

**Carrier Lumber Ltd.  
Robson Valley TSA  
Pest Management Plan  
CLL/ROBSON PMP 2019**

**March 30, 2019 – March 29, 2024**

**Prepared By:**

**Brett Musa, RFT**

**March 30th, 2019**

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## **INTRODUCTION**

### **1.1. Proponent of the Plan**

Carrier Lumber Ltd. of Prince George B.C. is an integrated forest company that has considerable experience in forest management and forestry operations in the Robson Valley Timber Supply Area.

Carrier Lumber Ltd. (CLL) shall be responsible for managing vegetation (pests) within the scope of this plan.

### **1.2. Purpose of the Plan**

The purpose of this Pest Management Plan (PMP) is to develop and implement the best possible Vegetation Management Strategies and create healthy commercially valuable stands of trees and meet all government regulations. The PMP deals with vegetation control within the context of managing cutblock vegetation where CLL has an obligation to achieve prescribed performance targets or Free Growing Stocking Standards.

#### **1.2.1 Short Term Objectives**

Short-term objectives of the PMP are to;

- ❑ Predict and conduct vegetation management activities prior to crop injury.
- ❑ Establish free growing crops while minimizing liability.
- ❑ Minimize the need for vegetation management treatments by employing principles of Integrated Pest Management.
- ❑ Conduct vegetation management treatments in compliance with legislated standards.
- ❑ To provide an opportunity for interested or affected parties (Government Agencies, First Nations, and Public Stakeholders) to contribute input into the development and content of the PMP.

#### **1.2.2 Long Term Objectives**

Long Term Objectives of the PMP are to:

- ❑ Provide a safe working environment for all employees and contractors.
- ❑ Manage forests for continued supply of economically viable wood products while integrating other forest values such as wildlife, fisheries, range and biodiversity.
- ❑ To promote well-stocked stands of valuable tree species in order to provide long term stability for forest sector workers, and communities.

CLL intends to treat blocks under the jurisdiction of this PMP for the purpose of achieving Free Growing Standards within the assessment period as defined by the Forest Practices Code (FPC) or the Forest and Range Practices Act (FRPA). Competing brush will be treated to prepare sites for planting, ensure crop establishment, and promote optimal growth.

### **1.3 Scope of Plan**

This PMP will cover all operating areas located in the Robson Valley T.S.A. under Forest License A15429, A15430, and A70174 within the Headwaters portion of the Prince George Natural Resource District. An overview map showing the area covered by this PMP can be found in Appendix 1.

### **1.4 Term of the Plan**

The plan will be in effect for a period of five years. The term for this plan is from March 30, 2019 to March 29, 2024 inclusive.

### **1.5 Current contact for the Plan**

The principal contact at Carrier Lumber Ltd. who has the responsibility for this plan is Brett Musa, RFT. He can be contacted at (250) 563-9271 during normal business hours.

## **2 OVERVIEW OF THE PLAN AREA**

### **2.1. PMP Operating Zone**

The areas covered by Forest Licenses A15429, A15430, and A70174 will be considered the area under this plan.

### **2.2. Forest Cover**

Forest cover within the plan area is dominated by the Sub-boreal Spruce (SBS) Biogeoclimatic Ecosystem Zone with the Engelmann Spruce – Subalpine Fir (ESSF) zone occupying the higher elevations and Interior Cedar Hemlock (ICH) zone in low to moderate elevation areas receiving higher levels of precipitation. Detailed descriptions of the SBS, ESSF, and ICH zones can be found in Ecosystems of British Columbia.<sup>1</sup>

Potential brush hazard from herbaceous, low and high shrubs can be predicted by biogeoclimatic zone, subzone and site series. The following table identifies **commonly** found biogeoclimatic zones and associated subzones within the PMP area and their corresponding brush hazard by site series.

<sup>1</sup> Meidinger and Pojar, 1991. Ecosystems of British Columbia. Special report Series 6, BC Ministry of Forests.

**Table 2.1: Site Series Vegetation Potential**

BEC Zone Sub-zone	SITE SERIES									
	01	02	03	04	05	06	07	08	09	10
ESSF mm1	mod	low	low	mod	very high	very high	n/a	-	-	-
ESSF wk1	high	low	low	high	very high	high	very high	very high	-	-
ESSF wc2	mod	low	low	mod	Mod	mod	very high	high	n/a	-
ESSF wc3	high	-	-	-	-	-	-	-	-	-
ICH mm1	low/mod	low	low/mod	mod	high	high	n/a	-	-	-
ICH wk1	mod	low	low	low	very high	very high	high	n/a	n/a	-
ICH wk3	low/mod	mod	low	low	high	very high	low	n/a	n/a	-
SBS dh1	low/mod	low	low	low	low	mod	very high	n/a	-	-
SBS vk	Very high	low	low	high	extreme	high	Very high	-	-	-

### 2.3. Public Use

Primary public uses of the PMP area are:

- hunting
- fishing
- berry picking
- firewood cutting
- mushroom picking
- camping
- hiking

Each of these will be managed on a site specific basis.

There are several high value recreation and camping sites for public use throughout the PMP area. In years where treatment is scheduled to occur within these high value areas, additional notification to applicable agencies will occur to ensure that the public is adequately notified.

#### 2.3.1. Access

Main Access routes are all season gravel roads. Winter Access is limited by lack of snow plowing on most roads. Secondary roads within cut blocks are deactivated to maintain natural drainage patterns. All-terrain vehicles and 4x4 access is possible on most harvested blocks. No improvements to access will occur as a result of vegetation management treatment operations under the PMP.

### **3. THE INTEGRATED PEST MANAGEMENT PROGRAM**

#### **3.1. Preventative Measures**

Predicting vegetation problems and minimizing the need for vegetation management treatments by employing principles of Integrated Pest Management (IPM) is a primary objective of this PMP. CLL will employ a number of predictive and preventative measures to avoid brush competition within the PMP area. These measures include, but are not limited to:

##### **3.1.1. Predictive Pre-Harvest Planning**

As a requirement of the FPC and the FRPA, a Site Plan or Silvicultural Prescription (SP) must be prepared before harvesting a block. During the SP development stage, blocks are stratified into homogeneous segments or treatment units using the BEC system. Site data such as vegetation species, moisture and nutrient status and expected brush hazards are collected and evaluated to predict how the site will respond to harvesting and site preparation treatments. This evaluation then drives the selection of various management options for each stratum such as, the timing of operations, stocking standards, stock selection, and site preparation requirements.

##### **3.1.2. Timing of Site Preparation and Planting**

CLL continues its practice to plant a given harvest block as soon as possible following harvesting. Generally, site preparation is completed within one growing season following harvesting and harvest blocks are planted in the following spring. Most summer harvested blocks are site prepared that fall and are planted in the following spring. Generally winter blocks are site prepared in the summer and planted the following spring. Some winter blocks are planted “as is” either the spring after harvest or the following spring.

##### **3.1.3. Site Preparation**

Once harvesting has been completed, areas where there are concerns regarding the number of acceptable plantable spots to meet the stocking standards, further site preparation activities will be considered. On sites that pose little regeneration and brush problems logging slash may be piled and burned.

If site preparation is required, mechanical site preparation and chemical site preparation options will be evaluated and the most appropriate treatment will be carried out.

##### **3.1.4. Planting Stock Selection**

Spruce, Lodgepole pine, and Douglas-fir are the primary tree species planted in the PMP area. CLL utilizes various container stock in order to minimize brushing treatments while managing the overall costs. On sites with low to moderate brush hazards, a smaller stock size such as a 310 or 313 stock type is generally used. However, on richer sites with moderate to high brush hazards, larger seedlings such as a 410, 412B

or 412A are generally used. The larger seedlings are capable of withstanding increased levels of snow press and have good vertical growth potential increasing their potential survival against competing vegetation and thus reducing the likelihood of vegetation control measures.

Seedling quality is monitored during its' growth at the nursery. At the time of lifting, each tree must meet certain specifications in root collar width and height. These specifications were developed in order to ensure that the tree has a proper root to shoot ratio and are sturdy enough to be planted out successfully.

### **3.1.5. Planting Practices**

Microsite selection, planting depth and stock handling are very important aspects in planting practices that will ensure survival and growth of the seedlings if properly managed. CLL continues to modify and improve our planting practices so that once planted, the seedlings will have the best chance to out compete other vegetation for growing space.

## **3.2. Competing Vegetation**

The British Columbia Ministry of Forests defines the term pest as being "...any organism or damaging agent designated as detrimental to effective resource management." For the purposes of vegetation management activities under a Pest Management Plan, the term "pest" refers to herbaceous, shrub and deciduous complexes that inhibit plantation establishment, optimal growth and development of crop trees or prevent a stand from achieving Free Growing Status.

For the purposes of this plan, the following vegetation complexes are the pests targeted by the treatments. Completing vegetation will be categorized into three layers:

<b>Vegetation Layer</b>	<b>Complex</b>	<b>Decision Matrix</b>	<b>Description</b>
Herbaceous Plants	A	Herbaceous	Herbaceous species compete within newly planted seedlings for light and commonly contribute to vegetation press and snow press. Species found in areas within the PMP include, but are not limited to: fireweed, grasses, thimbleberry, wood fern and lady fern.
Shrubs	B	Herbaceous/ Woody	Shrubs can be divided into two categories: Low and High shrubs. Low shrubs are woody plants which typically grow to be less than 1.5 meters in height; where as high shrubs typically grow to heights greater than 1.5 meters in height.  Low shrubs include, but are not limited to thimbleberry, black twinberry, white flowered rhododendron, prickly rose, red elderberry and red raspberry, false azalea and devils club.

		Woody	High shrubs include, but are not limited to alder, willow and douglas maple.
Non-crop Deciduous Trees	C	Woody	Species include, but are not limited to trembling aspen, black cottonwood, and paper birch. A moderate to high brush hazard is expected after harvest of stands with a non-crop tree component due to root and shoot suckering.

The chief reference for the identification of these pests is Plants of Northern British Columbia, (Mackinnon, Pojar, Coupe, 1992). This book provides a complete catalogue of plants commonly found within the Pest Management Plan area.

### 3.3. Monitoring

CLL is responsible for silvicultural monitoring until the block achieves Free Growing status. Once Free Growing status has been achieved, forest management responsibilities are taken over by the Ministry of Forests, Lands Natural Resources Operations and Rural Development.

#### 3.3.1. Surveys and Monitoring

Properly timed surveys are essential to identifying problems which may affect free growing objectives. Field surveys will be used to monitor competing forest vegetation (pests) under this plan.

To assess plantation establishment and performance, a number of surveys will be undertaken on each site to assess competing vegetation.

The following table outlines a typical frequency or schedule of surveys for a given block.

<b>CLL'S SILVICULTURAL MONITORING SCHEDULE</b>	
<b>Year</b>	<b>Survey</b>
-1	Pre-harvest assessment or SP determines site ecology and stratifies block into management units based on operational considerations including potential brush hazard.
0	Post harvest walkthroughs in order to determine plantability, site preparation requirements, and verification of SP and stock type requirements.
1-4	Planting and Regeneration surveys within the regeneration delay period in order to ensure regeneration delay is met. Intermittent Stocking Surveys and Brush Assessments as required.
3-10	Stocking surveys and/or Brush Assessments in order to determine the levels of stocking and the need for brushing treatments as required.
9-20	Free Growing Surveys and Forest Health Surveys as required by legislation with intermittent regeneration and brush hazard

assessments and walkthroughs.
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### 3.3.2 Data Collected

Data collected includes information on the condition of the seedlings on the site (height, age, species percentage, damage), the competing brush on site (amount, height, complex and distribution), whether the brush hazard is expected to increase, the restrictions to treatments (eg. slope or access), and the recommended treatment if required. The survey will also note wildlife habitat features, species at risk (plants and animals), and riparian features (eg. streams or water-bodies). In the event that the recommended treatment is a basal bark or cut-stump treatment then the number of stems and their diameter will be recorded. A map will accompany the survey and will indicate the area surveyed and define the area(s) delineated for treatment.

## 3.4. Competition Injury Thresholds

Injury thresholds identified under this PMP are the thresholds commonly selected for determining treatment requirements within the Forest Industry. The thresholds indicated are known to be effective tools in determining when injury, mortality or anticipated damage may occur or when there is an increased risk of not meeting silvicultural obligations.

### 3.4.1 Herbaceous and low shrub complexes

Crop tree performance and signs of suppression or damage both hinge on the ability of the crop tree to compete for light and nutrient resources. Signs of crop tree suppression include chlorotic color, short brushy leaders, short needles and poor weak stems.

The main competition index which CLL uses to aid in determining if a treatment is required for herbaceous or low woody shrub complexes is the Competition Index (CI)<sup>2</sup>. CI is a simple index which measures the competition for sunlight with regards to crop trees. CI is calculated as the sum of the percentage of cover and height for all non-crop species within a 1.26m radius of the crop tree. A relatively simple formula for CI is used:

$$CI = \frac{\text{Sum \% vegetation cover} \times \text{height of vegetation by species}}{\text{seedling height}}$$

Treatment decisions are then based on the data collected and the CI number generated by this formula. The data collected in the field is not limited to vegetation competition but also includes tree size (Root Collar Diameter and leader), age, species, vigor, as well as other site factors such as site series.

Injury thresholds have been identified to determine if treatment is needed:

1. sites with a CI which is <70 are normally considered to require no treatment.

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<sup>2</sup> Szauer, Tom, RPF. The Role of Competition Indices in Vegetation Management Decisions, Industrial Forestry Services Ltd. (Can be found in Appendix 2.)

2. sites with a CI of >70 are justifiably considered for vegetation control.

Where herbaceous complexes have caused mortality within a stand, the CI may not be available (little or no seedlings to provide an index value). Treatment thresholds will be based on the stocking status of the stratum within these stands. Where herbaceous competition has caused the stocking status of a stratum (an area >2.0ha) to become not-sufficiently restocked, a brushing treatment will be implemented.

Site preparation treatment thresholds for herbaceous complexes within stands that have not been planted will be assessed on a site specific basis. If the herbaceous cover is such that planted seedlings will not survive due to light availability or vegetation press, a brushing treatment may be implemented. A planting prescription will be completed for these areas with the number of plantable and preparable spots assessed and an appropriate treatment method will be prescribed.

### **3.4.2 Deciduous species and high shrub complexes**

For deciduous tree species or high woody competition free growing criteria from the "Establishment to Free-Growing Guidebook - Prince George Forest Region" are utilized as the treatment threshold. If a stratum (an area >2.0ha) either fails or is expected to fail to meet the free to grow criteria due to crop trees being impeded by the deciduous species and high woody shrubs on the site, then a treatment will be implemented. Decision Matrix 3 in Appendix 4 outlines the decision process for selecting the appropriate treatment method.

The FS660 can be found in Appendix 3 for more specific information on the threshold criteria, the basis of which is derived from the Establishment to Free Growing Guidebooks (commonly referred to as Appendix 9). Small amounts of deciduous are encouraged as it provides for increased biodiversity within the cutblock areas. In all cases, the stocking standards for each area will take precedent over all other criteria.

It should be noted that the surveys do not replace sound professional judgment. If the opinion of the professional forester is to treat or not to treat a site, it will not be dependent on the survey or the CI. Further consideration such as tree vigor, site conditions and site history will always be taken into account.

### 3.5 Vegetation Management Options

#### 3.5.1 Herbicides used for Vegetation Control

Six herbicides are proposed for use under this PMP:

Herbicide	Active Ingredient	Application			Pesticide Control Products Act #
		Usage	Aerial	Ground	
Vision	Glyphosate 35.6%	common	yes	yes	19899
Vantage	Glyphosate 35.6%	common	yes	yes	26884
Vision Max	Glyphosate 54.0%	common	yes	yes	27736
Weed-Master	Glyphosate 35.6%	common	yes	yes	29009
Release	Triclopyr 48.0%	common	no	yes	22093
Garlon RTU	Triclopyr 14.4%	common	no	yes	29334

### 3.5.2 Suggested Usage Rates

SUGGESTED MAXIMUM APPLICATION RATES FOR FOREST BRUSHING/RELEASE ACTIVITIES										
* this table does not apply to site preparation, cut stump, hack and squirt or stem injection										
Only under certain circumstances will rates in excess of the chart be approved										
Target Species	Suggested application rate (L/ha) of Vision:									
	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	Comments:	
twinberry	A	B							Not a likely sole target for aerial applications; possibly for ground	
cottonwood				A/B					Treat as for birch	
birch/aspens				A/B					If < 2m tall, 3 L/ha will generally control; 4 L/ha for taller competition	
rose					A/B				Rarely a target species in the Omineca-Peace/Cariboo	
pinegrass					A/B				Rarely a target species in the Omineca-Peace/Cariboo	
elderberry				A		B				
willow /D. Maple				A		B			Treatment should be aimed at control rather than elimination	
fireweed						A		B	4 L/ha should adequately control on most sites, provided adequate stock planted	
raspberry						A		B	4 L/ha should provide adequate control	
bluejoint grass						A		B	Treatment at 6 L/ha is only acceptable for sites where grass is the main competitor. Areas meeting this criteria must be stratified as such within the proposed treatment area.	
ladyfern						A		B	Usually found on rich sites with multiple species; 4 L/ha should be adequate for seedlings 3+ years old.	
rhododendron						A		B		
azalea						A		B		
thimbleberry						A		B	4 L/ha will provide adequate control on most sites; high levels acceptable for site preparation.	
alder						A		B	Benefits to site/soil should encourage suppression rather than eradication; 4 L/ha should provide control on most sites; 6 L/ha in areas of extensive competition and/or for site preparation	
	A	= MAXIMUM RATE FOR AERIAL APPLICATION								
	B	= MAXIMUM RATE FOR GROUND APPLICATION (i.e. backpack broadcast, cone spray)								

\*Application rates provided by the manufacturer for all herbicides will take precedent over the above guidance.

### 3.5.3 Chemical – Aerial Herbicide Treatments

The following table describes the aerial herbicide treatments that will be considered for vegetation management during the term of this PMP.

<b>Treatment Methods</b>	<b>Aerial Broadcast Application including thru-value treatment</b>	<b>Aerial Pilot Discretionary Application</b>
Chemical	Glyphosate	Glyphosate
Application Methods	Broadcast	Selective
Equipment Required	<ul style="list-style-type: none"> <li>• Helicopter</li> <li>• Mix equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Helicopter</li> <li>• Mix equipment</li> </ul>
Target Vegetation	All vegetation types	Deciduous species over 1 meter in height
Efficacy	1-3 years Factors: <input type="checkbox"/> Target species <input type="checkbox"/> Timing <input type="checkbox"/> Application rate <input type="checkbox"/> Crown closure	1-3 years Factors: <input type="checkbox"/> Target species <input type="checkbox"/> Timing <input type="checkbox"/> Application rate <input type="checkbox"/> Crown closure
Costs	\$325-550/ha Factors: <input type="checkbox"/> Pre-treatment layout <input type="checkbox"/> Access <input type="checkbox"/> Block size/ configuration <input type="checkbox"/> Snags and wildlife trees <input type="checkbox"/> Waterbody frequency	\$325-450/ha Factors: <input type="checkbox"/> Pre-treatment layout <input type="checkbox"/> Access <input type="checkbox"/> Block size/ configuration <input type="checkbox"/> Snags and wildlife trees <input type="checkbox"/> Waterbody frequency
Timing	<input type="checkbox"/> August 1 – September 15	<input type="checkbox"/> August 1 – September 15
Worker Safety	<input type="checkbox"/> Helicopter safety issues <input type="checkbox"/> Limited worker contact with chemical	<input type="checkbox"/> Helicopter safety issues <input type="checkbox"/> Limited worker contact with chemical
Affects on Wildlife	<input type="checkbox"/> Reduction in browse species and cover <input type="checkbox"/>	<input type="checkbox"/> Reduction in browse species and cover
Benefits	<input type="checkbox"/> Limited worker contact with chemical <input type="checkbox"/> Large areas can be treated in a short time frame <input type="checkbox"/> Cost effective <input type="checkbox"/> High efficacy <input type="checkbox"/> Varying application rates possible	<input type="checkbox"/> Limited worker contact with chemical <input type="checkbox"/> Large areas can be treated in a short time frame <input type="checkbox"/> Cost effective <input type="checkbox"/> Varying application rates possible <input type="checkbox"/> High efficacy <input type="checkbox"/> Selective treatment possible
Limitations	<input type="checkbox"/> May not be able to treat small blocks <input type="checkbox"/> Can only treat when on site conditions are within constraints <input type="checkbox"/> Technically demanding <input type="checkbox"/> Non-selective <input type="checkbox"/> Stringent application constraints <input type="checkbox"/> Intensive on block preparative required	<input type="checkbox"/> May not be able to treat small blocks <input type="checkbox"/> Can only treat when on site conditions are within constraints <input type="checkbox"/> Technically demanding <input type="checkbox"/> Non-selective <input type="checkbox"/> Stringent application constraints <input type="checkbox"/> Intensive on block preparative required

### 3.5.4 Chemical – Ground Herbicide Treatments

The following table describes the ground herbicide treatments that will be considered for vegetation management during the term of this PMP.

<b>Treatment Methods</b>	<b>Ground Broadcast Application</b>	<b>Ground Spot (Selective) or Discretionary Application</b>	<b>Ground Cut Stump or Hack and Squirt Application</b>	<b>Ground Basal Bark Application</b>
Chemical	Glyphosate	Glyphosate	Glyphosate	Triclopyr
Application Methods	Broadcast	Selective	Selective	Selective
Equipment Required	<ul style="list-style-type: none"> <li>• Backpack sprayers</li> <li>• Mix equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Backpack sprayers</li> <li>• Mix equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Backpack sprayers</li> <li>• Mix equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Backpack sprayers</li> <li>• Mix equipment</li> </ul>
Target Vegetation	<ul style="list-style-type: none"> <li>• All vegetation types</li> </ul>	<ul style="list-style-type: none"> <li>• All vegetation types</li> </ul>	<ul style="list-style-type: none"> <li>• All vegetation types</li> </ul>	<ul style="list-style-type: none"> <li>• Woody Stems</li> </ul>
Efficacy	<p>1-3 Years Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Target species</li> <li><input type="checkbox"/> Timing</li> <li><input type="checkbox"/> Application rate</li> <li><input type="checkbox"/> Competition density and height</li> <li><input type="checkbox"/> Coverage</li> </ul>	<p>1-3 Years Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Target species</li> <li><input type="checkbox"/> Timing</li> <li><input type="checkbox"/> Application rate</li> <li><input type="checkbox"/> Competition density and height</li> <li><input type="checkbox"/> Coverage</li> </ul>	<p>1-3 Years Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Target species</li> <li><input type="checkbox"/> Timing</li> <li><input type="checkbox"/> Application rate</li> <li><input type="checkbox"/> Competition density and height</li> <li><input type="checkbox"/> Coverage</li> </ul>	<p>2 Months to 1 Year Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Target species</li> <li><input type="checkbox"/> Efficacy reduced if chemical does not completely wrap the stem</li> <li><input type="checkbox"/> Crop density and stems size</li> </ul>
Costs	<p>\$500-850/ ha Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Terrain/site prep</li> <li><input type="checkbox"/> Access</li> <li><input type="checkbox"/> Competition density and distribution</li> </ul>	<p>\$500-850/ ha Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Terrain/site prep</li> <li><input type="checkbox"/> Access</li> <li><input type="checkbox"/> Competition density and distribution</li> </ul>	<p>\$500-850/ ha Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Terrain/site prep</li> <li><input type="checkbox"/> Access</li> <li><input type="checkbox"/> Competition density and distribution</li> </ul>	<p>\$550-1150/ ha Factors:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Terrain/site prep</li> <li><input type="checkbox"/> Access</li> <li><input type="checkbox"/> Competition density, size and distribution</li> </ul>
Timing	<ul style="list-style-type: none"> <li><input type="checkbox"/> August 1 – September 15</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> August 1 – September 15</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> August 1 – September 15</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Year round</li> </ul>
Worker Safety	<ul style="list-style-type: none"> <li><input type="checkbox"/> Proper procedures must be followed to minimize exposure to herbicide</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Site prep methods, slope or slash loading may hinder access and make for unsafe walking conditions</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Proper procedures must be followed to minimize exposure to herbicide</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Site prep methods, slope or slash loading may hinder access and make for unsafe walking conditions</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Proper procedures must be followed to minimize exposure to herbicide</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Site prep methods, slope or slash loading may hinder access and make for unsafe walking conditions</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Proper procedures must be followed to minimize exposure to herbicide</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Site prep methods, slope or slash loading may hinder access and make for unsafe walking conditions</li> </ul>

Affects on Wildlife	<input type="checkbox"/> Reduction in browse and forage species and cover <input type="checkbox"/> Treat only areas needed <input type="checkbox"/> Areas will be left in PFZ's	<input type="checkbox"/> Reduction in browse and forage species and cover <input type="checkbox"/> Treat only areas needed <input type="checkbox"/> Areas will be left in PFZ's	<input type="checkbox"/> Reduction in browse and forage species and cover <input type="checkbox"/> Treat only areas needed <input type="checkbox"/> Areas will be left in PFZ's	<input type="checkbox"/> Reduction in browse species and cover <input type="checkbox"/> Treat only target species areas needed <input type="checkbox"/> Areas will be left in PFZ's
Benefits	Able to treat small or irregular shaped areas.	Selective and able to treat small or irregular shaped areas.	Selective and able to treat small or irregular shaped areas.	<input type="checkbox"/> Treatment limited to target species only (very selective) Able to treat small or irregular shaped areas
Limitations	<input type="checkbox"/> Competition height effects efficacy (max. height = 3m) <input type="checkbox"/> Can only treat when on site conditions are within restrictions <input type="checkbox"/> High worker exposure <input type="checkbox"/> Intensive level of supervision is necessary <input type="checkbox"/> Intensive block preparation is required	<input type="checkbox"/> Competition height effects efficacy (max. height = 3m) <input type="checkbox"/> Can only treat when on site conditions are within restrictions <input type="checkbox"/> High worker exposure <input type="checkbox"/> Intensive level of supervision is necessary <input type="checkbox"/> Intensive block preparation is required	<input type="checkbox"/> Competition height effects efficacy (max. height = 3m) <input type="checkbox"/> Can only treat when on site conditions are within restrictions <input type="checkbox"/> High worker exposure <input type="checkbox"/> Intensive level of supervision is necessary <input type="checkbox"/> Intensive block preparation is required	<input type="checkbox"/> Easy to miss stems <input type="checkbox"/> Can only treat when on site conditions are within restrictions <input type="checkbox"/> High worker exposure <input type="checkbox"/> Intensive level of supervision is necessary <input type="checkbox"/> Intensive block preparation is required <input type="checkbox"/> Slow treatment

### 3.5.5 Non – Chemical Ground Brushing Treatments

The following table describes the non-chemical ground treatments that will be considered for vegetation management during the term of this PMP.

Treatment Methods	Mechanical Brushing	Manual Brushing	Animal Grazing	Girdling / Snap & Hinge
Brushing Methods	Selective	Selective	Broadcast	Selective
Equipment Required	Brush Saws Chain Saws	Hand tools	500-2000 sheep/goats	Girdling Devices
Target Vegetation	Alder, Willow, Deciduous	Herbaceous and woody shrubs	Herbs and Shrubs Small Deciduous	Deciduous
Efficacy	Under Review Factors: <input type="checkbox"/> Competitive species <input type="checkbox"/> Timing	Under Review Factors: <input type="checkbox"/> Competitive species <input type="checkbox"/> Timing	Under Review Factors: <input type="checkbox"/> Competitive species <input type="checkbox"/> Timing	Under Review Factors: <input type="checkbox"/> Competitive species <input type="checkbox"/> Timing
Costs	\$450 - \$1200/ ha Factors: <input type="checkbox"/> Density <input type="checkbox"/> Access <input type="checkbox"/> Terrain	\$600 - \$1100/ ha Factors: <input type="checkbox"/> Density <input type="checkbox"/> Access <input type="checkbox"/> Terrain	\$550 - \$750/ ha Factors: <input type="checkbox"/> Density <input type="checkbox"/> Access <input type="checkbox"/> Terrain	\$600 - \$1700/ ha Factors: <input type="checkbox"/> Density <input type="checkbox"/> Access <input type="checkbox"/> Terrain

Timing	Starts 2 to 3 weeks after foliar flush – August 1	Starts 2 to 3 weeks after foliar flush – August 1	June 1 to August 30	Starts 2 to 3 weeks after foliar flush – August 1
Worker Safety	<ul style="list-style-type: none"> <li><input type="checkbox"/> Chainsaw protective gear worn at all times</li> <li><input type="checkbox"/> Slash loading may hinder access and make for unsafe conditions</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Emergency Evacuation procedures</li> <li><input type="checkbox"/> Repetitive</li> <li><input type="checkbox"/> Poor maneuverability</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Slash loading may hinder access and make for unsafe conditions</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Emergency Evacuation procedures</li> <li><input type="checkbox"/> Repetitive</li> <li><input type="checkbox"/> Poor maneuverability</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Large Carnivores</li> <li><input type="checkbox"/> Guard dogs are normally used to protect the flock</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Protective gear for motorized girdling devices</li> <li><input type="checkbox"/> Worker safety equipment and procedures required</li> <li><input type="checkbox"/> Emergency Evacuation procedures</li> <li><input type="checkbox"/> Repetitive</li> <li><input type="checkbox"/> Poor maneuverability</li> </ul>
Affects on Wildlife	<ul style="list-style-type: none"> <li><input type="checkbox"/> Reduction in browse species and cover</li> <li><input type="checkbox"/> Treat only areas needed</li> <li><input type="checkbox"/> Wildlife trails remain clear</li> <li><input type="checkbox"/> Wildlife trees and buffers are maintained</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Reduction in browse species and cover</li> <li><input type="checkbox"/> Treat only areas needed</li> <li><input type="checkbox"/> Wildlife trails remain clear</li> <li><input type="checkbox"/> Wildlife trees and buffers are maintained</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Reduction in browse species</li> <li><input type="checkbox"/> Treat only areas needed</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Reduction in browse species and cover</li> <li><input type="checkbox"/> Treat only areas needed</li> <li><input type="checkbox"/> Wildlife trails remain clear</li> <li><input type="checkbox"/> Wildlife trees and buffers are maintained</li> </ul>
Benefits	<ul style="list-style-type: none"> <li><input type="checkbox"/> Selective</li> <li><input type="checkbox"/> Can be used in Pesticide Free Zones and No Treatment Zones</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Selective</li> <li><input type="checkbox"/> Can be used in Pesticide Free Zones and No Treatment Zones</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Can be used in No Treatment Zones</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Selective</li> <li><input type="checkbox"/> Can be used in Pesticide Free Zones and No Treatment Zones</li> </ul>

Limitations	<input type="checkbox"/> High cost <input type="checkbox"/> Short term control and low efficacy <input type="checkbox"/> Response of competition is to sucker <input type="checkbox"/> Repeated entries may be required for control <input type="checkbox"/> Increase slash loads may increase rodent population which may increase crop tree girdling <input type="checkbox"/> repetitive	<input type="checkbox"/> High cost <input type="checkbox"/> Short term control and low efficacy <input type="checkbox"/> Response of competition is to sucker <input type="checkbox"/> Repeated entries may be required for control <input type="checkbox"/> Increase slash loads may increase rodent population which may increase crop tree girdling <input type="checkbox"/> Repetitive	<input type="checkbox"/> High cost <input type="checkbox"/> Potential for soil erosion <input type="checkbox"/> Concerns of grazing near fish bearing streams <input type="checkbox"/> Repeated use may be required <input type="checkbox"/> Efficacy unknown on some herbaceous species – many respond vigorously to grazing	<input type="checkbox"/> High cost <input type="checkbox"/> Short term control and low efficacy <input type="checkbox"/> Response of competition is to sucker <input type="checkbox"/> Repeated entries may be required for control <input type="checkbox"/> Increase slash loads may increase rodent population which may increase crop tree girdling
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### 3.6 Treatment Selection (Matrix)

CLL’s Decision Matrix can be found in Appendix 4. Decisions on the treatment type to be used will be based on the decision matrix.

The decision matrix specifically addresses physical issues such as water-bodies, slope, competition types and access issues. Other issues from other stakeholders that are unknown at this time may alter a decision for use of one treatment type over another. These issues will be dealt with as they arise over the term of the plan.

#### 3.6.1 First Nations

The following table indicates the various First Nation groups with interests throughout the area under the plan.

Little Suswap First Nation	Canim Lake	Lhtako Dene Nation	Leihdli T’enneh	Xat’súll First Nation	Shuswap First Nation	Neskonlith First Nation	Simpcw
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There may be additional issues arise that define treatment methods as the consultation process proceeds with each of the above noted First Nation groups.

### 3.7 Post-Treatment Evaluation

Post treatment evaluations will be conducted within 11 months after treatment. An aerial review will be carried out on the treated areas and if issues are noted during the aerial

review, a ground survey will be conducted to determine the specific issues if any. As well, random ground surveys will be conducted within treated areas. Assessments of the treatment will be based on the objectives of the treatment. Critical factors reviewed will be crop tree performance, damage to crop trees, efficacy of treatment on target species, effect on non-target vegetation and resulting vegetation. Other factors such as the integrity of pesticide free zones and treatment boundaries will also be assessed during this review. Carrier’s Pest Management Plan ‘Treatment Follow-up Checklist’ is included in Appendix 5.

**4.0 ENVIRONMENTAL PROTECTION**

**4.1. Community Watersheds and Water Intakes (Domestic and Agricultural)**

There are no watersheds classified as community watersheds within the boundaries of this PMP. All domestic intakes and agricultural water sources will be protected with a 30-meter “No Treatment Zone” and buffer identified in table 4.2. If other water use sources are identified by stakeholders or found by CLL, then strategies to protect them will be determined at that time. It should be noted that the herbicides proposed for use under this plan have a very short half-life and they bond to soil particles very readily. These herbicides do not move through the environment as long as they are not in water. Therefore, the most important strategy is to keep them out of the water resources. The water resource is protected by applying pesticide free zones and buffers to the water resources and by ensuring appropriate treatment methods to the areas adjacent to the buffer areas.

**4.2. Other Resources and Riparian Areas**

The area under the plan contains many important fisheries and riparian areas. All watercourses, water-bodies and wildlife habitat features will be protected with an appropriate Pesticide Free Zone and an appropriate buffer. These are defined in the following table.

**Table 4.2: PFZ, Buffer and NTZ widths**

Area of Concern	Application Method	PFZ Width (m) <sup>1</sup>	Buffer Width (m) <sup>1</sup>	No treatment zone width (m) <sup>1</sup>
<ul style="list-style-type: none"> <li>• Fish bearing streams (wet or dry)</li> <li>• L1, L2, L3, L4 Lakes</li> <li>• Non-fish bearing streams with running water at time of treatment</li> <li>• Classified Wetlands</li> <li>• Identified heritage trails in McLeod Lake Band’s traditional territory</li> </ul>	• Aerial (glyphosate)	10	40	
	• Backpack (foliar) (glyphosate)	10	5	
	• Backpack basal bark (triclopyr)	10	3	
	• Hack and Squirt (glyphosate)	10	3	
	• Cut Stump (glyphosate)	10	3	

<ul style="list-style-type: none"> <li>Non-fish bearing streams with no running water at the time of treatment (and do not drain into fish bearing waterbody within 100m)</li> </ul> Temporary free standing body of water < 25m <sup>2</sup>	<ul style="list-style-type: none"> <li>Aerial (glyphosate)</li> <li>Backpack (foliar) (glyphosate)</li> <li>Backpack basal bark (triclopyr)</li> <li>Hack and Squirt (glyphosate)</li> <li>Cut Stump (glyphosate)</li> </ul>	0	0	
Temporary free standing body of water > 25m <sup>2</sup>	All methods	0	Various	
Active beaver lodge/pond/dam (slope less than 10%)	All methods			50
Active beaver lodge/pond/dam (slope greater than 10%)	All methods			90
Raptor nest (osprey, bald eagle, goshawk or Swainson's hawk occupied or not)	<ul style="list-style-type: none"> <li>All methods after Aug 1</li> <li>Backpack only within 300m of the nest prior to Aug 1</li> </ul>			100
Domestic and agricultural water intake	All methods		10	30
Private Land	All methods			10

<sup>1</sup>All distances are measured in **horizontal distances** from the high water mark of the stream or water-body.

### 4.3. Plants Requiring Protection

#### 4.3.1. Food Plants

First Nations, stakeholders and the general public use food and cultural plants and other special plants for sustenance and medicinal purposes. At this time, the only expected food plants used within the PMP area are berry crops and mushrooms. Historically, no berry crops have been specifically identified within the treatment areas. Should any areas be identified during consultation on the plan or during the term of the plan, CLL will address the issue at that time. The specific areas identified will be protected from treatment where they are so identified.

#### 4.3.2. Vulnerable plants Species

Vulnerable plant species are defined as those plant species whose numbers are either limited or are important for browse and forage. The status and distribution of rare plant communities is available from the Conservation Data Centre on the internet at <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre>

The following table outlines the Red and Blue listed plants found within the Robson Valley TSA. CLL will take the appropriate measures of protection if any of these plants are identified within the PMP boundaries. The minimum protection will be a “no treatment zone” around the area any of these plants may be found. Any further information on these plants can be found in *Rare Native Vascular Plants of British Columbia*, 2<sup>nd</sup> edition, by Douglas, Meidinger and Penny. 2002.

**Table 4.3.2(i): B.C. Conservation Data Centre: Rare Vascular Plant Tracking List  
Robson Valley TSA  
2019**

Scientific Name	English Name	Species Code	Global Status	Prov Status	BC List
<i>Botrychium ascendens</i>	upswept moonwort	BOTRASC	G3	S3	Blue
<i>Botrychium lineare</i>	Linear-leaf moonwort	BOTRLIN	G2G3	S3	Blue
<i>Botrychium montanum</i>	mountain moonwort	BOTRMON	G3	S3	Blue
<i>Carex adusta</i>	lesser brown sedge	CAREADU	G5	S2S3	Blue
<i>Draba densifolia</i>	Nuttall's draba	DRABDEN	G5	S2S3	Blue
<i>Muhlenbergia filiformis</i>	slender muhly	MUHLFIL	G5	S2	Red
<i>Pinus albicaulis</i>	whitebark pine	PINUALB	G3G4	S2S3	Blue
<i>Salix petiolaris</i>	meadow willow	SALIPET	G5	S3	Blue

#### 4.4 Treatment Threshold

A treatment threshold of greater than 100 hectares of proposed treatments within 100 km<sup>2</sup> will be used. This threshold is used in relation to broadcast treatments where there is little or no control over the types of vegetation that is impacted by the treatments. In the event that a selective method (e.g. basal bark) is used then the threshold amount will be waived. The use of a selective method does not have as large an impact on the habitat because only the target species is impacted. Therefore, threshold levels are different depending on whether the treatment type is broadcast or selective. As well, non-chemical treatments are excluded from the need for habitat assessments as their impact to the habitats are low and in some cases can enhance the habitat. This criterion will be used in the determining the new thresholds. **If the treatment threshold is exceeded in a proposed broadcast treatment, then a site specific wildlife habitat assessment must be completed.**

#### 4.5 Wildlife Habitat Assessments

These assessments are cutblock specific habitat assessments. The assessments will consider the potential impacts of treatment and will make recommendations regarding that treatment. Qualified personnel that have the ability to properly assess the wildlife habitats in question will complete these assessments. Recommendations from the habitat assessments will be used to mitigate potential impacts if any.

## **5. HERBICIDE APPLICATION OPERATIONAL PRACTICES UNDER THE PMP**

### **5.1. Pesticide Handling Practices**

#### **5.1.1. Pesticide Transportation**

*The Transportation of Dangerous Goods Act, the Integrated Pest Management Act and Regulations stipulate minimum standards for the transport of pesticides.*

Minimum requirements are:

1. Transport shall be limited to undamaged containers in which the pesticide was originally packaged or in undamaged containers marked (as a minimum) with the active ingredient, common name, trade name, pesticide concentration and name of the manufacturer.
2. All pesticides shall be transported in a manner that prevents escape or discharge of chemical.
3. Spill cleanup equipment along with spill contingency plan and first aid kit shall accompany transported pesticides.
4. Transport of pesticides shall occur in a lockable compartment, separate from the passenger section of the vehicle and ventilated so that pesticide vapours are vented to the outside.
5. Avoid transporting pesticides on wooden truck beds. If a wooden bed exists, use a storage box made of non-absorbent material or spread heavy plastic sheeting on the truck bed.
6. All pesticides shall be kept locked when vehicle is unattended.
7. All drivers of vehicles transporting pesticides shall be trained and aware of the spill contingency plan.
8. Pesticides shall not be transported with food, feed, seeds, drugs, drinking water or clothing in the same compartment.
9. People and/or animals shall not ride in the compartment containing pesticides.

10. When transporting pesticides, keep required documentation including: Material Safety Data Sheets and Product Labels.

#### **5.1.2. Pesticide Storage**

CLL purchases herbicide from the contractor that is applying the herbicide. CLL does not provide storage facilities for herbicide but expects the contractor to meet the requirements of section 66 of the Integrated Pest Management Regulation.

Temporary on-site storage is expected to occur ONLY within transport vehicles and must conform to the standards for transportation described in section 5.1.1.

#### **5.1.3. Water Pickup and Storage**

Clean water is essential when using it as a carrier for pesticide treatments. Water must be obtained from as clean a source as possible and stored in a clean, closed container. The following standards shall be implemented:

1. Intake from a source with enough depth to ensure that gravel and sand is not pumped in the system. All water sources must be approved by the project supervisor prior to their use.
2. Use a back-flow valve in line between the water source and the storage unit to ensure no contaminants could flow back into water source.
3. Do not pump water directly from the water source into the mixing equipment. The water must always be pumped through a storage unit and tested for cleanliness.
4. Check all water for cleanliness, after each storage unit load. If storage unit is found to contain dirty water, it must be flushed until the testing procedure no longer shows residual dirt.

Appropriate water use permits will be applied for where it will be required for water pick-up.

#### **5.1.4. Mixing and Loading of Pesticides**

The highest risk of exposure to pesticides is pouring and mixing concentrated products. The following conditions will be adhered to during the mixing and loading phase of pesticide use:

1. The designated mixing and loading stations are where all pesticides shall be mixed.

2. By law, the contractor carrying out treatment shall ensure that all mixers and loaders hold a valid and current Pesticide Applicator's Certification of the appropriate category.
3. No Mixing or loading of pesticides will occur within a pesticide free zone or buffer.
4. Mixers and loaders of pesticides shall have an emergency spill kit on site.
5. Mixers and loaders shall ensure that all equipment is in good operating condition.
6. The appropriate protective clothing and personal protection equipment must be worn. This may include rubber boots, chemical-resistant aprons, coveralls and gloves, a face shield, a hat and possibly a respirator. Personnel will have training on the limitations of protective clothing and equipment being used.
7. Ensure that the appropriate backflow device is used on the waterline used to fill the application equipment.
8. Equipment shall not be left unattended while filling.
9. First Aid equipment and eye wash station shall be located in close proximity of the filling station.
10. Ensure clean water is available for rinsing.
11. Ensure rates are not exceeded.
12. Know exact inventory of product on site prior to starting at any mix site.
13. Perform all mixing outdoors. If mixing in back of a vehicle, ensure adequate lighting and ventilation is available.
14. Load water into the delivery system last in order to rinse lines free of residual herbicide.

#### **5.1.4.1. Mixing and Loading Practices - Aerial Operations**

The following conditions will be adhered to during aerial herbicide operations:

1. With each load mixer/loader should be in contact with pilot to ensure that the mix ratio is correct for the unit.
2. Each load must be recorded immediately after loading into the spray system. The record shall include:
  - a. PUP or PMP number.
  - b. Contractor name and service license number
  - c. Volume of product, diluent and total mix in liters broken down by application method (conventional and low drift (by load)
  - d. Date and Time.

- e. Cutblock or opening number.
  - f. Pilot name and certification number.
  - g. Mixer and Loader name and certification number.
  - h. Summary of treatment information including total volume of product and carrier applied.
  - i. Weather (wind speed, temperature and humidity)
3. These records will be checked and signed by the mixer and project supervisor at the end of each spray window.
  4. When loading ensure: loading area is clear, cautionary signs are posted, hose end and aircraft connections are clean and drip free, system is free of leaks or drips, and aircraft is disconnected prior to take off.

#### **5.1.4.2. Mixing and Loading Practices - Ground Operations**

The following conditions will be adhered while conducting ground based applications of chemical herbicide:

1. Mix system for backpack, backpack basal, cut stump and hack and squirt to be located in a waterproof tub or vat in order to ensure the containment of any overflow or spill.
2. Each backpack mix shall be recorded once loaded and shall include:
  - a. PUP or PMP number
  - b. Contractor name and service license
  - c. Date and time
  - d. Mixer name and certification
  - e. Volume of herbicide
  - f. Volume of carrier
  - g. Name of applicator
  - h. Cutblock or opening number
  - i. Weather information (temperature, wind speed, humidity)
  - j. These records will be checked and signed by the mixer and project supervisor at the end of each spray window.

#### **5.1.5. Container and Residual Pesticide Disposal**

The following conditions will be adhered to for pesticide disposal. Responsibility of disposal of all empty containers shall be left up to the contractor. Certain guidelines should be followed in disposal:

1. 115 liter empty containers shall be returned to manufacturer for re-use.
2. If a container becomes damaged, certain precautions shall be taken to mitigate hazards to the environment. Triple rinse container, puncture to prevent future reuse, and deliver to an approved landfill in a timely manner.

3. 10 liter containers shall be triple rinsed, punctured and disposed of in an approved landfill.
4. All rinse shall be applied to the treatment area.

Contractor will be advised to dispose of any unused and unwanted pesticide by procedures indicated from Ministry of Environment, Environmental Protection Division or an approved disposal facility.

#### **5.1.6. Spill Plan**

##### **5.1.6.1 Spill Prevention and Reporting**

All spill actions, alerting, containment, cleanup and reporting will occur as per the CLL Spill Management Plan that is part of the Environmental Management System and amended from time to time. Prevention measures are managed through the storage, mixing and loading, transportation and disposal practices in previous sections. The plan will be on-site during operations as per the EMS requirements and it will be made available upon request by the Integrated Pest Management Branch.

##### **5.1.6.2 Herbicide Spill Kit**

A spill kit will be readily available during transportation and on site where pesticides are being stored, mixed, loaded and/or applied. In the case of aerial application, the spill kit will be located at the mix site and be readily available to be transported to the application site if a spill occurs. A spill kit will be located so it is easily accessible in the event of a spill in the vehicle which carries the pesticide.

The spill kit supplied must contain the following as a minimum:

1. Kitty Litter or equivalent absorbent material
2. Shovel – 2
3. Garbage bags
4. Waste receiving container with lid - 1
5. A set of boots, unlined gloves and goggles
6. Neutralizing material such as lime, chlorine bleach or washing soda
7. Spill Reporting procedure and all relevant numbers

#### **5.2. Boundary Layout Procedures**

All areas scheduled for herbicide application shall be subject to a pre-treatment ground layout in order to locate and mark all treatment boundaries, PFZ's, associated buffers, no treatment zones and retention patches. Boundary and treatment area layout shall be verified prior to treatment by the supervisor in charge given that prevailing weather conditions may have changed some site conditions. Boundaries shall be marked and in a manner clearly visible to the applicator. A Herbicide Application Layout Checklist (Appendix 9) must be completed for each block at the completion of the layout.

Applicator and supervisors will follow the maps provided unless otherwise changed by project supervisor. Detailed maps should include:

1. all streams and water-bodies
2. PFZ information, treatment area boundaries
3. bag and ribbon lines with color legend
4. treatment size in hectares
5. treatment type and application rate for each stratum
6. no treatment areas and any special condition pertaining to the treatment area.

#### **5.2.1. Boundary Layout - Aerial Applications**

The following conditions will be adhered to for treatment area layout for aerial applications:

1. Bags shall be used to mark water-bodies and treatment area boundaries.
2. As a guideline, bags will be hung no more than 15 meters apart with the distance being reduced in high brush areas.
3. As a guideline, corners will be marked with three bags placed closely together to ensure pilots are aware of changes in direction. All bags will be punctured.

#### **5.2.2. Boundary Layout - Ground Application**

The following conditions will be adhered to for treatment area layout for ground applications:

1. Treatment boundaries shall be located in highly visible ribbon. The ribbon line will delineate the boundary between the treatment zone and the buffer zone. Ribbons for treatment boundaries shall be inter-visible and no more than 10 meters apart.

#### **5.2.3. Variance in Layout Standards**

Distances and standards for boundary marking will vary depending on brush conditions, slope, and application. For aerial and ground herbicide operations, variations in layout standards may include reducing the distance between markers to ensure the integrity of treatment boundaries and PFZ's. The size of the buffer zone will also be dependant on brush conditions, terrain, significance of landform being protected and application method.

Pesticide Free Zones will be maintained adjacent to water bodies as outlined in section 4.2 of this plan.

#### **5.2.4. Layout Equipment**

All layout activities shall be carried out using aerial photographs (if available) and/or the most recent map as a reference. All boundaries shall be accurately mapped. Boundary markers will not be removed after treatment unless requested by local stakeholders or First Nations.

### **5.3. Application Equipment: Maintenance and Calibration**

#### **5.3.1. Aerial**

All equipment shall be calibrated prior to commencing operations. The Service Licensee shall provide proof of calibration analysis to CLL at the beginning of each spray season. The pilot and supervisor shall conduct periodic checks throughout the operations. Continuous monitoring is also the responsibility of the pilot during operations.

Maintenance of the spray equipment is the responsibility of the Service Licensee. The contractor shall have qualified personnel on each spray site who will ensure the equipment conforms to the manufacturer's standards. The Service Licensee will keep a log of the calibration and maintenance schedule.

#### **5.3.2. Ground**

Equipment for ground applications shall be calibrated prior to commencing spray operations in order to ensure that each individual is familiar with appropriate target delivery rate and equipment functioning. The most accurate method of calibration is to actually spray an area of known size and measure the amount of solution used over the known area. Calibration records must be provided to CLL prior to the commencement of any treatment.

Maintenance and repairs must be conducted by a maintenance person designated by the Service Licensee prior to the commencement of the contract. The person must be knowledgeable in the operation and repair of the equipment. The equipment must conform to the manufacturer specifications. The Service Licensee will keep a log of the calibration and maintenance schedule.

### **5.4. Herbicide Treatment Notice Forms (Signs)**

Signs indicating the use of pesticides will be posted at all roads and known trails leading into an approved treatment area on the day of treatment.

All treatment signs will:

1. Be a minimum size of 550 cm<sup>2</sup>.
2. Be water resistant.
3. Be posted for at least 14 days following the treatment.

4. Be written in letters that are clearly legible to a person approaching the treatment area.
5. Contain the following information:
  - a. "NOTICE OF HERBICIDE USE"
  - b. A cautionary symbol (eg. stop sign or raised hand)
  - c. A description of the treatment area
  - d. Name of Pests (vegetation) to be controlled
  - e. Date and Time of Application (Alternate Start time and Date if applicable)
  - f. Confirmation number
  - g. Trade Name of herbicide, active ingredient and registration #
  - h. Precautions for persons entering the treated area
  - i. Company (confirmation holder) Name, Address, Contact and Phone Number

### **5.5. Herbicide Application Procedures**

All herbicide treatments will be directed by an individual with a valid British Columbia Pesticide Applicator Certificate in the forestry category. If aerial treatment is prescribed, all pilots will hold a valid British Columbia Pesticide Applicator Certificate in the forestry category. For ground based herbicide application, a maximum ration of 4:1 non-certified to certified applicators will be maintained.

The on-site supervisor will be the holder of a valid British Columbia Pesticide Applicator Certificate in the forestry category. The on-site supervisor is the only person with the authority to allow the commencement of any herbicide treatment. Prior to and during the application of herbicides, drift monitoring will be done by an on site supervisor who has the authority to delay or stop the application of herbicides. The applicator (helicopter pilot or backpack sprayer) also has the authority and the responsibility to delay or stop the herbicide application if conditions are in question (weather or site conditions). Following a shut down, only the onsite supervisor has the authority to commence the treatment.

It is the service licensee's responsibility to conduct a pre-work conference with all of their employees to go over requirements for personal protection and safety in herbicide use operations. This information must be provided to CLL upon completion of the project.

### **5.6. Site Monitoring Procedures**

Concise site monitoring procedures are in place as outlined below. Prior to and during herbicide application, a CLL supervisor or designate will monitor the site, weather and application conditions.

### **5.6.1 Prior to Application**

As a minimum, the on site supervisor will conduct

1. Pre-work meeting with mixers and applicators.
2. Preflight for aerial application or walk through for ground application to identify treatment area boundaries.
3. Site assessment for appropriate brush conditions (moisture, leaf condition).
4. Site assessment for correct treatment boundary, buffer and/or PFZ marking.
5. Site assessment for people or large animals on the block.
6. Site assessment for wells or any unmapped water intakes.
7. Discussion with the pilots, for aerial application, regarding flight paths, nozzle direction and spray procedures for turns and weather check to verify conditions are appropriate (present conditions and forecast including wind speed, relative humidity and temperature).

### **5.6.2 During the Application**

As a minimum, the on site supervisor will:

1. Conduct weather checks to confirm that conditions are appropriate for herbicide application every half hour.
2. Conduct visual and/or physical checks to confirm that herbicide is not drifting into any PFZ or outside the treatment area.
3. Conduct discussions with applicators regarding site conditions that the applicator is experiencing.
4. Keep detailed records which will be kept for each site treated as per the "Aerial Herbicide Application Record" and the "Ground Herbicide Application Record" forms found in Appendix 8. This information must be submitted to CLL once the project has been completed.

### **5.6.3 Weather Data and Restrictions**

The CLL spray supervisor is responsible for initiating operational shutdown in the event of inclement weather. Shutdown will occur when conditions exceed the Restrictive Weather Conditions outlined in the table below.

Herbicides will be applied so there is no drift or leaching into the pesticide free zone.

Weather data will be collected and forecasting weather will be used for determining acceptable spray conditions. Hand held weather equipment will be used to record weather conditions. Attempts will be made to predict weather immediately after the spray period. Wind velocity and direction will be monitored on or immediately adjacent to the block. The following table summarizes weather conditions that will restrict the use of herbicides under this PMP.

Application Method	Wind Speed	Wind Direction	Temperature	Relative Humidity	Precipitation	Light
Aerial	Max 8 km/hr	away from PFZ	0 <sup>0</sup> -26.5 <sup>0</sup> C	50% or > **	Snow, heavy dew, or if rain is predicted. The product label will be used to determine rain fastness requirements	Transport Canada Restrictions Light & Fog
*Backpack	Max 8 km/hr	away from PFZ	0 <sup>0</sup> -30 <sup>0</sup> C	30% or >	Snow, heavy dew, or if rain is predicted. The product label will be used to determine rain fastness requirements	adequate daylight for a safe operation
*Basal bark	N/A	N/A	N/A	N/A	dry stems	adequate daylight for a safe operation

\*Note - Treatment may be restricted due to condition of applicators. Weather, terrain, safety equipment and physical conditioning of applicators will effect the health and safety (i.e. hypothermia or heat stress) as well as application quality, drift and evaporation. Conditions may require treatment be delayed until more suitable weather conditions exist.

\*\*Note - If application using large droplet size and high volumes, RH can be 40% or >.

### **5.7 Initial Treatment Maps**

Upon completion of the layout of a block, a treatment map at a scale of not greater than 1:20,000 will be created having containing the following features:

1. Forest License, Cutting Permit and Block
2. Treatment areas by method of treatment
3. Chemical name
4. Application rate
5. Target species or target vegetation complex
6. No treatment zones
7. Waterbodies and wetlands with classifications wherever possible
8. Conditions of the streams / waterbodies at the time of the layout
9. Latitude and longitude
10. Legend

This map will be reviewed with the service licensee performing the treatment at the pre-work conference. At the end of the pre-work, the contractor must sign a copy of the map indicating that they understand the treatment constraints and issues.

## **5.8 Final Treatment Maps**

Upon completion of the treatment on a block, a treatment map at a scale of not greater than 1:20,000 will be created having containing the following features:

1. Forest License, Cutting Permit and Block
2. Treatment areas by method of treatment
3. Chemical name
4. Application rate
5. No treatment zones (will include PFZ areas)
6. Waterbodies and wetlands with classifications wherever possible
7. Conditions of the streams / waterbodies at the time of the treatment
8. Location of Treatment Notice Forms (Signs)
9. Latitude and longitude
10. Legend

## **6.0 NON-HERBICIDE OPERATIONAL PRACTICES UNDER THE PMP**

All non-herbicide brush treatments under the PMP will conform to Carrier's environmental management system and the commitments made in the PMP for protection of other resources.

## **7.0 IMPLEMENTING THE PMP**

### **7.1 Map Requirements for the Survey Map**

The survey map will be at a scale not greater than 1:20,000 and will include the following features:

1. Forest License, Cutting Permit and Block name
2. Block boundary
3. Geographic features that will or may require pesticide free zones
4. Areas proposed for treatment
5. Areas that do not require treatment
6. Latitude and longitude
7. Legend

### **7.2 Overview Maps**

Each year CLL will create a set of overview maps that will show the location of all of the proposed treatments. These maps will be created at a 1:50,000 scale and will be used for the Notice of Intent to treat. They will be available at the Carrier Lumber Ltd. office and may be distributed upon request.

### **7.3 Annual Notice of Intent to Treat (NIT)**

At least 21 days prior to the commencement of the first treatment, CLL will submit the following information to the Administrator:

1. The name and business location of the confirmation holder
2. A description of the proposed treatment areas for each calendar year
3. A map that clearly identifies each treatment location (see section 7.2)
4. A description of the proposed treatment (including the pesticide and the method of application)
5. Total area of all of the proposed treatments for the calendar year

A sample of the notice of intent to treat form can be found in Appendix 7.

### **7.4 Annual Reporting**

CLL/HWFD will submit an annual report on all chemical activities conducted under the PMP to the Integrated Pest Management Branch by January 31<sup>st</sup> for the preceding calendar year. The following information will be provided:

1. Confirmation holder's name, address and confirmation number
2. Description of the treatment areas and final treatment maps
3. Total area treated
4. Methods of non-herbicide brush controls used
5. Total area treated with non-herbicide brush control methods
6. For each pesticide used:
  - i. Trade name of herbicide used
  - ii. Active ingredient name
  - iii. Registration number under the federal act (P.C.P.#)
  - iv. Amount of herbicide used (kilograms)
  - v. Method of Application
  - vi. Total area treated (with each pesticide used)

The sample of the annual report form can be found in Appendix 7. The annual report will be signed and dated.

## **8.0 Glossary**

**Administrator** – has the meaning as defined under the Integrated Pest Management Act

**application rate** – the amount of pesticide product or active ingredient applied to a unit area.

**basal treatment** – an application with backpack or knapsack sprayer using a flat fan or solid cone nozzle to the basal parts of each woody stem from a height of 50cm down the root collar.

**biodiversity** – the diversity of plants, animals and other living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, as well as the evolutionary and functional processes that link them.

**biogeoclimatic ecosystem zone** – a geographic area having similar patterns of energy flow, vegetation and soils as a result of a broadly homogeneous macroclimate.

**boom** – a section of pipe (or tubing) which connects several nozzles so that a pesticide can be applied over a wider area.

**broadcast application** – an application of chemicals over an entire area or field rather than only on rows, beds or individual plants.

**broadleaved plants** – most herbs, shrubs and trees having wide leaves. Not grasses or grasslike, nor coniferous plants.

**brush control** – control of herbaceous or woody plants such as grasses, fireweed, twinberry, aspen, alder and willow.

**buffer zone** – see pesticide buffer zone.

**calibrate** – (1) to determine the amount of pesticide being applied through a nozzle of a sprayer, duster or granular applicator over a given area; (2) to mark a container or tank to indicate the volume at certain levels.

**carrier** – an inert material mixed with active ingredients to make a pesticide formulation, e.g. finely ground clay, talc, volcanic ashes, water, oil, solvent, air and gas propellants.

**certified pesticide applicator** – an individual who holds a valid Applicator Certificate in a specific category issued by the Pesticide Control Branch, after the individual has passed the appropriate exam.

**community watershed** – the drainage area above the most downstream point of diversion on a stream for a water use that is for human consumption and that is licensed under the *Water Act*

**conifer** – a tree that bears its seeds in cones such as a pine tree.

**conifer release** – the removal of woody or brush species in a stand of coniferous trees to decrease competition for water, nutrients, light and space, and thus increase the growth rate of the conifers.

**coverage** – the degree of uniformity of a pesticide application over a surface.

**crop** – useful plants growing where desired.

**deciduous** – plants which lose their leaves during the dormant winter season (leaf loss may also be induced by drought, etc.).

**degradation** – the process by which a complex chemical is reduced into a less complex form. This process can be the result of the action of microbes, water, air, sunlight or other agents.

**drift** – the movement of pesticide droplets or dust, by wind or air currents, away from the target area onto areas not being treated. Drift constitutes one of the major hazards of pesticide application.

**ecology** –the science that deals with the relationships of organisms with each other and their environment.

**ecosystem** – a community of organisms interacting with one another and the specific habitat (environment) in which they live.

**efficacy** – a term used in pest control to mean the degree to which a pesticide or procedure will control a specified target pest.

**foliage** – the leaves, needles and blades of plants and grasses.

**free growing stand** – A stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees. It should include the minimum number of healthy well-spaced trees of the preferred and acceptable species and less than the maximum number of coniferous trees allowed per hectare.

**growing season** – The period of active growth characterized from the start of bud elongation to bud set.

**habitat** – a particular environment in which organisms live.

**hack and squirt** – a method of applying a herbicide selectively to a cut made with an axe. This may be done with an axe which injects a measured amount of herbicide with each cut (hypohatchet).

**herbaceous** – a plant that remains soft or succulent and does not develop woody tissue.

**herbicide** – a pesticide used to control or manage weeds.

**humidity** – refers to moisture or dampness in the air. Herbicides are often comparatively more effective under moderately warm, humid conditions. In areas or at times when humidity is very low, high herbicidal rates or high volumes of diluents may be required because sprays dry more quickly and absorption is poor.

**integrated pest management (IPM)** – is a decision making process that uses a combination of techniques to suppress pests and includes, but is not limited to the following elements:

- planning and managing ecosystems to prevent organisms from becoming pests
- identifying potential pest problems
- monitoring populations of pests and beneficial organisms, pest damage and environmental conditions
- using injury thresholds in making treatment decisions
- reducing pest populations to acceptable levels using strategies that may include a combination biological, physical, cultural, mechanical, behavioral and chemical controls
- evaluating the effectiveness of treatments

**no treatment zone** – means an area of land that must not be treated with pesticide.

**not satisfactory restocked (NSR)** – Productive forest land that has been denuded and has not been regenerated to the specified stocking standards for the opening.

**nozzles** – devices which control droplet size, application rate and uniformity of a pesticide application. The nozzle type determines the ground pattern of coverage, e.g. tapered flat spray, even flat spray, flooding, off center, atomizing, broadcast, solid stream, full cone and hollow cone nozzles.

**pest** – an undesirable organism.

**pest control service** – a person (company, firm, proprietorship, agency, etc) who by himself or by the employees provides a service involving the use or application of pesticides. A certified pesticide applicator must be in attendance at each pesticide application at a ratio of one certified applicator to 4 non-certified applicators.

**pest management plan (PMP)** – means a plan that describes:

- a program for controlling pests or reducing pest damage using integrated pest management, and
- the methods of handling, preparing, mixing and applying pesticides within that program

**pesticide** – means a micro-organism or material that is represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest, and includes;

- a plant growth regulator, plant defoliator or plant desiccant,
- a control product under the Pest Control Products Act (Canada), other than a device that is a control product, and
- a substance that is classified as a pesticide by regulation

**pesticide buffer zone** – A strip of land between the pesticide free zone and the pesticide treatment area. Pesticides are not applied directly in the pesticide buffer zone to prevent entry of pesticides or pesticide residues by drift, runoff, or leaching into the pesticide free zone. The width of the pesticide buffer zone is up to the discretion of the pesticide applicator, who must take the type of pesticide application equipment, speed of travel, terrain topography, soil conditions and weather conditions into account.

**Pesticide Control Act** – a Provincial Act, which replaced sections of the Pharmacy Act. It is administered by the Ministry of Environment and Parks, Pesticide Control Branch. The Act and Regulation provide for the certification of pesticide applicators and dispensers, as well as the licensing of pest control services and pesticide vendors and use of pesticides in the Province of British Columbia.

**pesticide free zone** – A strip of land, usually 10m in width, adjacent to water bodies. Pesticides may not be directly applied to, or allowed to reach the pesticide free zone via drift, runoff or leaching. Specific authorization is needed if the pesticide free zone is to be less than 10m.

**Poison Control Centre** – located at all major hospitals in British Columbia. They provide first aid information for poisoning victims. Antidotes and treatment procedures are available to doctors.

**precipitation** – refers to rainfall or snowfall. A precipitation in a spray mixture refers to the separation and settling out of one or more pesticide ingredients.

**Silviculture Prescription (SP)** – A site-specific plan describing the nature and extent of any timber harvesting and silviculture activities that are designed to achieve the required management objectives, including a free growing stand to specified standards.

**Site Plan (SP)** – A site-specific plan describing the nature and extent of any timber harvesting and silviculture activities that are designed to achieve the required management objectives, including a free growing stand to specified standards.

**species** – a group of individuals which are similar in structure and physiology and are capable of producing fertile offspring.

**spot treatment** – an application of spray to localized or restricted areas as differentiated from broadcast or complete coverage.

**spray** – a pesticidal formulation dissolved or suspended in a liquid (usually water or oil) so that it can be applied in fine droplets.

**stem** – those parts of a plant above the ground which support branches, twigs or flowers.

**stocking standards** – Stocking standards detail site-specific legal requirements that are stated in silviculture prescriptions. They specify the standards required to reforest denuded areas with a healthy new crop of trees within specific time frames. They include such information as the target and minimum number of healthy, well-spaced, preferred and acceptable trees per hectare that must make up the new crop, their species, conifer to brush ratio, maximum density, regeneration date, as well as the earliest and latest free growing time frame.

**stratification** – layering. Referring to horizontal temperature and/or moisture zones. Stratification plays a role in air inversions (fog and smog) and night frosts. Also used to induce germination of seeds, by layering seeds between moist materials and/or exposing to cold temperatures.

**swath** – the width covered by sprayer when it moves across a field or other area to be treated.

**weed** – any plant growing where it is not wanted.

**wildlife habitat feature** – A wildlife feature as defined by section 9 of the Government Actions Regulation

**9.0 References :**

Admas, Robert W. (ed.). 1995. Handbook for Pesticide Applicators and Dispensers Fifth Addition. British Columbia. Ministry of Environment. British Columbia Pesticide Control Branch.

Kidd, Frank A. and Mihajlovich, Milo. 1998. Triclopyr Herbicide: A bibliography of technical references of non-target field and laboratory reports. Province of British Columbia.

Meidinger and Pojar, 1991. Ecosystems of British Columbia. Special report Series 6, BC Ministry of Forests.

Mackinnon, Pojar, Coupe. 1992. Plants of Northern British Columbia

MOF. 1995. Establishment to free growing guidebook Prince George forest region. Province of British Columbia.

MOF. 1995. Silviculture surveys guidebook. Province of British Columbia.

Otchere-Boateng, Jacob. 1998. Herbicide field handbook. British Columbia Ministry of Forests. Victoria, BC.

Szauer, Tom . The Role of Competition Indices in Vegetation Management Decisions, Industrial Forestry Services Ltd.

**Appendix 1: Overview map of PMP Operating Area**

**Appendix 2. Szauer, Tom, RPF. The Role of Competition Indices in Vegetation Management Decisions, Industrial Forestry Services Ltd**

**Appendix 3. “Silviculture Survey Reference Card FS660”  
Methodology for Determining Free Growing Trees**

**Appendix 4. Carrier Lumber Ltd. Decision Matrix**

**Appendix 5. Carrier Lumber Ltd. Treatment Follow-up Checklist**

**Appendix 6. Carrier Lumber Ltd. Annual Notice of Intent to Treat**

**Appendix 7. Carrier Lumber Ltd. Annual Reporting**

**Appendix 8. Carrier Lumber Ltd. Ground and Aerial Herbicide  
Application Record forms**

**Appendix 9. Carrier Lumber Ltd. Herbicide Application Layout Checklist:**