\frac{\text{total number of trees (all plots)}}{\text{number of plots}} \times \frac{1}{\text{plot size in hectares}}$$

(e) Full payment for thinning will be issued if the total post thinning density is within 20% of the tree retention specifications, and:

i) an average of less than one nearby retained tree per plot is observed to have been damaged due to thinning activities, and
ii) an average of less than one stump per plot is measured above the maximum height or angle threshold.

(f) If the total post thinning density is greater than 20% above the leave tree specification, additional thinning is required to reduce the density to within 20% of the specification for full payment to be issued.

(g) If an average of more than one nearby retained tree per plot is observed to have been damaged due to thinning activities, the payment for thinning will be reduce by 25%.

(h) If an average of more than 1 stump per plot is measured above the maximum height or angle threshold, stumps in excess of the thresholds must be re-cut to meet the thresholds for payment to occur.

2.04 Pruning Quality Monitoring

(a) Payment for pruning will be based on inspection plots.

(b) At each plot the following will be determined:
i) the total number of prunable trees,
ii) the number of acceptable pruned trees,
iii) the number of trees with reworkable errors,
iv) the number of trees with non-reworkable errors.

(c) Reworkable pruning errors include:
i) missed tree(s),
ii) live or dead limb below minimum pruning height,
iii) limbs not completely severed from the stem,
iv) stubs greater than 1 cm long measured from the branch collar to the farthest tip.

(d) Non-reworkable pruning errors include scarring of the stem exposing the cambium layer.

(e) Percent quality of work will be determined by dividing the number of acceptable pruned trees by the total number of prunable trees within the plot area multiplied by 100.

$$\text{Percent Quality} = \frac{\text{number of acceptable pruned trees (all plots)}}{} \times 100$$

total number of prunable trees (all plots)

(f) If a minimum of 95% quality is achieved, full payment for pruning will be issued.

(g) If quality <95% and ≥75% is achieved, reworkable errors may be corrected to improve quality to achieve full payment, or payment for pruning will be based on the percent quality achieved. Pruning payment equals quality percent times bid price per unit.

Payment = (quality % X bid price per unit) X units completed

(h) A minimum of 75% quality must be achieved. If quality falls below 75% no payment for pruning will be issued for the work.

2.05 Surface Fuel Loading Reduction Quality Monitoring

(a) Payment for surface fuel loading reduction will be based on inspection plots.

(b) At each plot identified for surface fuel loading measurement, the following will be determined:
- i) the total fuel loading of fine woody fuel (≤7 cm diameter),
- ii) the total fuel loading of large diameter woody fuel (>7 - 20 cm diameter),
- iii) the total fuel loading of coarse woody fuel (>20 cm diameter),

(c) A reworkable surface fuel loading reduction error is considered when the measured fuel loading is greater than the target specification.

(d) Percent quality of work will be determined by dividing the number of acceptable plots by the total number of plots multiplied by 100.

$$\text{Percent Quality} = \frac{\text{number of acceptable plots}}{\text{total number of plots}} \times 100$$

(e) If a minimum of 95% quality is achieved, full payment for surface fuel loading will be issued.

(f) If quality <95% and ≥75% is achieved, reworkable errors may be corrected to improve quality to achieve full payment, or payment for surface fuel loading will be based on the percent quality achieved. Surface fuel loading payment equals quality percent times bid price per unit.

Payment = (quality % X bid price per unit) X units completed

(g) A minimum of 75% quality must be achieved. If quality falls below 75% no payment for surface fuel loading will be issued for the work.

3. KEY PERSONNEL

3.01 The Services shall be performed by the following "Key Personnel":

(a) Field Supervisor who will be supervising all field activities and who will be the single point of contact and responsible for direct interaction with LNTCFS Representative.

(b) Faller Supervisor who will be supervising all manual falling activities.

(c) Certified Faller(s) meeting the falling certifications described in this contract.

(d) Upon entering into this agreement, the key personnel of the project are as follows:

i. Field Supervisor: <NAME>

ii. Faller Supervisor: <NAME>

iii. Certified Faller(s): <NAME>

Schedule B – Contract Payment

Attachment to the Agreement with for the Type 1 Fuel Management Treatments in East Barriere Lake Treatment Area.

1. Fees

1.01 Your fees (exclusive of any applicable taxes) will be based on a rate of $enter bid rate per hectare (the "Unit of Measure") during the Term when you are providing the Services for a total number of 22.5 Units of Measure.

1.02 In no event will **fees** payable to you in accordance with this Schedule exceed in total $enter fee total.

2. Expenses

2.01 We will not pay any expenses to you for the completion of the Services.

3. Total Payable

3.01 In no event will the Total Payable for fees and, where applicable, expenses (exclusive of any applicable taxes described in the Agreement) in accordance with this Schedule exceed in total $enter fee and expense total.

4. Holdback from Payment

4.01 As per the Agreement, the LNTCFS will withhold 10% of the calculated amount from any payment. The 10% holdback will be retained for 40 calendar days after completion, or earlier termination, of all Services and interest is not payable on the amount held back by the LNTCFS.

The LNTCFS is authorized, but not obliged, to apply the holdback funds as follows:

a) firstly, to any unpaid government agencies or boards;
b) secondly to the Contractor's workers, direct subcontractors and suppliers, where required to do so by court order; and
c) thirdly as security for the correction of any breach of a provision of the Agreement.

5. Submission of Statement of Account

5.01 In order to obtain payment for any fees and, where applicable, expenses under the Agreement, you must submit to us a written Statement of Account in a form satisfactory to us on a schedule agreed upon in the work progress plan. The final Statement of Account must be received no later than March 16th, 2026.

5.02 The Statement of Account(s) must show the following:

SCHEDULE B

CONTRACT PAYMENT

(a) your legal name, address, the date and the period of time which the invoice applies ("Billing Period"), the contract number, and a statement number for identification;

(b) the calculation of all fees claimed under this Agreement for the Billing Period, with phases, hectares, dates, rates, and name(s) of persons providing the Services, a description of specific services/works completed during the Billing Period, including a declaration that the Services have been completed;

(c) and where expenses are to be paid under this Agreement, a chronological listing, in reasonable detail and with dates, of all expenses claimed by you under this Agreement for the Billing Period with receipts or copies of receipts, where applicable, attached;

(d) if you are claiming reimbursement of any GST or other applicable taxes paid or payable by you in relation to those expenses, a description of any credits, rebates, refunds, or remissions you are entitled to from the relevant taxation authorities in relation to those taxes;

(e) the calculation of any applicable taxes payable by us in relation to the Services provided under this Agreement and for the Billing Period as a separate line item (excluding taxes paid directly by you to a supplier and which were included in the bid price);

(f) any other billing information reasonably requested by the LNTCFS.

5.03 Within thirty days of our receipt of your invoice, or the date we authorize payment, whichever is the latter, we must pay you fees and, where applicable, expenses for those Services we determined were satisfactorily received during the Billing Period.

5.04 Invoices are to be submitted to:

Mike Francis, LNTCFS General Manager via email LNTCFSociety@telus.net

If you are unable to submit invoices electronically, you can submit via regular mail or hand deliver to:

Lower North Thompson Community Forest Society

PO Box 983, 573 Barkley Road

Barriere, BC, V0E 1E0

Schedule C -
SAFE Certification Requirements

Attachment to the Agreement with for the Type 1 Fuel Management Treatments in East Barriere Lake Treatment Area.

1. Prior to commencement of the Work or Services under the Agreement, the Contractor must ensure that all of the Contractor's Subcontractors are:

   (a) Certified in the *BC Forest Safety Council SAFE Company Program*; or

   (b) Certified under another safety scheme recognized by *BC Forest Safety Council*, and that certification or endorsement is maintained in good standing while working or providing direction on the Place of Work or Work Area.

2. The Contractor may apply in writing to the LNTCFS for exemption of the requirement for certification in the *SAFE Companies Program* of its Subcontractors under the following situations:

   (a) where the Work or Services is not normally performed by persons working in the forest industry;

   (b) where, by requiring *SAFE Company certification*, the Contractor would put an undue hardship on its Subcontractors performing the work or might prevent required work from being done under the Contract.

3. The LNTCFS must provide exemption approval in writing. Where approval or conditional approval is given, the Contractor must ensure its Subcontractors comply with the terms and conditions of the approval.

4. The Contractor's and its Subcontractor's good standing in the *SAFE Company Program* or other recognized program will be a factor of consideration for contract extensions or renewals under an option-to-renew contract.

5. Should the Contractor or its Subcontractors no longer be in good standing in the *SAFE Company Program* or other recognized program at any time during the Term of the Agreement, the Contractor shall immediately advise the LNTCFS and shall submit to the LNTCFS, within five (5) days, evidence satisfactory to the LNTCFS that the Contractor or its Subcontractors are actively engaged with the *BC Forest Safety Council* or other applicable organization in obtaining re-certification.

   The Contractor or its Subcontractors must achieve re-certification within a reasonable period of time, and the reasonable period of time will be determined by the LNTCFS in its sole opinion.

   When re-certification is obtained, the Contractor shall promptly submit proof of re-certification to the LNTCFS.

Schedule D – Insurance

Attachment to the Agreement with contractor name for the Type 1 Fuel Management Treatments in East Barriere Lake Treatment Area.

1. Without restricting the generality of the indemnification provisions contained in the Agreement, the Contractor shall, at its own expense, provide and maintain, during the term of this Agreement, the following insurance coverage as fully specified in ***Paragraph 12*** and any additional insurance which it is required by law to carry or which it considers necessary to cover risks not otherwise covered by insurance specified in this Schedule in its sole discretion.
2. All such insurance described herein must be primary and not require the sharing of any loss by any insurer of the LNTCFS.
3. Where a warranty period is required by the LNTCFS under this Agreement, the Contractor shall ensure that Products and Completed Operations coverage, as applicable, shall be in force for the duration of the warranty period.
4. Insurance shall be placed with Insurers licensed to underwrite such insurance in Canada and in forms and amounts acceptable to the LNTCFS. All such insurance shall be at no expense to the LNTCFS. If the LNTCFS requires additional Insurance Coverage to be obtained by the Contractor, the additional expense of such additional insurance shall be borne by the LNTCFS.
5. Notwithstanding ***Paragraph 6***, the Contractor shall, prior to the commencement of services and before any payments are made under this Agreement, file with the LNTCFS Representative evidence of insurance coverage in the form of a completed LNTCFS of *British Columbia Certificate of Insurance (Form FIN 173).* When requested by the LNTCFS, the Contractor shall provide certified copies of required insurance policies.
6. ICBC's *Confirmation of Automobile Insurance Coverage (Form APV 47)* or *Confirmation of Unlicensed Vehicle Coverage (Form APV 45)* may be used when applicable as evidence of **Automobile Liability Insurance** for vehicles or off-road vehicles used during the performance of the services.
7. The insurance policies, except for **Automobile Liability Insurance**, shall provide that the insurance shall not be cancelled or materially changed so as to affect the coverage provided under the Agreement, without the Insurer giving at least thirty (30) days prior written notice to the LNTCFS. Material change with respect to **Professional Liability Insurance** does not require the Insurer to give thirty (30) days prior written notice to the LNTCFS.
8. Failure to provide the required insurance documentation shall result in termination of this Agreement.
9. If the insurance policies expire prior to the end of the Agreement Term, the Contractor shall provide the ministry evidence of renewal or new policy meeting the requirements of the expired insurance in the form of a completed LNTCFS of *British Columbia Certificate of Insurance* and *ICBC's Form APV 47 or APV45*, if applicable, at least ten (10) days prior to the expiry date of the policies listed in this Schedule.
10. The Contractor shall ensure that all its subcontractors performing Services under this Agreement carry insurance in the form and limits specified in ***Paragraph 12***.
11. Unless stated otherwise under any subsection of ***Paragraph 12***, where the LNTCFS is to be added as an Additional Insured or otherwise to be identified on the policy, it shall be written as follows:

    "The LNTCFS and any of its employees, representatives, or agents".

12. The following forms of insurance and specified minimum limits are required:

a) **Commercial General Liability** Commercial General Liability insurance in an amount not less than $2 million inclusive per occurrence against bodily injury, personal injury, and property damage and including liability assumed under the Agreement.

Such policy(s) of insurance shall include, but not be limited to:

a. Products and Completed Operations Liability;
b. Owner's and Contractor's Protective Liability;
c. Contingent Employer's Liability;
d. Blanket Written Contractual Liability;
e. Personal Injury Liability;
f. Non-Owned Automobile Liability;
g. Cross Liability;
h. Employees as Additional Insureds;
i. Broad Form Property Damage;

and where such further risk exists:

a. Forest Fire Fighting Expense Coverage in the amount of:

☒ $1 million
☐ $500,000
☐ Not applicable

a. Sudden and Accidental Pollution endorsement on the Commercial General liability insurance policy with a limit of liability not less than the amount indicated below per occurrence insuring against bodily injury, property damage and clean-up expenses arising from new pollution conditions arising from the Contractor's performance of the Agreement, or if such endorsement is unavailable on the Commercial General Liability insurance policy, a Sudden and Accidental Pollution insurance policy insuring against same and with same limits of liability indicated below, such policy shall not contain an "insured vs insured" exclusion and this insurance shall include the LNTCFS as an additional insured as stated below:

☐ $250,000
☐ $500,000
☐ $1 million
☒ Not applicable

As per ***Paragraph 11***, the LNTCFS is to be added as an "Additional Insured" under this policy.

b) **Automobile Liability**

Where any licensed vehicle or off road vehicle is owned, leased, rented, or used in the performance of this Agreement, *Third Party Automobile Liability Insurance* in an amount not less than $2 million inclusive per occurrence must be provided for any such vehicle.

Schedule E - Safety Conditions

Attachment to the Agreement with contractor name for the Type 1 Fuel Management Treatments in East Barriere Lake Treatment Area.

Terms such as “employer”, “supervisor”, “multiple employer workplace”, “owner”, “prime contractor”, and “worker” have the meanings given those terms under the *Workers’ Compensation Act* (*WC Act*) and its regulation.

ARTICLE 1 OTHER SAFETY CONSIDERATIONS

Notice of Project

1.01 Where a Notice of Project is required as set out in the *WC Act* and its regulations, the Contractor, unless otherwise notified in writing by the LNTCFS or the Prime Contractor, must submit the Notice of Project in a format acceptable to *WorkSafe BC*.

1.02 Where the Contractor submits the Notice of Project, a copy must be provided to the LNTCFS. Where the LNTCFS or Prime Contractor will submit the Notice of Project, the Contractor must provide, upon request, all information necessary to support the Notice of Project and the Contractor will be provided with a copy of the Notice of Project.

1.03 The Contractor will commence and conduct all operations consistently with the Notice of Project.

Reporting

1.04 The Contractor must immediately submit written notice to the LNTCFS on all matters reported to WorkSafe BC by the Contractor or the Contractor’s Subcontractors. The written notice must include all information necessary to allow the LNTCFS to adequately collect and address safety or other related incidences, and will be anonymized so as not to include personal information about an identifiable individual including their name, address, telephone number, age, sex, race, religion, sexual orientation, disability, fingerprints, or blood type, health care, educational, financial or employment history and anyone else's opinion about the individual. This scope does not include business contact information (e.g., name, title, address, telephone or fax numbers or email address used for business contact purposes).

1.05 Where a Party brings safety concerns to the attention of the other Party, the Party will give full consideration to the issues raised. Where the Contractor receives safety concerns from the LNTCFS, the Contractor will provide the LNTCFS with a considered response, including any information necessary to demonstrate that the Contractor is in compliance with *WC Act* and its regulations.

1.06 Upon the LNTCFS’s request, the Contractor or any of its Subcontractors must provide evidence to the satisfaction of the LNTCFS that the Contractor or its Subcontractor(s) has:

(a) an effective business process in place to:

i) remedy any workplace conditions that are hazardous to the health or safety of the employer's workers including safe work practices and procedures;

ii) ensure that the employer's workers:

A. are made aware of all known or reasonably foreseeable health or safety hazards to which they are likely to be exposed by their work;

B. are made aware of their rights and duties under the *WC Act* and its regulations.

(b) established occupational health and safety policies and programs in accordance with the regulations, which includes:

i) first aid assessment and provision services and equipment;

ii) an employee monitoring system that will periodically ensure the well being of all workers working alone or in isolation;

iii) accident injury reporting and investigation;

iv) an emergency response plan and employee understanding of said plan that will ensure adequate and timely response to any emergency that can be reasonably expected to occur in relation to the Works or Services being performed;

v) evidence of training and any required certifications required under *WC Act* or its regulations;

vi) evidence of a maintenance program for all equipment and vehicles owned or operated by the Contractor or its Subcontractors commensurate with the risks associated with such equipment and vehicles;

vii) provision for the regular inspection of premises, work methods and work practices; and

viii) provision by the employer for the instruction and supervision of workers including orientation of workers in the safe performance of their work.

(c) provided and maintained in good condition protective equipment, devices, and clothing as required by the *Occupational Health and Safety Regulation* and ensure that these are used by the employer's workers;

(d) provided the employer's workers all information, instruction, training, and supervision necessary to ensure the health and safety of those workers in carrying out their work and to ensure the health and safety of other workers at the workplace;

(e) a copy of the *WC Act* and its regulations readily available for review by the employer's workers and, at each workplace where workers of the employer are regularly employed, post and keep posted a notice advising where the copy is available for review.

ARTICLE 2 PRIME CONTRACTOR PROVISIONS

2.01 The Contractor acknowledges, agrees, and warrants that:

(a) The Contractor will be considered to be the Prime Contractor and shall enter into a Prime Contractor Agreement with the LNTCFS and shall carry out the duties described therein, where any of the following conditions exist:

(i) the LNTCFS gave notice that the Successful Bidder would be the Prime Contractor;

(ii) the LNTCFS designates the Contractor to be the Prime Contractor at any time during the performance of the Work or Services;

(iii) the Contractor creates a multiple employer workplace through subcontracting any of the Work or Service at any time.

2.02 Where the Contractor is being considered as the Prime Contractor as per ***clause 2.01***, the following is applicable:

(a) upon request, the Contractor must satisfy the LNTCFS that the Contractor has the experience and capacity to address Prime Contractor responsibilities in accordance with the Agreement and the WC Act and its regulations; and

(b) the LNTCFS provides written acknowledgement of the Contractor’s experience and capacity to function as Prime Contractor; and

(c) where the Contractor creates a multiple employer workplace, the Contractor will provide or acquire at their own expense all resources necessary to discharge the Prime Contractor responsibilities; or

(d) the LNTCFS may, in its sole discretion, give consideration for compensation related to any

additional costs where, after commencement of the work, the LNTCFS creates a multiple employer workplace and designates the Contractor to be the Prime Contractor.

2.03 The LNTCFS may from time to time provides prior written notice that a person other than the Contractor is designated as the Prime Contractor. The Contractor agrees that on receiving such written notice, the Contractor will cooperate with the Prime Contractor and shall coordinate health and safety activities and ensure compliance with the Prime Contractor's safety program.

2.04 The Contractor shall, upon becoming aware of any apparent deficiencies in the Prime Contractor's work which would affect the Work or Services, shall report such deficiencies in writing to the Ministry Representative.

ARTICLE 3 HAND FALLING

3.01 Where hand falling activity will be taking place under the Agreement and without limiting any other provision of the Agreement or the Contract Documents, the Contractor shall comply with the following safety requirements.

3.02 Hand falling means the falling of trees by any means with at least one person at or near the base of the tree during falling and not inside a protected cab, where the trees are greater than 6 inches diameter at 12-inch stump height, or as may be determined by *WorkSafe BC*.

3.03 The Contractor must ensure that:

(a) all hand falling is undertaken by fallers certified by *BC Forest Safety Council (BCFSC)* or ENFORM and are qualified for the slope and timber conditions being addressed;

(b) a qualified Falling Supervisor satisfactory to the LNTCFS is designated for all forestry related hand falling activities and for all non-forestry related hand falling activities taking place.

3.04 A Falling Supervisor will be deemed qualified where:

(a) it has satisfactorily completed the *BCFSC Falling Supervisor Training* course; or

(b) it is *BCFSC Falling Supervisor Certified*; or

(c) in the LNTCFS's sole opinion, evidence of qualifications/certifications and proficiency for the timber and slope for the Work Area and competency to discharge the expectations of a falling supervisor is satisfactory.

3.05 No hand falling operations will commence without the LNTCFS's prior satisfaction of acceptable proof of qualification/certification and of the Falling Supervisor's ability and competence.

3.06 The Contractor must, at least five Work Days prior to commencement of any hand falling operations, notify the LNTCFS Representative of the name of the designated Falling Supervisor or substitution thereof.

3.07 A *Falling Plan* must be developed with full engagement by the Falling Supervisor in collaboration with Hand Falling personnel and others responsible to discharge aspects of the falling plan.

3.08 The Contractor must ensure:

(a) no work will commence prior to all considerations of the Falling Plan being implemented as established by the designated Falling Supervisor;

(b) all hand falling operations performed occur and are supported in accordance with the Falling Plan; and

(c) upon request of the LNTCFS representative, provide any documents and evidence to verify adherence to the Falling Plan.

3.09 If the Contractor engages a subcontractor as its Falling Supervisor, the Contractor shall not be relieved from the subcontracted obligations or any obligations under this Agreement.

Schedule F -
Prime Contractor Agreement

CONTRACT/FILE NO: EBL2025TU1-2	THIS AGREEMENT DATED FOR REFERENCE THE DAY (including 'nd' 'rd' or 'th' as applicable) DAY OF MONTH, 20YR.
FOR: TYPE 1 FUEL MANAGEMENT TREATMENTS IN EAST BARRIERE LAKE TREATMENT AREA The "**Activity / Treatment**" and the "**Work Location**"	

BETWEEN:

Lower North Thompson Community Forest Society
Box 983, 573 Barkley Road
Barriere, BC
V0E 1E0

Phone Number: **(250) 672-1941**
LNTCFS Representative: **Mike Francis**
E-mail Address: **LNTCFSociety@telus.net**

(the "LNTCFS")

AND:

Full Legal Entity Name of the Designated Prime Contractor
Physical & Mailing Address (including Postal Code)

Phone Number: (Area Code) Phone No ... FAX Number: (Area Code) Fax No
Business E-mail Address: Contractor's Email Address

Coordinator: name of the person(s) coordinating prime duties (as identified by the Prime, required for Construction sites)
Business Number: Company's Business Number for taxation purposes
WorkSafe BC Number: WCB No

(the "Prime Contractor")

referred herein to as "the Parties".

WHEREAS:

A. The LNTCFS and the Prime Contractor have agreed that a Multiple Employer Workplace is anticipated and expected at the Work Location and have duly executed this Agreement.

B. The LNTCFS and the Prime Contractor have agreed that the *Workers Compensation Act (WC Act)* and its regulations allow the LNTCFS to establish Prime Contractor responsibilities.

C. The Prime Contractor agrees to be the prime contractor at the Multiple Employer Workplace for the Work or Services being performed.

D. The Prime Contractor has the required knowledge and control of the Multiple Employer Workplace to execute the responsibilities of a prime contractor as described in the *WC Act* and its regulations.

E. The LNTCFS and the Prime Contractor have agreed that the prime contractor functions shall be carried out in accordance with this Agreement and any Contract Documents or other agreements between the Parties.

Accordingly, the Parties agree as follows:

ARTICLE 1. DEFINITIONS

1.01 In this document, the following words have the following meanings:

(a) "**Affected Parties**" means independent firms described in ***Article 2*** that create a multiple employer workplace;

(b) "**Affected Persons**" includes the Prime Contractor and Affected Parties and their visitors to the workplace, employees, officers, directors, agents, or subcontractors entering the Multiple Employer Workplace;

(c) "**Agreement**" means this Prime Contractor Agreement between the Parties;

(d) "**Amending Document**" means an *FS600 Contract Amendment* form or another standard form of similar nature specified by the LNTCFS;

(e) "**Contract Documents**" means those documents described in ***section 3.01***.

(f) "**Multiple Employer Workplace**" means a workplace where workers of two or more employers are working at the same time where the work being carried out "overlaps".

(g) "**Principal Contractor**" means a party who holds a contract for service or works with the LNTCFS and does not include any tenures or authorizations under the *Forest Act*.

(h) "**Term**" means the period of time this Agreement is in force pursuant to ***Article 3***.

1.02 If any of the words in ***section 1.01*** are used in any other Contract Document, they have the same meaning as in this document unless the context dictates otherwise.

ARTICLE 2. AFFECTED PARTIES

The following other parties are a party to the creation of a Multiple Employer Workplace and are affected by this Agreement and the responsibilities of the Prime Contractor as laid out herein:

Firm Name	Address	File#

ARTICLE 3. CONTRACT DOCUMENTS AND AMENDMENTS

Contract Documents

3.01 The Parties entered into the agreement dated for reference the , identified as Agreement Number that is applicable to and forms part of this Agreement.

Amending Documents

3.02 No change to the Agreement is effective unless the change is in the form of an Amending Document signed by both Parties.

ARTICLE 4. TERM OF AGREEMENT

4.01 Subject to ***Clause 3.02***, the Term of this Agreement is from Month & Day, 20YR to Month & Day, 20YR inclusive.

4.02 Time is of the essence in this Agreement.

ARTICLE 5. PRIME CONTRACTOR RESPONSIBILITIES

5.01 The Prime Contractor shall:

(a) familiarize itself with the Multiple Employer Workplace;

(b) immediately notify the LNTCFS Representative should there be any circumstance arising which another party claims or purports to be the prime contractor at the Multiple Employer Workplace. There can be only one prime contractor on any one Multiple Employer Workplace;

(c) coordinate safety activities and ensure compliance with the *WC Act* and the *Occupational Health & Safety Regulations* by all Affected Parties and act to protect any other workers entering the Multiple Employer Workplace;

(d) when requested, provide the following to the LNTCFS Representative:

i. up-to-date written information of the Prime Contractor's systems or processes related to the discharge of prime contractor duties;

ii. inspection results, safety meeting minutes, accident investigation findings for Prime Contractor's own workers and for the Affected Parties;

Coordination and Compliance

5.02 The Prime Contractor shall ensure that its systems or processes eliminates or minimizes risk of injuries and will adequately monitor and coordinate Affected Parties' activities to ensure compliance with the *WC Act* and the *Occupational Health & Safety Regulation,* which includes, but is not limited to:

(a) ensuring an Affected Party does not expose any Affected Person, or any person, entering the Multiple Employer Workplace to uncontrolled hazards;

(b) ensuring Affected Parties adequately supervise their workers relating to occupational health and safety at the Multiple Employer Workplace;

(c) conducting safety meetings with all Affected Parties and recording minutes of meetings;

(d) ensure all parties conduct ongoing Workplace inspections;

(e) ensuring all Affected Parties at the Multiple Employer Workplace are given any information necessary to identify and eliminate or control hazards and ensure the health or safety of all Affected Persons;

(f) coordination and planning of work activities with participation by all Affected Parties that will ensure work is carried out safely and that work of one employer will not create uncontrolled hazard for another;

(g) maintaining a list of individuals designated by an Affected Party as supervisor of its workers at the Multiple Employer Workplace;

(h) establishing, maintaining and communicating emergency response and evacuation procedures;

(i) providing, where needed, information to all Affected Persons about the safe use of resource roads and other access, including but not limited to the "rules of the road", other

road use traffic, and road use radio frequencies;

(j) carrying out a workplace first aid assessment and ensuring first aid coverage at the Multiple Employer Workplace is adequate and appropriate and coordinated with all Affected Parties, including but not limited to emergency transportation provisions for injured workers for the number of workers present;

(k) orientation of all Affected Parties and Affected Persons, or any person, entering the Multiple Employer Workplace to the site, workplace hazards and appropriate responses;

(l) ensuring Affected Persons at the Multi Employer Workplace know their rights and responsibilities to report unsafe acts/conditions, how to refuse to perform work that is unsafe, how to seek first aid, how to report injuries;

(m) promoting a positive safety culture by encouraging workers to discuss safety concerns/issues;

(n) ensuring a Notice of Project is delivered to WorkSafe BC for itself and all Affected Parties in accordance with the *WC Act* and its regulation.

5.03 The Prime Contractor shall not assign this Agreement or in any way create another Prime Contractor.

5.04 Where the Prime Contractor or Affected Parties identified in this Agreement are Principal Contractors for the LNTCFS, this Agreement forms the written notice of Prime Contractor.

The Work Location is a Multi Employer Workplace and as such the Parties hereto duly execute this Agreement.

SIGNED AND DELIVERED on behalf of the LNTCFS by an authorized representative of the LNTCFS	**SIGNED AND DELIVERED** by or on behalf of the Prime Contractor (or by an authorized signatory of the Prime Contractor if a corporation)
(LNTCFS Authorized Signatory) Printed Name	(Prime Contractor or Authorized Signatory) Printed Name
Dated this _____ day of _____, 20___	Dated this _____ day of _____, 20___

Schedule G -
Subcontracting Schedule

Attachment to the Agreement with for the Type 1 Fuel Management Treatments in East Barriere Lake Treatment Area.

ARTICLE 1 GENERAL PROVISIONS

1.01 If the Contractor engages a Subcontractor, the Contractor shall not be relieved from the subcontracted obligations or any obligations under this Agreement.

1.02 The actions of any Subcontractor engaged to carry out any of the work shall be deemed to be the actions of the Contractor.

1.03 If the Contractor engages a Subcontractor to carry out any of the work, any provision in this Agreement requiring the Contractor to meet an obligation associated with the Subcontractor's work shall be deemed to mean the Contractor shall ensure the Subcontractor meets that obligation.

1.04 The LNTCFS may, for a reasonable cause, object to the use of an intended Subcontractor and require the Contractor to employ another qualified Subcontractor.

1.05 The Contractor acknowledges and agrees that the Subcontractor or any of the Subcontractors' directors, officers or members is not an Associated Person of the Contractor as that term is referenced in the tendering documents and as defined in the federal *Income Tax Act* or related Canada Revenue Agency's interpretation bulletins.

1.06 Nothing in this Agreement will create any direct or indirect contractual relationship between the LNTCFS and any Subcontractor or impose any obligation or liability upon the LNTCFS to any Subcontractor.

1.07 The Contractor must ensure all approved Subcontractors obtain **WorkSafe BC** coverage and comply with all conditions of the *Workers Compensation Act* and regulations thereunder and where general Worksafe BC coverage is not obtainable, the Contractor will ensure all Subcontractors obtain **Personal Optional Protection** under the *Workers' Compensation Act*, and upon request must provide us with proof of such compliance.

1.08 The Contractor shall ensure that all its Subcontractors performing work under this Agreement carry insurance in the form and limits as specified in the insurance schedule, and upon request must provide us with proof of such compliance.

ARTICLE 2 INSPECTION BY THE CONTRACTOR

2.01 The Contractor is not entitled to subcontract any obligations with respect to inspection to the Subcontractor whose work is being inspected. Any inspection must be done by the Contractor, or by a different Subcontractor approved by the LNTCFS.

2.02 The Contractor shall inspect the work performed and/or each area of payment or part thereof for the purposes of determining the quality of work.

2.03 The Contractor shall inspect the work in the following manner:

The contractor shall ensure that all works are completed and meet all of the conditions and requirements as set out in this contract.

2.04 The Contractor shall provide the LNTCFS with a written statement of the work quality achieved, supported by inspection data and a map of the work area and/or area of payment (or portions thereof). The LNTCFS may examine such portion or portions of the work performed and/or area of payment as it considers appropriate to verify the quality of the work.

2.05 If the LNTCFS determines the inspection carried out by the Contractor does not correctly indicate the quality of the work, the LNTCFS may require the Contractor to carry out additional inspection(s).

ARTICLE 3 APPROVED SUBCONTRACTORS

3.01 Before commencement of any work, and by the date requested, the Contractor must provide a list of subcontractors and the phase or portion of work to be performed by each of them to the LNTCFS for approval.

3.02 There shall be no substitution of the Subcontractor(s) without the prior consent of the LNTCFS.

Fuel Management Prescription

A. PROJECT INDENTIFICATION	
PROJECT ID AND UNIT ID: **Project ID:** **East Barriere Lake FSR – Wildfire Risk Reduction** **Unit ID's:** **Right of Way (RW1, RW2, RW3, RW4)** **Type 1 (TU 1, TU 2, TU 3, TU 4)**	LAND OR TENURE HOLDER: **Ministry of Forests (Crownland)**
LATITUDE/ LONGITUDE: Lat: 51.25166° N Lon: -119.78888° W	GEOGRAPHIC DESCRIPTION: 0.5 to 10.5km – East Barriere Lake FSR
HIGHER-LEVEL PLAN(s): Kamloops Land & Resource Management Plan (1995) Community Wildfire Resiliency Plan – TNRD Electoral Area "O" Lower North Thompson (2023)	MAP REFERENCE NUMBER: 082M021, 082M022

B. PROJECT DESCRIPTION

OBJECTIVE:

The Thompson Nicola Regional Distract (TNRD) completed several Community Wildfire Resiliency Plans (CWRP) for each of the electoral districts within the region in 2023. Each of the CWRPs identified several Areas of Interest (AOI) and proposed Treatment Units. After completing a site visit, a large treatment area named East Barriere Lake (EBL [units RW1 – RW4 and TU1 – TU4]) were identified as a priority areas for reduction in forest fuels. The proposed EBL treatment area encompasses two proposed treatment units identified in the CWRP for TNRD Electoral District "O". The proposed EBL treatment area is anchored to the East Lake Forest Service Road and ties into adjacent fuel treatment units on a Community Forest tenure (K1Z). The objective of this treatment prescription is primarily to enhance the wildfire resiliency of the EBL community and East Barriere Lake FSR (primary evacuation route).

The treatment unit overlaps with a Natural Disturbance Type 3 (NDT 3) polygons, indicating frequent, stand-initiating fire events. Large (3219 and 1147 Ha) fires have occurred in the EBL Area. These fires date back to 1922 and 1925. A further five smaller fires have burned within 6 km of the EBL treatment area since the 1900's. Fire scars were observed during site visits; confirming the historical role of wildfire in the area. Climate change predictions for the interior of the province suggest that climatic conditions will increase the wildfire season length and intensity and strengthen the argument for proactive fuel management.

EBL was chosen as a priority area due to (1) presence of human structure (>6/ha; Wildland Urban Interface), (2) overstocked forest conditions with dense cedar ladder fuel layer, and (3) hyperinflated surface fuel loading caused by natural blowdown and hand falling along the BC Hydro power line that parallels East Lake FSR. The larger EBL treatment area is divided into two treatment types depending on fuel loading, management objectives, and treatment suitability. These include:

- **Right of Way Treatment (Units RW 1, RW 2, RW 3, and RW 4)**: clearcut treatment to create an expanded opening

along the uphill side of the BC Hydro/ TELUS powerline that parallels East Lake FSR to address long-standing issues around power outages and related ignitions caused from trees falling onto the line.

- **Type 1 Treatment (Units TU 1, TU 2, TU 3, and TU 4):** selective treatment which targets the retention of live layer 1 trees (>12.5cm DBH) with spacing of layer 2, 3, and/or 4 trees in larger canopy gaps giving preference for fire-resistant and fire-adapted species.

This combination of treatment types within the larger EBL treatment area will increase the effectiveness and safety of BCWS suppression ground crews while simultaneously reducing wildfire severity within the area due to modification of crown, ladder, and surface fuels within the area. Post-treatment mechanical piling will be conducted across all treatment units where feasible to further reduce surface fuel loading (large and coarse woody fuels >7cm), unit-specific constraints such as the presence of riparian features, sensitive soils, and steep slopes have been identified, mapped, and will limit mechanical piling.

Specific objectives for this fuel management treatment are to:

- Reduce surface fire intensity and likelihood of crown fire initiation and propagation within the treated area.
- Reduce wildfire risk within the Wildland Urban Interface identified along East Barriere Lake.
- Create safer working conditions for fire suppression and other first responders.
- Maintain and enhance wildlife habitat values within the treatment area which include moose winter range, and an active Osprey nest.
- Maintain and enhance water values in the area which include East Barriere Lake, wetland, streams, and several water licenses.

STRATEGIES:

Overstorey removal – RW1, RW2, RW3, RW4:
Vegetation will be removed through a conventional clearcut system. Surface fuel reduction will be completed in accordance with obligations from harvesting. These units are to be maintained as permanent non-green up features.

Modifying Aerial Fuels – all units
A combination of complete and selective removal of crown (layer 1) and ladder (layers 2, 3, and 4) trees depending on the treatment type (defined above). This will reduce horizontal and vertical fuel continuity of aerial fuels within the treatment area, thereby decreasing potential for crown fire initiation and propagation. Dense stocking (high number of stems per hectare) can propagate fire vertically into tree crowns and horizontally between tree crowns, spacing of stems decreases the ability for a crown fire to propagate within a stand.

Increasing Canopy Base Height – TU1, TU2, TU3, TU4
Pruning low branches on retained trees creates a fuel strata gap between surface and aerial fuels. This increases the Critical Surface Fire Intensity threshold and flame length needed to ignite aerial fuels, thereby decreasing the potential for crown fire initiation. Low branches can act as “ladder fuels” which propagate fire vertically into tree crowns, and their removal further decreases the ability of a crown fire to initiate within a stand.

Reducing Surface Fuel Loading – all units
Removing excessive surface fuels reduces potential Surface Fire Intensity and thereby:

- Increases the chances of tree survival by reducing heating of the cambium and foliage;
- Reduces likelihood for adverse soil effects by reducing potential flame residence times and intensity;
- Reduces the potential for passive (e.g. torching) and active crown fire behavior;
- Creates safer suppression opportunities by increasing the likelihood of success of a direct attack by ground crews and equipment.

METHODS:

Field Marking:

Roads: Pink
Block Boundary: Orange – Printed
Falling Corners: Orange, Solid Blue
Machine Free Zone: Pink – Printed
Water Licenses: Pink – double tailed
Wildlife Tree Retention Area: Orange – Printed

Field Sampling/Data Collection:

Stand inventory data was collected using a total of 43 fixed radius plots (3.99 m) across the EBL treatment area using a 200m x 200m grid (approx. 1 plot/2ha). Surface fuel loading data was collected using a total of 11 fuel transects (30m transect) across the EBL treatment area, transect data was collected at every 4th fixed area plot (approx. 1 transect/8ha).

Fuel Treatment:

The EBL treatment area includes two proposed treatment types: Right of Way (RW1, RW2, RW3, RW4) and Type 1 (TU1, TU2, TU3, TU4). This prescription is designed for flexibility to utilize a variety of treatment systems (i.e. conventional harvest equipment, ground crews, small equipment) as long as contractors can demonstrate prescription targets are achievable and ensure minimal impact to leave trees, understory retention, and other resource values such as water and soil.

Right of Way Treatment (RW1, RW2, RW3, RW4):

Right of Way activities will include:

- Clearcut harvest;
- Road and landing building (Temporary Access Structures);
- Forwarding of logs to designated landings;
- Processing of logs within designated landings;
- Loading and hauling of logs off-site;
- Pile burning for debris disposal. Chipping and/or grinding may be used as an alternative method to dispose of surface fuel as long as chipped material is hauled off site;
- Surface fuel cleanup, piling, and pile burning

Type 1 Treatment (TU1, TU2, TU3, TU4):

Type 1 activities will include:

- Retention of living merchantable layer 1 stems (all species) >12.5cm DBH;
- Retention of non-merchantable stems (deciduous species) <12.5cm DBH;
- Spacing of non-merchantable stems (coniferous species) <12.5cm DBH;
- Pruning of branches;
- Surface fuel cleanup/piling; and
- Open burning (debris removal through chipping may also be considered).

TREATMENT AREA SUMMARY						
TU	GROSS AREA (ha)	LEAVE AREAS (ha)	ROAD (ha)	NET AREA (ha)	NAR (ha)	TREATMENT REGIME
RW 1	6.3	0.0	0.1	6.2	0.0	CC, PILE, BURN
TU 1	6.2	0.0	0.0	6.2	0.0	THIN, PRU, PILE, BURN
RW 2	3.8	0.0	1.9	3.7	0.0	CC, PILE, BURN
TU 2	30.4	0.0	1.9	28.5	0.0	THIN, PRU, PILE, BURN
RW 3	3.6	0.0	0.3	3.3	0.0	CC, PILE, BURN
TU 3	25.6	0.0	1.3	24.3	0.0	THIN, PRU, PILE, BURN
RW 4	17.9	0.0	1.8	16.1	0.0	CC, PILE, BURN
TU 4	48.0	0.0	3.1	44.9	0.0	THIN, PRU, PILE, BURN
RW SUBTOTAL	**31.6**	**0.0**	**4.1**	**29.3**	**0.0**	-
TU SUBTOTAL	**110.2**	**0.0**	**6.3**	**103.9**	**0.0**	-
TOTAL	**141.8**	**0.0**	**10.4**	**133.2**	**0.0**	-

D. SITE CHARACTERISTICS							
TU	CFFBPS FUEL TYPE	TIMBER TYPE (Forest Cover Inventory)	BGC SUBZONE, VARIANT & SITE ASSOC.	ELEVATION RANGE (m)	SLOPE POSITION	SLOPE RANGE (%)	ASPECT
RW 1 / TU1	C5	$Cw_{70}Fd_{15}Sx_5Pw_5Hw_5$	ICHdw3($01_9 05_1$) *	650-685	Lower-Level	5-30	North
RW 2 / TU2	C5/S1	$Cw_{75}Fd_{10}Hw_{10}Sx_5$ (Ep, Pw)	ICHdw3($01_7 04_3$) *	650-775	Lower-Toe	5-35	North
RW 3 / TU3	C5/S1	$Cw_{80}Fd_{15}Hw_5$ (Sx, Pw, Ep)	ICHdw3(01) *	635-750	Lower-Toe	15-50	North - Northwest
RW 4 / TU4	C5/S1	$Cw_{60}Fd_{15}Sx_{15}Hw_{10}$ (Pw, At)	ICHdw3($01_8 04_2$) *	640-715	Toe-Level	5-45	Northwest
FUEL TYPE DETERMINATION (Rationale)	This site is not an exact match for any specific CFFDRS fuel type. The designated Fuel type is the closest approximation, but may not provide an exact estimate of potential surface fire intensity of the post-treatment stand. S1 has been added in to reflect high levels of blowdown.						

*Use classification for ICHmw3

E. SOIL CHARACTERISTICS

TU	SOIL TEXTURE	DUFF DEPTH (cm)	COARSE FRAGMENTS (%)	SOIL DISTURBANCE LIMIT (%)	SOIL HARZARD RATING		
					Compaction	Erosion	Displacement
RW 1 / TU1	SiL / SiCL	11	5 - 15	5	VH	M	H
RW 2 / TU2	SiL	3	60	10	H	M	H
RW 3 / TU3	SiCL	2	5	5	VH	M	H
RW 4 / TU4	SiCL / L	6	10 - 25	5	VH	H	M

F. VALUES – FOREST AND RANGE PRACTICES ACT

RIPARIAN & LAKESHORE AREAS - Forest Planning and Practices Regulation (FPPR) division 3, Government Action Regulation (GAR) section 6, Forest and Range Practices Act (FRPA) sections 180 and 181

Is the proposed cutting, modification or removal of trees, or site preparation, in an area that contains streams, lakes or wetlands? YES ☒ NO ☐	East Barriere Lake exists downslope from the TU. The treatment boundary has been established a minimum 15 meters from the highwater mark of the lake. Several non-classified drainages (NCDs), non-fish bearing streams (S6s), and fish-bearing streams (S4s) exist within the EBL treatment area. Two non-classified wetlands (NCWs) and one W3 wetland exist within and adjacent to the EBL treatment area.

RIPARIAN MANAGEMENT AREAS (RMAs) - FPPR sections 51 and 52

STREAM, LAKE, WETLAND ID	CLASS	RRZ (m)	RMZ (m)	SPECIFICATIONS FOR RIPARAN OR LAKESHORE MANAGEMENT AREAS
East Barriere Lake	Lake Class 'C'	10	190	EBL units RW1 – RW4 and TU1 – TU4 are adjacent to East Barriere Lake, all units are located outside the RRZ but lie within the 200m Lakeshore Management Zone (LMZ). The following strategies will be applied to manage for the integrity of the LMZ: • Treatment boundary has been established 15m from lake edge; remainder of the LMZ (excluding R/W units) will be subject to the type 1 treatment • If skid trails are created, they will be located >20m from edge of RRZ • Within TU1 – TU4, no live trees over 12.5cm dbh will be removed excluding danger trees • Retention of all deciduous trees excluding danger trees
S4-1; S4-2; S4-3; S4-4; S4-5	S4	0	30	A 15m MFZ has been established from the stream centerlines. A minimum of 10% basal area retention will be maintained for these features; this will be achieved through a combination of RMZ area reserved from harvest and/or dispersed RMZ retention within the harvest area. RMZ will be subject to the right-of-way and/or type 1 treatments; debris piles will be located outside MFZs.
S6-1; S6-2, S6-3	S6	0	20	A 5-10m MFZ has been established from the stream centerline for S6-2 and S6-3, while S6-1 RMA is located within a larger machine free area. RMZ will be subject to the right-of-way and/or type 1 treatments; debris piles will be located outside MFZs.

NCD-1; NCD-2; NCD-3; NCD-4; NCD-5; NCD-6; NCD-7; NCD-8; NCD-9; NCD-10; NCD-11; NCD-12; NCD-13	NCD	0	0	A 5-10m Machine Free Zone (MFZ) has been established from the NCD centerlines; these areas will be subject to the right-of-way (NCD-4,) and type 1 treatments; piles will be located outside MFZs.
NCW-1; NCW-2	NCW	0	0	A MFZ boundary has been established along the edge of NCWs; these areas will be subject to the right-of-way and type 1 treatments; piles will be located outside MFZs.
W3-1	W3	0	30	Treatment boundary has been established along the edge of the wetland. RMZ will be subject to the right-of-way and type 1 treatments; piles will be located outside riparian MFZs.

TEMPERATURE SENSITIVE STREAMS - FPPR section 53, GAR section 15, FRPA sections 180 and 181	
Are there temperature sensitive streams or direct tributaries to temperature sensitive streams within or adjacent to the proposed treatment area? YES ☐ NO ☒	No temperature sensitive streams are present.
ROAD CONSTRUCTION IN RIPARIAN MANAGEMENT AREAS - FPPR section 50	
Is road construction proposed in riparian management areas within the treatment area or an associated road permit (RP)? YES ☐ NO ☒	N/A
STREAM CROSSINGS - FPPR section 55	
Will stream crossings be constructed within the proposed treatment area or a road permit road providing access to the treatment area? YES ☐ NO ☒	N/A
MAINTAINING STREAM BANK AND CHANNEL STABILITY ON S4, S5, and S6 STREAMS - FPPR section 52 (2)	
Is the proposed treatment in the RMZ of an S4, S5 or S6 stream that is directly tributary to an S1, S2 or S3 stream and the activity is likely to contribute significantly to the destabilization of the stream bank or the stream channel? YES ☐ NO☒	N/A
DOMESTIC WATER LICENCES - FPPR section 59	

Does the proposed treatment area contain water sources that are diverted for human consumption by licensed waterworks?
YES ☒ NO ☐
	Several domestic water licenses and one lawn and garden water license exist within or adjacent to the RW4, TU3, and TU4 treatment units.
	- Waterlines have been mapped and flagged with pink ribbon 2-tailed that will be visible to ground crews and machine operators.
	  ○ **Right of Way Treatment** – harvest operations will minimize disturbance to lines and remedy any damage to the lines that occurs as a result of harvesting
	  ○ **Type 1 Treatment** – ground crews will not construct burn piles within 5.0m of water lines and machine free zones have been established around waterlines to minimize disturbance from any mechanical piling.
	- License holders have been engaged through consultation prior to treatment implementation, no concerns have been identified.

LICENCED WATER WORKS (inside or outside of a community watershed) - FPPR section 60	
Does the proposed treatment include areas that are within 100 m of a licensed waterworks? YES ☒ NO ☐	The EBL treatment area is adjacent to and/or contains several licensed waterworks. - License holders have been engaged through consultation prior to treatment implementation, no concerns have been identified. - Measures to avoid and mitigate any disturbance to these features are outlined under Domestic Water Licenses.
FISHERIES SENSITIVE WATERSHED - GAR section 14, FPPR section 8.1	
Are any activities proposed within a fisheries sensitive watershed? YES ☒ NO ☐	The EBL treatment area is located within the East Barriere River Fisheries Sensitive Watershed (f-3-010-10). - All new road construction will be temporary; these features will be rehabilitated and de-compacted following completion of harvest and associate post-harvest clean-up activities. *See Riparian Management Areas section for treatment specifications.*
COMMUNITY WATERSHED - GAR section 8, FPPR section 8.2, 61, 62 and 84	
Does the proposed treatment area include areas that are within a community watershed? YES ☐ NO ☒	The treatment area is not within a community watershed (iMap BC, November 2024)
Will this project require road construction or deactivation within a community watershed? YES ☐ NO ☒	N/A
WATERSHED ASSESSMENT CONSIDERATIONS - FRPA section 180 areas with "significant watershed sensitivity"	

Does the proposed treatment area include areas that have watershed assessment considerations? YES ☐ NO ☒	N/A

SOIL DISTURBANCE AND PERMANENT ACCESS STRUCTURES - FPPR sections 35 and 36				
TREATMENT UNIT	**Proposed Max. Allowable Soil Disturbance (%)**	**Proposed Max. Soil Disturbance for Roadside Work Areas (%)**	**Proposed Max. Permanent Access Structures (%)**	**COMMENTS**
RW1, RW2, RW3, RW4 TU1, TU2, TU3, TU4	5	N/A	N/A	-
Do the proposed Permanent Access Structures exceed 7% of the total area? YES ☐ NO ☒		No new permanent access structures will be created as a result of this treatment. Proposed access structures will be temporary and rehabbed after treatment completion.		
LANDSLIDES AND TERRAIN STABILITY - FPPR section 37				
Does the proposed treatment area include areas where terrain stability is a concern? YES ☒ NO ☐		Treatment area does not overlap any Unstable or Potentially Unstable slope stability polygons (iMap BC, January 2025). Signs of terrain instability were noted during field work; these areas have been excluded from clearcut harvest units and located within larger Machine Free Zones (MFZ) where present within the Type 1 treatment units. These steps will mitigate stability concerns as the Type 1 treatment will retain almost all layer 1 trees while MFZs will keep machinery away from these areas.		
SUITABLE SECONDARY STRUCTURE - FPPR section 43.1				
Does the proposed treatment area include a "Targeted pine leading stand"? YES ☐ NO ☒		N/A - not a pine leading stand.		
UNGULATE WINTER RANGE - GAR section 12, FRPA sections 180 and 181, FPPR section 69				
Does the proposed treatment area include areas within an Ungulate Winter Range? YES ☒ NO ☐		The western part of TU 1 overlaps with Critical Moose Winter Range (iMap BC, November 2024). The following strategies will be used to maintain and/or enhance moose habitat: • Retention of live layer 1 trees to provide visual screen and thermal cover. • Retention of all deciduous trees, including palatable moose forage species including birch and aspen. • The treatment prescription has been designed to promote the development of a mixed-forest type. • Retention of deciduous shrubs, including palatable moose forage species including red-osier dogwood, willow, and highbush-cranberry.		
WILDLIFE HABITAT AREA - GAR section 10, FRPA sections 180 and 181, FPPR section 69				

Does the proposed treatment area include any wildlife habitat areas (WHA)? YES ☐ NO ☒	The proposed treatment unit does not overlap any Wildlife Habitat Areas (iMap BC, November 2024).
OBJECTIVES SET BY GOVERNMENT FOR WILDLIFE - FPPR section 7	
Does the proposed treatment area include areas to which objectives for wildlife under FPPR section 7 apply? YES ☒ NO ☐	The western part of TU1 overlaps Critical Moose Winter Range; refer to Ungulate Winter Range section above for strategies. Other portions of the treatment area do no overlap with regionally important wildlife species habitat.
SPECIES AT RISK – FPPR Section 7	
Are there species at risk present within the boundaries of the prescribed treatment area? YES ☐ NO ☒	No signs of any species at risk in the area was observed during field operations. However, the Kamloops LRMP has identified several species of concerns including: - Flammulated Owl (*Psiloscops flammeolus)* - Spotted Bat (*Euderma maculatum)* - Interior Western Screech Owl (*Otus kennicottii macfarlanei)* - Lewis's woodpecker (*Melanerpes lewis)* - Western Rattle Snake (*Crotalus viridis)* - Great Basin Spadefoot Toad (*Spea intermontana)* - Williamson's Sapsucker (*Sphyrapicus thyroideus)* - American Badger (badger spp) *Taxidea taxus* If any species listed above are observed during treatment, a stop work order must be given until an assessment can be completed by a qualified professional.
MIGRATORY BIRD CONVENTION ACT	
Are the proposed activities have potential to conflict with regulations set in the *Migratory Bird Convention Act*? YES ☐ NO ☒	The EBL treatment area overlaps with a mix of Risk Rank 3, 4, and 5 forest cover polygons. Forest cover polygons classified as: - Risk Rank 1 to 3 can be treated at any time (no restrictions). - Risk Rank 4 will be scheduled for treatment outside Restricted Period 2 (May 15 – July 20). - Risk Rank 5 polygon will be scheduled for treatment outside Restricted Period 1 (April 23 - August 1). If treatment is required to be completed during restricted periods 1 or 2: • Identification and management strategies of enduring nests must be developed by a qualified resource professional. An active Osprey (*Pandion haliaetus*) nest was observed during fieldwork. The nest is located in EBL TU 2, it location has been GPS'd and is located within a machine free zone. The following strategies will be used to maintain and/or enhance osprey habitat: • Falling, harvesting, mechanical piling, thinning, and/or pruning of

	trees located within a 100m buffer of the identified Osprey nest will be scheduled outside the courtship and breeding season (March 1th – August 31st). • Retention of live layer 1 trees to provide visual screen and continuous forest cover. • Targeted mark to leave retention of large diameter wildlife trees to provide perching and fledging habitat.
OBJECTIVES SET BY GOVERNMENT FOR BIODIVERSITY OBJECTIVES (Landscape Level) - FPPR section 9	
Does the proposed treatment area include areas to which objectives for landscape level biodiversity under FPPR section 9 apply? YES ☒ NO ☐	The EBL treatment area is located in a NDT3 ecosystem and are therefore, historically this area was expected to experience frequent, stand initiating wildfires. This treatment will not emulate a stand initiating wildfire regime but rather a stand maintaining fire regime to meet the primary wildfire risk reduction objective while supporting secondary objectives for other resource values present on the site. This treatment will support biodiversity, aesthetic, recreation, and water values by retaining all live trees over 12.5 cm DBH. Furthermore, maintenance of coarse woody debris will seek to emulate mature forests that historically would have been present across the landscape within this disturbance regime.
OBJECTIVES SET BY GOVERNMENT FOR BIODIVERSITY OBJECTIVES (Stand Level) - FPPR section 9.1	
Are considerations for maintaining stand structure (wildlife trees, wildlife tree reserves, etc.), coarse woody debris, and maintaining tree and vegetation species composition incorporated into this prescription? YES ☒ NO ☐	This treatment will retain all live trees over 12.5 cm DBH, excluding danger trees that are not marked for retention. This will leave a fully stocked, mature stand. Non-merchantable conifer stems under 12.5cm will be spaced and retained in canopy gaps to support stand stocking and provide structural complexity within the treatment units. All non-merchantable deciduous stems will be retained. Coarse woody debris retention will be limited due to prescription objectives. Understory vegetation and forest floor impacts will be limited due to limited ground disturbance from Type 1 treatments.
RECREATION FEATURES – FRPA section 56 and 149, FPPR section 70	
Does the proposed treatment area contain interpretive sites, recreation trails, recreation sites, recreation facilities that are considered to be of significant recreation value and are designated a resource feature? YES ☒ NO ☐	Treatment Units TU-4 and RW-4 partially overlap with two recreational reserves: East Barriere Lake (East Side) (4.3ha) **REC31821** and Deadfall Creek (53.27ha) **REC6350**. The proposed treatments have been referred to the Kamloops Recreation District and a section 16 authorization has been received.
VISUAL QUALITY OBJECTIVES – GAR section 7, FRPA sections 180 and 181, FPPR section 9.2	
Is the proposed treatment within a scenic area? YES ☒ NO ☐	The EBL treatment area is located within the following Visual Landscape Inventory Polygons: Polygon # 416 VSC= 3 VAC= Medium EVC= Modified VQO = Modified Polygon # 1863 VSC= 4 VAC= High EVC= Partial Retention VQO= Partial Retention

	Polygon # 1848 VSC= 3 VAC= Medium EVC=Partial Retention VQO= Partial Retention The EBL treatment area design incorporates visual design concepts and principles (such as being located lower down of the landform, high tree retention, and borrowing from the natural character of the landscape). A Visual Impact Assessment (VIA) has been completed for the EBL Treatment Area. The RW1-RW4 clearcut units will be maintained as permanent non-green up features; as per the treatment of other utility corridor alterations the surface area measurements for the RW units have been counted as green for the percent alteration calculation (VIA Guidebook 2022). The Type 1 partial cut treatment units will meet the VQO definition of Partial retention (easy to see, small to medium in size and natural in appearance).
ARCHAEOLOGICAL RESOURCES/ CULTURAL HERITAGE RESOURCES – FPPR section 10	
Are there any known archaeological sites or cultural heritage resources that are important to First Nations within the proposed area? YES ☐ NO ☒	Information-sharing for these proposed treatment units has been completed and no concerns were identified. A Preliminary Field Review (PFR) was completed for this block; no archaeological sites were identified and no further archaeological work is required. If any archeology sites are discovered during treatment, a stop work order will be ordered and communicated to License Holder and Thompson River District Staff.
INVASIVE PLANTS - FRPA section 47 and FPPR section 17	
Is the introduction and spread of invasive plants likely as a result of the proposed treatment? YES ☒ NO ☐	An Invasive Alien Plant Program search was completed in November, 2024. While no invasive species were identified in the IAPP search for the EBL treatments area, the following invasive species were recorded in the general area of EBL: • Spotted knapweed (*Centaurea stoebe*) • Hoary alyssum (*Berteroa incana*) • Canada Thistle (*Cirsium arvense*) • Bull Thistle (*Cirsium vulgare*) • Sulphur cinquefoil (*Potentilla recta*) Operational crews should be aware and able to identify the above species. The following strategies are recommended to reduce likelihood of spreading invasive plants: - Trained and knowledgeable field crews who can identify and report discovered invasive plants through Report-a-Weed application. - Visual inspections and manually removal of vegetation found on vehicles, equipment and tools before entering the work site.

	- Grass seeding areas of excessively disturbed soil (i.e. exposed mineral soil) within 5 m of road that cannot be reforested should be seeded at manufacture's prescribed rates with native grass mixes (or forage mixture that meets or exceeds Canada Common Number 1 Forage Mixture as defined by the Canada Seeds Act) after completion of treatment activities. - Inspections of seeded areas within 24 months of seeding . Additional re-seeding within 12 months if found to be insufficiently revegetated to prevent the introduction or establishment of invasive species.

NATURAL RANGE BARRIERS - FRPA section 48, FPPR section 18	
Are there natural range barriers within the proposed treatment area that are likely to be removed or rendered ineffective? YES ☐ NO ☒	The EBL treatment areas overlap with the following range units: - Saskum – Vacant (referred to DTR) - RAN077239 – Active (referred to Robert Black) License holders have been engaged through consultation prior to treatment implementation, no concerns have been identified.
LAND USE OBJECTIVES - Higher Level Plans and objectives set by Government under the *Land Act*	
Are there land use objectives (higher level plans or objectives under the *Land Act*) that apply to the proposed treatment area or a Road Permit necessary to provide access to the treatment area? YES ☒ NO ☐	• Kamloops LRMP • Community Wildfire Resiliency Plan (CWRP) – TNRD Electoral Area "O" Lower North Thompson
Do the proposed activities conflict with land use objectives (higher level plans or objectives under the *Land Act*)? YES ☐ NO ☒	Prescription is not expected conflict with higher level plans
Known and potential species at risk, windthrow hazard, and old growth management areas? YES ☒ NO ☐	**Old Growth:** The majority of the EBL treatment units overlap Old Growth Management Areas (OMGAs) and/or Old Growth Deferral Areas (OGDAs). Treatment Units RW1 – RW4 are prescribed as a clearcut and will remove the existing stand structure present on the site to create an expanded opening along the powerline. The openings will function to improve safety, reduce wildfire risk and reduce outages and related costs along this section of the FSR and powerline. Treatment Units TU1 – TU4 are prescribed for a Type 1 treatment that involves select removal of non-merchantable understory trees while simultaneously retaining live Layer 1 trees. The removal of mature Layer 1

	trees >12.5 cm DBH will be limited to assessed danger trees that will not be placed in established in a No Work Zone. This treatment type intends to preserve the existing stand structure characteristics present on the site. The Thompson Rivers District has been engaged through the development of these treatment areas and has endorsed the proposed treatments; documentation on file. **Species at Risk** No species at risk were noted during fieldwork, or are known to be in the area as of writing this report (CDC iMap BC, November 2024). **Windthrow Risk** Windthrow assessments were completed for the proposed treatments. Where clearcut treatments are prescribed (RW1 – RW4) some minor windthrow following harvesting may occur. Prescribed hand treatments in TU1-TU4 are not expected to alter windthrow hazard.
CHRISTMAS TREE FARMS	
Does the proposed treatment overlap an active Christmas tree farm? YES ☐ NO ☒	N/A

G. OTHER CONSIDERATIONS AND REQUIREMENTS

CONSULTATION – FIRST NATIONS

FIRST NATION	CONCERNS IDENTIFIED AND MEASURES TO ADDRESS
First Nations consultation complete? YES ☒ NO ☐	Information-sharing completed March 2025; no concerns identified. A Preliminary Field Review (PFR) was completed for this block; no archaeological sites were identified and no further archaeological work is required.

CONSULTATION – GENERAL PUBLIC/COMMUNITY MEMBERS

East Barriere Lake residents have been engaged through consultation during treatment layout and again prior to treatment implementation, some concerns have been identified around potential for treatment to impact privacy and shading along the Forest Service Road. Several residents have provided written support of the project.

EXISTING TENURE HOLDERS (Forest, Range, Guide Outfitters, Trappers)

TENURE HOLDER	CONCERNS IDENTIFIED AND MEASURES TO ADDRESS
Trapline - TR0337T001	License holder (Brian Dack) has been engaged through consultation prior to treatment implementation, no concerns have been identified.
Range - RAN077239	The EBL treatment areas overlap with the following range units: - Saskum – Vacant (referred to DTR)

	- RAN077239 – Active (referred to Robert Black) License holders have been engaged through consultation prior to treatment implementation, no concerns have been identified.
PRIVATE PROPERTY	
Does private property border the proposed treatment area? YES ☒ NO ☐	Treatment is directly adjacent to several private property lots; refer to general public consultation statement above.
SMOKE MANAGEMENT	
Does a smoke management plan exist for the proposed treatment area? YES ☐ NO ☒	A smoke management plan is not provided as part of this prescription. Smoke management should be discussed with contractor during pre-work and all burning must align with provincial OBSCR regulations.
SAFETY	
Have any specific safety concerns been identified in or adjacent to the proposed treatment area? YES ☒ NO ☐	- Steep slopes exceeding 40% exist in parts of TU2, TU3, and TU4 - BC Hydro and TELUS utility lines parallel the East Barriere Lake FSR - High public use/ recreational area for residents within adjacent community Operational based safety practices should be reviewed with contractor prior to treatment.
UTILITIES	
Are utilities located in or adjacent to the proposed treatment area? i.e. power lines, gas lines, etc. YES ☒ NO ☐	BC Hydro and TELUS utility lines are located along East Barriere Lake FSR, within and adjacent to the treatment area. Prior to treatment activities, contractors should contact BC Hydro. WorkSafe BC's general limits of approach will be observed by contractors. If minimum distances cannot be observed, contractors will obtain assurance in writing using WorkSafe BC's form 30M33. BC Hydro has been engaged through consultation prior to treatment implementation, no concerns have been identified. A Certified Utility Arborist will used when tree falling occurs within the limits of approach of the hydro lines, and all burn piles will be located a minimum of 10m from utility lines.
ACCESS CONTROL	
Are there any foreseen issues with access and access control during and post treatment? YES ☒ NO ☐	The EBL treatment area is adjacent of East Barriere Lake FSR and has moderate to heavy public use - treatment activities such as tree falling and pile burning will require access control.
TRAFFIC CONTROL	

Is traffic control required at any point during operations? YES ☒ NO ☐	Treatments include road construction and tree falling along East Barriere Lake FSR, which is regularly used by the public. Traffic control will be required for road building and any tree falling activities within 2 tree lengths of the FSR.

H. STAND AND STOCK TABLE

Stand and stock data not required for treatments units RW1 to RW4.
Stand and stock data has been included for treatment units TU1 to TU4; these are included as attachments to this prescription.

I. TREATMENT DESCRIPTION

SURFACE FUEL LOADING

EXISTING AMOUNT, COMPOSITION, DISTRIBUTION, AND STRUCTURE:	TARGET AMOUNT, COMPOSITION, DISTRIBUTION, AND STRUCTURE:
Right-of-Way Treatment **Fine Woody Fuels (≤7cm):** 6-8 t/ha (avg ~7 t/ha) **Large Diameter Woody Fuels (>7cm - ≤20cm):** 0-14 t/ha (avg ~7 t/ha) **Coarse Woody Fuels (>20cm):** 0-95 t/ha (avg ~50 t/ha) **Type 1 Treatment** **Fine Woody Fuels (≤7cm):** 7-20 t/ha (avg ~14 t/ha) **Large Diameter Woody Fuels (>7cm - ≤20cm):** 10-36 t/ha (avg ~24t/ha) **Coarse Woody Fuels (>20cm):** 15 - 120 t/ha (avg ~108 t/ha) patches up to 210 t/ha Surface fuel loading is high throughout the treatment area, especially lower slope areas adjacent to the utility lines and East Barriere Lake FSR. Fine fuel loading consists of timber litter (twigs, branches, and needles), shrubs, herbs, and moss. There is a high amount of coarse fuel loading which exists as conifer and deciduous blowdown and powerline felling/ bucking; all of which is in various levels of decay. Blowdown in moderate in the rest of the EBL treatment area and is a result of various forest health problems	**Right-of-Way Treatment** **Fine Woody Fuels (≤7cm):** ≤11 t/ha **Large Diameter Woody Fuels (>7cm - ≤20cm):** ≤10 t/ha **Coarse Woody Fuels (>20cm):** ≤15 t/ha **Type 1 Treatment** **Fine Woody Fuels (≤7cm):** ≤11 t/ha **Large Diameter Woody Fuels (>7cm - ≤20cm):** ≤20 t/ha **Coarse Woody Fuels (>20cm):** ≤20 t/ha Surface fuel cleanup will involve targeting all debris from spacing and at least 95% of the pruning and previously down and recently felled debris from 20 cm to 1 cm in diameter (elevated stems, tops, and limbs, excluding designated CWD). • Elevated coarse woody debris up to 20 cm in diameter is to be removed through open burning. • Larger stems can be left as CWD as long as all elevated branches are removed and the stem is flush to the ground and are not crossed or in 'jackpots'. • Barkless debris more than 25% buried in the organic litter layer can be retained regardless of size to

including fir beetle, root rot, and mountain pine beetle.	prevent site disturbance. • CWD should be scattered with logs laid flush to the ground.

METHOD USED TO MEASURE	Surface fuel loading information was collected using fuel transects (line intersect method). Pre-treatment surface fuel loading is continuous and patchy.	
CROWN CLOSURE	Right-of-Way Treatment existing: **30 – 60 %** Type 1 Treatment existing: **50 - 65 %**	Right-of-Way Treatment target: **0 %** Type 1 Treatment target: **35 - 50%**

BIODIVERSITY AND FOREST HEALTH - CONSIDERATIONS AND TARGETS	
COARSE WOODY DEBRIS (CWD) RETENTION TARGET - SPH and Distribution	The Chief Foresters maximum coarse woody debris (CWD) target for ICH is 19 pieces per hectare of large CWD, each being a minimum of 10 m long and 20 cm in diameter at one end. This target may be exceeded provided that the surface fuel loading targets are met. Preference is to retain logs with signs of advanced decay, bark off, and those buried partly in the organic soil layer. Logs are to be left flush to the ground, all limbs/branches removed, and at a target of 5 m apart. Due to the presence of Douglas- fir Bark Beetle in the general area, do NOT fell and leave live/green Fd trees as CWD since this may increase potential for beetle infestation.
WILDLIFE TREE RETENTION TARGET	Suitable high quality wildlife trees (>12.5 cm) located within the Type 1 (TU) treatment units should be left standing provided that no greater than 5% of the treatment area is placed in no work zones for danger tree retention. Any broken stems should be left on site to provide suitable wildlife habitat. Suitable Wildlife trees may include stems with: - Internal decay (heart-rot or natural/ excavated cavities present); - Crevices present (loose bark or cracks suitable for bats); - Large brooms present; - Active or recent wildlife use; - Tree structure suitable for wildlife use (e.g., large nest, hunting perch, bear den, etc.); - Largest trees on site (>40cm DBH) and/or veterans
FOREST HEALTH	Douglas-fir Bark Beetle was noted within and surrounding the EBL treatment area. As a result, any live/green Douglas-fir fallen stems should not be left on site since this may increase the potential for beetle infestation. *Armillaria ostoyae* was observed within and adjacent to the EBL treatment area, occurring in a continuous patchy distribution.

TREATMENT SPECIFICATIONS SUMMARY	
Treatment Units	TREE REMOVAL/RETENTION STRATEGY BY SIZE/SPECIES (Summarize specifications identified in table above)
RW 1 – RW 4	Right of Way Treatment (RW1, RW2, RW3, RW4):

	A clearcut approach will be conducted to remove merchantable timber and blowdown and establish a more fire-resilient opening adjacent to the road and powerline. Temporary access roads will be required for processing & hauling (see prescription map for locations). Specific activities will include: • Clearcut harvest; • Road building; • Forwarding of logs to designated landings; • Processing of logs within designated landings; • Loading and hauling of logs off-site; • Pile burning for debris disposal. Chipping and/or grinding may be used as an alternative method to dispose of surface fuel as long as chipped material is hauled off site; • Surface fuel cleanup, piling, and pile burning

TU1 – TU 4	Type 1 Treatment:
	• Retain all live Layer 1 stems (>12.5 cm DBH) regardless of species, unless that tree is assessed as dangerous
	• Retain all living deciduous stems regardless of layer, unless that tree is assessed as dangerous
	• Retain deciduous shrubs within the treatment area
	• Retain trees marked with a "W" (Wildlife Tree)
	• Remove all dead or dangerous stems.
	  • Large diameter dead and dying trees may be retained if (1) assessed as safe, or (2) assessed as dangerous and placed in a No Work Zone (max 5% of the work area).
	  • Preference for retention of Act, At, Fd, and trees with unique features (e.g. spike top, cavities, brooms).
	• Remove all understory conifer stems that are dead/suppressed; remove all non-layer 1 Cedar
	• Remove understory conifer stems (<12.5 cm DBH) within 5.0m of the dripline of Layer 1 leave trees
	• Retain all understory conifer stems (<12.5 cm DBH) outside the 5.0m of the dripline of Layer 1 leave trees that have good form, health, and vigor.
	  • Trees will be spaced to a minimum inter-tree distance of 3.0m from other non-layer 1 trees where canopy gaps occur.
	  • Preference for retention of fire resistant and fire adapted species (Fd, Pw, Pl).
	  • Retained understory trees will be pruned 3.0m or up to 50% tree height.

TREATMENT SPECIFICATIONS – DESCRIPTION

RIGHT OF WAY TREATMENT UNITS (RW1 – RW4):

Tree Falling and Course Woody Debris Cleanup

Mechanical harvesting of unit to remove standing timber and reduce current surface fuel loading. Salvage all windblown timber and coarse woody debris that is present. Hoe chuck, forward or skid timber to roadside or designated landings.

Process all wood at roadside and designated landings.

Surface Fuel Cleanup

This aspect of the treatment is designed to reduce surface fuel loads within the treatment units to lower surface fuel loading by targeting the piling of over 95% debris generated from tree removal, along with pre-existing surface fuels. Removal of previously downed debris should focus on removing elevated stems, tops, and limbs from 1-20cm in diameter, excluding designated CWD. Bark-less debris more than 25% incorporated within the organic soil layer can be retained.

Snow Conditions

- Surface fuel removal should be conducted with snow free conditions, or minimal snow coverage to ensure surface fuel targets set in this prescription are met.

Surface Fuel Cleanup Measurable Standard

- Remove over 95% of tree removal debris into burn piles, down to 1 cm in diameter
- Remove over 95% of the available surface fuels into burn piles, between 1 cm to 20cm in diameter
- Fine Fuels (≤7 cm) must be ≤11 t/ha on average post-treatment
- Large Diameter Fuels (>7-≤20 cm) must be ≤20 t/ha on average post-treatment
- Coarse Fuels (>20 cm) must be ≤20 t/ha on average post-treatment
- Retain a maximum 19 pieces per hectare of large CWD, each being a minimum of 10 m long and 20 cm in diameter at one end

Open Burning

This aspect of the treatment is designed to remove fuel from the site.

- Piles should be at least 5.0m horizontal distance, from the coarse woody debris, recreation trails, waterlines, streams, and the edge of the Type 1 treatment unit boundaries.
- Piles should be located at least 10.0m from utility lines and poles.

Burning of piles should be left to the late Fall, Winter or early Spring, and conducted under conditions that will minimize spread. Burning must be complete within contract timelines. All open burning must be in compliance with the BC Wildfire Act, Wildfire Regulation Hazard Abatement Requirements, and Open Burning Smoke Control Regulations (OBSCR). As required by OBSCR, notice will be sent to the Ministry of Environment prior to pile burning commences.

Open Burning Measurable Standard

- All burn piles pushed in and over 95% of debris consumed
- All piles are fully extinguished

TYPE 1 TREATMENT UNITS (TU1 – TU4):

Tree Falling (>12.5 cm DBH)

All live Layer 1 trees (>12.5 cm DBH), deciduous trees, and trees marked with a "W" are to be retained during this treatment. Trees assessed and marked as dangerous by a WorkSafe BC certified Danger Tree Assessor are to be felled unless they have been placed in a No Work Zone (up to 5% of the work area may be placed in no work zones to accommodate wildlife tree retention). Any merchantable non-danger tree falling should be incidental only.
Falling work of trees in excess of 15 cm DBH located within TU treatment units must be completed by a BC Forest Safety Council certified Faller.

Understory Thinning (<12.5 cm DBH)

This aspect of the treatment is designed to reduce horizontal and vertical fuel continuity between surface and crown fuels reducing the crown fire, candling and spotting potential. It's designed to allow for the retention of some understory trees to support future stocking and stand structure within the treatment area. Understory (<12.5cm DBH) spacing to be completed as follows:

- Remove all cedar over 50 cm tall and under 12.5 cm DBH (non-layer 1)
- Minimum treatment height of 50 cm for all other conifers
- Remove all stems from within 5.0 m of the dripline of Layer 1 leave trees
- Any live/healthy stems not within 5.0m of a retained Layer 1 leave trees will be spaced (MITD 3.0 m)
- Remove all dead/suppressed stems
- Retain all deciduous trees

Thinning Measurable Standard

- Remove over 95% of understory trees that do not meet retention specs listed above

Pruning

This aspect of the treatment is designed to create a level of separation between surface and crown fuels reducing the crown fire, candling and spotting potential.

- Pruning will be conducted on all live and dead conifer stems over 3m in height and include both dead and live branches.
    - Trees will be pruned to a maximum of 50% of tree height (i.e. 50% live crown retained), or 3m from the ground to the lowest branch tip, whichever is less.
    - Pruned branch stubs should not to exceed 1cm in length.
- Trees under 3.0 m height should not be pruned due to small stem size and thin bark, however these trees should be spaced a minimum 4.5 m from the branch tip of neighboring trees.

Pruning Measurable Standard

- Remove over 95% of branches that occur or extend below 3m (unless restricted by tree height)

Surface Fuel Cleanup

This aspect of the treatment is designed to reduce surface fuel loads within the treatment area to lower surface fire intensity and likelihood of crown fire initiation. Surface fuel cleanup will involve targeting the piling of over 95% debris generated from felling, spacing and pruning as well as available surface fuels which existed prior to treatment. Removal of previously downed debris should focus on removing elevated stems, tops, and limbs from 1-20cm in diameter, excluding designated CWD. Bark-less debris more than 25% incorporated within the organic soil layer can be retained regardless of size to prevent site disturbance.

Snow Conditions

- Surface fuel removal should be conducted with snow free conditions, or minimal snow coverage to ensure surface fuel targets set in this prescription are met.

Surface Fuel Cleanup Measurable Standard

- Remove over 95% of spacing debris into burn piles, down to 1 cm in diameter

- Remove over 95% of pruned branches into burn piles, down to 1 cm in diameter
- Remove over 95% of the available surface fuels into burn piles, between 1 cm to 20cm in diameter
- Fine Fuels (≤7 cm) must be ≤11 t/ha on average post-treatment
- Coarse Fuels (>7 cm) must be ≤35 t/ha on average post-treatment
- Retain a maximum 19 pieces per hectare of large CWD, each being a minimum of 10 m long and 20 cm in diameter at one end

Open Burning

This aspect of the treatment is designed to remove fuel from the site included residue generated from the treatment as well as those which were pre-existing.

- Piles should be randomly distributed throughout the treatment area.
- Piles should be at least 5.0 meters, horizontal distance, from the coarse woody debris, recreation trails, waterlines, streams.
- Piles must be located to prevent scorch, root damage and stress to the leave trees.
- Piles are not to be more than 3m x 3m and piles to be at least as tall as wide before ignition can occur.
- Piles should be located at least ten meters from utility lines and poles.

Understory trees with excessively singed needles caused by burning of piles must be felled and burned along with the piles. Burning of piles should be left to the late Fall, Winter or early Spring, and conducted under conditions that will minimize spread. Burning must be complete within contract timelines. All open burning must be in compliance with the BC Wildfire Act, Wildfire Regulation Hazard Abatement Requirements, and Open Burning Smoke Control Regulations (OBSCR). As required by OBSCR, notice will be sent to the Ministry of Environment prior to pile burning commences.

Open Burning Measurable Standard

- All burn piles pushed in and over 95% of debris consumed
- All piles are fully extinguished

TREATMENT APPROACH – STAND MODIFICATION TREATMENT	
MERCHANTABLE TIMBER UTILIZATION: Was commercial timber harvest considered? YES ☒ NO ☐	Conventional harvesting will be used in the Treatment Units RW1-RW4 to reduce fuel loading in adjacent units along the BC Hydro powerline. This treatment will remove and utilize merchantable timber from within the treatment units along with non-merchantable understory trees. Commercial timber harvesting opportunities within the Type 1 treatment units (TU1 – TU4) are limited to due to prescribed retention of all layer 1 stems, but may include some volume recovery through danger tree removal and/or grinding depending on timing of treatments and market conditions.
BRUSHING	N/A
PRUNING	See treatment description.
THINNING	See treatment description.
SKIDDING/ PROCESSING	N/A
DEBRIS PILING	See treatment description.

PILE BURNING	See treatment description.
MULCHING	N/A
MASTICATION	N/A
GRINDING	N/A
PRESCRIBED FIRE	May be considered as a maintenance treatment upon further assessment.
PLANTING	N/A
OTHER	N/A
AUTHORIZATION AND TIMBER TENURE	
FRPA SECTION 52	Units TU1 – TU4: Section 52 authorization to be issued by Natural Resource District
FORESTRY LICENCE TO CUT (FLTC)	Units RW1 – RW4: Harvest authority to be issued by Natural Resource District
PARK USE PERMIT	N/A
ROAD PERMIT OR ROAD USE PERMIT	N/A
OTHER (E.G. LOCAL GOVERNMENT, UTILITIES)	Potentially WorkSafe BC assurance in writing form 30M33.

J. POST TREATMENT

EXPECTED VEGETATION RESPONSE

The Right of Way treatment (RW1-RW4) is designed to create an expanded opening along the existing BC Hydro/ TELUS utility line. This will create an open site that will likely become occupied with a mix of trees, shrubs, and herbs infill. Shrub layer may flourish for short term after canopy has been removed, however these species are not anticipated to significantly increase fire hazard.

The Type 1 treatment is designed to minimize vegetation growth and maintain a partly shaded understory. Few significant canopy openings are expected to be created by treatment, those that are should be supported by retention of spaced understory stems. A component of deciduous brush infill is expected in areas opened up by treatment activities. Shrub layer may flourish for short term after canopy has been opened, however, deciduous shrubs are not anticipated to significantly increase fire hazard.

ADDITIONAL TREATMENTS OR MAINTENANCE

The Right-of-way treatment is designed to create an expanded opening along the existing BC Hydro/ TELUS utility line using a clearcut silviculture system, future maintenance treatment may be required to maintain an open/ cleared forest structure.

The Type 1 treatment is designed to create a reasonably stable forest stand structure primarily comprised of layer 1 trees (>12.5cm DBH). Annual monitoring for the first five years is recommended to assess the stand response to opening the canopy and understory. Further forest mortality caused from natural disturbance agents such as bark beetles, root disease, windthrow, snow press, or wildfires in the area may trigger further fuel management hazard reduction efforts. The amount of coniferous regeneration in the stand should be monitored every five years to determine a further spacing and pruning treatment. Prescribed burning should be considered as a future maintenance treatment upon further assessment.

SILVICULTURE OBLIGATIONS:

Do silviculture obligations apply to the treatment area? YES ☐ NO ☒

The Right of Way treatment (RW1-RW4) is designed to remove 100% of the pre-harvest merchantable basal area of the stand and create an expanded opening along the existing BC Hydro/ TELUS utility line. These treatment units are intended to be maintained in an open / cleared state; therefore, no silviculture obligation will apply to the Right-of-Way treatment units under this prescription.

The Type 1 treatment (TU1-TU4) is designed to maintain >80% of the pre-harvest merchantable basal area of the stand. Merchantable basal area removal will be limited to dangerous trees and incidental loss. Therefore, no silviculture obligation will apply to the Type 1 treatment units under this prescription.

PLANTING: Is planting a treatment required as a legislative obligation? YES☐ NO ☒

Planting is not required.

K. OUTSTANDING WORKS

Cutting authorities to be issued by Natural Resource District
Certified utility arborist to be retained for danger tree removal adjacent to hydro line
Works permissions and forms from BC Hydro required prior to work starting

L. ADMINISTRATION

PREPARATION

FOREST PROFESSIONAL NAME *(Printed)*	FOREST PROFESSIONAL SIGNATURE
Mike Francis, RPF	REGISTERED PROFESSIONAL FORESTER PROVINCE OF MICHAEL FRANCIS BRITISH COLUMBIA NO. 4188
FPBC MEMBERSHIP NUMBER: 4188	DATE: April 22, 2025

M. ATTACHMENTS

MAPS: YES ☒ NO ☐ Type(s) Fuel Management Prescription Map	CRUISE DATA: YES ☐ NO ☒	WUI WTA Plots and Photos: YES ☐ NO ☒
FIELD DATA CARDS YES ☐ NO ☒ Type(s):	MODELING/DATA ANALYSIS: YES ☐ NO ☒ Type(s):	ARCHAEOLOGY IMPACT ASSESSMENT YES ☐ NO ☒ Completed By: Date:

AIR PHOTOS/IMAGERY: YES ☐ NO ☒	BURN PLAN: YES ☐ NO ☒	STAND AND STOCK TABLES: YES ☒ NO ☐ Describe: one table attached for each of the treatment units (TU1 – TU4)
BIOLOGIST ASSESSMENT: YES ☐ NO ☒ Completed By: Date:	TERRAIN STABILITY ASSESSMENT YES ☐ NO ☒ Completed By: Date:	VISUAL IMPACT ASSESSMENT YES ☒ NO ☐ Completed By: LNTCFS Date: March 4, 2025
BROWNS TRANSECT: YES ☐ NO ☒		

Right-of-way:

Project: East Barriere Lake		Pre-treatment	Post-treatment spec.
TU(s): TU - 1 to TU - 4	Weight of fuel (kg/m²):	0.7	1.1
Weather Station: East Barriere Lake (243)	Rate of Spread (m/min):	2.3	2.3
90th Percentile BUI: 137.52	Wildfire Intensity (kW/m):	496.8	759
90th Percentile ISI: 11.27	own Base Height (CBH) (m):[1]	1	3
CFFBPS Fuel Type: C5	tical Surface Intensity (kW/m):	158.6	824.1

[1]CBH - refer to Fuel Management Prescription Guidance for CBH measurement direction

Surface Fire Intensity Targets		
Is Wildfire Intensity below 2000 kW/m?	Yes	← These boxes auto populate when Wildfire Intensity and CSI values are input into their respective boxes.
Is Wildfire Intensity less than CSI?	Yes	←

Critical Surface Fire Intensity Calculations

Wildfire Intensity I = HWR (Byram 1959)		
Enter Weight of the Fuel (kg/m²)	→	1.1
Enter Rate of Spread (m/min)	→	2.3
Wildfire Intensity (kW/m)	=	759.0

Wildfire intensity is used to index fire suppression difficulty and to evaluate whether the critical threshold for crown fire ignition has been exceeded. Post-treatment wildfire intensity should be below 2,000 kW/m or the CSI, whichever is the lower value.

Critical Surface Fire Intensity for Initial Crown Combustion (Van Wagner 1977)		
Enter Foliar Moisture Content (%)	→	95
Enter Crown Base Height (m)	→	3.0
Critical Surface Fire Intensity (kW/m)	=	824.1

The threshold for which a surface fire will begin to involve crown fuel is the Critical Surface Fire Intensity (CSI). Suppression is more successful when the surface fire intensity is less than the CSI and crown fuel is not ignited.

Type 1:

Project: East Barriere Lake		Pre-treatment	Post-treatment spec.
TU(s): TU - 1 to TU - 4	Weight of fuel (kg/m²):	1.4	1.1
Weather Station: East Barriere Lake (243)	Rate of Spread (m/min):	2.3	2.3
90th Percentile BUI: 137.52	Wildfire Intensity (kW/m):	966	759
90th Percentile ISI: 11.27	own Base Height (CBH) (m):[1]	1	3
CFFBPS Fuel Type: C5	tical Surface Intensity (kW/m):	158.6	824.1

[1]CBH - refer to Fuel Management Prescription Guidance for CBH measurement direction

Surface Fire Intensity Targets		
Is Wildfire Intensity below 2000 kW/m?	Yes	← These boxes auto populate when Wildfire Intensity and CSI values are input into their respective boxes.
Is Wildfire Intensity less than CSI?	Yes	←

Critical Surface Fire Intensity Calculations

Wildfire Intensity I = HWR (Byram 1959)		
Enter Weight of the Fuel (kg/m²)	→	1.1
Enter Rate of Spread (m/min)	→	2.3
Wildfire Intensity (kW/m)	=	759.0

Wildfire intensity is used to index fire suppression difficulty and to evaluate whether the critical threshold for crown fire ignition has been exceeded. Post-treatment wildfire intensity should be below 2,000 kW/m or the CSI, whichever is the lower value.

Critical Surface Fire Intensity for Initial Crown Combustion (Van Wagner 1977)		
Enter Foliar Moisture Content (%)	→	95
Enter Crown Base Height (m)	→	3.0
Critical Surface Fire Intensity (kW/m)	=	824.1

The threshold for which a surface fire will begin to involve crown fuel is the Critical Surface Fire Intensity (CSI). Suppression is more successful when the surface fire intensity is less than the CSI and crown fuel is not ignited.

EBL - TU 1 Species and Diameter Class	Avg CBH	Avg Ht	SPH	CUT	LEAVE
Layer 1A (>40cm DBH)					
Spruce	12	32	20	0	20
		TOTAL LIVE (healthy)	20	0	20
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	20	0	20
		TOTAL ALL	20	0	**20**
Layer 1B (27.5 - 39.9cm DBH)					
Cedar	2	20	20	0	20
Douglas-fir	15	26	40	0	40
Spruce	8	27	40	0	40
Birch	17	23	20	0	20
		TOTAL LIVE (healthy)	120	0	120
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	100	0	100
		TOTAL ALL	120	0	**120**
Layer 1C (22.5 - 27.4cm DBH)					
Douglas-fir	2	13	40	0	40
Birch	15	22	100	43	57
		TOTAL LIVE (healthy)	80	0	80
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	60	43	17
		TOTAL CONIFER	40	0	40
		TOTAL ALL	140	43	**97**
Layer 1D (17.5 - 22.4cm DBH)					
Cedar	1	17	120	0	120
Douglas-fir	3	8	20	0	20
Spruce	1	12	20	0	20
Lodgepole Pine	0	21	20	0	20
Aspen	17	24	20	0	20
Birch	12	19	40	14	26
		TOTAL LIVE (healthy)	220	0	220
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	20	14	6
		TOTAL CONIFER	180	0	180
		TOTAL ALL	240	14	**226**
Layer 1E (12.5 - 17.4cm DBH)					
Cedar	0	12	80	0	80
Douglas-fir	3	13	40	29	11
Spruce	4	14	20	0	20
Birch	8	17	60	0	60
		TOTAL LIVE (healthy)	160	0	160
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	40	29	11
		TOTAL CONIFER	140	29	111
		TOTAL ALL	200	29	**171**

TOTALS LAYER 1 (>=12.5cm DBH)					
TOTAL CONIFER			71%		451
TOTAL ALL					**634**

Layer 2					
Cedar	2	10	180	180	0
Spruce	2	10	80	0	80
Birch	5	17	20	0	20
		TOTAL LIVE (healthy)	100	0	100
		TOTAL Live (suppressed)	180	180	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	260	180	80
		TOTAL ALL	280	180	**100**

Layer 3					
Cedar	0	4	2060	2060	0
Douglas-fir	0	2	180	160	20
Spruce	1	3	80	70	10
White Pine	0	2	100	90	10
Western Hemlock	0	2	20	20	0
Subalpine Fir	0	1	20	20	0
Birch	1	3	60	0	60
		TOTAL LIVE (healthy)	820	720	100
		TOTAL Live (suppressed)	1680	1680	0
		TOTAL DEAD	20	20	0
		TOTAL CONIFER	2460	2420	40
		TOTAL ALL	2520	2420	**100**

Layer 4					
Cedar	0	1	3900	3900	0
Douglas-fir	0	0	1080	1080	0
Spruce	0	1	20	20	0
White Pine	0	0	620	620	0
Western Hemlock	0	0	620	620	0
Aspen	1	2	20	0	20
Birch	0	1	20	0	20
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	6280	6240	40
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	6240	6240	0
		TOTAL ALL	6280	6240	**40**

EBL - TU 2 Species and Diameter Class Layer 1A (>40cm DBH)	Avg CBH	Avg Ht	SPH	CUT	LEAVE
Douglas-fir	1	27	25	25	0
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	25	25	0
		TOTAL CONIFER	25	25	0
		TOTAL ALL	25	25	**0**
Layer 1B (27.5 - 39.9cm DBH)					
Cedar	4	22	100	0	100
		TOTAL LIVE (healthy)	100	0	100
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	100	0	100
		TOTAL ALL	100	0	**100**
Layer 1C (22.5 - 27.4cm DBH)					
Cedar	2	18	25	0	25
Spruce	3	30	25	0	25
		TOTAL LIVE (healthy)	50	0	50
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	50	0	50
		TOTAL ALL	50	0	**50**
Layer 1D (17.5 - 22.4cm DBH)					
Cedar	2	20	200	0	200
Douglas-fir	8	24	25	0	25
Spruce	1	24	25	0	25
		TOTAL LIVE (healthy)	250	0	250
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	250	0	250
		TOTAL ALL	250	0	**250**
Layer 1E (12.5 - 17.4cm DBH)					
Cedar	1	15	75	0	75
Western Hemlock	3	13	25	0	25
Birch	9	19	100	0	100
		TOTAL LIVE (healthy)	200	0	200
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	100	0	100
		TOTAL ALL	200	0	**200**

TOTALS LAYER 1 (>=12.5cm DBH)					
TOTAL CONIFER			83.3		500
TOTAL ALL					**600**

Layer 2					
Cedar	3	12	975	975	0
White Pine	1	9	25	0	25
Lodgepole Pine	4	9	25	25	0
Subalpine Fir	5	11	25	25	0
Birch	0	12	100	75	25
		TOTAL LIVE (healthy)	750	700	50
		TOTAL Live (suppressed)	300	300	0
		TOTAL DEAD	100	100	0
		TOTAL CONIFER	1050	1025	25
		TOTAL ALL	1150	1100	**50**

Layer 3					
Cedar	1	3	2975	2975	0
Western Hemlock	1	2	50	50	0
Birch	1	2	100	0	100
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	3100	3000	100
		TOTAL DEAD	25	25	0
		TOTAL CONIFER	3025	3025	0
		TOTAL ALL	3125	3025	**100**

Layer 4					
Cedar	0	1	2825	2825	0
Douglas-fir	0	1	700	600	100
Spruce	0	1	475	400	75
White Pine	0	0	25	0	25
Western Hemlock	0	1	450	450	0
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	4475	4475	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	4475	4275	200
		TOTAL ALL	4475	4275	**200**

EBL - TU 3 Species and Diameter Class	Avg CBH	Avg Ht	SPH	CUT	LEAVE
Layer 1A (>40cm DBH)					
Cedar	1.25	29	18	9	9
Douglas-fir	0.5	28	9	0	9
Spruce	8	44	9	0	9
White Pine	15	35.5	18	9	9
Birch	18	23	9	0	9
		TOTAL LIVE (healthy)	45	0	45
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	18	18	0
		TOTAL CONIFER	55	18	37
		TOTAL ALL	64	18	**46**
Layer 1B (27.5 - 39.9cm DBH)					
Cedar	1	23	45	0	45
Douglas-fir	2	24	27	18	9
Western Hemlock	1	21	9	0	9
		TOTAL LIVE (healthy)	64	0	64
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	18	18	0
		TOTAL CONIFER	82	18	64
		TOTAL ALL	82	18	**64**
Layer 1C (22.5 - 27.4cm DBH)					
Cedar	4	18	145	0	145
Douglas-fir	4	20	18	0	18
		TOTAL LIVE (healthy)	164	0	164
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	164	0	164
		TOTAL ALL	164	0	**164**
Layer 1D (17.5 - 22.4cm DBH)					
Cedar	1	20	118	9	109
White Pine	0	20	9	0	9
		TOTAL LIVE (healthy)	118	0	118
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	9	9	0
		TOTAL CONIFER	127	9	118
		TOTAL ALL	127	9	**118**
Layer 1E (12.5 - 17.4cm DBH)					
Cedar	2	14	327	45	282
Douglas-fir	1	18	27	0	27
Western Hemlock	2	15	36	0	36
		TOTAL LIVE (healthy)	345	0	345
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	45	45	0
		TOTAL CONIFER	391	45	346
		TOTAL ALL	391	45	**346**

TOTALS LAYER 1 (>=12.5cm DBH)					
TOTAL CONIFER			98.8		728
TOTAL ALL					**737**

Layer 2					
Cedar	2	9	391	391	0
Douglas-fir	0	10	36	0	36
White Pine	0	6	9	0	9
		TOTAL LIVE (healthy)	264	219	45
		TOTAL Live (suppressed)	136	136	0
		TOTAL DEAD	36	36	0
		TOTAL CONIFER	436	391	45
		TOTAL ALL	436	391	**45**

Layer 3					
Cedar	0	2	2373	2373	0
Douglas-fir	0	4	200	175	25
Spruce	0	5	9	0	9
White Pine	0	3	18	0	18
Western Hemlock	0	3	55	55	0
Subalpine Fir	0	4	9	9	0
Aspen	2	3	18	0	18
Birch	1	3	118	0	118
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	2764	2576	188
		TOTAL DEAD	36	36	0
		TOTAL CONIFER	2664	2612	52
		TOTAL ALL	2800	2612	**188**

Layer 4					
Cedar	0	1	2045	2045	0
Douglas-fir	0	1	564	564	0
Spruce	0	1	127	127	0
White Pine	0	0	73	73	0
Western Hemlock	0	1	127	127	0
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	2936	2936	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	2936	2936	0
		TOTAL ALL	2936	2936	**0**

EBL TU 4 Species and Diameter Class	Avg CBH	Avg Ht	SPH	CUT	LEAVE
Layer 1A (>40cm DBH)					
Cedar	5.4	29.1	64	0	64
Douglas-fir	9.6	27.5	100	45	55
Spruce	1	40	18	0	18
Aspen	27	32	9	0	9
		TOTAL LIVE (healthy)	145	0	145
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	45	45	0
		TOTAL CONIFER	182	45	137
		TOTAL ALL	191	45	**146**
Layer 1B (27.5 - 39.9cm DBH)					
Cedar	6	25	136	9	127
Douglas-fir	3	22	18	18	0
Spruce	3	35	18	0	18
Western Hemlock	5	23	45	0	45
		TOTAL LIVE (healthy)	182	0	182
		TOTAL Live (suppressed)	9	0	9
		TOTAL DEAD	27	27	0
		TOTAL CONIFER	218	27	191
		TOTAL ALL	218	27	**191**
Layer 1C (22.5 - 27.4cm DBH)					
Cedar	2	19	55	0	55
		TOTAL LIVE (healthy)	55	0	55
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	55	0	55
		TOTAL ALL	55	0	**55**
Layer 1D (17.5 - 22.4cm DBH)					
Cedar	2	15	118	36	82
Western Hemlock	2	20	36	0	36
		TOTAL LIVE (healthy)	118	0	118
		TOTAL Live (suppressed)	0	0	0
		TOTAL DEAD	36	36	0
		TOTAL CONIFER	155	36	119
		TOTAL ALL	155	36	**119**
Layer 1E (12.5 - 17.4cm DBH)					
Cedar	4	13	82	0	82
Western Hemlock	9	12	18	0	18
		TOTAL LIVE (healthy)	64	0	64
		TOTAL Live (suppressed)	36	0	36
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	100	0	100
		TOTAL ALL	100	0	**100**

TOTALS LAYER 1 (>=12.5cm DBH)					
TOTAL CONIFER			98.5		601
TOTAL ALL					**610**

Layer 2					
Cedar	2	7	191	191	0
Douglas-fir	0	12	9	9	0
Western Hemlock	1	8	18	0	18
		TOTAL LIVE (healthy)	100	82	18
		TOTAL Live (suppressed)	100	100	0
		TOTAL DEAD	18	18	0
		TOTAL CONIFER	218	200	18
		TOTAL ALL	218	200	**18**

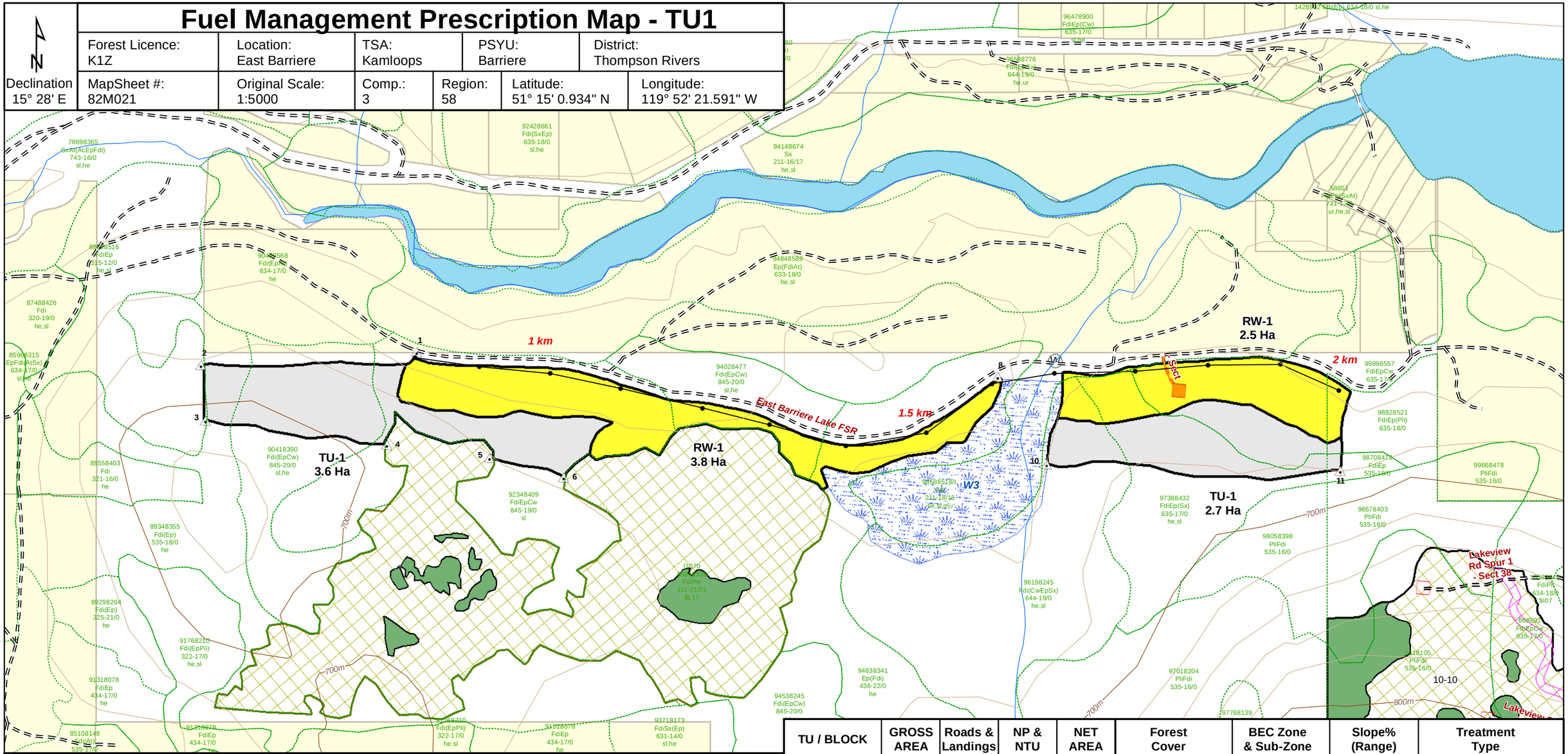
Layer 3					
Cedar	0	2	745	745	0
Douglas-fir	0	2	91	75	16
Spruce	0	2	200	175	25
White Pine	1	5	9	0	9
Western Hemlock	0	2	227	227	0
Birch	2	6	64	0	64
		TOTAL LIVE (healthy)	45	0	45
		TOTAL Live (suppressed)	1264	1195	69
		TOTAL DEAD	27	27	0
		TOTAL CONIFER	1273	1222	51
		TOTAL ALL	1336	1222	**114**

Layer 4					
Cedar	0	1	836	836	0
Douglas-fir	0	1	100	75	25
Spruce	0	1	118	100	18
White Pine	0	0	18	0	18
Western Hemlock	0	0	127	127	0
Aspen	1	1	73	0	73
		TOTAL LIVE (healthy)	0	0	0
		TOTAL Live (suppressed)	1273	1273	0
		TOTAL DEAD	0	0	0
		TOTAL CONIFER	1200	1138	62
		TOTAL ALL	1273	1138	**135**

Fuel Management Prescription Map - TU1

Forest Licence:	Location:	TSA:	PSYU:	District:
K1Z	East Barriere	Kamloops	Barriere	Thompson Rivers

Declination	MapSheet #:	Original Scale:	Comp.:	Region:	Latitude:	Longitude:
15° 28' E	82M021	1:5000	3	58	51° 15' 0.934" N	119° 52' 21.591" W



Block Boundary		400 mm CMP		Wildlife Trees	
WTP		Gate / Blockage		Rock	
Falling Corner	2	Powerline / Poles		Designated Crossing	
Water Source	W	Landing - Proposed		Water Lines	
Nest	N	Road - Proposed		NCD - Stream	NCD
Avalanche Area		Landing - Constucted		Stream	S6
Slope Break		Road - Contructed / FTEN		Machine Free Zone	
Gully		Landing - Rehab/Temp		Lakeshore Management Zone	
RESULTS Openings		Temporary Access Structure		Lakes / Water Bodies / Rivers	
VRI		Recreation Trail		Swamp / Wetlands	
Contour Lines		Bladed Skid Trail		OGMA	

Lower North Thompson Community Forest Society

PO Box 983 Barriere, BC V0E 1E0

P: 250-672-1941 F: 250-672-1942

e: lntcfsociety@telus.net

Date mapped: December 12, 2024
File Name: EBL_TU1.mxd
Mapped By: T.B. (Todd) Phillips

444 Clearwater Valley Rd.
Clearwater, BC
V0E 1N1
P: (250) 674-4092

admin@thompsonresource.com

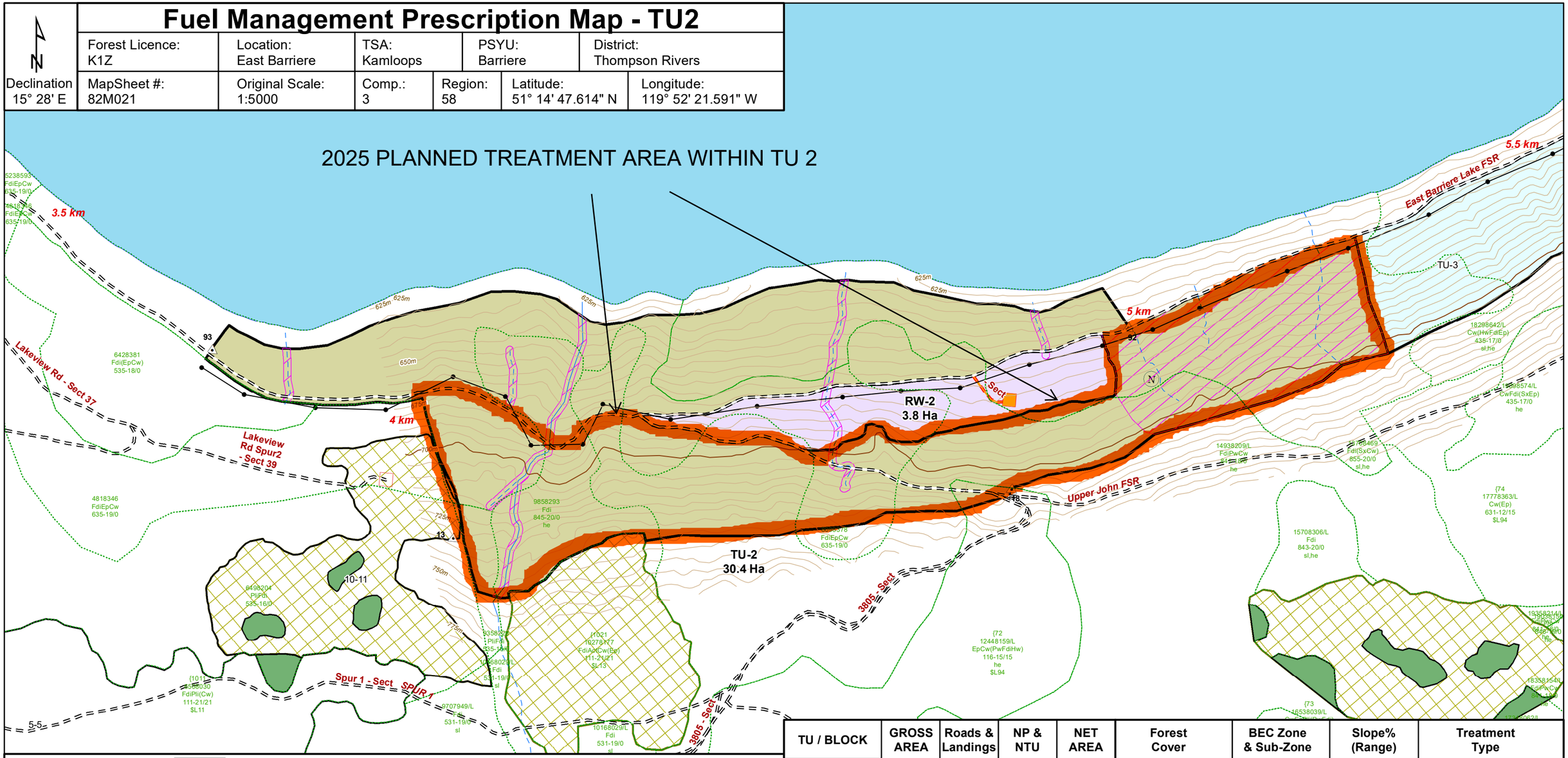
TU / BLOCK	GROSS AREA	Roads & Landings	NP & NTU	NET AREA	Forest Cover	BEC Zone & Sub-Zone	Slope% (Range)	Treatment Type
TU 1	6.2			6.2	CF(S) 645-O/19	ICHmw3 01,05	20% (5 - 30)	Hand Treat
Block RW1	6.3	0.1		6.2	CF(S) 645-O/19	ICHmw3 01,05	20% (5 - 30)	Clearcut
TU 2	30.4	1.9		28.5	C(FESH) 734-O/19	ICHmw3 01,04	30% (5 - 35)	Hand Treat
Block RW2	3.8	0.1		3.7	C(FESH) 734-O/19	ICHmw3 01,04	30% (5 - 35)	Clearcut
TU 3	25.6	1.3		24.3	C(FHP) 745-O/17	ICHmw3 01	35% (15 - 50)	Hand Treat
Block RW3	3.6	0.3		3.3	C(FHP) 745-O/17	ICHmw3 01	35% (15 - 50)	Clearcut
TU 4	48.0	3.1		44.9	C(FSH) 845-O/20	ICHmw3 01,04	15% (5 - 45)	Hand Treat
Block RW4	17.9	1.8		16.1	C(FSH) 845-O/20	ICHmw3 01,04	15% (5 - 45)	Clearcut
TOTAL	**141.8**	**8.6**		**132.2**				

Fuel Management Prescription Map - TU2

Forest Licence: K1Z	Location: East Barriere	TSA: Kamloops	PSYU: Barriere	District: Thompson Rivers	
MapSheet #: 82M021	Original Scale: 1:5000	Comp.: 3	Region: 58	Latitude: 51° 14' 47.614" N	Longitude: 119° 52' 21.591" W

Declination 15° 28' E

2025 PLANNED TREATMENT AREA WITHIN TU 2



Block Boundary		400 mm CMP		Wildlife Trees	
WTP		Gate / Blockage		Rock	
Falling Corner	2	Powerline / Poles		Designated Crossing	
Water Source	W	Landing - Proposed		Water Lines	
Nest	N	Road - Proposed		NCD - Stream	NCD
Avalanche Area		Landing - Constucted		Stream	S6
Slope Break		Road - Contructed / FTEN		Machine Free Zone	
Gully		Landing - Rehab/Temp		Lakeshore Management Zone	
RESULTS Openings		Temporary Access Structure		Lakes / Water Bodies / Rivers	
VRI		Recreation Trail		Swamp / Wetlands	
Contour Lines		Bladed Skid Trail		OGMA	

TU / BLOCK	GROSS AREA	Roads & Landings	NP & NTU	NET AREA	Forest Cover	BEC Zone & Sub-Zone	Slope% (Range)	Treatment Type
TU 1	6.2			6.2	CF(S) 645-O/19	ICHmw3 01,05	20% (5 - 30)	Hand Treat
Block RW1	6.3	0.1		6.2	CF(S) 645-O/19	ICHmw3 01,05	20% (5 - 30)	Clearcut
TU 2	30.4	1.9		28.5	C(FESH) 734-O/19	ICHmw3 01,04	30% (5 - 35)	Hand Treat
Block RW2	3.8	0.1		3.7	C(FESH) 734-O/19	ICHmw3 01,04	30% (5 - 35)	Clearcut
TU 3	25.6	1.3		24.3	C(FHP) 745-O/17	ICHmw3 01	35% (15 - 50)	Hand Treat
Block RW3	3.6	0.3		3.3	C(FHP) 745-O/17	ICHmw3 01	35% (15 - 50)	Clearcut
TU 4	48.0	3.1		44.9	C(FSH) 845-O/20	ICHmw3 01,04	15% (5 - 45)	Hand Treat
Block RW4	17.9	1.8		16.1	C(FSH) 845-O/20	ICHmw3 01,04	15% (5 - 45)	Clearcut
TOTAL	**141.8**	**8.6**		**132.2**				

Lower North Thompson Community Forest Society
PO Box 983 Barriere, BC V0E 1E0
P: 250-672-1941 F: 250-672-1942
e: lntcfsociety@telus.net

Date mapped: April 7, 2025
File Name: EBL_TU2.mxd
Mapped By: T.B. (Todd) Phillips

444 Clearwater Valley Rd.
Clearwater, BC
V0E 1N1
P: (250) 674-4092
admin@thompsonresource.com

APPENDIX C

File: 00265-20/Year [Hit F11 to enter information into fields]

Date

VIA EMAIL/ REGISTERED MAIL/[delete if not applicable]

Name/Company Name
Address 1
Address 2
City, British Columbia
Postal Code

Dear First Name and Last Name:

In accordance with your request dated Date, authority is hereby granted under section 52(1)(b) of the *Forest and Range Practices Act* to cut/damage/destroy trees for the purposes of located . Authority is restricted to the areas of Crown land on the attached map, and only to the extent necessary to facilitate works.

This authority is subject to the following conditions: [Add any special requirements relevant to the specific application]

1. Any species, size, live/dead tree requirements?
2. Include any special requirement here.
3. Include any special requirement here.
4. Activities must be in accordance with attached prescription?
5. Wildlife trees reference needed?
6. Fisheries Act reference needed?
7. Any fire hazard must be abated in accordance with the Wildfire Act.
8. No timber may be removed from the location on the attached map/ area under this authority.
9. A copy of this letter and associated maps must be on site while activities are being carried out.
10. This authorization expires Date.

If you have any questions, please contact Name, Title, at Phone number.

Yours truly,

District Manager Name
District Manager,
Thompson Rivers Forest District

Attachment(s):
cc:

PRE-WORK CONFERENCE CHECKLIST

APPENDIX D

District:	LNTCFS Representative:	Date of Pre-Work: Click here to enter a date.
Contract #:	Geographic Location:	Project Name:
Contractor Legal Name:		Contractor Representative:
Treatment Units Applicable to Pre-work (insert TU names):		Pre-work Method: ☐ Field ☐ Office ☐ Video Conference/Telephone

How to populate the check boxes:
Y: Discussed and an understanding of contractor requirements is confirmed.
N: Discussed and a follow-up is required. **Add follow-up requirement details at the end of the document.**
NA: Not applicable.

GENERAL	**Y**	**N**	**NA**
Formalize responsibilities of the LNTCFS representative and/or inspector who will administer the contract on behalf of the LNTCFS.	☐	☐	☐
Formalize responsibilities of the contractor representative (***note:*** if this person is acting on behalf of the contractor at this conference, ensure you have a signed authorization letter to this effect from the contractor).	☐	☐	☐
Confirm roles and responsibilities and names of contractor's team (key personnel).	☐	☐	☐
Review the communication plans.	☐	☐	☐
Confirm the subcontractors designated by the Contractor.	☐	☐	☐
Confirm the date of the work site tour to review work conditions, boundaries, access, and hazards. Planned date of work site tour: Click here to enter a date.	☐	☐	☐
Reaffirm requirement not to begin work prior to the start-up date and not before receipt of a Notice to Commence Work.	☐	☐	☐
Confirm arrangements for the provision of any LNTCFS supplied materials, services, or equipment (e.g., LNTCFS supplied tree seedlings, culverts, etc.).	☐	☐	☐
Explanation of contract enforcement process, including progression to possible contract cancellation.	☐	☐	☐
Review the dispute resolution process as per the contract.	☐	☐	☐
Confirm all stakeholder notification requirements and reaffirm that the contractor is to notify the public of work affecting them directly (i.e., trail closures, road work, etc.), and to try to minimize any inconvenience to the public. Notification may include advertising in the media, signage, etc.	☐	☐	☐
SAFETY REQUIREMENTS			
General	**Y**	**N**	**NA**
Confirm proof of WorkSafe coverage, including Personal Optional Protection as applicable.	☐	☐	☐
Advise that the LNTCFS cooperates with and the Employment Standards Branch to monitor compliance the *Employment Standards Act*.	☐	☐	☐
For silviculture work, bring attention to the Compliance with Employment Standards Inspection Form (FS775a and FS775b).	☐	☐	☐
Advise that the LNTCFS cooperates with WorkSafe to monitor compliance with safety and that all activities are to be conducted in a manner consistent with the Act and safe work practices. This includes assessment of first aid requirements and adequate equipment and resources; ensuring safe work conditions/procedures and personal protective equipment, procedures, and communications in place for man check, signage, hazard awareness, etc.	☐	☐	☐

Ensure Contractor is aware that any safety concerns that are within the control of the LNTCFS should be brought to the attention of the LNTCFS Representative.	☐	☐	☐
Review the requirement for an emergency response plan to be in place.	☐	☐	☐
Ensure contractor is aware of the compulsory registration with ICBC of all off road vehicles, requirement for safety gear and displaying license decal.	☐	☐	☐
Ensure contractor is aware of their responsibilities for employee safety training, supervision, and reporting. This should include a review of the contract Safety Conditions Schedule.	☐	☐	☐
Ensure contractor meets the requirements for all safety equipment and emergency transportation.	☐	☐	☐
Discuss known safety hazards and the methods the contractor will use to deal with unsafe work conditions such as snags, hazardous areas, weather, or wild animal problems, etc., including new hazards since advertisement.	☐	☐	☐
Ensure the Contractor is aware, as per the *Wildfire Act*, that a person carrying out an industrial activity must "immediately carry out fire control and extinguish the fire, if practicable" on any fire within 1 km of their work site and the *Workers' Compensation Act* states that any worker who may be called upon to fight a forest fire must receive firefighting training acceptable to the Workers Compensation Board and that training must be delivered on an annual basis.	☐	☐	☐
Discuss resource road use protocols.	☐	☐	☐
Notice of Project	**Y**	**N**	**NA**
Verify the contractor has submitted the appropriate Notice of Project to WSBC. These forms are obtained through WSBC.	☐	☐	☐
Prime Contractor Agreement - Multiple Employer Workplace	**Y**	**N**	**NA**
Will Contractor or LNTCFS create multiple employer workplace? If no, skip to next section.	☐	☐	☐
Ensure the Contractor is qualified and capable of being Prime Contractor. Review contractual requirement and explain Prime Contractor functions to ensure the Contractor understands: ○ their function as Prime Contractor ○ requirement to reviews other employers' safety programs and practices to ensure conformance ○ requirement to cooperate with a designated Prime Contractor Ensure the Contractor Prime Contractor has adequate program procedures to discharge prime obligations. Execute the Prime Contractor Agreement (NRS 1354).	☐	☐	☐
If this Contractor is not the Prime Contractor: ○ provide copy of the Prime Contractor Agreement inserting this Contractor as an Affected Party ○ update and distribute all other parties agreements	☐	☐	☐
Ensure the Contractor is aware and understands their function as Prime Contractor if they choose to subcontract.	☐	☐	☐
Manual (Hand) Falling Operations	**Y**	**N**	**NA**
Ensure the Contractor understands the need for and requirement to designate a qualified falling supervisor.	☐	☐	☐
If trees 6" or more at the stump will be cut by hand, a WRR Manual Falling Verification form must be completed by the contractor and reviewed by the LNTCFS representative.	☐	☐	☐
Review the Hand Falling Supervisor qualifications (must know the hazards and the means to control the hazards and can instruct, direct and control workers, understands procedures and the documentation required in regards to manual tree falling operations).	☐	☐	☐
Review Faller certification/qualifications	☐	☐	☐
Supervisor to ensure adequate Falling Plan prior to commencement of falling operations.	☐	☐	☐
Danger Trees	**Y**	**N**	**NA**
Ensure Contractor is aware that before work can start, a full assessment is required by a certified Wildlife/Dander Tree Assessor for any suspected danger trees considered for retention. Any suspect trees assessed as "safe" and left standing must be documented, marked, mapped and communicated to workers.	☐	☐	☐
Camp Standards	**Y**	**N**	**NA**

Highlight the requirement that *Employment Standards Act* and its Regulations and note that compliance is part of the contract;	☐	☐	☐
Where an industrial camp is for silviculture workers, advise that copies of the Silviculture Workers Fact Sheet must be posted at the camp and copies provided to all silviculture workers (link to the fact sheet is found in the Camp Standards Schedule.	☐	☐	☐
Advise that a copy of the Camp Standards Schedule must be permanently posted in a prominent place in the camp.	☐	☐	☐
Advise that 72 hour notification must be given to the LNTCFS representative, WorkSafe BC, and the local Health Authority prior to any camp being established (links to Health and WorkSafe are found in the Camp Standards Schedule).	☐	☐	☐
Ensure Contractor is aware of their requirement to review the camp standards and plans and proposed location to ensure that the site is suitable considering local site parameters, other resource users, tenure holders, downstream impacts, First Nation concerns, and other factors.	☐	☐	☐
As per the Operational Services Contract, provide Contractor with written approval to establish a temporary camp.	☐	☐	☐
WRR Services	**Y**	**N**	**NA**
Complete a Contract Work Progress Plan (NRS 791b). This should include: 1. The identification of the initial work monitoring areas as per the contract Schedule A section 3.03. 2. The identification of priority treatment areas including clear direction on deadline dates by activity including the prioritization of pile burning within specific areas to be completed prior to the next fire season (e.g., all pile burning must be completed within TU1 prior to fire season).	☐	☐	☐
Ensure the contactor is aware of the post-treatment targets for: • conifer thinning, • pruning heights, • fine woody debris, • large woody debris, • coarse woody debris, and • any other specified targets. This should include a discussion of the pre-treatment values and the cutting and clean up requirements to achieve the post-treatment targets.	☐	☐	☐
Review the debris management strategy. This should include at a minimum the following details as applicable: Pile burning: • burn pile construction standards • burn pile placement criteria • burn timing Residual fibre utilization: • material staging and processing areas • review of the processing equipment • hauling vehicle access and turnaround locations	☐	☐	☐
Review the contract quality monitoring details in section 3.02 of the contract Schedule A. This includes: • the minimum LNTCFS inspection plot density and the Quality Monitoring Sampling Plan Map • the fixed area plot sizes or variable radius plot prism sizes and process • the surface fuel loading transects process • the plot establishment method • general inspection process for pile burning, CWD etc.	☐	☐	☐
Review the method of calculating payment, including the percent quality of work calculations, holdback provisions, and any charges or deductions that may result from non-compliance or unsatisfactory work.	☐	☐	☐
Review of other critical site factors. E.g., recreation use, traffic control.	☐	☐	☐

Ensure the contactor is aware of the soil disturbance limits and the approved road, trail, and landing construction plan. Confirm that any additional road, trail or landing construction must be approved by the LNTCFS Representative beforehand.	☐	☐	☐
Ensure the contractor is aware of all treatment area, road, trail and landing rehab requirements.	☐	☐	☐
Ensure all project map(s) and field marking is understood.	☐	☐	☐
Discuss site access and parking locations.	☐	☐	☐
For any prescribe burns, review the approved burn plan.	☐	☐	☐
Legislative Requirements	**Y**	**N**	**NA**
Ensure the Contractor is aware, as per the *Wildfire Act*, that a person carrying out an industrial activity must "immediately carry out fire control and extinguish the fire, if practicable" on any fire within 1 km of their work site and the *Workers' Compensation Act* states that any worker who may be called upon to fight a forest fire must receive firefighting training acceptable to the Workers Compensation Board and that training must be delivered on an annual basis.	☐	☐	☐
Ensure the contractor understands fire danger classes and the impact on carrying out industrial activities.	☐	☐	☐
Review of the Wildfire Regulation and confirmation of the contractor's understanding of precautions, fire hazard assessment and abatement, fire control and permissible open fires (e.g., category 3 open fires).	☐	☐	☐
Confirm that a burn registration number has been assigned if applicable.	☐	☐	☐
Review all requirements under the Open Burning Smoke Control Regulation (OBSCR) and all additional burning bylaws applicable to the project. This includes an understanding of the smoke venting index and when burning can occur.	☐	☐	☐
Confirm all riparian management areas or reverse zone locations and review the associated management strategies.	☐	☐	☐
Discuss all stream crossings and existing or new drainage structures.	☐	☐	☐
Discuss all water licenses and point of diversions within the area and their associated management strategies.	☐	☐	☐
Confirm all cutting authorities have been issued and that all timber marking requirements are understood.	☐	☐	☐
Ensure the contractor is aware of their waste assessment and silviculture obligations.	☐	☐	☐
Discuss all wildlife habitat measures includes the requirements under the Migratory Bird Convention Act.	☐	☐	☐
Review all relevant archaeological and First Nation cultural resources in the area.	☐	☐	☐
If any terrain stability issues are present, ensure all locations are known and appropriate measures are in place.	☐	☐	☐
Ensure the contractor is aware of all invasive species in the area and the invasive species management plan. This should include a review of the Best Practices for Preventing the Spread of Invasive Plants During Forest Management Activities.	☐	☐	☐
Ensure the contactor is aware of all legislation associated with herbicide or fertilizer use if applicable.	☐	☐	☐
Other Requirements	**Y**	**N**	**NA**
(Specify):	☐	☐	☐
(Specify):	☐	☐	☐

Follow-up requirement details if "N" is selected for any items:	
SIGNED by the Contractor or by its authorized Contract Representative:	
Name	**Signature**
SIGNED by the LNTCFS Representative:	
Name	**Signature**

APPENDIX E

Operational Treatment Manual Falling Verification Form

(applicable to Owner Relationships and programs that are SAFE Certified)

VERIFICATION FORM MUST BE COMPLETED PRIOR TO CONDUCTING MANUAL FALLING ACTIVITIES. MANUAL FALLING IS CONSIDERED TREES 6 INCHES OR MORE IN DIAMETER AT STUMP HEIGHT.

FORM TO BE COMPLETED BY QUALIFIED FALLER SUPERVISOR OR CONTRACTOR

Contract No:	Contractor Name
Date:	Location:
Project/Activity:	

Part A. Faller Supervisor

Name of Qualified Faller Supervisor(s):
Provide details of their qualifications. If certified, attach a copy of the BCFSC Certified Falling Supervisor ID Card, or the BCFSC Falling Supervisor Course Training Certificate.
Comments:

Part B. Fallers

Are Faller's certified* and qualified for the slope and timber conditions (*log books, faller cards*)? ☐ Yes ☐ No **Must be certified by the BC Forest Safety Council (BCFSC), the Canadian Association of Geophysical Contractors (CAGC formally ENFORM) or the BCWS Faller Certification program.* Is a copy of the falling cards attached to confirm that fallers are current? ☐ Yes ☐ No
Comments:

Part C. Falling Plan

	Comments
Qualified Assistance available ☐ Yes ☐ No • *Readily available (10 mins)* • *Have communication* • *Able to provide necessary first aid, ERP aware?* • *May require certified/qualified faller unless equipment is accessible to address hazards*	
Faller evaluations completed? ☐ Yes ☐ No	
Emergency Response Plan (including a First Aid Assessment that considers access issues and transportation barriers) established & communicated? ☐ Yes ☐ No	
Hazard Assessment? ☐ Yes ☐ No	
Alternative falling methods identified? ☐ Yes ☐ No *(hydraulic jacks, heavy equipment, avoidance)*	
Completed by:	Date:
Signature:	

Fuel Management Survey Data Collection Standard

May, 2023

These standards apply to all fuel management survey activities under the Wildfire Risk Reduction Program.

CONTENTS

ACKNOWLEDGEMENTS

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DOCUMENT PURPOSE

The purpose of this document is to standardize data collection for the Crown Land Wildfire Risk Reduction program and ancillary funding streams and to provide the technical background for fuel management projects across British Columbia.

ARTICLE 1: GENERAL STANDARDS

1.1 DEFINITIONS

In this document, the following words shall have the following meanings. Definitions are limited to those that are specific to fuels measurement and fire behaviour. Definitions which are considered common to, and unchanging throughout, the general practice of forestry and surveying (e.g., DBH, sph, etc.) are not re-defined in this standard.

Aspect – The direction towards which a slope faces. For the purposes of wildfire, aspects are categorized as in Table 1.

Table 1. Aspect definitions.

Description	Abbreviation	Approximate Range of Bearings (degrees)
North	N	316 - 45
East	E	46 - 135
South	S	136 - 225
West	W	226 - 315
Flat	F	No identifiable aspect, associated with 0% slope

Categorization – Identification of data collection classes for a certain characteristic to reduce sampling time and cost.

Coarse woody debris (CWD) – Sound and rotting logs, stumps, and coarse roots >20 cm in diameter in all stages of decay, that provide habitat for plants, animals and insects and a source of nutrients for soil structure and development [1].

Crown Base Height (CBH) – Measure of the vertical distance from the ground to the lowest point of the live (or dead, in specific circumstances) crown of an individual tree [2]. Dead components of the crown are measured when they are sufficiently dense to sustain vertical fire propagation. Individual dead limbs should not be considered. Full whorls of, or multiple dead limbs, especially with needles and fine

[1] https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/wildlife-tree-committee/wildlife-tree-guidance-policies

[2] Scott, J.H.; Reinhardt, E.D. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Res. Pap. RMRS-RP-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service.

branches or volatile mosses or lichens, should be considered. [3] Crown base height is not necessarily the height at which the branch attaches to the bole (Figure 1). CBH is associated closely with fuel strata gap.

Figure 1. The lowest point of the live crown is the crown base height (right red arrow), not to be confused with where the branch attaches to the bole (left red arrow). [4]

Crown Class – Describes the position of an individual tree relative to the forest canopy. FuelCalcBC uses the terms and definitions, as found in Table 2.

[3] Ministry of Forests, Lands, Natural Resource Operations, and Rural Development – BC Wildfire Service. 2019. Wildfire Threat Assessment Guide and Worksheets Version 3.

[4] Photo credit: Dana Hicks.

Table 2. Crown class definitions and abbreviations, as cited in FuelCalcBC and FuelCalc. [5, 6]

Crown class	Definition
Dominant	A tree whose crown extends above the general level of the main canopy of even-aged stands or, in uneven-aged stands, above the crowns of the tree's immediate neighbors and receiving full light from above and partial light from the sides (as defined by the Society of American Foresters (SAF) 2008) [7].
Co-dominant	A tree whose crown helps to form the general level of the main canopy in even-aged stands or, in uneven-aged stands, the main canopy of the tree's immediate neighbors and receiving full light from above and comparatively little from the sides (SAF 2008).
Intermediate	A tree whose crown extends into the lower portion of the main canopy of even-aged stands or, in uneven-aged stands, into the lower portion of the canopy formed by the tree's immediate neighbors, but shorter in height than the co-dominants and receiving little direct light from above and none from the sides (SAF 2008).
Emergent	A tree whose crown is completely above the general level of the main canopy, receiving full light from above and from all sides (SAF 2008).
Suppressed	A tree whose crown is completely overtopped by the crowns of one or more neighboring trees. Note that the vigor of overtopped (suppressed) trees varies from high to low depending on individual circumstances (SAF 2008).
None	None or unknown.

[5] Korpela, Ed. 2018. FuelCalcBC User's Guide (version 1.2). Available: www.BCwildfire.ca (within the application's 'Help' menu).

[6] Lutes, Duncan C. 2020. FuelCalc User Guide (version 1.7). Available: https://www.firelab.org/sites/default/files/images/downloads/FuelCalc_1-7_User_Guide.pdf.

[7] Society of American Foresters. The Forestry Dictionary. 2008

Crown Closure – The stand condition, expressed in a percentage, resulting in the crowns of trees touching and effectively blocking sunlight from reaching the forest floor. Crown closure is estimated from a visual observation from aerial photography or as an average of multiple ground-based assessments. Ground based assessments utilize 'speckle diagrams' to assist with calibrating surveyor estimates. At the plot level, crown closure is estimated for each layer (L1 – L4, see definitions) and is estimated to the nearest 10%, as consistent with Forest Analysis and Inventory Branch methods. Diagrams in the FS 660 may be useful as a benchmark for estimation.

Decay – When applied to woody debris sampling using the planar intercept method, decay means visibly punky or able to be kicked apart easily.

Edge effect – The potential introduction of sampling bias from either avoiding polygon edges and / or from sampling technique which results in edge trees being sampled at a lower probability than non-edge trees.

Fine woody debris (FWD) - Woody debris (see definition) with a diameter ≤7 cm. In the case that a piece of woody debris straddles the 7 cm threshold (i.e., one end of the piece >7 cm, while the other end is <7 cm), categorization is determined at the point of measurement (i.e., at the planar intersection). Fine woody debris is further categorized into five diameter classes (Table 3).

Table 3. Category classes defined by diameter for fine woody debris.

Category	Diameter (cm)
1	≤ 0.5 cm
2	0.6 – 1.0
3	1.1 – 3.0
4	3.1 – 5.0
5	5.1 – 7.0

Flammable conifer shrub – Shrub with characteristics of high flammability, such as dry and dead leaves or twigs, dry leathery leaves, high oil or resin, needle-like leaves (e.g., juniper).

Flammable weed – Invasive weed with characteristics of a high flammability, such as dry and dead leaves or twigs, dry leathery leaves, high oil or resin, needle-like leaves (e.g., scotch broom).

Fuel Strata Gap (FSG) - The distance from the top of the surface fuel bed to the lower limit of the canopy fuel layer constituted by live foliage and ladder fuels that can sustain vertical fire propagation (canopy base height).[8] Associated closely with canopy base height and crown base height.

Grid sampling – A systematic sampling method to locate plot centers on a grid from a randomly selected starting point.

[8] Cruz, M.G., Alexander, M.E., Wakimoto, R.H., Modeling the likelihood of crown fire occurrence in conifer forest stands, For. Sci. 50 (2004) 640–658.

Ground Fuel - All combustible materials below the litter layer of the forest floor that normally support smouldering or glowing combustion associated with ground fires (e.g., duff, roots, buried wood, peat). [9]

Ladder Fuels - Fuels that provide vertical continuity between the surface fuels and crown fuels in a forest stand, thus contributing to the ease of torching and crowning (e.g., tall shrubs, small-sized trees, bark flakes, tree lichens).[11]

Large diameter woody debris (LDWD) – Woody debris (see definition) with a diameter >7 cm - 20 cm. In the case that a piece of woody debris straddles the 7 or 20 cm thresholds (i.e., one end of the piece is >7 cm, while the other end is <7 cm), categorization is determined at the point of measurement (i.e., at the planar intersection).

Layer 1 (L1) – Trees with a diameter at breast heigh (DBH) ≥ 12.5 cm. L1 trees may be further categorized based upon DBH.

Layer 2 (L2) – Trees with a DBH ≥ 7.5 cm – 12.49 cm. Also referred to as poles.

Layer 3 (L3) – Trees > 1.3 m in height and with a DBH <7.5 cm. Also referred to as saplings.

Layer 4 (L4) – Trees 0.3 - 1.3 m tall. Also referred to as regeneration.

Masticated fuel bed – A surface fuel bed, or a mixture of surface and ground fuels, of masticated forest fuels.

Mastication – Reduction of forest fuels (usually understorey trees or shrubs) into small pieces by mechanical mulching, grinding, chipping, shredding or chopping.

Microplot - A small, fixed area plot, with a plot multiplier of 10,000. The most used are 1 m x 1 m square or circular with a radius of 0.56 m (1 m^2).

Planar Intercept Sampling – A sampling technique that utilizes sampling planes. Using the planar intercept method, the sampling area is an imaginary plane extending from the ground, vertically from horizontal (not perpendicular to the slope) to an established height above the ground. The sampling plane extends both above and below the transect from the top of the litter layer to the height of the highest surface fuels.

Plot Center – The term plot center is used to refer to the systematically located grid point from which all types of plots (variable radius, fixed area, transect, etc.) are located. One or more types of plots may be located in relation to each plot center in order to collect the data required based upon survey objectives.

Plot Multiplier – The factor used to multiply stand data collected in a fixed area plot to calculate the equivalent data into per hectare numbers. The plot multiplier is equal to the area of a hectare divided by the area of the fixed area plot. The most common plot multipliers are found in Table 4.

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[9] BC Wildfire Service. Wildfire Glossary. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/glossary#F.

Table 4. Plot multipliers for the most used plot radii or plot dimensions.

Plot Radius (m) or Plot Dimension (m)	Plot Area (m^2)	Plot Multiplier
0.56 (or 1 x 1)	1	10,000
2.52	20	500
3.99	50	200
5.64	100	100
7.98	200	50
11.28	400	25

Post-Treatment Surveys - Surveys designed to collect data to assess if the treatment has been implemented to the prescribed specifications and achieved stated post-treatment targets.

Prescription Development Surveys - Surveys to collect fuels characteristics to develop fuel management prescriptions (activities, specifications, post-treatment targets) and to input into associated fire behaviour modeling in the prescription development process.

Sampling Method – Defines how samples are selected from the population of interest (i.e., the treatment unit).

Sampling plane – The imaginary plane extending vertically from horizontal from the top of the litter layer to the height of the highest surface fuels. Sometimes used interchangeably with 'transect', although a transect is a line, whereas a sampling plane extends above and below the transect (see planar intercept sampling definition).

Stand Layers – As defined provincially and agreed upon by the Forest Practices and Investment and Forest Analysis and Inventory Branches of the Ministry of Forests, Lands, Natural Resource Operations, and Rural Development; includes Layer 1, Layer 2, Layer 3, and Layer 4 (see associated definitions).

Surface Fuel - All combustible materials lying above the duff layer between the ground and ladder fuels that are responsible for propagating surface fires. [10]

Treatment Decision Surveys – Surveys used to collect data to drive a binary decision on the next course of action: 1. Leave as-is (do not complete fuel management prescription), 2. Develop a fuel treatment prescription.

[10] BC Wildfire Service. Wildfire Glossary. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/glossary#F.

Tree Status - Tree status (health of the individual tree) is an input for FuelCalcBC and is used to prioritize trees for removal during thinning. The available tree health status categories are detailed in Table 5.

Table 5. Tree status details to describe individual tree health in FuelCalcBC. [11]

Tree Status	Abbreviation	Definition
Healthy	H	Tree with very little biotic or abiotic damage.
Unhealthy	U	Tree with some biotic or abiotic damage and this damage will reduce growth. However, it appears the tree will fully recover from this damage.
Sick	S	Tree with extensive biotic or abiotic damage and this damage will ultimately cause death within the next 5-10 years.
Dead	D	Tree with no observable living tissue.

Wildlife Tree Class (WTC) – A classification system for individual trees based upon the deterioration and decay process. The system is based upon a scale of 1 – 8 for conifer trees and 1 – 5 for broadleaf trees (Figure 2). Wildlife tree classes are used to assess future and current wildlife habitat characteristics.

[11] Korpela Ed. 2018. FuelCalcBC User's Guide (version 1.2). Available: www.BCwildfire.ca (found within the application's 'help' menu).

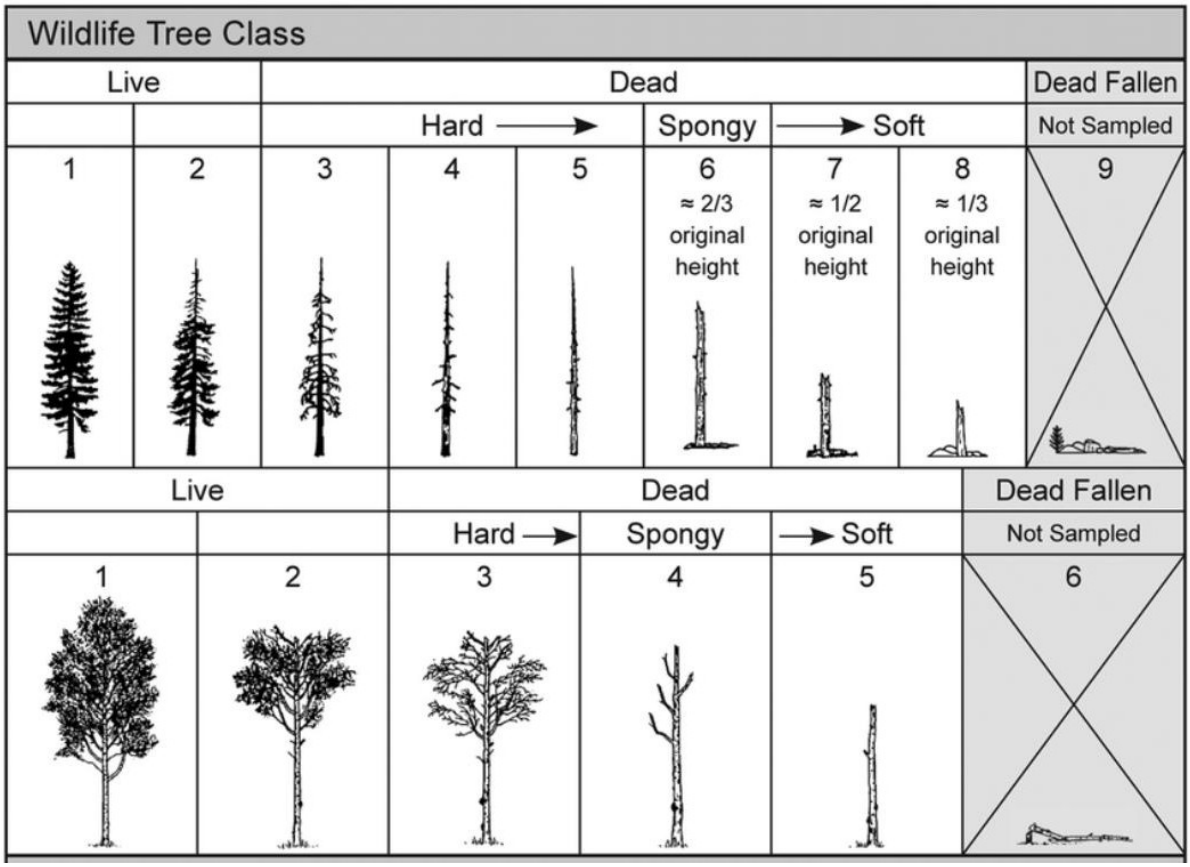


Figure 2. The Wildlife / Danger Tree classification in BC. [12]

Woody Debris – Also referred to as woody surface fuels. Dead and downed woody materials, including twigs, branches, and boles of trees and woody shrubs that have fallen and lie on or above the ground, including dead tree boles leaning greater than 45 degrees from perpendicular. Woody debris can be created through human activity (e.g., logging, fuel management activities) or naturally (e.g., windthrow, self-pruning, mortality). Specific to its impacts on fire behaviour, woody debris is categorized by diameter with two classes: fine woody debris and large diameter woody debris (see definitions).

[12] Wildlife/ Danger Tree assessor's course workbook.

ARTICLE 2: PERSONNEL

2.1 CREW QUALIFICATIONS

Inspector Qualifications

All work should be reviewed and approved by a Registered Professional Forester (RPF), or Registered Forest Technician (RFT) who is experienced in data collection, has an understanding of fire behaviour, and is familiar with the treatment prescription options that are appropriate and considered acceptable for the area(s) and fuel type(s).

Survey Design Qualifications

Stratification, survey designs, sampling method and intensity should be determined by a Silviculture Accredited Surveyor (SAS) or Qualified Forest Professional (RPF or RFT) who has the necessary competencies and experience to ensure accurate and thorough forest measurements, data collection and mapping.

Survey Crew

The Survey Crew must include at least one of the following that is experienced in both forest measurements and fuels data collection, and timber cruising (if applicable) who has been to every polygon surveyed:

1. Qualified Forest Professional (RPF or RFT),
2. Silviculture Accredited Surveyor (SAS),
3. Accredited Timber Evaluator (ATE) or
4. Accredited Timber Cruiser (ATC).

Technical Background

The intent of this document is to provide standards to provincial staff, forest practitioners, and forest industry professionals who, operating in their scope of practice, engage in the planning and implementation of forest fuel management across BC. This document is written for those with experience in surveying, stand and fuels measurement and data collection, and who are collecting data under the supervision of, and for decision-making by, a professional working within their scope of practice. This manual is not written such that it is appropriate for use by individuals without some training and experience in both wildfire and surveying.

> "*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." [13]

Some of the skills and activities outlined in this document are based upon professional reliance (e.g., visual assessments). For these activities, it is understood that the person undertaking the activity is highly competent in the skill-area and has the expertise to confidently decide based upon their assessment – a decision which other professionals competent in the scope of work would also make under similar circumstances.

Members of the Association of British Columbia Forest Professionals (ABCFP) must ensure that they are practicing within a field only where training and ability make them professionally competent. In 2013 the ABCFP released *Interim Guidelines – Fire and Fuel Management* to provide ABCFP members with information and guidance to be considered when working in the area of fire and fuel management. Members shall stay abreast the aforementioned Interim Guidelines, the related Summary Paper [14], as well as any updates to these guidance papers.

[13] Ministry of Forests, Lands, Natural Resource Operations, and Rural Development – BC Wildfire Service. 2020. Fuel Management Prescription Guidance.

[14] Association of BC Forest Professionals. 2013. Summary Paper Fire and Fuels Management. https://abcfp.ca/WEB/abcfp/Files/policies/Fire_Fuel_Management-Summary_Paper.pdf

ARTICLE 3: STANDARDS APPLICABLE TO ALL SURVEYS

3.1 GENERAL STANDARDS

The standards of performance in Article 3 apply to every survey.

This standard was written for the following types of surveys:

1. Treatment decision surveys: these surveys are to collect sufficient fuels characteristics to drive a 'treat' or 'no treat' decision.
2. Prescription development surveys: these surveys are to collect fuels characteristics to develop fuel management prescriptions and to input into associated fire behaviour modeling in the prescription development process.
3. Post-treatment surveys: these surveys are designed to collect data to assess if the treatment has been implemented to the prescribed specifications and achieved stated targets.

Technical Background

Objectives

This standard was designed to meet the following objectives and drive the following decision-making, as communicated by BCWS:

1. Pre-treatment stand level data collection to assist in the following decision-making processes:
    a. Treatment decision surveys to drive potential fuel treatment activity recommendations (i.e., treat or no treat); and,
    b. surveys to assess current threat and determine fuel management prescription specifications which will achieve fire behaviour targets (fuel treatment prescription development).
2. Post-treatment stand level data collection to:
    a. assess if the treatment has met fuel management prescription specifications and achieved targets;
    b. feed into fire behaviour models to evaluate post-treatment fire behaviour targets; and
    c. meet RESULTS Information Specification Submission (RISS) for Government Funded Silviculture Activities

In order to meet the aforementioned objectives, this document was written for the following types of surveys:

1. Treatment decision surveys,
2. Prescription development surveys, and
3. Post-treatment surveys.

Completing surveys according to the principles outlined in this manual will demonstrate that the decisions driven by the data are based upon data collected using statistically sound sampling design in a statistically valid manner and is a demonstration of due diligence.

Survey Principles

The survey and data collection principles within this standard are guided by the understanding of:

1. The widely varied range of stand and fuel types for which these surveys must be useful;
2. A professional's ability to determine relevant characteristics based upon survey objectives;
3. The current Fuel Management Prescription Guidance and Specimen (prescription template);
4. Reporting requirements (Community Resiliency Investment (CRI) Program, RISS); and
5. The role of the Registered Forest Professional.

The process of data collection consists of 6 steps:

1. Office review
    a. Preparing for the survey, review of all available information (e.g., higher level plans, ecosystem field guides, resource inventories and assessments, aerial photos, provincial fuel typing, base-map and feature identification, fuel management prescription, wildfire (or other) stocking standards).
2. Pre-stratification
    a. Pre-treatment survey stratification can be based upon potential consequence (e.g., priority zone, distance to values at risk, position relative to values at risk and predominant fire season wind direction), probability (e.g., fuels components, stand structure, areas of low or no fuel), other (e.g., ecology, operational constraints), or a combination of the above.
    b. Pre-stratification will be confirmed / refined in the field
3. Determine a field inspection route / walk-through of each stratum
    a. Route should transect all tentative stratum and traverse the majority of the potential treatment area.
    b. Finalize stratification
        i. Based upon aforementioned considerations.
        ii. Post-treatment stratification may be required based upon
            a) treatment / activity recommendations (e.g., when treatment is determined to not be sufficient / burn not successful, difference in maintenance recommendations)
            b) For payment purposes
            c) Forest cover / inventory label updates / differences
    c. Determine site index method, survey objective(s), survey methods, design, and intensity
4. Data gathering for each stratum
    a. Determine final appropriate survey design, sampling methodology, and intensity.
    b. Collect data based upon above determination for each stratum
    c. Plot photographs
5. Data summary
    a. Summarize the data, calculating statistics where applicable.
    b. Data summarization should result in the data required (e.g., for prescription development, model inputs, RESULTS submissions).
6. Report survey results.

Consistent and accurate data collection, summarization, data analysis, and treatment recommendations are essential.

3.2 FORMAT OF DOCUMENTATION

This standard does not include field forms; it is up to the surveyor to develop a data collection method (paper or digital) which fits with the collection device and method of compilation and that collects all the required data. It is advisable that the Ministry Designated Representative and the survey contractor agree to the chosen method of field data collection, documentation and format for submission prior to commencement of field work.

3.3 FUEL TREATMENT SURVEY PROCEDURAL CHART

Fuel treatment / wildfire risk reduction assessment and survey procedural chart.

The following chart outlines the necessary steps to assess and survey a potential fuel treatment area (pre-treatment, such as treatment decision or prescription development, surveys) or treatment area (post-treatment surveys). The steps outlined below are incorporated within this Standard and are referenced by the corresponding Standard Article numbers.

Step 1 – Treatment Decision Surveys - Article 4

1. Strata clearly not requiring treatment will be separated (stratified) from the Survey area. Visual assessment notes and representative photographs for those areas stratified for not requiring treatment shall be documented.
2. A Treatment Decision Survey will be performed within those areas that 'may require' fuel treatment activities. Treatment Decision Surveys will be performed either by:
    a. using visual assessment if the surveyor has sufficient experience and is confident in defending their professional decision. This process may include subjectively located plots to calibrate the surveyor's decision, but this data is not recorded as it is not statistically defensible.
    b. With a low intensity grid sample to collect data needed to inform the treat/no treat decision.
3. Next course of action recommendation will be made for each stratum, from the following options:
    a. Re-assess, or Leave as is (no further action required),
        i. Move to STEP 3;
    b. Develop a Treatment Prescription
        i. Move to STEP 2.
4. If the Ministry Designated Representative has completed this step and determined the next course of action (i.e., recommendation for treatment is confirmed), move to the relevant next step, as per #3 above.
5. If operational fuel treatment has been completed,
        i. Move to STEP 4 and STEP 5.

Step 2 – Prescription Development Survey - Article 5

1. Sampling intensity will be driven by the degree of variability and complexity found in the stratum.
    a. For all stratum for which a fuel treatment prescription survey will be developed, the following products will be delivered:
        i. Plot data, fuel treatment prescription, prescription map, and a minimum of three photographs per plot clearly labeled with treatment unit and plot number.
        ii. Guidance for fuel treatment prescription is found in the BCWS Fuel Management Prescription Guidance document, accessible through the Tools for Fuel Management webpage. [15]
        iii. Fuel treatment prescription maps shall follow the standards as set out in the BCWS Fuel Management Prescription Guidance document.[15]
2. If operational fuel treatment has been completed,
        i. Move to Step 4 and STEP 5.

Step 3 – Treatment Decision Survey Reports – Article 4

1. Strata for which the next determined course of action is re-assess or Leave as is (no treatment required) trigger submission of a Survey Report Summary.
2. For all stratum within which a treatment decision survey was completed and for which the next determined course of action is re-assess or Leave as is, the following products shall be delivered to the Ministry Designated Representative:
    a. Plot data, field data summary (compilation and / or visual assessment summary), recommendation (and timeline for follow-up, if applicable), survey map, and representative photographs.

Step 4 – Post-Treatment Survey - Article 6

1. Sampling design and intensity will be driven by the degree of variability and complexity found in the stratum.
2. Data shall be collected in formal sample plots consistent with the treatment prescription survey.
3. For all stratum within which a post-treatment survey is completed, the following products shall be delivered to the Ministry Designated Representative:
    a. Plot data, data summary (compilation), recommendation (and timeline for follow-up, if applicable), survey map, and representative photographs.

Step 5 – Submission to RESULTS – Article 7

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

1. For all stratum within which operational fuel treatment activity has been completed, a RESULTS submission following the 6th edition of the *RESULTS Information Submission Specifications for Government Funded Silviculture Activities (RISS-gf)*[16] is required.

Technical Background

Prior to embarking on a survey, the surveyor must determine / understand the survey objectives. It is recommended that the surveyor discuss the survey objectives, as well as the implications on additional data collection required, level of statistical rigour, and precision required, based on objectives, with the Ministry Designated Representative.

For example, if the objective is to collect enough information to make a simple 'treat / no treat' decision (i.e., treatment decision survey), then a visual assessment with notes and photographs may be sufficient information on which to base a recommendation. Alternatively, it may be determined that additional formal sample plots are required, potentially at a lower plot intensity.

3.4 SURVEY TIMING

Data collection should be completed in snow-free conditions in order to accurately assess surface fuels (loading, type, arrangement), all layers of the stand (L3, L4 specifically), litter and duff depth. Furthermore, sampling surface fuels (dead and downed woody debris) during times when deciduous shrubs are dormant requires significantly more expertise among the survey crew to identify dead versus dormant trees and shrubs.

If surveys are completed by inexperienced crews when deciduous species are dormant, when ground is snow-covered, or soil is frozen, there may be a need for follow-up data collection and additional surveys to ensure the data collected is accurate and is gathered for all fuels characteristics relevant to the survey objectives.

3.5 STRATIFICATION

A common reason for stratification, from a sampling perspective, is to create more homogeneous strata (sampling areas) to increase sampling precision.

There are several factors to consider during stratification. The initial, most basic level of stratification occurs when determining if a polygon is currently in a state where fuels should be treated, or not (e.g., is the polygon rock, water, deciduous trees or other non-fuel or low-fuel type).

When stratifying areas recommended for treatment, stratification for fuel treatments is done primarily to define areas that have similar characteristics and that will need a specified treatment to reach a prescribed post-treatment state. These characteristics include: stand type (e.g., species composition, vertical structure, spatial distribution of trees and total densities of trees by size classes), surface fuels (e.g., loading), operational considerations (e.g., slope or soil sensitivity), or other variables which factor

[16] https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-reporting-results/business-and-policy-documentation

into the specified treatment for a stratum. These reasons for stratification into treatment units will result in more homogenous strata that will also have the added benefit of increasing sampling precision.

Technical Background

Because of the high variability of fuel types within which these surveys will take place, it is not recommended to set minimum triggers for stratification. This practice may lead to over-stratification, if a stratification is triggered by variation in a characteristic which is not of interest for the project objective (e.g., treatment specifications) or under-stratification if one type of stand should be treated using two different methods based upon characteristics which are not included in the list of stratification triggers.

3.6 SURVEY LINES AND PLOTS

Survey lines and plot centers will be established using Global Positioning System (GPS) units (preferred), or if necessary, by manual chaining methods. Survey plot centers will be established utilizing a grid sampling method. To eliminate potential bias, grid sampling will be based upon the selection of a random starting point (P.O.C.) and maintain systematic positioning of plots throughout the survey. Grid sampling may be used with a low or high plot intensity. Square grids are highly recommended.

There is a potential for bias introduced during edge sampling. Methods to correct for edge effect are provided (Appendix B – Sampling to Avoid Edge Effect Bias), should it be determined that the block edges cannot be assumed to be the same as the block interior.

Survey lines and plots must be identified as follows:

1. For both GPS and manual chaining methods:
    a. point of commencement (P.O.C.) must be marked with flagging tape and identifying information recorded in waterproof ink;
    b. Plot centers must be marked on the ground in such a way that they may be re-located for monitoring or auditing purposes. If the ground is frozen or very rocky ground and a shovel or stick cannot be used for a plot center, a comment should be made within the field form indicating what was used for the plot center.
2. If a GPS is being used, plot centre UTM Coordinates must be provided;
3. If a manual chaining method is being used:
    a. survey baseline (if established) and all strip lines must marked with flagging tape showing the baseline and strip line number in waterproof ink;
    b. all plot centre flagging tape must have the bearing and distance to the next plot written in waterproof ink.

Technical Background

Sampling Intensity and Precision

The current BCWS Fuel Management Prescription Guidance document states the following:

> *"In all cases, the stand should be sampled 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)."

There are a wide range of stand and fuel types that will be sampled using these protocols. As such it is not possible to specify desired precision or sample size requirements that will be suitable for all situations. Surveys must be completed such that the information collected for the characteristics of interest is precise enough to allow treatment recommendations and prescriptions to be confidently developed. For example, assume that you will treat an area if a stand characteristic of interest is greater than 100 units. If your sample produces a wide confidence interval of 1000 units, +/- 500 (a 50% sampling error), this low precision will be acceptable as your lower confidence limit is well above your threshold of 100 units. If on the other hand your sample produces a confidence interval of 90 +/- 15 then your treatment decision is uncertain and you may decide to establish additional plots. Note that this process is analogous to that described in Section 8.1.1.5 of the silviculture survey manual. The difference in this application is that there are not set standards for fuel treatments (e.g., stocking standards) that we are comparing the confidence intervals to. In this case we are comparing our confidence intervals of a variety of fuel variables to a variety of treatment thresholds. An acceptable confidence interval may be very wide and met with minimal sampling, if the confidence interval clearly does not envelope a threshold for decision-making. Similarly, a very small confidence interval achieved through high sampling intensity may not be acceptable if it includes a threshold which is important for decision-making.

Sample size decisions should also incorporate considerations of costs and available time and project budget. Increasing sample size may result in increased measurement errors if crews are forced to move too quickly to meet time and budget constraints. This also needs to be considered and balanced when choosing sample sizes.

Grid Sampling

The grid sampling method, a type of systematic sampling, is generally the most common method for locating plot center (see definition in glossary). Grid sampling may be used with a low or high plot intensity.

The benefits of using the grid sampling method are:

- Demonstrates that the surveyor has walked over the entirety of the strata reported on;
- Provides accurate, reproducible results;
- Can be used with high or low plot intensity;
- Can be used by surveyor with less experience in surveys or less experience in collecting data on fuels (relies less upon professional experience for decision-making).

A foundation of the grid sampling method is to eliminate potential bias introduced in plot location through the selection of random starting point and maintaining systematic positioning of plots throughout the survey. Square grids are highly recommended, although other grid types are acceptable.

Edge Effects

Technical background for the standard for controlling for bias due to edge effects is found in Appendix B – Sampling to Avoid Edge Effect Bias.

3.7 PLOT INFORMATION

For each formal sample plot established, data will be collected as per Article 8.

3.8 REQUIRED PHOTOGRAPHY

For each plot established, a minimum of 3 photographs shall be taken: one representative of each fuel layer (crown, ladder and surface). Additional photos, one in each cardinal direction, are recommended, particularly in plot locations which will be measured in post-treatment surveys.

3.9 SITE INDEX METHODOLOGY

Site index is determined using the procedural guidelines outlined in Land Management Handbook Field Guide Insert 12 - Selecting a Method to Estimate Site Index, 2006.[17]

3.10 ADDITIONAL FIELD NOTES

The following is a non-exhaustive list of considerations and assessments which may be relevant to the project and field work, depending on site and objective(s). This standard does not provide guidance on additional field notes required, completing the additional assessments, or when such assessments should occur. It is recommended that the surveyor and / or supervising professional consult the appropriate guidance documents and relevant field forms, where available.

- Access
- Soil profile
- Terrain stability
- Windthrow
- Riparian / stream assessments
- Current / available access description (distance, type, width, feasibility, maintenance responsibility)
- Values at Risk (structures or other – distance, direction, location on slope, location in relation the predominant fire season wind direction)
- Archaeological assessments
- Wildlife
- Species or ecosystems at risk

3.11 SURVEY MAPS

Survey maps must show:

1. the type of Survey;
2. land status and tenure overlaps;
3. survey area by stratum (ha);

[17] https://www.for.gov.bc.ca/hfd/pubs/Docs/Fgi/Fgi12.pdf

4. inventory label (if relevant – e.g., post-treatment surveys);
5. point(s) of commencement of the survey;
6. plot centers labeled;
7. survey lines and direction travelled.

3.12 PRESCRIPTION MAPS

Prescription maps will be completed in accordance with Section 4 of the BCWS Fuel Management Prescription Guidance document. [18] Additional requirements may be set by the relevant funding program.

3.13 MERCHANTABLE TIMBER

A professional estimate of the pre-treatment and post-treatment merchantable stand volumes is necessary to ensure the appropriate tenure and pricing are utilized for the fuel management operational treatment. If any merchantable timber will be cut, a professional volume estimate is required and completing a full timber cruise following the procedures in the Timber Cruising Manual [19] should be considered when cutting >50 m^3/ha or >500 m^3 in total. In addition to providing statistically valid data, a full timber cruise also provides the opportunity to utilize a cruise-based cutting authority if applicable and to determine the stumpage rate through a full appraisal if desired. A professional grade profile estimate of the merchantable volume is also required in some circumstances for the utilization of the Interior Concurrent Residual Harvest System (CHRS) [20] which provides an alternative method of scale which is designed to reduce the administrative burden associated with timber delivery to secondary manufacturing facilities.

The merchantable timber sampling method and intensity or if a full timber cruise is required should be determined in collaboration with the Ministry Designated Representative based on the project specifics. Considerations in completing a full cruise should include the total merchantable volume and its value.

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

[19] https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/timber-cruising/timber-cruising-manual

[20] https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/timber-scaling/alternate-methods-of-scale

ARTICLE 4 – TREATMENT DECISION SURVEYS STANDARDS

4.1 GENERAL TREATMENT DECISION SURVEY STANDARDS

The standards contained in this article apply to treatment decision surveys, in addition to the standards specified in Article 3. Treatment decision surveys are executed to collect sufficient fuels characteristics to drive a 'treat' or 'no treat' decision. Treatment decision surveys may be completed through visual assessments or formal sample plots.

Visual assessments shall include physically walking through a stratum to visually record information, as described in the standard. Visual assessments are a subjective assessment of a polygon based on ocular estimates, and supported by assessment notes and photographs, and do not involve establishing formal plots or collecting data. Therefore, visual assessments do not result in survey summary compilation and statistical analysis is not required. Relying on visual assessments alone to complete treatment decision standards is acceptable only when: 1) conducted by a skilled surveyor with years of fuels data collection experience, 2) any other qualified surveyor or professional with experience in fuels data collection and fire behaviour would come to the same conclusion, and, 3) discussed with and approved by with the Ministry Designated Representative. In all other cases, formal sample plots shall be established as part of the treatment decision survey.

The treatment decision surveys will be either be executed based upon visual assessment, supported with informal plots to calibrate surveyor eye, or using formal plots on a grid with data gathered in a statistically valid manner. In both cases, the survey includes physically walking through a stratum to record information as defined in this standard.

Technical Background

The sampling method defines how samples are selected from the population of interest (for fuels treatments, the population of interest is typically the treatment unit). Two approaches are presented here: a visual / subjective assessment and systematic (grid) sampling. The first relies solely on expert opinion as data are not collected in a statistically defensible manner. The second provides the recommended option for collecting statistically defensible information.

Ultimately information is collected to make a decision, and professionals need to be able to defend that decision. Part of defending the decision is defending your method for collecting information. Relying on expert opinion may be acceptable, particularly when decisions (e.g., treat / no treat) are obvious and spending time and resources collecting statistically defensible information is not warranted. For example, a treatment decision survey, completed with a visual assessment, results in a clear determination that prescription development is the next recommended course of action. In this case, establishing multiple formal sample plots, which may be re-established during the prescription development survey, would be redundant and may not be an effective use of time or funds. Alternatively, when it is possible that another professional would, given the same information, arrive at a different decision and / or the decision is not obvious, collecting statistically defensible information through systematic grid sampling should be employed.

The credibility of the survey results is only as good as the appropriateness of the sampling method and sampling intensity chosen by the surveyor.

4.2 TREATMENT DECISION SURVEY PROCEDURES

1. Visual assessments, when utilized, shall be completed via a walk-through, or reconnaissance, in which the entire stratum is covered.
2. Pre-stratification is recommended prior to performing the treatment decision survey to identify homogeneous strata for sampling and to delineate non-fuel / no treatment areas which clearly are not to be sampled (e.g., bodies of water, rock, or other low or no-fuel areas). Use of photos, images, maps, and / or use of the aerial overview stratification are recommended in this pre-stratification procedure.
3. Further stratification may be required either in the office or during the field component of the treatment decision survey. For example, there may be strata which clearly meet the criteria for utilizing only the visual assessment method, whereas other areas should be stratified in order to complete formal plots to gather data to help make appropriate recommendations.
4. The areas stratified for formal plot establishment shall be sampled using grid sampling, as detailed in Article 3.
5. Information will be gathered and recorded for all areas on which the treatment decision survey is completed, regardless of recommendation (i.e., areas determined to be not-treatable, through either visual assessments or formal plots, shall have information recorded to help support the aforementioned recommendation).

Technical Background

Technical background on selecting sampling methods is found in Section **4.1 General Treatment Decision Survey Standards**. Background on determining sampling intensity is found in Section **3.6 Survey Lines and Plots**.

4.3 VISUAL ASSESSMENT INFORMATION

1. Visual assessment measurements / observations collected during the treatment decision survey include, but are not limited by:
    a. BEC classification to the site series level
    b. forest health factors/damage agents, including an estimate of severity (percent mortality) (where applicable);
    c. stem density by layer (live and dead/dying);
    d. species composition by layer;
    e. median height by layer;
    f. median crown base height by layer;
    g. basal area (m2) estimates for total live Layer 1 stems (≥12.5 cm DBH) and total live Layer 2 stems (≥7.5 cm DBH and <12.5 cm DBH) using a prism with a Basal Area Factor (BAF);
    h. estimate of woody debris surface fuel loading by fine and large diameter categories;
    i. description of woody debris surface fuel loading (e.g., arrangement, continuity);
    j. duff and litter depth;

k. description of each surface fuel layer (i.e., surface, ladder, and crown), including make-up / composition of fuels, arrangement, and continuity;
l. estimate of crown closure by layer;
m. photographs representing the stand/stratum, specifically surface, ladder, and crown fuel layers.

4.4 PLOT INFORMATION

1. Sample plots shall be established, as per Article 3: located systematically on a grid starting from a randomly selected P.O.C. and maintaining systematic positioning of plots throughout the survey.
2. Sample plots may be completed at a relatively low intensity.
3. Minimum sampling intensity will be determined in collaboration with the Ministry Designated Representative based on the project specifics.

Technical Background

As mentioned in Section **3.6 Survey Lines and Plots**, there are a wide range of stand and fuel types that will be sampled using these protocols. Further to that, there is a variety of survey objectives which may impact the acceptable sampling intensity and precision. As such it is not possible to specify desired precision or sample size requirements (minimum sample size) that will be suitable for all situations. It may be determined to be acceptable precision for treatment decision surveys to sample at a lower intensity, based upon the binary decision and the potential for the area to be surveyed using formal plots again, if the recommended next course of action is prescription development surveys.

4.5 RECOMMENDATIONS

Upon completion of the treatment decision survey, summary of notes, and compilation of data collected, the recommended next course of action will be included in the survey summary. The categories include:

1. Re-assess – Do another treatment decision survey in the future and recommend a date of reassessment.
2. Leave as is – No further treatment or assessment is needed.
3. Develop a treatment prescription - Recommend a full prescription development survey and survey plot intensity.
    a. Alternatively, if formal plots established are at an acceptable intensity, data collection from the treatment decision survey may supplant the need for a prescription development survey.

4.6 REPORTING AND DELIVERABLES

For all stratum within which a treatment decision survey was completed, the following products shall be delivered to the Ministry Designated Representative:

a. Plot data,

b. data summary (compilation),
c. recommendation (and timeline for follow-up, if applicable),
d. survey map, and
e. representative photographs.

ARTICLE 5 - PRESCRIPTION DEVELOPMENT SURVEY

5.1 GENERAL PRESCRIPTION DEVELOPMENT SURVEY

Prescription development surveys are to collect data to develop fuel management prescriptions and to input into associated fire behaviour modeling in the prescription development process.

Prescription development surveys are located plot center on a grid, initiated from a random starting point, and maintain systematic positioning of plots throughout the survey.

5.2 PRESCRIPTION DEVELOPMENT SURVEY PROCEDURES

1. Sample plots shall be established, as per Article 3: located systematically on a grid and maintaining systematic positioning of plots throughout the survey.
2. Sample plots completed on a grid may be completed at a low or high intensity.
3. Minimum sampling intensity will be determined in collaboration with the Ministry Designated Representative based on the project specifics.

Technical Background

As mentioned in Section **3.6 Survey Lines and Plots**, there are a wide range of stand and fuel types that will be sampled using these protocols. Further to that, the survey objective, in this case a survey used to develop a fuel management prescription, will impact the acceptable sampling intensity and precision. As such it is not possible to specify desired precision or sample size requirements (minimum sample size) that will be suitable for all situations.

5.3 REPORTING AND DELIVERABLES

For all stratum within which a prescription development survey is completed, the following products shall be delivered to the Ministry Designated Representative:

a. Plot data,
b. data summary (compilation),
c. fuel treatment prescription
d. prescription map,
e. spatial data, and
f. representative photographs.

Formatting, content, and expectations regarding fuel treatment prescriptions, prescription maps, and spatial data submissions are guided by the BCWS Fuel Management Prescription Guidance. [21] There may be additional standards, depending upon funding or as set in the contract.

[21] https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_fuel_management_prescription_guidance_final.pdf, https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

ARTICLE 6 – POST-TREATMENT SURVEY

6.1 GENERAL POST-TREATMENT SURVEY

Post-treatment surveys are designed to collect data to assess if the treatment has been implemented to the prescribed specifications and achieved stated targets. Post-treatment surveys shall be executed such that they collect the necessary information for RESULTS Information Specification Submissions (RISS) for Government Funded Silviculture Activities.

6.2 POST-TREATMENT SURVEY PROCEDURES

1. Sample plots shall be established, as per Article 3: located systematically on a grid from a random starting point and maintaining systematic positioning of plots throughout the survey.
2. Sample plots completed on a grid may be completed at a low or high intensity.
3. Minimum sampling intensity will be determined in collaboration with the Ministry Designated Representative based on the project specifics.
4. For post-treatment surveys on areas that have stocking standards associated, surveyors should consult and follow the procedures set out in the Silviculture Survey Procedures Manual to ensure that data collection specific to the stocking standards and relevant RESULTS submission standard is achieved, in addition to the data detailed in Article 7.

Technical Background

As mentioned in Section **3.6 Survey Lines and Plots**, there are a wide range of stand and fuel types that will be sampled using these protocols. Further to that, the survey objective, in this case a survey used to assess if treatments have been implemented to the prescribed specifications and achieved stated targets, will impact the acceptable sampling intensity and precision. As such it is not possible to specify desired precision or sample size requirements (minimum sample size) that will be suitable for all situations.

6.3 REPORTING AND DELIVERABLES

For all stratum within which a post-treatment survey is completed, the following products shall be delivered to the Ministry Designated Representative:

a. Plot data,
b. data summary (compilation),
c. recommendation (and timeline for follow-up, if applicable),
d. survey map, and
e. representative photographs.

Post-treatment surveys trigger a submission into RESULTS. See Article 7 for details.

ARTICLE 7 – SUBMISSION INTO RESULTS

7.1 GENERAL SUBMISSION INTO RESULTS

All Crown land wildfire risk reduction (WRR) projects which include an operational implementation component trigger a submission to RESULTS. For each post-treatment survey completed, a RESULTS submission is required.

7.2 DATA ENTRY STANDARDS

All data must be entered into RESULTS in accordance with the most current version of the *RESULTS Information Submission Specifications for Government Funded Silviculture Activities (RISS-gf)*, and as updated from year to year. The RESULTS business and policy documentation webpage provides the most up-to-date standards including the ***RESULTS Information Submission Specifications for Government Funded Silviculture Activities***. [22]

[22] https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-reporting-results/business-and-policy-documentation

ARTICLE 8 - FIELD DATA COLLECTION

8.1 GENERAL FIELD DATA COLLECTION

This section outlines the standard methodology for data collection. Please see the glossary for additional definitions and details. Any definitions not found within the body of the document and / or the glossary can be assumed to utilize the same definition as applied in the general practice of forestry and defined in the *Silviculture Survey Procedures Manual*.

This standard provides methods to allow data collection for a wide number of fuel characteristics. However, field crews are not required to sample every characteristic represented within this standard. Crews, guided by the Ministry Designated Representative, should only sample the characteristics they are interested in, ensuring that all data to meet the goals and objectives of the program is collected, and also as determined relevant by the goals and objectives of the project.[23] In most cases the data collected from plot to plot will be the same although there are situations when some characteristics may be sampled on a subset of the sampling plots. Table 6 outlines the recommended relative importance of various fuels characteristics, abbreviations for which are used throughout Article 8.

Table 6. Abbreviation and relative importance of each field found in the following sections.

Abbreviation	Description of Importance
H	required to meet legislated requirements, essential component to meet overarching program goals, and / or accuracy is critical
T	desired where it has an effect on treatments being prescribed, or to be collected as per Ministry Designated Representative
L	useful for a complete description of a stratum
B	Best practices

The methodology outlined in the following section describes, where relevant, the minimum level of measurement error and categorization. Depending upon the survey objective, data can be collected to a more precise measurement or collected in more refined categories but should not be collected in a less precise manner or with less categories than outlined.

Technical background

Flexibility Within the Standard

[23] Lutes, Duncan C.; Keane, Robert E.; Caratti, John F.; Key, Carl H.; Benson, Nathan C.; Sutherland, Steve; Gangi, Larry J. 2006. FIREMON: Fire effects monitoring and inventory system. Gen. Tech. Rep. RMRS-GTR-164-CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 1 CD.

Prior to embarking on a survey, the surveyor must clearly understand the survey objectives and project objectives. It is recommended that the surveyor discuss the survey objectives, as well as the implications on additional data collection required, level of statistical rigour, and precision required, based on objectives, with the Ministry Designated Representative. For example, it may not be necessary to collect data on each fuels characteristic outlined within Article 8. This may save time and money for the project, unless an important characteristic is overlooked and then a second trip to the field will be extremely costly.

This document outlines methods for flexibility within the standard. However, field crews guided by the Ministry Designated Representative and the professional responsible for the work, should sample the characteristics they are interested in, while also ensuring that all data to meet the goals and objectives of the program is collected, as determined relevant by the goals and objectives of the project.

Categorization

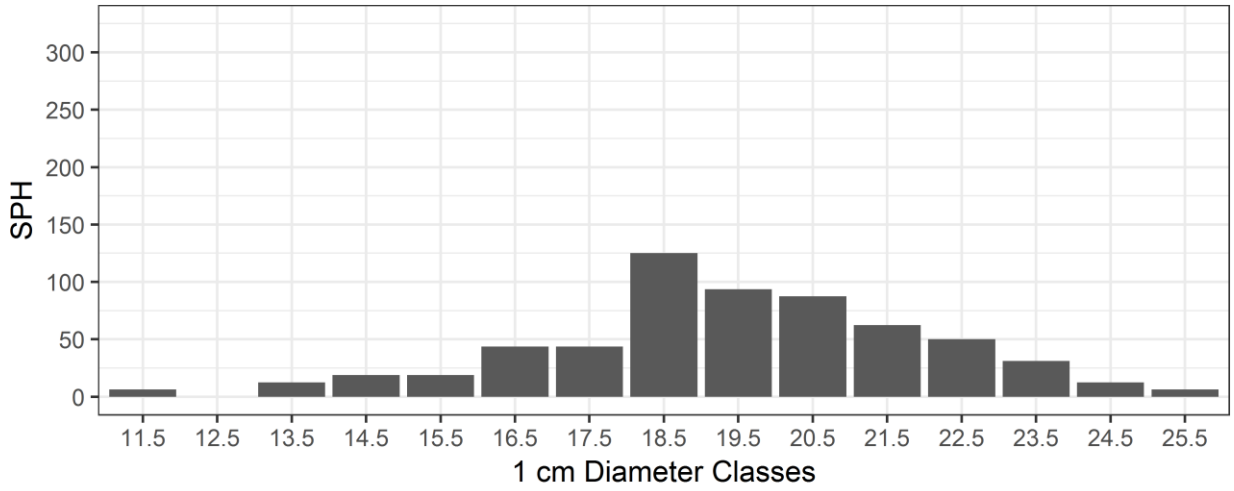
Several of the stand characteristics measured in these surveys are recorded by categories (e.g., DBH classes / tree layers, fine woody fuel loading categories and large diameter woody fuel categories). Categorization is done to reduce survey time and costs. When deciding on categories the following must be taken into consideration:

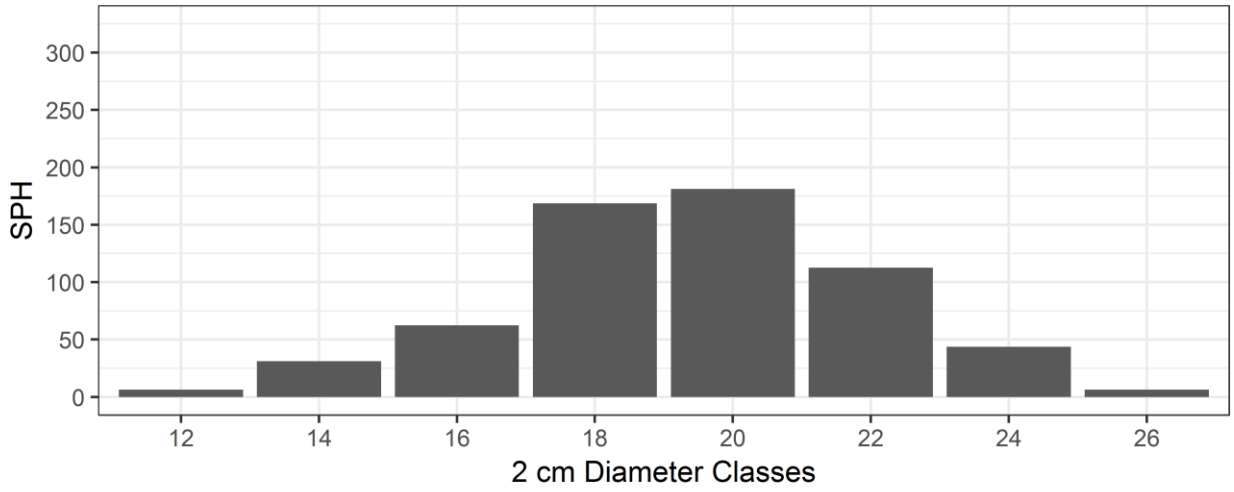
1. Available time and budget.
2. Minimum number of categories required for treatment decisions and prescription development.
3. Minimum number of categories required for model inputs.
4. Consistent categorization that may be required if data from multiple surveys is to be combined and analyzed to examine trends and produce summary statistics across projects (e.g., at District, Regional or Provincial level).
    a. It is difficult, and sometimes impossible, to combine data that has been collected with different categories.

    b. If now, or in the future, it is planned to complete comparative analyses of the data between areas and projects, standard categorization (number of categories, as well as set ranges, and absolute start and end points for each category) should be mandated.

5. From an analytical perspective, if a variable can be collected without categorization, this is preferred as it allows for more flexibility in analysis and data processing. It obviously also typically increases survey time and costs so there is a trade-off that needs to be made. It is important to realize that this trade-off is being made when collecting data in categories.
    a. Consider the example of tallying trees by DBH classes. If all trees were measured for DBH, then the data could be summarized by any set of DBH classes required for a particular application of the data.
6. From an analytical perspective, it also follows that if categorization is required to reduce survey time and costs, more categories are better as these can be combined in data processing if required. Again, this comes at an increased cost so the trade-offs must be considered.
    a. E.g., data collected in 1 cm classes can be combined into 2 cm classes. But the reverse is not true.

b. More categories also allow for a more detailed interpretation of the data (see Figure 3).





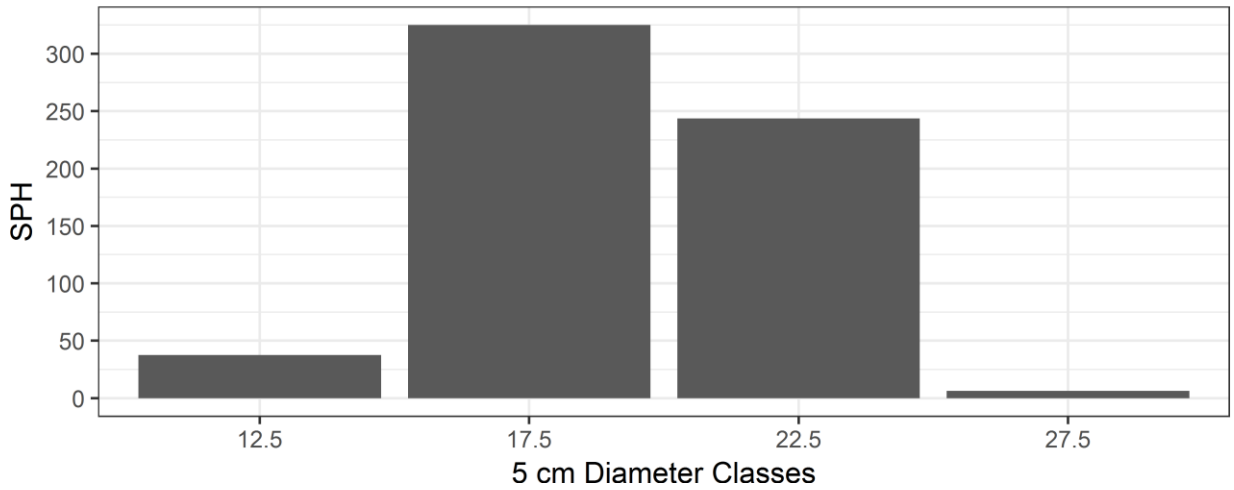


Figure 3. Data from a single survey summarized with different DBH categories. The finer the classes, the more detail is understood about the stand structure.

8.2 ESTABLISHING PLOTS

Formal sample plots shall be established using one or more of five plot types (i.e. data collection / sampling methods): fixed radius circular plot, variable radius circular plot, sampling planes (transects), cross-sectional profile, and fixed area square plot. At one single plot center, multiple plot types listed above may be established, depending upon the project objective. At a minimum, sample plots shall employ fixed radius circular, sampling plane (transect), and cross-sectional profile. Table 7 details acceptable plot type for the data being collected.

Table 7. Details acceptable plot types for the data to be collected.

Data collected	Acceptable sampling method
Large trees (L1 – L2)	Variable radius circular (BAF), fixed radius circular
Small trees (L3 – L4)	Fixed radius circular
Surface fuels (Woody Debris)	Sampling plane (transect)
Surface fuels (grass, shrubs, weed, other)	Fixed area square, fixed radius circular
Surface fuels (litter)	Cross-sectional profile
Ground fuels (duff)	Cross-sectional profile

In this standard, the plot center applies as follows:

- Plot center for fixed radius and variable radius plots, as described in the Silviculture Survey Manual and Cruising Manual.
- Sampling planes (transects), cross-sectional profile, and fixed area square plot are located in relation to, but not centered around, the established plot center.

To reduce bias, the data collection shall adhere to the following:

- Methodology for locating the sampling plane / transect, microplots, and cross-sectional profiles relative to the plot center shall be determined prior to the survey and shall be consistently located throughout the survey. See Figure 4 as an example of how to establish different types of plots relative to one systematically located plot center. Specifically, the following three variables for sampling planes shall be predetermined and remain constant throughout the survey.
    - The starting point of the sampling plane shall be outside the fixed area plot, at a predetermined and consistent distance from plot center, to reduce trampling or disturbing fine fuels prior to measurement (e.g., the fixed plot has a 5.64 m radius; the sampling plane starting point is 6 m from each plot center).
    - The starting point of the sampling plane shall be in a consistent cardinal direction from the plot center (e.g., starting point is always 6 m due north from the plot center).

- The sampling plane shall extend in a predetermined and consistent cardinal direction from the starting point. (e.g., the sampling plane shall extend due north from its starting point).

- Microplots and cross-sectional profiles shall be located at predetermined and consistent locations relative to the sampling plane. To reduce trampling or disturbing surface fuels or duff while collecting data, the microplots and cross sectional profiles shall be at the end of the longest two sampling plane lengths (e.g., 25 m and 30 m).
- Methodology (e.g., plot radius, BAF, sampling plane lengths, etc.), once determined, shall remain constant throughout the survey.

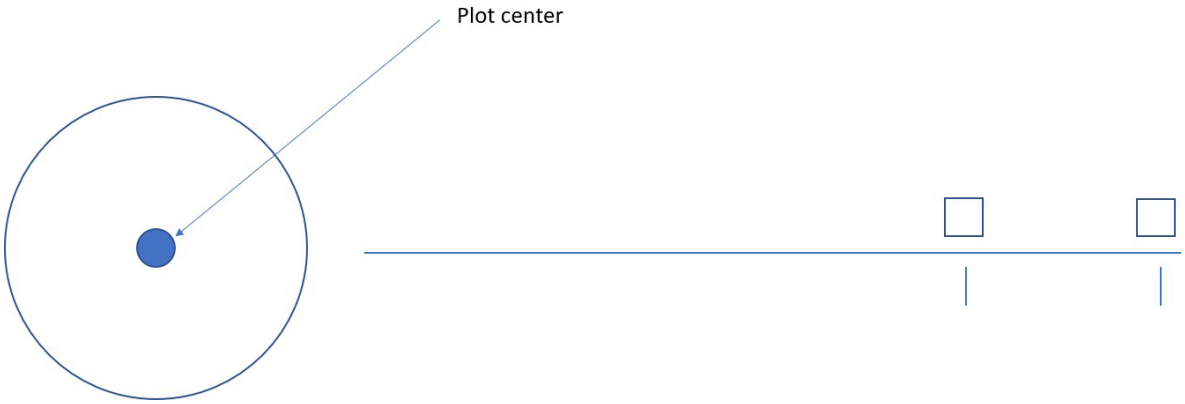


Figure 4. An aerial view example of establishing different types of plots relative to a systematically located plot center. Around the plot center is a fixed radius circular plot. The transect begins outside the fixed area plot, extending away from plot center. Two cross-sectional profiles and two fixed area square microplots fall along the transect at the end of the last two transects.

Fixed Radius Circular Plots

The most common shape and size of plot for stand data collection is 3.99 m radius circular plot. There is no mandatory requirement for any specific plot size; acceptable radii options for circular plots include 2.52 m, 3.99 m, 5.64 m, 7.98 m or 11.28 m. See Table 4 for plot multipliers.[24] A constant plot size should be used for a stratum (i.e., don't change plot sizes within the same stratum). In the case that the data will be compiled to a larger unit (e.g., compiled for multiple strata across the entire treatment area), then the plot size should remain constant for the entire survey.

Fixed radius circular plots are used to collected stand data on smaller trees (L3 – L4) and may be used to collect information on the overstorey / larger trees (L1 – L2), as well. It is important to select an

[24] For more details on, and explanation of plot area and plot multipliers, please consult the *Silviculture Survey Procedures Manual – May 1, 2020*.

appropriate plot size for the survey. Standard errors are generally larger with small plots (i.e., lower precision). [25]

Variable Radius Plots

Variable radius plot sampling (or point sampling) is a method of selecting trees to be tallied based on their size (DBH). In variable radius plots the probability of tree selection is proportional to the size (basal area at breast height) of the tree. Variable plots are generally more efficient to measure than fixed area plots; trees can be assessed for in/out status with an angle gauge (i.e., prism). [26] In fuels data collection, variable radius plots are acceptable to capture data for larger (L1 – L2) trees.

Variable radius sampling is a fast and cost-efficient technique for data collection, but it is important to use the right prism size, or basal area factor (BAF), for the stand type. One risk of using an inappropriate BAF selection is density estimates much higher or lower than actually exists in the stand. Furthermore, a larger BAF, when used in appropriate stand types, may result in lower precision in density. In this case, the mean may still be accurate, but the variability and confidence interval around the mean is much wider than using a lower BAF, more appropriate to the stand type. [27]

The general guidance for variable plots, is that the prism size (basal area factor) should be chosen to capture 5 – 8 'in' trees per plot and that 'in' trees should not be more than 12 m from plot center. One BAF should be targeted for use for the entirety of the polygon. In stands with larger trees, a larger BAF is more appropriate; in stands with smaller trees, a smaller BAF will more accurately capture data. If the variation of the stand is high, choose a lower BAF to capture variability at and between sampling locations and to tighten the confidence interval (reduce sampling error).

As L1 and L2 trees may both be measured with BAF, this introduces the potential need for prism plots to accurately capture very high variability. It may be that when determining appropriate BAF size, a small BAF results in the number of 'in' trees being unacceptably high or the distance of 'in' trees from plot center being unacceptably far. In this case, it is possible to use more than one BAF at one plot center: one smaller BAF used to collect L2 information and a larger BAF used to collect L1 data. As stated in the paragraphs above, the important aspect is to keep sampling methodology constant throughout the stratum. For example, once it has been determined that two BAFs is the appropriate method, then all plots within the stratum should be collected using the same two BAFs. Please note: this approach introduces several potential points for measurement and / or recording errors. For example, it requires keeping the two sets of trees separate so that none fall between the cracks (or are double-counted). This may require the surveyor to measure the DBH of all trees near to the category break-point (i.e., 7

[25] Iles, K. 2003. *A sampler of inventory topics: a practical discussion for resource samplers, concentrating on forest inventory techniques*. Kim Iles & Associates Ltd. pp 516 – 523.

[26] FLNRORD Cruising Manual 2020.

[27] SilvaTerra Blog Biometrics and Forest Technology. Pond, Nan C. July 22, 2015. https://blog.silviaterra.com/variable-radius-plot-sampling/

cm DBH and 12.5 cm DBH) to determine which BAF is correct. Using a single BAF is more a matter of quality control, as opposed to a technical requirement. [28]

Line of sight and ability for surveyors to see 'in' trees should also be a consideration when deciding upon the use of variable radius plots. For more detailed information on variable plot sampling using a prism, see the most current version of the *Timber Cruising Manual*.

Sampling Planes

Sampling plane, or transect, is a method for measuring downed woody debris. In order to reduce bias, there are two issues to consider: starting point and orientation. Sampling planes should originate from randomly or systematically located points. In this case, the plot centers located on a grid can serve as the systematically located point. Orientation should either be consistent (in the same direction every time) or random (randomly selected orientation for each transect). [29]

For the purposes of data collection specific to fuels management projects, other opportunities to bias the data occur; there is a potential to trample, move, or otherwise disturb woody debris before or during data collection along the sampling plane. It is for this reason that it is recommended to locate the sampling plane starting point outside the fixed area plot. At the same time, the starting point needs to be consistently located relative to the systematically located plot center, in both distance and direction.

Bias introduced through sampling plane orientation can be reduced through random orientation or consistent orientation. Although there are some advantages to random orientation, namely to correct for the non-random orientation of downed woody debris, this method is more difficult to implement, introduces potential opportunity for survey bias, and is more difficult to inspect.

8.3 DATA BY SURVEY

The data collection fields outlined in Table 8 are considered general data which is specific to the survey, or entire polygon / treatment unit. Much of the data included in Table 8 may be populated in the office and prior to heading to the field.

Table 8. Data collected once per survey to be representative of the entire polygon surveyed.

Field Name	Relative Importance	Description
Surveyor	H	Name and accreditation / credentials
District	L	Record the name or abbreviation for the MFLNRORD district.

[28] Iles, K. 2003. *A sampler of inventory topics: a practical discussion for resource samplers, concentrating on forest inventory techniques*. Kim Iles & Associates Ltd. pp 516 – 523.

[29] Iles, K. 2003. *A sampler of inventory topics: a practical discussion for resource samplers, concentrating on forest inventory techniques*. Kim Iles & Associates Ltd. pp 381 – 383.

Field Name	Relative Importance	Description
Project Identification / Contract Number	H	If the survey is being completed under a contract, record the specified project identification number or contract number.
Page	B	Record the page number. The goal is to provide a logically organized package of survey cards to include in the finished report.
Survey Date	H	Record the date in which the survey data was collected in the field.
License	H	Record the license under which the area was treated (if applicable).
Lat/Long	H	Record the center point of the treatment area (or the closest access point)
Treatment Area	H	Record the treatment area name / identifier.
Treatment Unit	H	Record the treatment unit(s) name / identifier.
Treatment Unit Area (Net)	L	Record the net area (ha) of the treatment unit, if applicable.
Survey Type	H	Treatment decision, prescription development, post-treatment
Elevation	L	Record the minimum, maximum and average elevation of the stratum in meters above sea level.
Aspect	H	Record the direction toward which a slope faces for the stratum.
Slope position	L	Record the position for the slope of the stratum. Crest, upper slope, middle slope, lower slope, toe, depression, flat / level.
Surface expression	L	Record the surface expression of the stratum. Plain, undulating, ridges, terraces, cone, depression, fan, hummock, rolling.
Slope %	L	Record the minimum, maximum and average slope percentage of the treatment unit. Slope percent should be measured using a clinometer and measured to the nearest percent.
BGC Zone, Subzone and Variant	L	Record the biogeoclimatic zone, subzone and variant of the stratum. Biogeoclimatic information should be confirmed during the survey.

Field Name	Relative Importance	Description
		Regional ecological classification zone and subzone maps and field guides should be used to confirm the biogeoclimatic zone, subzone, variant.
Site Series	L	The regional field guides for identification and interpretation of ecosystems are used to determine the site series of the stratum. Record the primary site series that covers the majority of the treatment unit, the secondary and tertiary site series if applicable.
Site Series %	L	If there is more than one site series present within the stratum, a percentage should be assigned to each of the different site series. The site series should be rounded to the nearest 10 percent and the combined site series percentages should equal 100 percent.
Edatopic grid	L	The moisture and nutrient co-ordinates of the site can be determined by using the edatopic grid of the corresponding biogeoclimatic zone site series and / or confirmed during the survey.
Plot radius (fixed)	H	Record the plot radius (m) used for fixed radius plots.
Plot multiplier	L	Record the plot multiplier for fixed area plots, based upon the radius.
Basal Area Factor (BAF)	H	Record the prism size used in completing the prism sweeps for variable radius plots.
Sampling plane lengths	H	Record the sampling plane length for the planar intercept methodology for each category of surface fuels. Sampling plane length should be measured in 0.1 m.
Sampling method	H	Record the sampling method being used on this stratum.

8.4 DATA BY PLOT

This section describes the general information which represents, or is applicable at, the plot level. The data for fields in Table 9 should be collected once per plot. Each plot shall be GPS'ed (see Article 3 for details).

Table 9. Fields for plot level data collection to be representative of the circular, fixed radius plot.

Field Name	Relative Importance	Description
Plot name/ number	H	Record the plot name / number / unique identifier.
Deviations to sampling methodology	H	Record any deviations to the sampling methodology and explanation for deviation (if applicable).

8.5 FIXED AND VARIABLE RADIUS CIRCULAR PLOT

This section outlines the standard methodology for collecting stand data using both variable and fixed radius plots, depending on the data to be collected. Data is to be collected on all four layers (L1 – L4).

Table 10. Data to be collected once per plot to be representative of the plot.

Field Name	Relative Importance	Description
Fuel Strata Gap	L	Record the average fuel strata gap for the plot (0.1 m) based upon a visual assessment of the average fuel strata gap.
Crown Closure	H	Record the total crown closure for each layer, representative of the plot. Conifer and deciduous crown closure may also be recorded independently, depending upon survey objectives. Crown closure is estimated from ocular estimates using speckle diagrams to assist with surveyor calibration. Estimate crown closure to the nearest 10%.
Ladder Fuel Horizontal Continuity	L	Record the percent of plot area covered by ladder fuel. Plot area covered should be measured using ocular estimates and speckle diagrams to assist with surveyor calibration. Estimate to the nearest 10%.

L1 - L2 / large trees

Layer 1 (L1) and L2 trees may be measured in fixed or variable radius plots. If any merchantable timber will be cut, refer to Section **3.13 Merchantable Timber** for full timber cruise considerations. The plot type used for L1/ L2 trees shall be determined at the beginning of the survey and remain consistent throughout the survey. Variable radius plots are often preferred, as they are generally more cost-efficient.

The data collected remains the same regardless of the type of plot utilized. Table 11 outlines the data and measurement standards to be collected for each ‘in’ tree per plot.

Table 11. Fields for data collection for each L1 and L2 'in' tree.

Field Name	Relative Importance	Description
Species	H	Record tree species.
Height	H	Record tree height to the nearest 1.0 m. Minimum one tree per plot shall be measured with a vertex, laser, clinometer and chain, or using an equivalently accurate method. The height of remaining trees may be ocular estimates based upon the height of the measured tree. Additional trees may be measured, as needed, to assist in calibrating surveyor estimates.
Age	H	Record the age of the tallest living tree for the leading and second most abundant species by Layer. The age of remaining species may be estimated ocularly based on the ages of the measured trees. Primary aging method is core sampling with whorl counting for determinant species or destructive sampling as alternatives if the tallest tree is too small for coring.
Diameter	H	Record diameter at breast height to the nearest 1 mm (0.1 cm)
Crown base height (CBH)	H	Record CBH to the nearest 0.5 m. Minimum one tree per plot shall be measured with a vertex, laser, clinometer and chain, measuring tape, or using an equivalently accurate method. CBH of other 'in' trees may be ocular estimates based upon comparison to the CBH of the measured tree. Additional CBHs may be measured, as needed, to assist in calibrating surveyor estimates.
Crown class	T	Record the crown class, as defined and abbreviated by FuelCalcBC. Options are dominant, codominant, intermediate, open grown, emergent, suppressed, none.
Wildlife Tree Class (WTC)	L	Record WTC 1 - 8 (conifer) or 1 - 5 (hardwood), as per the Wildlife Danger Tree diagrams and definitions.[30] [31]
Forest health factor(s)	T, L	Record the applicable pest code(s) of the forest health factor on **each** affected tree. Record all forest health factor(s) determined to impact treatment specifications, targets, or prescription objectives.

L3 – L4 / small trees

[30] Appendix 6. Vegetation Resource Inventory Ground Sampling Procedures. 2002. B.C. Ministry of Sustainable

Resource Management, Terrestrial Information Branch for the Resource Inventory Committee. See http://srmwww.gov.bc.ca/tib/veginv/publications.htm. Or as described in *WorkSafeBC Wildlife/ Danger Tree Assessor's Course Workbook* (various modules).

[31] Equivalent data collection techniques are available, including but not limited to tree status, as defined by FuelCalcBC (see definitions in glossary).

Fixed radius circular plots are recommended for data collection of the small (Layer 3 – Layer 4) trees, but can be equally useful for collecting L1 and L2 data. Data is collected by species and layer. Table 12 outlines the methodology, including minimum precision and categorization, for each data field to be collected. Further refinement in precision or in categorization is possible based upon project objectives (e.g., collecting data by individual stem).

Table 12. Fields for data collection in fixed radius plots.

Field Name	Relative Importance	Description
Tree Density	H	Tally 'in' trees by layer (L3 – L4) and by species. In the case that dead understorey trees are difficult to identify to a species level, a species code of 'dead' is acceptable. (See Table 13 for an example). It is not necessary to tally trees <30 cm in height.
Height	H	Record the plot's median tree height for each layer to the nearest 1.0 m, based upon surveyor's ocular assessment of the median tree. The tree may be measured using a vertex, laser, clinometer and chain, measuring tape, or using an equivalently accurate method or by ocular estimate based upon a comparison with a tree that was measured using a previously measured, and visible, tree.
Age	H	Record the age of the tallest living tree for the leading and second most abundant species by Layer. The age of remaining species may be estimated ocularly based on the ages of the measured trees. Core sampling, whorl counting for determinant species or destructive sampling are all acceptable means of determining age.
Forest health factor(s)	T	Describe any notable forest health factors per layer.

Table 13. Example tally data for small trees (L2 – L4) by layer and species in a 5.64 m radius plot with a plot multiplier of 100.

Layer	Pli	Fd	Py	Dead	Total by Layer (sph)	Average height	Average age	Average CBH	Crown Class	Forest Health Factors
3	IIII	II	II	III	1100	2	4	0.5	S	DMF
4	I		III		400	0.6	2	0.2	S	None
Total by Species (sph)	800	300	500	300	1900					

8.6 SAMPLING PLANE (TRANSECT)

Dead and downed woody surface fuels is be collected using a planar intercept technique based upon the methodology developed by Alexander and McRae (1979)[32] and further adapted in the Prescribed Fire Handbook[33]. Dead and downed woody surface fuels that intersect the sampling plane shall be tallied by size category (see Table 14 for defined categories). Sampling plane lengths vary by debris diameter size category: one sampling plane length is used for each of the six categories. Smaller diameter categories have shorter sampling plane lengths (i.e., at the end of each determined sampling plane length, the smallest size category is 'dropped' and no longer sampled). For example, all size categories are sampled for the first 5 m of the transect after which the smallest size category ceases to be sampled. After 10 m, the next smallest size category is no longer sampled. Figure 5 visually displays an example of sampling plane lengths by size category.

Table 14 details size categories, corresponding sampling plane and category numbers, and outlines general guidance for sampling plane length for each size category, based upon a 30 m default sampling length.

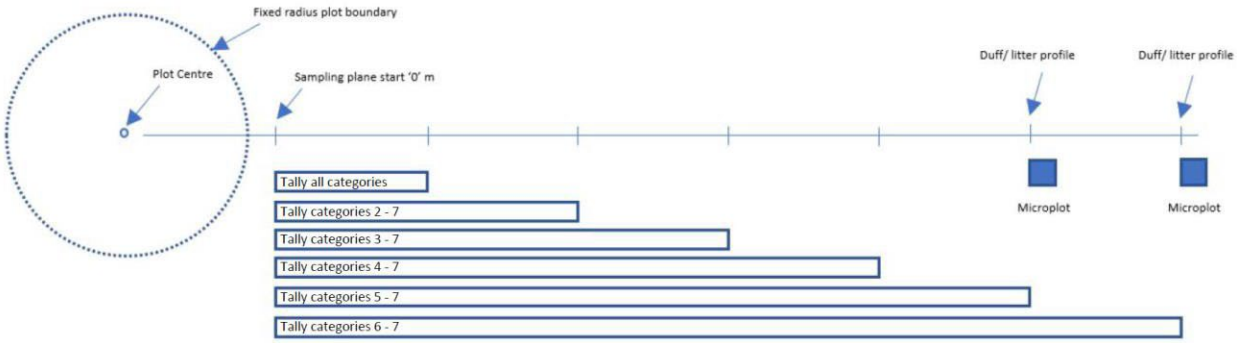


Figure 5. Example of linear sampling plane, microplot, and duff/ litter sampling locations using the planar intercept methodology.[34]

The following recommendations are to avoid or reduce common mistakes or errors during sampling:

1. Complete the surface fuel and ground sampling prior to the stand data collection.
2. Complete the sampling in crews of 2 or 3 to maximize efficiency and reduce travel back and forth over the fuels.

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[32] Alexander and McRae 1974. Measurement and Description of Fuels and Fire Behaviour on Prescribed Burns: A Handbook.

[33] Trowbridge, R., B. Hawkes, A. Macadam, and J. Parminter. 1989. Field Handbook for Prescribed Fire Assessments in British Columbia: Logging Slash Fuels.

[34] Figure adapted from: Lutes, Duncan C.; Keane, Robert E.; Caratti, John F.; Key, Carl H.; Benson, Nathan C.; Sutherland, Steve; Gangi, Larry J. 2006. FIREMON: Fire effects monitoring and inventory system. Gen. Tech. Rep. RMRS-GTR-164-CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 1 CD.

3. Use a 'go-no-go' gauge [35] to quickly determine size categories for those pieces for which their category is not immediately evident, or for use by inexperienced surveyors.
4. Ensure the measuring tape, which represents the lower portion of the sampling plane, is straight as possible, avoiding kinks or bends.

Measurement rules for planar intercept sampling can be found in Appendix C – Planar Intercept Tally Rules. This standard does not provide all details on implementing planar intercept sampling methodology. For more information and helpful hints, see Appendix A – Tools, Resources, and Links..

Woody debris categories – planar intercept

Woody surface fuels in British Columbia are categorized into 7 diameter classes (see definitions and Table 14) [36].

Table 14. Woody debris size categories and guidance on sampling plane length.

	Diameter category (cm)	Woody debris category No.	Default sampling plane length (m)
Fine Woody Debris (FWD)	≤ 0.5	1	5
	0.6 – 1.0	2	10
	1.1 – 3.0	3	15
	3.1 – 5.0	4	20
	5.1 – 7.0	5	25
Large Diameter Woody Debris (LDWD)	>7.0 – 20.0	6	30
Coarse Woody Debris (CWD)	>20.0	7	30

[35] Go-no-go gauges can be made relatively easily out of sheet aluminium or old plastic cards (credit, grocery, etc.).

[36] Data collection specifics for CWD related to biodiversity values are not included as part of this standard. It is recognized that these logs serve important functions in the ecosystem and provide habitat, biodiversity and other values; it is up to the professional to manage accordingly for the resource values provided by the component of coarse woody debris, including the values provided by pieces greater than 20 cm diameter.

Table 15. Data collection fields for woody surface fuels estimated through planar intercept method.

Field Name	Relative Importance	Description
Slope of sampling plane	H	Record the slope percent of the sampling plane. Slope should be measured using a clinometer and measured to the nearest 1 % percent.
Fine woody debris	H	Tally number (simple counts) of downed and dead woody fuel pieces by size category which intersect the sampling plane.
Species percent breakdown	H	Record estimated percentage of species (round percent to the nearest 10% and ensure that percentages add to 100%).
LDWD\CWD diameter	H	Record diameter of each piece of LDWD\CWD where it intersects the sampling plane. Measure to the nearest mm (0.1 cm).
LDWD \CWD species	H	Record species of each LDWD\CWD piece that intersects the sampling plane.
LDWD \CWD decay class	H	Record if LDWD\CWD is decayed (see definition).

Calculations

A tally line intercept form, a field form and the BCWS-developed *line intersect calculator* are available on the Tools for Fuel Management Webpage[37]. The BCWS-developed *line intersect calculator* is a tool available to assist in calculating total fuel loading estimates based upon the default woody surface fuel categories when collected using the planar intercept technique. In the calculator, sampling plane lengths can be defined, should shorter or longer sampling lengths be desired to meet the desired sampling precision or if / when slope corrections are required.

Technical Background

The length(s) of the sampling plane(s) can be varied to achieve the desired sampling precision. Generally, the less sampling points collected (i.e., fewer surface fuels intersecting the sampling plane), the longer the sampling plane length required. Time and budget, as well as project objectives, should all factor into the determination of an appropriate sampling plane length. It is not uncommon to meet data collection needs and survey objectives with a total sampling plane length shorter than 30 m. Please

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

note, sampling plane lengths are horizontal distances (as described in the above paragraph), therefore corrections based upon slope percent may be required.

Similarly, the sampling plane height is undefined; all intersections of dead and down material should be tallied regardless of their height above the ground. General guidance is a sampling plane height of 2 m, although there are certainly sites where a shorter sampling plane height will suffice, or a taller sampling plane height may be required.

8.7 MICROPLOT

The following surface fuels shall be measured in fixed microplots of 1 m^2 (1 m x 1 m or 0.56 m): pinegrass, sagebrush, bunchgrass, flammable weed, pine litter, deciduous shrub, flammable conifer shrub, moss, lichen, and masticated fuel bed. A minimum number will be determined in collaboration with the Ministry Representative. More microplots are acceptable, although as outlined in Section **8.2 Establishing Plots,** the location and number of microplots shall be determined prior to survey start and remain consistent throughout the survey.

Table 16. Data for which collection occurs in fixed 1 m x 1 m microplots.

Field Name	Relative Importance	Description
Surface Fuel Composition	T	Describe the type of the surface fuels for which data is collected. Descriptor options include, but are not limited to: pinegrass, sagebrush, bunchgrass, flammable weed, pine / conifer litter, deciduous shrub, flammable conifer shrub, moss, lichen, masticated fuel bed. It is acceptable to identify more than one type of surface fuel for which data is collected, depending upon the site and survey objectives.
Continuity / coverage	T	Record the surface fuel continuity / coverage of the surface fuel in each microplot by surface fuel composition descriptor (a separate percent cover for each composition descriptor determined relevant). Surface fuel continuity should be measured using ocular estimates and using speckle diagrams to assist with surveyor calibration. Estimate to the nearest 1%.
Fuel bed depth	T	Record the average surface fuel bed depth in each microplot by surface fuel composition descriptor (a separate fuel bed depth for each composition descriptor determined relevant). Average fuel bed depths should be determined using an ocular estimate. Measure to the nearest 1 cm.

Technical Background

Fixed Area Square Plots

Microplots are generally collected in higher sampling intensity than fixed radius plots (i.e., more than one microplot is established per each plot center. The intensity and precision with which microplots are established should follow the same sampling intensity principles as the establishment of other plots.

Fixed area square plots are most commonly established as microplots (e.g., 1 m x 1 m) and are used to collect data on surface fuels. As with all other types of plots, consistent placement of plots relative to a systematically located plot center is key to reducing bias.

8.8 CROSS SECTIONAL PROFILE

Duff and litter depth are measured using a duff / litter profile at established points along the sampling plane. To reduce bias, the goal is to create a vertical cross-section of the litter and duff without compacting, compressing, or disturbing the profile. A minimum of two duff / litter profiles per planar transect shall be used. More cross-sectional profiles are acceptable, although as outlined in Section **8.2 Establishing Plots,** the location and number of cross-sectional profiles shall be determined prior to survey start and remain consistent throughout the survey.

Table 17. Data collection fields for litter and duff depth measured in cross-sectional profiles.

Field Name	Relative Importance	Description
Litter depth	T	Record the litter depth to the nearest 1 cm.
Duff depth	H	Record the duff depth to the nearest 1 cm.

8.9 OTHER ASSESSMENTS AND CONSIDERATIONS

It is expected that to develop a fuel treatment prescription, surveyors / professionals will need to consider additional data collection to manage for other values (e.g., riparian, ungulate winter range, coarse woody debris, etc.).

The following is a non-exhaustive list of considerations and assessments which may be relevant to the project and field work, depending on site and objective(s). This standard does not provide guidance on completing the following assessments or provide guidance regarding when such assessments should occur, as it is outside the scope of this standard. It is recommended that the surveyor and / or supervising professional consult the appropriate guidance documents and relevant field forms, where available.

- Soil profile
- Terrain stability assessment
- Wind throw
- Riparian / stream assessments
- Access (currently existing or planned)
- Values at Risk (structures or other – distance, direction, location on slope, location in relation the predominant fire season wind direction)

- Archaeological assessments
- Wildlife
- Species and ecosystems at risk

ARTICLE 9 CALCULATIONS / STATISTICS

9.1 GENERAL CALCULATIONS AND STATISTICS

For all surveys that result in data collected in a statistically valid manner, statistical analysis / validation should be completed for each characteristic of interest at the stratum level. This will allow surveyors to determine how precisely the survey data describes the stratum, in relation to the characteristic(s) of interest. The characteristics of interest depend upon the survey and project objective and surveyors should confirm the characteristics of interest for the survey, in discussion with the Ministry Designated Representative.

Statistical analysis includes calculation of the sample mean, variance, and sample standard error which is used to determine the confidence intervals for the mean (upper and lower confidence limits). Confidence intervals are calculated at a confidence interval (e.g., 95%). A confidence interval of 95% translates to saying that one can state with 95% confidence that the confidence interval includes the true mean. There is no set level of confidence that must be utilized for the statistical analysis.

Visual assessments do not collect data in a statistically valid manner and therefore statistical analysis is not appropriate.

Technical Background

Statistics enable surveyors and decision-makers to make informed decisions. Estimates of population characteristics are calculated based on the collected data. This typically includes an estimate of the mean and variance. The sample standard error (based on the variance) is used to determine a confidence interval for the mean.

Given the range of variability around the sample mean, as described by the confidence interval at a defined confidence level, the decision maker can consider the following questions:

- Does the decision hinge on a confidence interval that includes an important threshold (i.e., the true mean may be above or below the threshold at the level of precision)?
- Is a greater level of precision required to make a decision?
- What level of confidence is the decision-maker willing to accept?

Statistical calculations are only completed when plots are established (i.e., visual assessments do not result in statistical analysis).

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APPENDIX A – TOOLS, RESOURCES, AND LINKS

Provided below are a list of potentially helpful tools, links, and references for the practitioner and fuels surveyor. These references are not necessarily developed, maintained, or supported by BCWS. It is up to the practitioner and surveyor to verify the quality, accuracy, and currency of the information found within prior to use.

Many of these tools can be accessed through the Tools for Fuel Management webpage: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

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Ministry of Forests, Lands, Natural Resource Operations and Rural Development – Timber Pricing Branch. *Coastal Appraisal Manual*. Accessible: https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/coast-timber-pricing/coast-appraisal-manual-and-amendments

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PLANAR INTERCEPT SAMPLING

Measurement And Description of Fuels And Fire Behaviour Alexander & McRae:

https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/measurement_of_forest_fuel_mcrae_and_alexander_1979.pdf

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Line Intersect Calculator (xls). Accessible: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

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Tally line intersect form (xls). This is a field form that can be utilized for woody surface fuel data collection. Accessible: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

PRESCRIPTION GUIDANCE

BC Wildfire Service *Fuel Management Prescription Guidance*. Accessible: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

SURVEYING

Ministry of Forests, Lands, Natural Resources Operations and Rural Development. Silviculture Survey Procedures Manual. Accessible: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-surveys

APPENDIX B – SAMPLING TO AVOID EDGE EFFECT BIAS

EDGE EFFECTS

Avoidance of block edges when sampling *may* cause a level of bias that is unacceptable for decision making (i.e., could result in the wrong treatment decision being made). The smaller the block is, the higher the proportion of edge area. If you avoid sampling the edges you are making the assumption that the block edges are the same as the interior of the block. If you can defend this assumption, or defend the assumption that avoiding the edges will introduce minimal bias then it may be practical to avoid the edges. However, if you cannot defend this assumption, then you are introducing an unknown bias that may influence your treatment decision and / or prescription. When dealing with estimates of totals per hectare, edge avoidance almost always results in an under-estimate of the totals because trees along the edge are sampled with lower selection probabilities.

Types of edges

In general, one can categorize edges into three types:

Hard Edges – These include a forest next to a clear-cut, lake, swamp, or road (Figure 6).

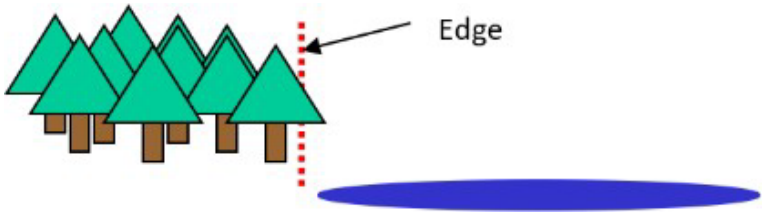

Figure 6. Hard edge

Soft Edges – These include a gradual change in stand differences. These differences could be a result of soil, slope or aspect variation within a forest producing different plant communities (Figure 7).

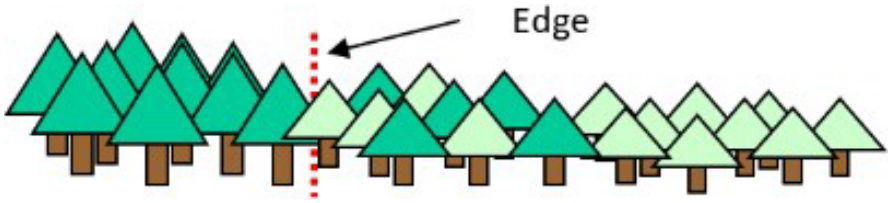

Figure 7. Soft edge

Imaginary Edges – These include legal boundaries, zoning differences or usage differences (Figure 8).

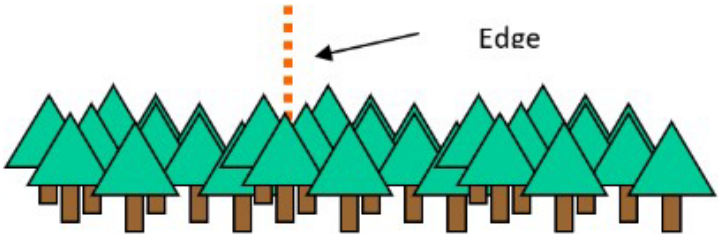

Figure 8. Imaginary edge

Incorrect sampling of edges can lead to significant bias

There are two main sources of bias:

1. Avoidance of the edge – by avoiding the edge you are making the assumption that the edges are the same as the interior of the block. In many cases this is not true.
2. Method caused bias – this is an artifact of the sampling technique that results in edge trees not being sampled with the correct probability.

Significant portions of the target population will be under-sampled if plots are not established due to their proximity to block boundaries (e.g., placing plots with the requirement that the entire plot must fit within the block). The amount excluded depends on the plot size and shape as well as the sampled block sizes and shapes. The smaller the average block size, the larger the bias, as the percentage of area that is under-sampled is higher (Table 18).

Table 18. Percent of area that is undersampled when requiring 11.28 m radius plots to fit fully within the block.

Block Size (ha)	Percent of area undersampled, by block shape		
	Circular (%)	Rectangular (%)	Square (%)
1	64.0	42.8	40.0
2	48.6	31.3	29.4
3	40.8	25.9	24.4
4	36.0	22.7	21.3
5	32.6	20.4	19.2
10	23.7	14.6	13.8
15	19.6	12.0	11.3
20	17.1	10.4	9.8
25	15.4	9.4	8.8

Block Size (ha)	Percent of area undersampled, by block shape		
	Circular (%)	Rectangular (%)	Square (%)
30	14.1	8.6	8.1
35	13.1	7.9	7.5
40	12.2	7.4	7.0
50	11.0	6.7	6.3
60	10.1	6.1	5.7
70	9.3	5.6	5.3
80	8.7	5.3	5.0
90	8.3	5.0	4.7
100	7.8	4.7	4.5
120	7.2	4.3	4.1
140	6.6	4.0	3.8
160	6.2	3.8	3.5
180	5.9	3.5	3.3
200	5.6	3.4	3.2

When using fixed area plots, each tree in the target population must have an equal chance of being selected for the sample to be unbiased. Unless some type of correction is used, trees along the edges have a lower probability of being selected and are therefore under-represented in the sample.

When using variable radius plots, each tree has a selection probability proportional to its size. This selection probability will be reduced for trees along the edges and therefore these trees will be under-represented in the sample unless some type of correction is used.

Design based sampling regimes and estimators rely on known probabilities of selection. Edge avoidance results in reduced selection probabilities for trees along the edge.

The easiest way to understand this is to think of a plot centered on an individual tree. If, for example, we are using 11.28 m radius fixed area plots, then picture an 11.28 m radius plot centered on an individual tree. This tree centered plot is referred to as the tree's inclusion zone. If a sample plot center lands in the tree's inclusion zone the tree will be included in the sample plot. The size of the inclusion zone (equal for all trees with fixed area plots and variable dependent on size with variable radius plots) dictates the weight of that tree in the sample estimators. When a tree's inclusion zone includes area

that we do not allow plot centers to land in, then that tree will have a lower probability of being sampled than trees whose entire inclusion zones have a chance of a plot center landing in (Figure 9).

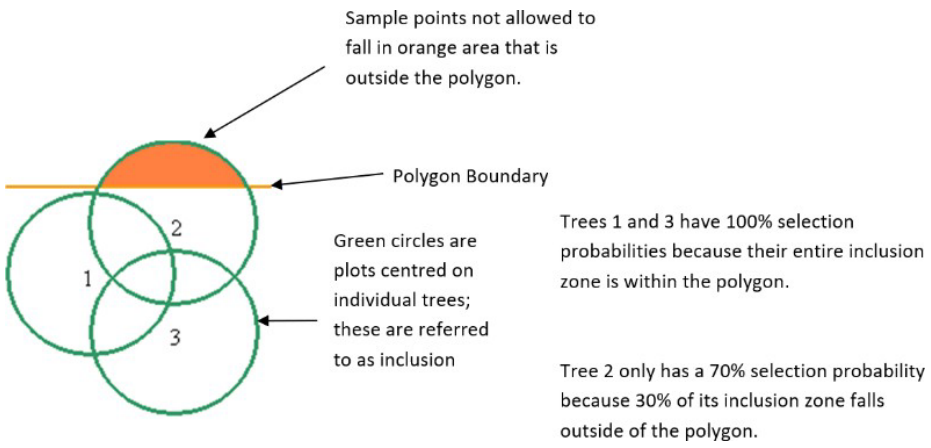

Figure 9. Illustration of trees near an edge having different probabilities of being selected.

Correcting for Edge Effect

Walkthrough Method

The walkthrough method was developed by Ducey *et al.* 2004 [38]. It is described in detail in Iles 2003 [39] and in the Cruising Manual [40].

The walkthrough method is relatively simple to implement in the field. It is a geometric method for implementing a direct correction of the lower selection probabilities of edge trees. Consider tree 2 from Figure 9, which only has a 70% selection probability (30% of the inclusion zone is outside the boundary). Using the walkthrough method, if this tree is selected in the sample, it will be double counted if the sample point lands in the 30% of the inclusion zone that is the mirror image across the tree centre of the 30% that is outside the boundary. The result is a 100% selection probability (40% * 1 + 30% *2 = 100%) (Figure 10).

[38] Ducey, M.J., Gove, J.H. and Valentine, H.T. 2004. A walkthrough solution to the boundary overlap problem. For.Sci. 50(4) 427-435.

[39] Iles, K. 2003. A sampler of inventory topics: a practical discussion for resource samplers, concentrating on forest inventory techniques.

[40] BC Timber Pricing Branch. 2020. Cruising manual.

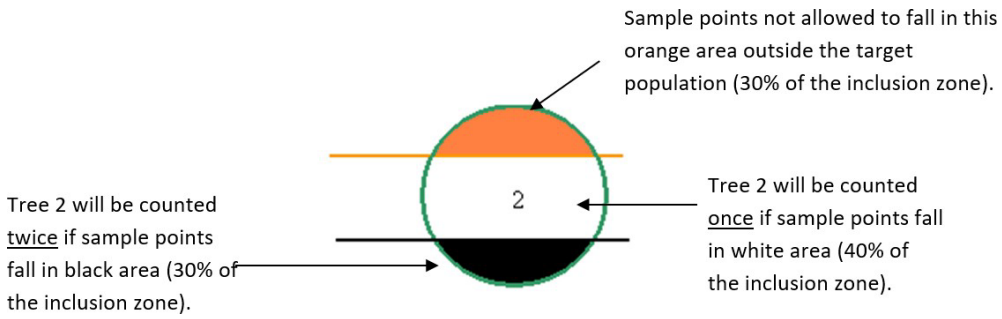

Figure 10. Example of how the walkthrough method increases an individual tree's selection probability to 100%. (Note that the green circle above is a tree centered plot, or the tree's inclusion zone).

In most cases all that is required is a double counting of trees that are closer to the block boundary than to the plot centre when walking a straight line from the plot centre to the tree to the boundary. The point located the same distance and bearing from the tree, as the tree is from the plot centre, is called the "walkthrough point". If the walkthrough point lands outside the block the tree is tallied twice. The following procedure is summarized from Table 1 in Ducey *et al.* 2004.

Step 1: Is it possible the tree is closer to the block boundary than the sample point?

No – tally the tree normally

Yes – proceed to step 2.

Step 2: Measure the direction and distance (x) from the sample point to the tree. Continue in the same direction and measure the distance between the tree and the boundary (y). Is y less than x?

No – tally the tree normally.

Yes – proceed to step 3.

Step 3: If you go the distance x from the tree along the same direction do you end up outside the block? In most cases the answer will be yes if y is less than x, but in some cases with irregular boundaries you may walk outside the block and back inside again.

No – tally the tree normally

Yes – tally the tree twice.

NOTE – the fixed area plot can be entirely within the polygon, and you can still have trees with inclusion zones that overlap the boundary, and which need to be double counted. For this reason, it is important to use the walkthrough method whenever a plot is close to edge, not just when it overlaps the edge.

The "Bounce-back" or Reflection Method for Transects

When a transect encounters the block edge:

- Stop at the boundary, turn around 180 degrees, and follow the original line back into the block.
- Continue along the line in the reverse direction to complete the required sampling distance.
    - For example, if the planned transect is 30 m, and the edge is encountered at 24 m, then the 6 m back into the block is sampled twice.
- Record or tally each piece along the length sampled two times or have a location on the tally sheet to mark it as being counted twice.
- All fixed area square plots or sampling points which are located along the transect shall be 'bounced back' and placed along the transect at the originally planned location.

APPENDIX C – PLANAR INTERCEPT TALLY RULES

All measuring rules and figures are taken or adapted from the Measurement And Description of Fuels And Fire Behaviour Alexander & McRae and the *Field Handbook for Prescribed Fire Assessments in British Columbia: Logging Slash Fuels* (Trowbridge et al, 2002) unless otherwise noted.

Using planar intercept methodology, the plot is a vertical plane extending from the ground to the height of the dead and downed woody debris. For FWD, intersections can be dot tallied by size category. For LDWD and CWD, further data collection is required.

Regardless of diameter class, the following tally rules apply.

- Particles qualifying for tally include twigs, stems, branches, and stems from any trees and shrubs that are dead and downed.
    - Consider a particle downed when it has fallen to the ground or has been severed from its original source of growth.
    - Dead branches attached to boles of standing trees are NOT tallied (they are not downed).
    - Dead woody stems and branches still attached to standing brush or trees are NOT tallied.
    - Litter (cones, bark flakes, needles, leaves, grasses, forbs) is NOT tallied.
    - LDWD and CWD with the decay class of 4-5 will not be tallied (Figure 11).

Vegetation Resourse Inventory Ground Sampling Procedures March 1997 Table 8.1

	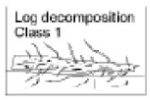	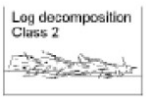	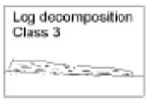	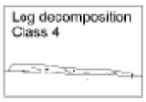	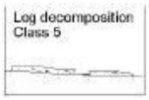
	CLASS 1	**CLASS 2**	**CLASS 3**	**CLASS 4**	**CLASS 5**
WOOD TEXTURE	intact, hard	intact, hard to partly decaying	hard, large pieces, partly decaying	small, blocky pieces	many small pieces, soft portions
Other associated characteristics					
PORTION ON GROUND	elevated on support points	elevated but sagging slightly	sagging near ground, or broken	all of log on ground, sinking	all of log on ground, partly sunken
TWIGS < 3 cm (if originally present)	twigs present	no twigs	no twigs	no twigs	no twigs
BARK	bark intact	intact or partly missing	trace bark	no bark	no bark
SHAPE	round	round	round	round to oval	oval
INVADING ROOTS	none	none	in sapwood	in heartwood	in heartwood

Figure 11. CWD decay classes

- For each piece intersecting the sampling plane, it helps to visualize the central axis (Figure 12).

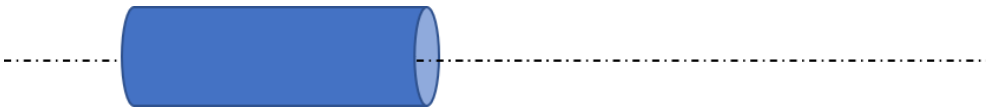

Figure 12. Representation of woody debris and the central axis.

- Intersections are tallied when the central axis lies in, or above the litter. When the central axis of the particle, where the intersection occurs, lies in the duff, the piece is NOT tallied (Figure 13).

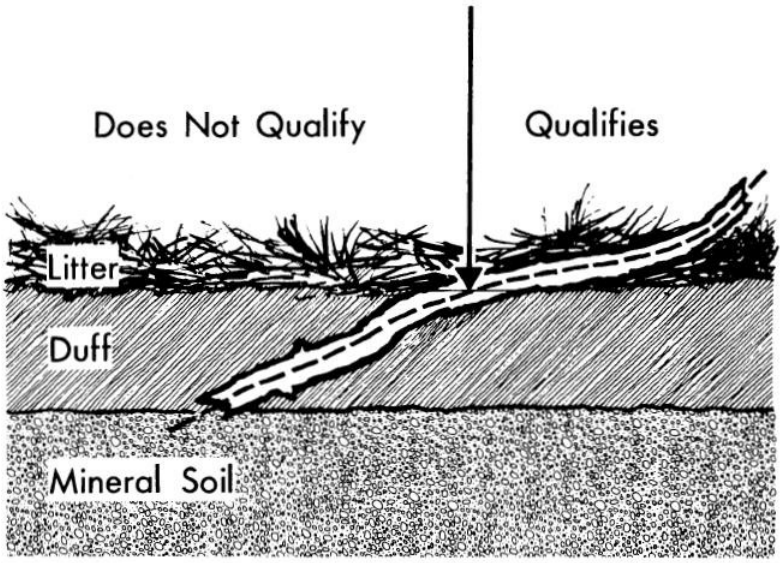

Figure 13. Pieces are tallied only when intersection lies in or above the litter (to the right of the arrow).

- A piece is tallied if the sampling plane intersects the central axis. If the plane exactly intersects the central axis, tally every other such piece.
    - If the sampling plane intersects the end of a piece, the piece must only be counted if the sampling plane intersects the central axis (Figure 14).

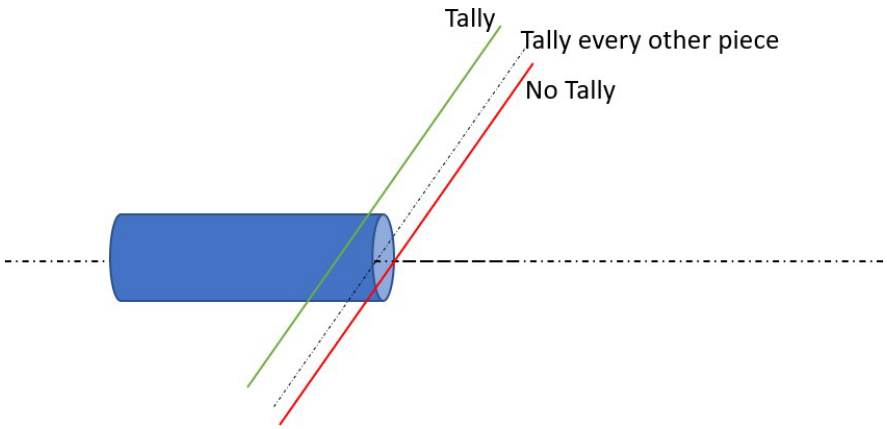

Figure 14. An intersection at the end of a branch or log must include the central axis to be tallied.

- Do NOT tally a piece that has a central axis that coincides exactly with the sampling plane (Figure 15).

Figure 15. When the sampling plane is exactly the same as the central axis (viewed from above), the piece is not tallied.

- If the sampling plane intersects one curved piece more than once, tally each intersection, assuming all other tally rules are met (Figure 16).

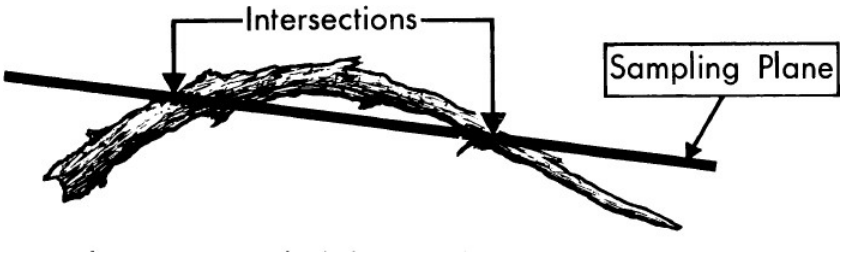

Figure 16. Count all intersections of a curved piece; in this figure there are two.

- Tally wood slivers and chunks left over from logging by visually molding the pieces into a diameter for determining size class or estimating a diameter.

- Tally uprooted stumps and roots that are not encased in dirt. Consider uprooted stumps as either tree stems or individual roots, depending upon where the sampling plane intersects the piece(s).
    - Undisturbed stumps are NOT tallied.
- Be sure to look up from the ground when collecting data; downed material can be at any height. A practical cutoff is 2 m, but in deep slash, 2 m may not be sufficient to collect data on the dead and downed woody debris.
- For areas with very heavy slash loads, modifications may be necessary. Please see the aforementioned references for available options.

Document History

Version	Change Made	Effective Date
1	Add "age" info to tables 12 and 13. Update to Section 3.13 and Appendix C to provide additional clarification. Updated text in red.	May, 2023