Invasive Alien Plants
Pest Management Plan
for Provincial Crown Lands in
Central and Northern British Columbia

Ministry of Forests, Lands and Natural Resource Operations

FLNR PMP 402-0664-15/20
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Executive Summary

An invasive alien plant is any non-native plant species that has the potential to cause undesirable or detrimental impacts to our economy, society, and/or ecosystems. In BC, the term "invasive plants" includes “invasive alien plants”, “weeds” and “noxious weeds”. Invasive plants may displace native plant species, decrease biodiversity, reduce available forage and browse for wildlife and domestic animals, reduce habitat for rare and endangered species, contribute to loss of aesthetic values, and cause changes to ecological community structure and function. Some of these plants are toxic to humans and/or animals and can be a threat to infrastructure, reduce sight-lines on roads and cause economic losses to many industries. Efforts to reduce their cumulative impacts are best achieved through an integrated approach of prevention and control.

The Weed Control Act and Regulations in British Columbia require land occupiers, as defined in the Act, to control provincially listed noxious weeds on both private and public land. The Forest and Range Practices Act and accompanying Regulations require forest and range tenure holders to incorporate measures in their forest and range plans to prevent the introduction or spread of listed invasive species. The Integrated Pest Management Act and Regulations provide the statutory authority to allow pesticide use on public lands as described in a PMP.

The development of this PMP was led by the Ministry of Forests, Lands and Natural Resource Operations Invasive Plant Program with collaboration and assistance from the Ministries of Environment BC Parks, and Transportation and Infrastructure. Developed in compliance with the Integrated Pest Management Act and Regulations, it outlines an Integrated Pest Management approach for the control of invasive plants on crown land, including prevention strategies, manual/mechanical treatment methods, biological and cultural controls, and the use of herbicides.

This plan is intended to describe and provide guidance for an Integrated Pest Management approach of invasive plants on Crown land; it is not meant to be an operational plan. Where appropriate, government ministries work collaboratively with regional invasive species committees or other partnering agencies to design operational treatment plans within the PMP area.

This PMP covers the management of invasive alien plants on provincial Crown land within the geographic area corresponding to the Regional Districts of Skeena-Queen Charlottes, Kitimat-Stikine, Bulkley-Nechako and Fraser-Fort George, Stikine Region, Peace River Regional District and Northern Rockies Regional Municipality. There is also a portion of the Thompson Nicola Regional District from Albreda to north of Vavenby within the area covered by the PMP. This area encompasses a diversity of ecosystems ranging from dry open meadows in the Sub Boreal Spruce zone, to wet, closed-canopy rainforests and alpine areas. It has vast timber, agricultural, oil and gas, and recreational values, as well as some rare native species and plant communities, and critical fisheries and wildlife habitats. This PMP aims to protect these values through managing invasive plants.
1.0 Introduction

Section 24(2)(g) of the Integrated Pest Management Regulation (IPMR) requires the preparation of a Pest Management Plan (PMP) for herbicide use for the management of noxious weeds and invasive plants on more than 50 hectares a year of public land (e.g. provincial Crown land).

A PMP is a plan that describes:

- A program for managing pest populations or reducing damage caused by pests based on integrated pest management; and,
- The methods of handling, preparing, mixing, applying, and otherwise using pesticides within the program.

This plan is intended to describe and provide guidance for an Integrated Pest Management (IPM) approach for control of invasive plants on Crown land; it is not meant to be an operational plan. Where appropriate, government ministries work collaboratively with regional invasive species committees or other partnering agencies to design operational treatment plans within the PMP area.

1.1 Purpose and Objectives of this PMP

1.1.1 Purpose

The primary purpose in developing this PMP is to provide a single document that describes a multi-agency approach and planning process, using the principles of IPM that will both ensure the effective management of invasive alien plants on provincial Crown lands within central and northern BC while also protecting environmental and human health values.

This PMP is designed to replace the existing PMP (Confirmation # 402-0657-10/15).

1.1.2 Objectives

The objectives of this PMP are to ensure:

- Legal accountability with the provisions of the Integrated Pest Management Act (IPMA) and IPMR, as well as applicable federal, provincial and local government laws and regulations;
- The responsible use of herbicides;
- The incorporation and use of the principles of IPM; and,
- Public and First Nations awareness of, and input into, invasive plant management at the landscape level.
Existing populations of invasive plants may not necessarily be eradicated under this PMP, but rather, kept from expanding beyond defined containment lines.

The focus of treatments will generally be on invasive plants that are expanding into new geographic areas and those on the leading edge or in gaps between treatment areas where there is a risk of further spread into previously uninhabited, susceptible areas.

1.2 Plan Holder and Description of the PMP Area

The PMP holder will be the BC Ministry of Forests, Lands and Natural Resource Operations (FLNR).

The plan area will be specific to provincial Crown land within the geographical area:

- South of the Yukon and Northwest Territories to approximately 52 deg 9 minutes to 53 degrees; from Haida Gwaii east to the Alberta border;
- The Regional Districts of Skeena-Queen Charlottes, Kitimat Stikine, Bulkley Nechako, Fraser Fort George, Peace River, the portion of the Thompson Nicola Regional District from Albreda to north of Vavenby, the Stikine Region and the Northern Rockies Regional Municipality.

A map showing the geographic boundaries of the areas covered by this PMP is shown in Appendix 1.

The plan area also encompasses areas/lands under the jurisdiction of the following “partnering ministries”:

- The BC Ministry of Transportation and Infrastructure (MOTI), Northern Region;
- The BC Ministry of Environment (MOE), BC Parks, Skeena, Omineca, Peace, and West Coast Regions;

The plan area contains a diverse array of natural and modified areas including forest, grassland, alpine, subalpine, riparian and marine/estuarine ecosystems, pastures, and utility and transportation corridors. Resource uses and activities within this area may include, conservation (e.g. wildlife enhancement or protection), hunting, trapping, grazing, recreation, tourism, mining, gas and oil development, logging, transportation and water. Invasive plants can negatively impact all of these resources and the uses of them.
Provincial Crown land is also immediately adjacent to private land throughout the region and co-ordination through regional invasive plant committees and local governments is necessary for the overall success of invasive plant management programs.

1.3 Use of This Plan on Crown Land

This PMP provides the guidance for invasive plant management on Crown land; it informs and guides the development of annual operating plans. It is recognized that people using Crown land such as transportation corridors, Forest Service road systems, recreation sites, trails, and parks can serve as means for the spread of invasive plants. Control of invasive plants in these areas is a critical component of a regional approach to successful invasive plant management. Where appropriate, government ministries work collaboratively with regional invasive species committees within this PMP area to implement effective invasive plant management regimes across jurisdictions.

Agencies or non-government organizations working in partnership with the Province of British Columbia may be authorized to use this PMP for IPM activities on Crown lands, provided that the following are adhered to in a signed letter of agreement:

Compliance with the contents of, and commitments made in, the PMP; and,

Compliance with the requirements contained in the IPMA, IPMR, and other applicable legislation (e.g. the Park Act and the Ecological Reserve Act).

1.4 Term of Plan

This plan shall be in force for a five-year period from the date that Confirmation of a Pesticide Use Notice has been obtained from the MOE.

1.5 Person Responsible for Managing Invasive Plants

The person responsible for coordinating the management of invasive plants under this PMP, and the principal contact for information related to this plan is:

Denise McLean
Invasive Plant Specialist
Ministry of Forests, Lands and Natural Resource Operations
2000 S. Ospika Boulevard, Prince George, BC, V2N 4W5
Tel: (250) 614-7433  Fax: (250) 953-0413
E-mail: Denise.McLean@gov.bc.ca
1.6 Public Use within the Plan Area

The principal land uses within the PMP area are: forestry, agriculture, mining, gas and oil development, recreation, hunting, fishing and medicinal and food plant gathering. Substantial timber harvest levels support numerous sawmills and pulp mills. The area is also well known for its land and water based recreational activities. There are also many high use Provincial Parks and Protected Areas including conservation areas, conservancies, recreation areas and sites and resort tenures that are popular tourism destinations. Hunting, fishing and non-consumptive activities like hiking, nature photography, boating and research activities are also popular. Provincial Crown land is also used for harvesting of medicinal and food plants and fur bearing animals.

2.0 Invasive Plants and Noxious Weeds

Invasive plants are plants that are non-native or alien to the ecosystem under consideration. Their introduction causes, or is likely to cause, economic or environmental damage, or harm to human health. In B.C. the term invasive plant is synonymous with invasive alien plant.

These plants threaten the natural environment and are recognized globally as the second greatest threat to biodiversity. Free from the plant pests that keep them in check in their native ranges, invasive plants reproduce rapidly and spread aggressively, dominating natural areas and altering biological communities. The result of these invasions can include reduced recreation and crop values, damaged infrastructure, displaced native vegetation that is important forage for wildlife and livestock, reduced biodiversity including species at risk, and damaged native ecosystems.

For the purposes of this PMP, the following definitions apply:

**Invasive plant** – are non-native or alien to the ecosystem under consideration. Their introduction causes, or is likely to cause, economic or environmental damage, or harm to human health. In B.C. the term invasive plant is synonymous with invasive alien plant.

**Noxious weed** – any invasive plant species designated by regulation to be noxious under the BC Weed Control Act (WCA) and Regulations.

**Regional Invasive Plant or Species Committee** – refers to regional committees that coordinate invasive plant and/or species management in a specific region of BC.
2.1 How Invasive Plants Are Spread

Although wind, water, domestic and wild animals can disperse invasive plant seeds, human activity is often found to be the primary cause of invasive plant introductions and/or spread. Invasive plants have been shown to be introduced and/or spread by the following activities:

- Construction and maintenance on transportation and utility corridors, rail lines, ship yards, highways, pipe lines and power lines, moving and transporting soil, gravel and fill;
- Forestry operations: road/landing/skid trail building and maintenance, machinery movement during harvesting, post-harvest site preparation and planting, log hauling;
- Range activities: grazing, herding livestock, supplemental feeding and building of fences, stock trails, water developments and corrals;
- Mining operations: road building and maintenance, movement of machinery, soil disturbances and storing of top soil, creation of permanent openings in the forest canopy cover;
- Gas and oil exploration and development: well drilling and pipeline construction, movement of machinery, creation of temporary and permanent openings in forest canopy cover;
- Use of seed mixes that are contaminated with invasive plant seed.
- Horticultural practices: importation and planting of plant species that over time become invasive, careless disposal of garden refuse, unintentional seed introduction in soil; and,
- Recreational activities: disturbance of soil by all-terrain vehicles, and other recreational activities, spread of invasive plants by hikers, vehicles and boats, and the dumping of aquatic plants into watercourses.

2.2 The Need to Control Invasive Plants

Hundreds of species of plants have been intentionally or unintentionally introduced to North America since European exploration and settlement began. Many of these invasive plants become nothing more than nuisance weeds to gardens and human-influenced landscapes, however, a small proportion end up as serious threats to natural areas and native ecosystems. These serious threats are those invasive plant species that will be addressed by this PMP.

There are also legislative requirements to control invasive plants. The Weed Control Act and Regulations require land occupiers, as defined in the Act, to control species of
 provincially listed noxious weeds on both private and public lands, as well as additional species that are identified as noxious within specified Regional Districts.

Invasive plants are able to establish quickly and out-compete native plants; some of which are rare and at risk. Many invasive plants have short life cycles, while others are extremely long-lived (e.g. broom and gorse may live for 50 years or more, and their seed bank (seed buried in the soil) may remain viable for decades). Seed banks allow plants to germinate, grow and set seed while environmental conditions are favourable. Some invasive plant species further increase their advantage over native species by producing toxins that inhibit the growth or establishment of other plants. Because they are introduced, these species have few or no natural predators in BC’s environments, thus giving them a further advantage over native species.

Invasive plants have varying traits that permit them to rapidly invade new areas and out-compete native plants for light, water, and nutrients. Some of these traits include:

- Fast growth rates;
- Profuse reproduction by seeds and/or vegetative structures;
- Specially adapted seeds to assist their movement by wind, water or animals;
- Prickles, spines, thorns, or sap that can cause physical injury and repel animals;
- Irregular germination ability allowing establishment during non-ideal conditions;
- Ability to alter soil conditions to benefit only the invasive species in question;
- Allelopathy (production of chemicals that inhibit the growth of other plants); and,
- Unhindered growth and reproduction resulting from introduction without the predators that impact the plant in its native habitat.

Because of these traits, their ability to outcompete native plants can result in large, dense infestations that may cause the following ecological, social and economic problems:

- A decline in plant and animal biodiversity;
- Altered soil nutrient and hydrological cycles;
- Reduced soil productivity by affecting mycorrhizal fungi or changing chemistry (allelopathic chemicals);
- Negative effects to the habitat of rare and endangered species;
- Increased costs to remove vegetation from impacted infrastructure;
- Reduced availability of traditional plants used for food or medicine;
- Reduced quality and quantity of forage for grazing and browsing wildlife and livestock;
- Toxic or injurious effects to animals and humans;
- Decreased quality of water and fish habitat;
• Changed ecological community structure and function;
• Impacts on aesthetics (visual quality, tourism);
• Altered fire regimes; and
• Reduced access to recreation areas.

3.0 The Integrated Invasive Plant Management Program

This PMP aims to achieve effective, long-term invasive plant prevention and management compatible with both the legislated mandate(s) for invasive plant control, and the needs of humans, animals, plants, and environmental resources at and beyond the treatment site. No single tactic can solve a current invasive plant problem or prevent future infestations; therefore it is often necessary to combine several control methods into an IPM program.

IPM is a decision making process for determining what actions will be taken when pest problems occur. In IPM programs, all available information is considered in order to manage pest populations effectively in an environmentally sound manner. Preventing organisms from becoming pests, by keeping them at some acceptable level (i.e. below a level that causes damage), is generally the first step in an IPM program. When applied appropriately, this process will result in improved management, lower costs, ease of maintenance, and lower environmental impacts from control activities.

Successful implementation of an IPM program requires:

• Strategic, monitoring-based, prevention-oriented management;
• Extensive communication and cooperation among federal and provincial agencies, First Nations, local governments, private industry, landowners, and the general public;
• Public education and awareness programs in cooperation with regional invasive plant committees; and,
• Continued resourcefulness and innovation by invasive plant managers.

Government recognizes that within the larger plan area, there are localized areas with unique social and cultural values whose residents may wish to have further input and discussion on the operational delivery of invasive plant treatments under this PMP. The plan holder will respond to these requests while developing annual operating plans through best available means, such as open house gatherings, email notifications, website postings, etc.

The elements of an IPM program for this PMP are:
- Prevention;
- Identification;
- Surveys, Inventories and Data Management;
- Establishing Priorities and Management Strategies;
- Selecting Treatment Options and Methods and,
- Monitoring and Evaluation.

Government and other agencies or non-government organizations authorized to conduct activities under this PMP are committed to the principles and practice of IPM, and to the implementation of IPM steps as outlined in Figure 1.

Figure 1 - IPM Steps for an Effective Invasive Plant Management Program

1. **Step 1**
   - Identify High Risk Sites
   - Identify High Priority Plants
   - Define Management Objectives Including Restoration
   - Determine Financial and Human Resource Capabilities

2. **Step 2**
   - Develop Treatment Plan (s)

3. **Step 3**
   - Implement Treatment Plan (s)

4. **Step 4**
   - Monitor Efficacy to Determine Whether Treatment Thresholds Were Met
   - If not Repeat Steps 2, 3, and 4

5. **Step 5**
   - If Necessary, Implement Rehabilitation Strategy to Ensure Stable Invasive Plant Resistant Community is Established
3.1 Prevention

Preventing the initial establishment and spread of invasive plants is the single most effective method of invasive plant control.

If a new invasive plant species does manage to arrive in BC the most effective method of control then is to prevent it from establishing and spreading. This requires awareness and training of specialists, naturalists, and local residents so that they know what species to look for and how to report these new invasive species; reporting systems that are linked to quick assessment processes; and, response systems that quickly plan and implement management before the new species can firmly establish and start spreading. Communication through the Federal, Provincial, Regional and local level is necessary for all these components to be in place and to determine how the alien species are arriving so that preventative actions can be strengthened.

If a new invasive species does manage to establish, prevention of spread is a priority. This is achieved not only by direct control treatments but also by promoting healthy ‘weed resistant’ habitats in areas not infested. Prevention of spread, habitat health and ‘weed resistance’ are affected by activities that disturb natural habitats like road or recreational trail development, right of way disturbances for fence construction, timber harvesting, livestock grazing and oil and gas development. For these reasons it is important to clean equipment, livestock and outer clothing and footwear to prevent the introduction and spread of invasive plant seeds to non-infested sites. Prompt seeding of disturbances using certified seed is also an important tool to establish healthy weed resistant plant communities and prevent the establishment of invasive plants as well as minimizing soil erosion.

The following are examples of land management practices that can help prevent invasive plant establishment and/or inhibit invasive plant growth. FLNR (and those ministries authorized to undertake invasive plant control under this PMP) will implement the following practices, as applicable, on a site-specific basis:

- Prevent the movement of soils contaminated with priority invasive plant seed and vegetative plant parts (e.g. gravel pit material used in road construction and maintenance, yard and garden waste dumping);
- Maintain soil, subgrade or surfacing material that is being moved during road construction as free as practicable of invasive plants or seeds
- Educate roadside mower, excavator and grader operators on work practices that will reduce spreading invasive plant seeds and plant parts;
- Keep equipment yards and storage areas free of invasive plants as practicable to prevent the spread of plant parts and seeds from these high traffic areas;
• Inspect clothing and vehicle/equipment undercarriages when working in, and prior to leaving, areas known to contain invasive plants;
• Clean and wash clothing and equipment, dislodging plant seeds or plant parts, and contain associated water, mud and dirt either on-site or at designated cleaning stations;
• Keep infestations sufficiently away from areas with a high potential for spread such as roadsides, parking lots, staging areas or recreation sites etc., so that plant parts or seeds are not inadvertently transported by vehicles and equipment;
• Keep equipment and/or livestock out of infested areas where practicable; and,
• Re-vegetate disturbed areas adjacent to, or known to be at risk from priority invasive plant establishment using an appropriate combination of scarification and native plantings, or seeding with an ecologically appropriate seed mix that is free of invasive plants that are considered a threat in the area. Request and check the Certificates of Seed Analysis for each species in the seed mixture prior to mixing to ensure no invasive plant contaminants.

3.2 Identification

Accurate identification of invasive plant species and recognition of the threat posed by new invaders is a fundamental requirement for successful invasive plant management programs. Several resources are available for accurate identification of invasive plants. Dichotomous keys are useful for ensuring accurate species identification, E-Flora BC ([http://ibis.geog.ubc.ca/biodiversity/eflora/](http://ibis.geog.ubc.ca/biodiversity/eflora/)) provides an electronic atlas accessible to anyone with internet access, and the Weeds BC site ([http://www.weedsbc.ca](http://www.weedsbc.ca)) contains information on many invasive plants.

Stewardship and Ecology Specialists within FLNR maintain herbaria of native and introduced plant samples collected from BC, and the Royal BC Museum provides species identification services to the Invasive Plant Program. Staff and contractors engaged in managing invasive plants are provided plant identification training and reference materials. Any species found that is a potential new invader to BC is collected, confirmed by taxonomists, and added to the Royal BC Museum herbarium.

3.3 Surveys, Inventory and Data Management

Invasive plant surveys are observations made at a single point in time to determine the occurrence of one or many species within a defined landscape. The difference between a survey and an inventory is that an inventory is a cataloguing of all invasive plants of concern within a management area, whereas a survey is an individual observation or a sampling of a representative portion of a larger landscape. In other words, an inventory is
the overall picture within the geographic area, which is made up of one or many invasive plants surveys.

Inventories of invasive plant species within the PMP area are required to effectively develop and implement provincial, regional, and local management strategies, and to measure program success. Surveys and inventories are conducted at different intensity levels, or categories, depending upon the individual situation. Categories of survey are cursory, operational or precise and they are conducted in accordance with the methodology outlined in FLNR Invasive Plant Program Reference Guide (https://www.for.gov.bc.ca/hra/Plants/RefGuide.htm).

The primary focus of invasive plant inventories/surveys is on invasive plant species listed under FRPA, Invasive Plant Regulation, or in the Weed Control Act and Regulations, or on additional priority species as identified by regional invasive plant committees that are not regulated by provincial legislation. Surveys are also an important first step in discovering a new incursion of a species, and finding isolated patches of expanding species. The survey(s) confirms invasive plant infestation extent, size, distribution, and density.

Inventories/surveys may be conducted by truck, ATV, motorbike, bicycle, boat, helicopter, horseback, or on foot depending on access to the area, the level of detail required, and budget. Efforts are made to choose the method that will have the least impact on the land base.

Areas that are likely to be susceptible to invasion will be examined in detail once the survey boundaries have been determined. Many dry land invasive species tend to invade grasslands and forest openings while riparian invasive species prefer lakeshores, ponds, sloughs, creeks, river edges, marshes and seepage areas. Experience with biogeoclimatic zone/subzone may also assist in focusing survey efforts. Areas that have been recently disturbed or that receive disturbance on a regular basis are carefully inventoried/surveyed, as they are generally the preferred habitats of invasive species. Such areas may include, but are not limited to:

- Roadsides, ditches, pullouts and landings;
- Mining, gas and oil exploration and development activities
- Recreation sites;
- Openings in the forest canopy;
- Burned areas;
- Air strips;
- Gravel pits;
- Areas where vehicle traffic and loading/unloading is common;
• Areas that are/have been over-grazed, and areas of heavy livestock and/or wildlife use;
• Areas where there has been recent development, or construction sites where machinery has been present; and,
• Any other areas where human activity or natural disturbance may increase the likelihood of invasive plant introduction, establishment and spread.

When a target species is detected, the information is recorded on a Site and Invasive Plant Inventory Record (Appendix 3). If it is a new site, then information specific to the site is recorded. If the site is an existing site, then only the Site ID and data specific to the survey of any invasive plant infestation found will be recorded.

The information recorded at an invasive plant site includes the UTM coordinates (northing, easting and zone), location, jurisdiction, date, species, estimated size of infestation in hectares, distribution, density, and any pertinent site characteristics or additional information, such as soil type or proximity to riparian areas. Site photos may also be taken. If the surveyor is unable to correctly identify a particular plant species, a sample will be taken for identification.

Invasive plant survey and inventory data is housed within the Invasive Alien Plant Program (IAPP) application. This comprehensive database and mapping application allows extraction of relational data, statistics and spatial mapping information, and is housed at the following web site: https://www.for.gov.bc.ca/hra/Plants/application.htm

The inventory information in IAPP provides the basis for monitoring species activity, evaluating the effectiveness of treatment prescriptions at the local and landscape scale, and for decision making within the program. Extensive effort is made to maintain the inventory at a high standard, including documenting over time invasive plant locations as they move and change in size, distribution and density. Although the task is large due to the extent of area managed and number of species and infestations, collecting treatment and treatment monitoring data and updating survey data significantly helps to maintain the inventory.

### 3.4 Establishing Priorities

An invasive plant species may be designated a threat either through legislation, a formal risk assessment process, or through monitoring, risk assessment and a regional invasive species committee determination. As well, the area covered under this PMP has very diverse ecology, climate and level of invasive plant infestation resulting in different priorities within each geographic area. To determine the priority species within the PMP
area, all regions and their associated committees/councils assess invasive plants using the general criteria below:

- Risk of spread (based on a combination of available habitat, biological methods of reproduction and the dispersal potential of the plant itself or via anthropogenic vectors of spread);
- Level of “invasiveness” (e.g. competitive ability, mode of reproduction, and behaviour in similar ecosystems);
- Potential to cause social, economic or environmental damage;
- Legal designation for control; and
- Likelihood of success, which depends on a combination of the control methods/tools available for the particular species, and its current range or distribution. New infestations and/or species with limited distribution are more likely to be successfully controlled than larger, well established populations.

Committees/councils can use the BC Invasive Plant Core Ranking Process Tool as part of their assessment process for invasive plants of concern in their area. [https://www.for.gov.bc.ca/hra/invasive-species/calculatorIndex.htm](https://www.for.gov.bc.ca/hra/invasive-species/calculatorIndex.htm)

Prioritizing invasive plants for management activities involves putting invasive plant species into management categories based on consideration of the criteria above.

Priority category names and/or strategies and/or definitions vary from region to region within the PMP area (see Table 1), but can be generally defined as follows:

**Category 1: Prevent**

- New species not present in BC or in the Plan Area, but likely to establish if introduced; and

  *Management Focus*: Early Detection and Rapid Response (EDRR) or Regional Early Detection and Rapid Response (REDRR).

**Category 2: Eradicate**

- Species that are new to the management area (e.g. regional species committee boundary) with limited distribution and low density on infested sites; and/or

- Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species; and
• **Management Focus:** Eradication or the permanent removal of 100% of an invasive plant species from a selected site or area. This is usually only attainable for small isolated patches/clumps of an invasive plant or noxious weed species and may take many years of repeated treatments to be achieved.

**Category 3: Contain**

• New infestations of established species in the area outside of the main population;

• Can include established infestations along transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps/transfer stations, maintenance yards, and gravel pits;

• For some species in this category, where agreement among agencies conducting invasive plant management programs in the area is reached, a containment line may be established and mapped online in IAPP. Treatments will generally only occur within the containment boundary if sensitive sites or unique resources are at risk. Where feasible, treatments are conducted outside the containment boundary to contain the infestation and reduce the infestation size. Preventing or reducing access to areas with invasive plant infestations is also a strategy employed in containment; and

• **Management Focus:** Containment to the current location and/or distribution.

**Category 4: Strategic Control / Rehabilitation**

• Established low-density or high-density infestations that are widely distributed and fairly common throughout the area;

• Eradication or Containment is no longer possible within the management area; and

• **Management Focus:** Treatments will be focused in high value or sensitive areas only, either for environmental, social or economic reasons.
Table 1- Invasive Plant Strategies used by Committees/Councils in the PMP Area

<table>
<thead>
<tr>
<th>General Category</th>
<th>Northwest Invasive Plant Council (NWIPC)</th>
<th>Invasive Plant Committee of the Peace River Regional District (IPCRRD)</th>
<th>Northern Rockies Invasive Plant Committee (NRIPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1-Prevent</strong></td>
<td>REDRR*</td>
<td>REDRR</td>
<td>REDRR</td>
</tr>
<tr>
<td><strong>2-Eradicate</strong></td>
<td>Extremely High to High for Operational Control</td>
<td>A – High Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td><strong>3-Contain</strong></td>
<td>Moderate to Low for Operational Control</td>
<td>B – Medium Priority</td>
<td>Lower Priority</td>
</tr>
<tr>
<td><strong>4-Strategic Control/Rehabilitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>C- Awareness/Lower Priority</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*within NWIPC, each Invasive Plant Management Area has separate REDRR and High Priority Lists

### 3.5 Management Strategies

Managing invasive plant populations under an “injury threshold” approach is complex and confusing. The IPMR defines the injury threshold as “the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.” The principle of injury threshold was developed for agricultural systems to manage the economic impacts that pests have on crops. There is an ecological and/or economic threshold associated with a pest density at which action is taken to prevent injury. With invasive plants, ecological, economic and social impacts are considered when determining the best management strategy for targeted species. Invasive plants that are determined to be a high threat and do not occur in a region or occur only at very low population levels, are controlled before their populations expand to cause significant injury. It is only when invasive plant species have expanded to a large area and rehabilitation of critical habitats and other values are contemplated that injury thresholds as defined under the IPMR are considered. Government’s approach is based on selection of the optimum management strategy for each invasive plant species as presented below.

The selection of which invasive plant management strategy to employ on a landscape is determined by the review and consideration of key factors. These factors include:
1) species distribution across a defined landscape,
2) invasiveness (threat) of the invasive plant species,
3) susceptibility of habitats that are invaded or threatened by the species, and
4) density of plants at a site, or potential for the species to become very dense.

Upon review of the current inventory data for each species, the distribution of known sites will either be considered localized within a defined area of susceptible habitat, or endemic across the majority of susceptible habitat. If an invasive plant species is detected and confirmed to be a new incursion to the province, a provincial response plan is engaged with the objective of eradicating the new invader. This is referred to as Early Detection Rapid Response (EDRR). If a species is determined to be localized to a small area, or a new incursion to the management area or region, the resulting management objective may be to extirpate the species from the infested sites through a regional early detection and rapid response treatment plan. If the localized infestation covers a much larger area and there is no chance of eradicating the population, the resulting management objective is to contain the infestation in order to stop the spread and establishment into un-infested areas. This is referred to as Containment. Finally, if a species is determined to be endemic across the majority of a defined area(s) of susceptible habitat behind a containment line, the resulting management action is referred to as Rehabilitation. Rehabilitation actions include biological control measures, intensive treatments, and re-vegetation. The potential for a species to cause impacts in the future due to high density indicates that rehabilitation may be required. These three strategies are discussed further below.

### 3.5.1 Early Detection Rapid Response

The objective of EDRR is to eliminate infestations of new, high risk invasive plant species before they become established within the province or region. The discovery of a new invader to the province invokes the BC EDRR Plan ([http://www.for.gov.bc.ca/hra/invasive-species/index.htm](http://www.for.gov.bc.ca/hra/invasive-species/index.htm)) developed by the Inter-Ministry Invasive Species Working Group which may also involve the federal government if the species is new to Canada. A new incursion of an invasive plant species into a region from another part of the province is also managed to achieve extirpation, provided there is susceptible habitat at risk.

### 3.5.2 Containment

The management approach of this strategy is to prevent existing established invasive plant populations from spreading into new areas. This is often, but not always, facilitated by delineating a geographic line, referred to as a containment line, around the infested area. A containment line is a boundary drawn on a map delineating the main infestation of a species from the area where the species is not
yet established. Once a containment line is drawn, intensive management is focused on the smaller outlier or satellite infestations located outside of the main infestation. Management of some sites, such as extensive infestations in Pesticide Free Zones (PFZ) (See Appendix 2 for definition) may focus on increased monitoring rather than treatment. Action taken inside the containment line is referred to as rehabilitation which is explained in section 3.5.3. The containment area may be small or large depending on the distribution of the species; small containment lines typically cover one or several drainages or a portion of a valley. These lines are often small enough that they are easily delineated within the boundaries of a regional invasive species committee, and are uploaded and displayed in the IAPP application for land manager and public viewing and for determining which sites require treatment. Large containment areas may cover significant portions of a region or of the province.

3.5.3 Rehabilitation

The management strategy for rehabilitation is to reduce the current impact(s) of an invasive plant species, or multiple species, to an acceptable level (i.e. below an injury threshold). Once the density of plants is significant enough to impact the ecosystem, the services it provides, or the economic values derived from it, the injury threshold of the site has been reached.

Rehabilitation treatments may be undertaken within a containment area to accelerate the recovery of an ecosystem to a previously existing natural or desired state. Biological control (for species with agents available) is often used within containment lines, either by itself or in combination with other management strategies, to weaken the invasive plant population by decreasing its density and ability to reproduce. In summary, the management strategy of rehabilitation is to reduce the potential impacts at a site caused by high invasive plant densities, recognizing that eradication is no longer feasible, and that future management of the site must recognize the continued existence of these plants.

3.6 Establishing Treatment Thresholds

Ideally, treatments are executed when invasive plant population levels are low; long before the injury threshold is reached, thereby reducing expenses and the unnecessary introduction of treatment agents into the environment. In some cases there may be no tolerance for invasive plant species at all (i.e. zero treatment threshold for EDRR), and in other cases the number of invasive plants that can be tolerated before control measures are considered may be much greater. This decision relates directly to the sites threatened or occupied by a priority invasive plant (e.g. a site with a rare and endangered plant species
or plant community may prompt a treatment decision at low invasive plant population levels. Other considerations include seasonality, weather conditions, financial and human resources, site accessibility, site conditions, target species, distribution, and percent cover, and the ecological, economic, societal consequences of not treating, and the availability of effective control/treatments.

### 3.7 Invasive Plant Treatment Options

Treatments occur only when monitoring indicates thresholds have been reached and treatment is necessary. All options may require more than one treatment.

All treatment options are considered after it has been established that a species or a site is designated as a high priority for control. The IPM approach is always used to ensure that an invasive plant species is receiving the most effective treatment. The following treatment options are considered for use either individually or in combination:

- Mechanical and cultural control;
- Biological control; and
- Selective spot application of herbicides.

#### 3.7.1 Mechanical Control

Mechanical control methods that may be used in the integrated invasive plant management program include:

- Controlled burning
- Cultivation/Tilling
- Dead-heading
- Covering/Smothering;
- Digging/Excavating;
- Flaming/Tiger Torch burn
- Hand pulling;
- Hot water/Steam
- Mowing;
- Mulching
- Sheet Mulching
- Salt water/Vinegar

Mechanical methods of invasive plant control are often used on small sites or portions of sites, because they:
• Involve using simple and readily available tools and equipment;
• Are effective and environmentally safe methods if timed correctly and precautions are taken to minimize soil disturbance and native vegetation loss in the treatment area;
• Are sometimes the only available techniques for invasive plant control in areas where herbicides cannot be used; for example they may be the best option when in close proximity to environmentally sensitive features;
• May be effective at reducing invasive plant density or movement off site; and/or
• Result in minimal or no impact to fish habitat as long as erosion and sedimentation are controlled.

Some of the limitations of manual and mechanical control include:

• Mowing is less effective on low-growing plants, or those that have the ability to re-sprout quickly after disturbance. Mowing may not be the best choice on a site if seed feeding bio-control agents are present;
• Cutting effectiveness is largely dependent on plant species, stem diameter, time of cut, and age of the plant;
• Spot burning can pose safety issues for both workers and the environment;
• Burning and/or mowing exacerbates the growth of some invasive plant species, especially those that reproduce by rhizomes;
• Covering/smothering may be costly and labour intensive because treatment sites require regular monitoring to detect and repair torn materials and may prevent native vegetation from re-establishing on the site;
• Excavating may be costly and labour intensive and may include removal of concrete or fencing for example, as complete removal of all root fragments must be obtained to prevent re-growth in rhizomatous species;
• Digging, excavating and hand-pulling are not suitable treatments for species with adventitious root buds and rhizomes;
• Soil disturbance created by mechanical treatments may facilitate the re-establishment of invasive plants; and
• Repeated follow-up treatments must be conducted to remove all new germinants for three to five years or longer, depending on the length of time the targeted species remains viable.

Proper disposal of invasive plants or invasive plant parts following control is important; reproductive vegetative plant parts and seeds should be bagged and
disposed of in a landfill or other designated disposal site. When working in remote areas, this may include burial on-site. Burial on-site will be deep enough to avoid disturbance in the future.

3.7.2 Cultural Control

Targeted grazing, re-vegetation and/or fertilization are examples of cultural control methods. Managing public use of land to reduce or prevent weed infestation is another example of a cultural control.

Targeted grazing involves using cattle, goats, or sheep for invasive plant control and has the following advantages:

- May be economical;
- May retard plant development and seed formation and will gradually deplete root reserves because the tops of young plants are continuously grazed; and
- May be a viable option for control of certain species of invasive plants in areas where manual or mechanical methods or herbicides cannot be used.

Some of the limitations of targeted grazing include:

- The “non-selective” nature of grazing may result in removal of desirable vegetation in conjunction with targeted invasive plants;
- Multiple treatments are necessary and their timing is critical;
- May create additional soil disturbance and compaction (wet soils); and,
- Animal husbandry and transportation costs can be prohibitive.

3.7.3 Biological Control

Biological control involves using host-specific organisms to reduce a pest population to an acceptable ecological and economic level. Agents are predominantly insects and are introduced when and where it is appropriate to reduce invasive plant populations. They attack and weaken target invasive plant species and over time reduce plant density. This treatment option is most often used to assist in rehabilitation of infested areas.

A complete list of biological control agents operationally used and of agents under development is available on-line at:

http://www.for.gov.bc.ca/hra/Plants/biocontrol/Agent-plant_matrix.htm

The benefits of using biological control agents include the following:
• Affords long-term control on sites with well-established invasive plant populations;
• Used in areas where other treatment methods may not be feasible, such as PFZs; and
• They reduce invasive plant populations below a level where significant environmental or economic damage occurs.

Some of the limitations of using biological control include the following:

• Some agents may be slow to affect target species because they can take up to 10+ years to become established and disperse;
• Some agents have specific habitat requirements and are not suited for all infested sites;
• Biological control agents are not available for all invasive plant species, take many years of testing prior to being approved for use; and,
• Biological control will never eradicate the targeted invasive plant species.

3.7.4 Applications of Herbicides

Following careful consideration of the use of the IPM treatment options outlined previously in Section 3, herbicides are used when no other method of control is practical or effective. All herbicides are applied by selective application (See definition in Appendix 2) on a spot treatment (See definition in Appendix 2) basis to control invasive plants with the goal of reducing herbicide use on each site over time. The benefits of spot applications of herbicides include:

• Effective, safe and easy to use IPM tool;
• Treatment costs may be significantly lower than those associated with manual or mechanical methods and therefore more invasive plants can be treated; and
• No soil disturbance.

Some of the limitations for use of herbicides include the following:

• Herbicides are not used within PFZs near water sources and/or human or livestock water wells (See section 4.7);
• Use is limited in areas with seasonal water courses and on sites with coarse soils; for example residual herbicides (those that last for one or more seasons) cannot be used on plants growing on soils containing greater than 70% sand or in areas that drain into creeks even if the watercourse is dry at
the time of application. Non-residual herbicides may be applied in these areas provided that the required PFZs, as stated in the IPMR, are adhered to; and

- May need more than one treatment due to un-germinated seed located in the surrounding soil.

### 3.8 Treatment Method Selection

Generally, no method will achieve control in a single treatment, unless the target is a single plant or newly arrived at the location. The success of different treatment methods will depend on characteristics of the target invasive plant and on site conditions. The integration of a number of control strategies into an IPM program is often more effective than using a single type of treatment strategy alone.

General conditions associated with selection and use of treatment options are shown in Table 2.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Conditions for Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manual and Mechanical</strong></td>
<td>New, small infestations; Applicable to most species but aggravate some situations, e.g., rhizomatous hawkweed species or knotweed species; Sometimes require re-vegetation (to some extent) with grasses and native plant species.</td>
</tr>
<tr>
<td>(e.g. covering/smothering, cutting, digging/excavating, girdling, hand pulling, mowing, pruning, stabbing, tilling, spot burning)</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural</strong> (i.e. targeted grazing by sheep, cattle, goats, etc.)</td>
<td>Infestation size is variable, otherwise similar to mechanical treatments. No other options are either available or desirable.</td>
</tr>
<tr>
<td><strong>Biological</strong> (i.e. systematic release of insects and diseases that feed or attack exclusively on targeted invasive plant species)</td>
<td>Older, more established incursions generally with widespread occurrences of target species beyond treatment site; Currently operationally only available for thistles, knapweeds, toadflax species, tansy ragwort, leafy spurge, hound’s-tongue, and St. John’s wort within the PMP area.</td>
</tr>
</tbody>
</table>
3.9 Monitoring and Evaluation

Monitoring is repeated over time so changes in invasive plant populations can be followed. It is conducted regularly and is used to detect new invaders, to measure the effect of treatments on the target invasive plant and on non-target vegetation, and to record trends that may be occurring in an invasive plant population. IAPP is an important component of monitoring because it houses long-term inventory, treatment, and monitoring data. Monitoring results are used to guide program direction and provide appropriate feedback for adjustments to ensure the Invasive Plant Program is effectively managing invasive plants. Some specific components of monitoring are described below.

3.9.1 Species Monitoring

Inventory surveys, or pre-treatment monitoring, are completed visually, repeated over time, and provide a record of information about invasive plant occurrence, density, and site characteristics. Government maintains the integrity of the species inventory by routinely monitoring invasive plant sites and updating surveys as resources allow. Many sites are inventoried before receiving an initial treatment through species-specific, and/or geographic-specific survey activities; an exception to this is a site that has a new, priority species that is encountered during the delivery of treatment activities. In years following an initial survey, site survey information is updated from treatment information collected in the field.

3.9.2 Treatment Monitoring and Evaluation

A minimum of 10% of treatments, both chemical and non-chemical, are monitored annually to ensure the following:

- Compliance with the commitments made in this PMP;
- Compliance with the IPMA and IPMR and other legislation;
- Correct completion of IAPP treatment records; any errors that may be discovered are returned for correction to the person who conducted the treatment;
• Whether the chosen treatment method was the best method or whether another method should be employed;
• Efficacy of control method used;
• Protection of environmentally sensitive areas;
• Potential or actual impacts to non-target vegetation;
• Re-growth of invasive plants; and
• Re-treatment requirements, if any.

Biological control treatments are monitored to determine the following:

• Establishment;
• Biological control agent population growth and dispersal; efficacy of agent(s) and level of invasive plant control achieved over time; and
• Identification of gaps in biological control agent effectiveness due to biological control agent habitat preferences.

Agencies operating under this PMP may also conduct “during treatment” inspections of both herbicide applications and/or manual/mechanical treatments being conducted under this PMP. These inspections may assess, for example, public and worker safety, environmental concerns, completion schedules and adherence to standards, specifications and the commitments made in this PMP.

4.0 Operational Information

The operational information in this section includes:

• Qualifications and responsibilities of persons applying herbicides;
• Procedures for safely transporting herbicides [IPMR Section 58(3)(a)(i)];
• Procedures for safely storing herbicides [IPMR Section 58(3)(a)(ii)];
• Procedures for safely mixing, loading and applying herbicides [IPMR Sections 58(3)(a)(ii) and (iii)];
• Procedures for the safe disposal of empty herbicide containers and unused herbicides [IPMR Section 58(3)(a)(iv)];
• Procedures for responding to herbicide spills [IPMR Section 58(3)(a)(v)]; and,
• Identification of each pesticide that will be used under the plan, the manner of its application, and the type of equipment required for each manner of application [IPMR Section 58(3)(c)].
4.1 Qualifications and Responsibilities of Persons Applying Herbicides

The transportation, storage, handling, application and disposal of pesticides are governed by federal and provincial legislation. Ministry personnel, contractors, and other agencies working under this PMP will follow safe handling practices including workplace requirements for Workplace Hazardous Materials Information System (WHMIS) labelling and worker education. The required practices for pesticide applicators are detailed in:

- BC Ministry of Environment, Canadian Pesticide Education Program Applicator Core Manual; and,

All herbicide applications under this PMP will be conducted or supervised by a person who holds a Pesticide Applicator Certificate endorsed for the class of pesticide and the pesticide use required under this PMP. Those authorized to treat invasive plants under this PMP will be provided with pre-work information and sufficient oversight to ensure they fully understand the legislative requirements contained in the PMP.

The responsibilities of the Certified Pesticide Applicator are to:

- Be in continuous attendance at the site with available proof of certification;
- Ensure that applications do not violate this PMP or applicable legislation;
- Supervise no more than 4 uncertified assistants at one time or as allowed under Regulation;
- Maintain contact, auditory and/or visual, with the uncertified assistants;
- Be within 500 meters of persons being supervised; and,
- Comply with the standards contained in Division 7 of the IPMR, and all other applicable legislation.

4.2 Procedures for Safely Transporting Herbicides

The Transport of Dangerous Goods Act regulates the handling and transportation of poisonous substances that may include herbicides. The IPMA and IPMR also specify certain transport requirements/procedures.

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for safely transporting herbicides within the Plan Area:
• Ensure that herbicides are carried in a compartment that is secured against spillage and unauthorized removal. The compartment shall be separate from food and drinking water, safety gear, spill containment equipment and people;
• Ensure that all herbicide containers are inspected for defects prior to transporting. Herbicides shall be kept in their original containers and with original labels. If original labels are not available, the herbicides shall be placed in appropriate containers that have the trade name, active ingredient concentration and pesticide registration number affixed to the outside of the container;
• Ensure that the vehicle is equipped with a first aid kit, fire extinguisher, spill contingency plan and kit, and that the vehicle operator has been trained on how to handle spills;
• Ensure that all documents and placards are carried in, or placed on, transport vehicles if required under the Transportation of Dangerous Goods Act, the IPMA or the IPMR; and,
• Ensure that the vehicle operator reads and understands the herbicide labels and the product Material Safety Data Sheet (MSDS) for all herbicides being transported.

4.3 Procedures for Safely Storing Herbicides

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for safely storing herbicides within the Plan Area:

• Ensure that herbicides are stored in accordance with the IPMA, IPMR and the Workers’ Compensation Board document Standard Practices for Pesticide Applicators;
• Keep herbicides in their original containers and with original packaging. If original packaging is not available, the herbicides shall be placed in appropriate containers that have the trade name, active ingredient concentration and pesticide registration number affixed to the outside of the container;
• Ensure that storage facilities are locked when left unattended, ventilated to the outside atmosphere, are entered only by persons authorized to do so, and that there is a placard affixed and maintained on the outside of each door leading into the storage area bearing, in block letters that are clearly visible, the words “WARNING – CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY”;
• Keep storage facilities separate from work and living areas, and away from food, flammable materials, bodies of water and water sources;
• Ensure the storage facility is equipped with necessary spill equipment, first aid kits, and the appropriate Material Safety Data Sheets of herbicides stored;
4.4 Procedures for Safely Mixing, Loading and Applying Herbicides

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for safely mixing, loading and applying herbicides within the Plan Area are adhered to:

- Ensure that all mixing, loading and application of herbicides is carried out by, or directly supervised by, a Certified Pesticide Applicator with the appropriate category of certification, and that all manufacturer’s recommendations, as specified on the herbicide labels, are adhered to;

- Ensure that all mixing, loading and application of herbicides are undertaken in a safe manner. All mixing and loading shall be undertaken only in areas at least 15 meters from, and selected to prevent any spilled herbicides from entering into pesticide-free zones, no treatment zones, bodies of water, fish or wildlife habitat, water sources, or other environmentally sensitive features (e.g., agricultural production areas);

- Ensure that containers used to mix, prepare or apply herbicides are not washed or submerged in any body of water;

- Ensure that eye wash station(s), protective clothing, safety spill kits, spill response plans, a copy of the invasive plant PMP, each herbicide product’s MSDS, emergency telephone numbers and first aid supplies are present and available at or near each mixing, loading or treatment site.

- Follow all directions and restrictions on herbicide product labels, including adhering to the recommended re-entry times to treated areas unless personal protective equipment is worn; and,

- Ensure that the listed herbicides in this PMP will only be mixed with water as a carrier for herbicide applications. Prior to any water being collected in the field
from a natural source in invasive plant applications, a fresh water permit will be acquired from the MOE.

### 4.5 Procedures for Safe Disposal of Empty Herbicide Containers and Unused Herbicides

Except where herbicides are applied by plan holder personnel, the responsibility of container disposal will lie with the contractor, or other agencies working under this PMP.

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for the safe disposal of empty herbicide containers and unused herbicides within the Plan Area:

- Ensure that all herbicide waste is disposed of in a manner consistent with relevant laws, and in accordance with the manufacturer’s instructions as noted on the product label, as appropriate;
- Ensure that empty herbicide containers are returned to the herbicide distributor as part of their recycling program; or triple rinsed or pressure rinsed, altered so that they cannot be reused, and disposed of in a permitted sanitary landfill or other approved disposal site; and
- Ensure that all leftover herbicide mix is stored for future use in a manner consistent with the requirements specified in Section 4.3 (procedures for safely storing herbicides).

### 4.6 Procedures for Responding to Herbicide Spills

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for responding to herbicide spills within the Plan Area. If contractors that work under this PMP have their own spill response plan, they must meet or exceed the following plan:

- Ensure that a herbicide spill kit accompanies all vehicles carrying herbicides within the plan area, and contains, as a minimum, the instructions for spills, emergency telephone numbers, kitty litter, large plastic garbage bags, shovels, an ABC type fire extinguisher, polyethylene or plastic tarp (3m x 3m minimum), dustpan and shop brush, flagging tape and rope, a first aid kit, and personal protective clothing/equipment (rubber gloves, safety glasses); and,
- Ensure that the following spill procedures are followed if a herbicide spill occurs within the plan area:
  1) All personnel shall be protected from herbicide contamination by wearing appropriate protective clothing and safety gear;
2) Any person exposed to a herbicide shall be moved away from the place of the spill;
3) First aid should be administered, if required;
4) The source of the spill should be stopped;
5) The spilled material should be stopped from spreading by creating a dam or ridge;
6) The project supervisor shall ensure operations cease until the spill is contained and the source is repaired;
7) Absorbent material shall be spread over the spill, if applicable, to absorb any liquid;
8) The absorbent material shall be collected in garbage bags or containers with the contents clearly marked, removed from the spill site, and disposed of only in a designated landfill;
9) When more than 5 kg or litres of herbicide¹ is spilled, the person responsible for the project will immediately report it to the Emergency Management BC by telephoning 1-800-663-3456 or, where that is impractical, to the nearest detachment of the R.C.M.P.; and,
10) An approved representative of the plan holder(s) will be notified of the details related to the spill as soon as is practical by the contractor or project supervisor.

¹Environmental Management Act Spill Reporting Regulation, Reportable Levels for Certain Substances, Item #19.

4.7 Herbicide Selection and Use

Herbicide selection is driven first by the conditions of the site, and secondly by the target species. Currently, only glyphosate products may be used within 1 meter of a high water mark, if applied by selective application, for noxious weed or invasive plant control, while the remaining herbicides can only be used where a 10 meter PFZ can be maintained by ensuring an adequate buffer zone. However, if a product on the following list is approved for use within PFZs in the future, then that label expansion will be adopted under this PMP.

The list of herbicide active ingredients shown in Section 4.7.1 below includes all possible active ingredients that may be used within the term of the PMP. However, due to the proposed 5 year duration of the PMP, it is not possible to precisely forecast with certainty which herbicide active ingredients will or will not be used from this list. Many of the herbicide active ingredients listed for possible use within this PMP are sold under a variety of Trade Names. The Plan holder reserves the right to utilize any and all of the available products (i.e. Trade Names) for the above listed active ingredients, provided that they are registered for the intended purpose under the Federal Pest Control Products (PCP) Act.
4.7.1 Properties and Use Patterns of Herbicide Active Ingredients Proposed for Use:

**Aminopyralid** - is one of the newer broadleaf specific herbicides registered for use in invasive plant control. It is a synthetic enzyme, which functions by its systemic mode of action. It is absorbed by both leaves and roots, and translocates throughout the plant.

**Clopyralid** - is a selective, residual herbicide that is less persistent in soil than picloram and it does not injure trees or shrubs when applied to target herbaceous species in close proximity.

**Diflufenzopyr** - improves the efficacy of certain auxin-like herbicides, such as dicamba, on many broadleaf weed species. Diflufenzopyr aids in the activity of these broadleaf herbicides by causing increased disruption of normal growth patterns at a plant’s growing points in the roots and shoots. Much like Picloram, it may persist in the soil, it cannot be used near desirable trees or their root systems, and care must be taken to avoid areas where soil may be moved or where there is a shallow aquifer or domestic water intake, especially where there are permeable soils. It also may not be used in any residential areas. Currently in Canada, diflufenzopyr is only found in the herbicide products OVERDRIVE® and Distinct WDG®.

**Dicamba** - is a selective, non-residual herbicide used for the treatment of young, actively growing broadleaf weeds, brush species, and some species of invasive plants. Because it is selective, it is useful in areas where grasses are to be retained on the site.

**Fluroxypyr** - is a selective herbicide for the control of annual broadleaved weeds in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas. It is effective for controlling hard-to-kill annual broadleaved weeds such as kochia (including glyphosate-resistant plants). It is a systemic auxin-type herbicide and moves within the plant for control of above-ground and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms include epinasty (twisting of the stems) and swollen nodes. Currently in Canada, Fluroxypyr is found in the herbicide product SIGHTLINE®.

**Glyphosate** - is a non-selective, non-residual herbicide that kills all vegetation on contact, and since it kills grasses as well as broadleaf invasive plants, its use is limited. It is not persistent because it is rendered inactive when it contacts soil. It may be used within 1 meter of a high water mark if selectively applied for invasive plant control, and application near water is generally by wick or stem injection.
**Imazapyr** - is a non-selective, residual herbicide that gives season-long control of most species of annual and perennial broadleaf plants, grassy weed species, and some species of invasive plants. It is effective at low application rates. It works by preventing germination of seeds, is readily absorbed through foliage and roots, and moves rapidly throughout the plant where it breaks down tissue. It is particularly useful in controlling vegetation that has not been effectively managed using a combination of physical controls and glyphosate application. Treated plants stop growing soon after spray application. Imazapyr is found in the herbicide product ARSENAL®

**Triclopyr** - is a selective herbicide that controls many invasive broadleaf plants, and is very effective in controlling many new identified invasive shrubs and deciduous tree species. It works by accumulating in the areas of active cell growth and interfering with normal plant growth processes. It is absorbed by green bark, leaves, roots, and cut stem surfaces and moves throughout the plant.

**Mecoprop-p** - is a selective, non-residual, translocated herbicide that interferes with growth regulation in many noxious weed and invasive plant species. Because it is selective, it is useful in areas where grasses are to be retained on the site. It is most effective when the target plant is actively growing, and is more actively taken up by the foliage than the roots.

**Metsulfuron-methyl** - is a non-selective, residual herbicide that is effective in the suppression and management of difficult to control invasive plants such as common tansy and Canada thistle. It works by causing rapid inhibition of plant cell division and growth.

**Picloram** - is a selective, broadleaf specific, residual herbicide that can remain in the soil for several years and continue to control susceptible vegetation. It is a systemic herbicide for use on a wide variety of broadleaf invasive plants. Because picloram may persist in the soil, care must be taken to avoid areas where soil may be moved or where there is a shallow aquifer or domestic water intake. The mode of action and soil persistence allows for a broader application window.

**2,4-D** - is a selective, non-residual, translocated herbicide that interferes with growth regulation in many noxious weed and invasive plant species. Because it is selective, it is useful in areas where grasses are to be retained on the site. It is most effective when the target plant is actively growing, and is more actively taken up by the foliage than the roots.

**Surfactant or Adjuvants** - Adjuvants and surfactants are chemicals or agents that are sometimes added to herbicide spray mix to allow easier mixing, and to assist in
the spreading of the herbicide spray mix and the wetting of, and adherence to, the surface of the plants being treated. This has been shown to decrease the possibility of drift (the movement of the applied material away from the intended target to adjacent areas by wind). Some adjuvants and surfactants may also be used to adjust the pH of the herbicide spray mix. Spray mixes that are highly to mildly alkaline (i.e. pH greater than 7) have been shown to break down (degrade) or hydrolyze more rapidly, reducing the effectiveness of the herbicide being applied. If required, surfactant/adjuvant products may be added to the herbicide active ingredients proposed for use under this PMP.

**Herbicide Active Ingredient Formulations** - A number of the herbicide active ingredients listed above are included in different final products as different formulations. For example 2,4-D is available as an Amine, an Ester and a Choline. While each formulation has slightly different characteristics (i.e. volatility), they break down in the environment the same way.

Additional background information on the Environmental, Toxicological and other Parameters of the herbicides listed can be found in Appendix 4.

### 4.7.2 Description of Application Equipment Proposed for Use

The following is a description of each type of application equipment proposed for use under this PMP:

**Backpack and Hand Held Sprayers:** A portable, manually operated, low pressure container with a nozzle and a positive shut-off system used for the spot application of herbicides onto foliage, basal bark areas or into or onto freshly cut stems and stumps.

**Vehicle mounted sprayer:** A motorized vehicle equipped with a pump, holding tank for spray mix, and nozzles (low pressure) attached to handguns, booms and or boomless nozzles used for spot and broadcast applications of herbicides onto foliage. The vehicle may be a four-wheel drive truck or an all-terrain vehicle.

**Wick/Wipe On Applicators:** Absorbent pad, wicks or rope attached to a long-handled applicator or stick used to apply herbicides onto foliage, basal bark areas or freshly cut stems or stumps.

**Squirt Bottle:** Hand-held, non-pressurized container used to apply herbicides onto foliage, basal bark areas or freshly cut stems or stumps.

**Injection Tools:** Used to inject herbicides into individual stems.
5.0 Environmental Protection Strategies and Procedures

Environmental protection is one of the principal reasons for the existence of each Ministry’s Invasive Plant Program. In order to protect ecosystems, there are circumstances where the use of a herbicide is the only method that can effectively remove invasive plant species. This is particularly true when site goals require extirpation of all target species, or restoration of a site is required because a particular injury threshold has been exceeded. The risk to ecosystem health and function that can result from invasive plant establishment and spread is far greater than the risk of safe, localized herbicide use.

All invasive plant management activities proposed for use under this PMP will incorporate strategies to ensure the protection of our environment. These procedures require that any person(s) applying or handling herbicides under the authority of this PMP be cognizant of the location of the following:

- All community, domestic and agricultural water sources;
- Riparian areas, wetlands and all bodies of water whether or not they contain fish;
- Wildlife habitat and species at risk; and
- Food plants intended for human consumption, including First Nations traditional medicinal use.

The term riparian is used, in the context of this plan, to mean an area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.

All PFZs in this PMP will comply with the standards contained in Division 7 of the IPMR. A PFZ is defined as an area of land that must not be treated with pesticides, and must be protected from pesticide contamination through either direct means (e.g. through herbicide drift) or indirect (e.g. soil and/or water movement). PFZs are measured by the horizontal distance from the high water mark and they will always be identified and flagged prior to any herbicide application. In order to decrease the risk of breaching a PFZ, appropriate buffer zones sufficient to ensure the maintenance of the PFZ, will be applied outside PFZs. Products containing glyphosate are eligible for selective application within a PFZ up to one meter from the high-water point of any riparian area.

5.1 Procedures to Protect Community Watersheds

The following precautionary procedures will be implemented within community watersheds:

- PFZ procedures described in Section 5.0 will be followed for all community watersheds;
• The location of community watersheds to be protected will be verified by accessing the Community Watershed Database, maintained by the BC Ministry of Environment, at the following web site http://www.env.gov.bc.ca/wsd/data_searches/comm_watersheds/index.html. For the City of Dawson Creek information and maps of the community watershed are available at the City of Dawson Creek Watershed Department page: http://www.dawsoncreek.ca/cityhall/departments/water/watershed/dawson-creek-watershed-atlas/

• Herbicides shall not be stored within a community watershed for more than 24 hours prior to their use, and removed from the community watershed within 7 days of use, unless they are stored in a permanent structure;

• A 10 meter PFZ shall be maintained from the point of herbicide application and all bodies of water within the community watershed;

• A 30 meter PFZ shall be maintained down slope from licensed water intakes within the community watershed;

• A 100 meter PFZ shall be maintained upslope from all licensed water intakes within the community watershed;

• All PFZs shall be measured and marked/flagged prior to herbicide use.

5.2 Procedures to Protect Domestic and Agricultural Water Sources

PFZ procedures described in Section 5.0 will be followed for all domestic and agricultural water sources. The plan holder shall ensure that prior to herbicide application for invasive plant management near private and/or agricultural lands, the location of registered domestic and agricultural water sources shall be verified through review of the two online resources listed below, visual observation, and by direct contact with landowners contiguous to the proposed treatment site. Attempts to identify and locate unregistered domestic and agricultural water sources will be made by visual observation followed by attempts to contact the owner/occupier of the adjacent land prior to herbicide application.


The table below describes the minimum protective measures that shall be implemented. The No Treatment Zones (NTZs) in this table reflect the standards as specified in Sections 71(3) and 71(4) of the IPMR.
Table 3 - Minimum Protective Measures under the IPMR to Protect Domestic and Agricultural Water Sources

<table>
<thead>
<tr>
<th>IPMR Section</th>
<th>Uses</th>
<th>Permitted Applications</th>
<th>NTZ *</th>
</tr>
</thead>
<tbody>
<tr>
<td>71(3)</td>
<td>All pesticide applications except bacterial pesticides</td>
<td><strong>General Rule</strong> – Must maintain a 30 m NTZ around a water supply intake or well used for domestic or agricultural purposes, including water for livestock and irrigation purposes</td>
<td>30 m NTZ</td>
</tr>
<tr>
<td>71(4)</td>
<td>All pesticide applications except bacterial pesticides</td>
<td>May reduce the NTZ under section 71(3) if reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well</td>
<td>NTZ at discretion of applicator</td>
</tr>
</tbody>
</table>

*See the definition in Appendix 2

5.3 Procedures for Protecting Riparian Areas, Bodies of Water and Wetlands

In order to protect fish, riparian areas, and bodies of water from adverse effects during invasive plant management (chemical and non-chemical), the plan holder will implement the following procedures to minimize any adverse and lasting effects on natural ecosystems:

- PFZ procedures described in Section 5.0 will be followed for all bodies of water, wetlands and riparian areas;
- Ensure that whenever herbicide, manual or mechanical control methods are applied, efforts are made to prevent harmful alteration, damage or destruction to fish or their habitat. Reducing negative impacts on streamside vegetation and bank stability will reduce erosion and water turbidity.
- Ditches with water are considered to be a water body under the IPMR unless they are "self-contained" (i.e., there is/will be no outflow at any time of year). A 10 m PFZ must be maintained around a water body for all herbicides except glyphosate. For noxious weed control using glyphosate, the PFZ can be reduced to 1 m if selective treatment is used. If the water in the ditch is temporary and free-standing (is not flowing into other water bodies) and at no time is, or flows into, a fish bearing water body, then glyphosate can be applied up to but not below the high water mark of the ditch.
- Ensure that whenever control methods involving herbicide application are proposed in areas identified as Karst lands, that the Best Management Practices
specific to herbicide applications, as identified in the provincial government publication entitled “Karst Management Handbook for British Columbia”, are adhered to (http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf);

- Ensure that best management practices that comply with the IPMR are applied during invasive plant management;
- Hold pre-work meetings with plan holder(s) personnel and/or contractors and affected agencies to ensure all involved in the invasive plant management process can competently protect riparian areas and bodies of water during the course of their work.
- Prevent invasive plant control impacts on water bodies and riparian habitat by ensuring that contract documents and prescriptions will describe best management practices, including, but not limited to, no refuelling of machinery or herbicide mixing within 15 meters of a riparian zone, no clean up (excluding the case of an emergency spill), and including a requirement to install descriptive flagging such as “Riparian Zone” and “Pesticide-Free Zone” placed at appropriate intervals.

Ensure that the minimum protection measures during herbicide applications for bodies of water (temporary, permanent, fish-bearing, not fish-bearing), dry streams, and classified wetlands are adhered to according to the requirements specified in the IPMR. These requirements are summarized in the following table:

Table 4 - PFZ Requirements under the IPMR when Applying Herbicide for Invasive Plant Control

<table>
<thead>
<tr>
<th>Permitted Application</th>
<th>PFZ*</th>
<th>Regulation Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-glyphosate and aminopyralid Applications</strong></td>
<td>10 meter PFZ</td>
<td>73(1)</td>
</tr>
<tr>
<td>Around or along a body of water or dry stream and classified wetland using any pesticide except glyphosate, subject to label restrictions and including all application methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glyphosate Applications</strong></td>
<td>1 meter PFZ above the high water mark</td>
<td>74(2)(a) and 77(2)</td>
</tr>
<tr>
<td>If the glyphosate product is applied by selective application methods up to but not below the high water mark of temporary, free-standing bodies of water that are not fish-bearing at any time of the year and do not drain directly into a fish-bearing body of water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### If the glyphosate product is applied by selective application methods over a dry stream that is not fish-bearing at any time of the year and does not drain directly into a fish-bearing body of water

0 meter PFZ 74(2)(b)

| If the glyphosate product is applied by selective application methods in proximity of a body of water or a classified wetland that is fish bearing or that drains directly into a fish bearing body of water or a dry stream that when wet is fish bearing or drains directly into a fish bearing body of water | 2 meter PFZ 74(1)(a)ii |

*See the definition in Appendix 2*

### 5.4 Procedures to Protect Wildlife Habitat/Species at Risk

In order to protect wildlife and species at risk from adverse effects during invasive plant management, the plan holder will implement the following procedures to minimize any adverse and lasting effects on natural ecosystems:

- Consider sensitive ecosystems or 'at risk' plant, vertebrate or invertebrate species when developing treatment plans for a given site;
- Consult the following layers in iMapBC at [http://maps.gov.bc.ca/ess/sv/imapbc](http://maps.gov.bc.ca/ess/sv/imapbc):
  - WSI-IO-Red-listed Species – Nonsensitive;
  - WSI-IO-Blue-listed Species – Nonsensitive;
  - WSI-SO-Red-listed species – Nonsensitive;
  - WSI-SO-Blue-listed Species – Nonsensitive; and
  - Endangered Species and Ecosystems – Non-Confidential Occurrences – Conservation Data Centre;
- Ensure that there is communication with agencies responsible for species at risk prior to invasive plant management being carried out, so that management plans can be adjusted accordingly;
- Ensure that best management practices (as derived from documents on species habitat, lifecycle information and locations) are applied during invasive plant management; and
- Hold pre-work meetings with plan holder(s) personnel and/or contractors and affected agencies to ensure all involved in the invasive plant management process can competently protect species at risk and wildlife habitat during the course of their work.
5.5 Procedures to Prevent Herbicide Contamination of Food Sources Intended for Human Consumption

Berry picking, bee keeping areas, vegetable gardens, and areas containing agricultural crops or domestic animals are found at many locations within the plan area, but generally not in immediate proximity to potential treatment area(s). In addition, First Nations people within the Plan Area may use several species of native plants for food gathering purposes.

Invasive plants generally become established in areas where ground disturbance has occurred such as new road construction and maintenance. These areas are often not traditional plant or agricultural use areas due to disturbance or they are unsuitable for crop production. This, in turn, reduces the risk of human food contamination as there is often separation between those areas most likely to receive direct herbicide application for invasive plant control from those areas where food gathering collections or agriculture may occur.

The plan holder shall ensure that, prior to herbicide applications for invasive plant management, procedures are developed and implemented to prevent herbicide contamination of food intended for human consumption including:

- Identification of native plant species and agriculture production sites.
  - During the required consultation process, the public and First Nations were invited to forward the names of those plant species of used for food gathering, so that they are not inadvertently affected during treatment activities. Additional plant species will be added to this list if identified by First Nations and others.
  - Efforts will continue through ongoing engagement to identify food gathering and agriculture sites that may be affected by herbicide treatment.
  - Organic Growers’ Societies and individuals will be contacted to determine the location of certified organic farms and to assist in defining adequate buffer zones that will be used around known organic farms;

- Proposed treatment area notification:
  - Where requested, First Nations will be provided with information on where treatment is planned,

- Invasive Plant management adjacent to traditional food gathering plants and agriculture sites:
  - In areas adjacent to food growing or harvesting, non-chemical methods of invasive plant management shall be considered where treatment objectives can be achieved;
Treatment Notices will be posted at public access points to proposed herbicide treatment areas advising of herbicide use near these sites. This will communicate that the area has been treated with herbicides and signs will advise when it is safe to re-enter the area. In most cases this is 24 hours from the time of herbicide application; and,

Where possible, herbicide treatments shall be conducted at times to minimize impacts on food plant production and harvesting (e.g., delay treatments until after the fruit has predominantly dropped from the plant, use of non-residual herbicides if possible)

5.6 Procedures to Protect First Nations Interests in Traditional Food/Medicine Gathering and Culturally Significant Areas

First Nations people within the Plan Area may use several species of native plants for ethno-botanical purposes. Invasive plants generally become established in areas where ground disturbance has occurred such as new road construction and maintenance. These areas are often not traditional use plant areas because the disturbance has removed the natural vegetation. This in turn reduces the risk of contamination as there is often separation between those areas most likely to receive direct herbicide application for invasive plant control from those areas where ethno-botanical collections or traditional use may occur.

The plan holder shall ensure that, prior to herbicide applications for invasive plant management, procedures are developed and implemented to prevent herbicide contamination of food or medicinal plants intended for human consumption including:

- Identification of native plant species and culturally significant sites.
  - During the required consultation process, First Nations were invited to forward the names of those plant species of cultural importance, so that they are not inadvertently affected during treatment activities. Additional plant species and sites of cultural importance will be added to this list if identified by First Nations and others.
  - Efforts will continue through ongoing engagement to identify culturally significant plants and sites.
- Proposed treatment area notification:
  - Where requested, First Nations will be provided with information on where treatment is planned each spring,
• Invasive Plant management adjacent to traditional use plants and culturally significant sites:
  o Provide annual training to on-ground treatment contractors to recognize traditional use plants and culturally significant sites;
  o Non-chemical treatment methods of invasive plant management will be considered where treatment objectives can be achieved;
  o Treatment Notices will be posted at public access points to proposed herbicide treatment areas advising of herbicide use near these sites. This will communicate that the area has been treated with herbicides and signs will advise when it is safe to re-enter the area. In most cases this is 24 hours from the time of herbicide application; and,
  o Where possible, herbicide treatments shall be conducted at times to minimize impacts on food/medicinal plant production and harvesting (e.g., delay treatments until after the fruit has predominantly dropped from the plant, use of non-residual herbicides if possible) and on cultural uses (e.g., delay treatments until after traditional use occurs, use of non-residual herbicides if possible).

5.7 Procedures for Safe Herbicide Application

Ensuring that correct environmental protection procedures are in place can be further strengthened by requiring that handling and applying herbicides is conducted in a manner that reduces the risk of accidents caused by human error or equipment malfunction.

5.7.1 Pre-Treatment Inspection Procedures for Identifying Treatment Area Boundaries

The following procedures shall be implemented to ensure that treatment area boundaries are identified and clearly marked prior to herbicide applications:

• A pre-treatment inspection shall be conducted to establish treatment boundaries and to document the location of environmentally sensitive areas;
• A pre-season meeting shall be held between the Contractor and the plan holder or their representative to confirm procedures for determining treatment area boundaries and the locations of environmentally sensitive features; and,
• Marking/flagging of all PFZs and/or NTZs shall be completed prior to herbicide application.
5.7.2 Procedures for Maintaining and Calibrating Herbicide Application Equipment

All herbicide application equipment used under this PMP for invasive plant management shall be safe, clean, in good repair, compatible and appropriate for the herbicide being applied. All equipment shall be inspected and calibrated prior to the commencement of herbicide applications each year, and once every 10 days throughout the application season. Backpack sprayers and vehicle-mounted sprayers shall also be re-calibrated when changing herbicide products or when nozzle output begins to vary. Calibration is not undertaken on wick/wipe on applicators or squirt bottles.

An example of an Invasive Plant Treatment Calibration record is shown in Appendix 5.

5.7.3 Procedures for Monitoring Weather

An anemometer (wind speed) and thermometer will be used to ensure weather conditions are suitable for herbicide application at treatment sites before herbicide treatment occurs and periodically during herbicide application. Wind speed and direction and temperature will be recorded prior to application.

The certified pesticide applicator has the final authority to decide when herbicide applications should be stopped due to inclement weather or adverse site conditions. Examples of conditions which herbicide applications should cease are as follows:

- When parameters are exceeded according to the manufacturer’s label; OR
- When conditions prevent the herbicide product from being applied effectively according to the label instructions (e.g., periods of rain or snow); OR
- When wind speed and/or direction causes the foliar application of herbicides to drift and/or miss the target noxious weed or invasive plant; OR
- Ground wind velocity is over 8 km/hour for foliar or soil applications; OR
- The maximum air temperature exceeds 27°C, or the maximum stated on the herbicide label is exceeded; OR
- It begins to rain during the herbicide application, increasing the chances of excessive runoff or leaching; OR
- There is ice or frost on the foliage.
6.0 Reporting, Notification, Ongoing Engagement and Plan Amendments

The plan holder, partnering organizations, and each contracting firm that applies herbicides under this PMP are committed to following the IPMR when managing invasive plants. The plan holder will maintain a high standard of communication, record keeping and professionalism when developing and consulting on this PMP and any future amendments that may arise. Specific activities in these areas, as well as requirements under the IPMA are outlined in this section.

6.1 Reporting

Accurate record keeping allows both plan holder and the Administrator of the IPMA, to:

- Monitor the quantity of herbicides used;
- Ensure compliance with the IPMR;
- Ensure compliance with the commitments made in this PMP; and,
- Ensure compliance with the contents of the Pesticide Use Notice.

The plan holder will ensure that each of the required records described below are maintained.

6.1.1 Confirmation Holder Use Records

The plan holder, partnering organizations and each contracting firm that applies herbicides under this PMP must maintain daily records of herbicide use.

Section 37(1) of the IPMR describes the requirements for these records. The following records must be kept for each treatment location and day of use:

- Date and time of the herbicide use;
- PMP confirmation number;
- Names of all applicators and certification number of certified applicators;
- Name(s) of the invasive plant(s) targeted for treatment;
- Trade name of each herbicide used and its registration number under the federal Pest Control Products (PCP) Act;
- For each herbicide used, the method and rate of application and the total quantity used;
- Prevailing meteorological conditions including temperature, precipitation and velocity and direction of the wind, these conditions should be measured at the beginning of each day before starting treatment, re-measured if
obvious changes in environmental conditions occur throughout the day, and re-measured at the end of any treatment day;

- A record for each piece of the holder’s herbicide application equipment that requires calibration, showing when the equipment was calibrated and the data upon which its calibration was based;
- Any advice given to owners or managers regarding things such as safe re-entry time or any additional precautions that should be taken to minimize exposure to the pesticide.

In addition to maintaining daily records of herbicide use, all users of the PMP will retain records of site assessment and invasive plant inventory as well as operational herbicide and other treatment records. These records will include:

- Site assessment and invasive plant inventory forms;
- Treatment notifications;
- Maps of invasive plant sites, treatment and biological control;
- Pre and post treatment records of sites; and
- Project checklists including equipment, First Aid and spill kit.

Most of the inventory, assessment, treatment and monitoring information will be entered into and housed in the Invasive Alien Plant Program, IAPP.

### 6.1.2 Annual Report for Confirmation Holders

In accordance with Section 39 of the IPMR, the plan holder will provide to the Regional Administrator, IPMA, the following information for each calendar year by January 31 in the next calendar year for operations conducted under this PMP during the calendar year:

- The name and address of the confirmation holder, and their confirmation number;
- Trade names and active ingredients of the herbicides applied, including their PCP Act Registration numbers;
- Locations and total area treated (ha);
- Methods used to apply herbicides;
- Quantity of each active ingredient applied (kg);
- Methods of non-herbicide pest controls used and the estimated total area of their use; and
- The web address for IAPP map display and data entry modules.
6.2 Notifications

The plan holder commits to providing the following notifications with respect to this PMP:

6.2.1 Notification of PMP Confirmation

The plan holder will, within 7 days of the plan confirmation date, make available, for the term of the confirmation, a copy of the confirmation and the PMP with relevant maps at their local office to allow inspection by the public as well as posting on the FLNR website at: https://www.for.gov.bc.ca/hra/Plants/pmp.htm

6.2.2 Annual Notice of Intent to Treat

As per section 42 of the IPMR, the plan holder will forward, in writing, to MOE, at least 21 days prior to treatment in each year during which the PMP is in effect, an Annual Notice of Intent to Treat (NIT). The NIT will be submitted to each Regional Office of MOE within whose geographic boundaries herbicide applications are being proposed. The NIT will identify:

- Name and business location of confirmation holder(s);
- Estimated area proposed for treatment;
- Proposed treatment methods;
- Herbicides proposed for use and their method of application; and,
- The web address for IAPP map display and data entry modules.

6.2.3 Notification of Contravention

Section 72(1)(d) of the IPMR requires that a confirmation holder give written notice to the administrator on a contravention of the IPMA or IPMR that involves the release of a pesticide into the environment. The plan holder commits to abiding by this requirement. The plan holder will also be responsible for inspecting the site, arranging any necessary testing, coordinating any required site remediation, and contacting any affected landowners.

In addition, the plan holder has implemented contractor guidelines to ensure compliance. Failure of the contractor to observe the following requirements may be cause for contractor dismissal:

- Violation of the requirements of the IPMA or the IPMR;
- Mixing of herbicides in inappropriate locations such as near environmentally sensitive zones;
- Failure to use adequate personal protective equipment when required by the product label;
- Failure to flag PFZs prior to treatment;
• Application of treatment herbicides within prohibited zones;
• Improper clean-up or reporting of spills;
• Application of herbicides by uncertified personnel without appropriate supervision;
• Improper disposal of unused herbicides or containers;
• Improper equipment calibration;
• Application of herbicides under inappropriate or unsafe conditions;
• Failure to properly complete and submit daily operating logs or records; or,
• Handling, storing, mixing, transporting, or applying herbicides in a manner that violates product labels.

6.2.4 Posting of Treatment Notices

Treatment Notices will be posted and maintained in locations so that they are clearly visible and legible from each approach for which public/employees/contractors access the treatment area or at locations where due diligence would seem to require them. The signs shall remain posted for 14 days following herbicide application, and contain the following information:

• The trade name and active ingredient of the herbicide that will be used;
• The date and time of the herbicide used;
• The purpose of the treatment;
• Precautions to be taken to prevent harm to people entering the treatment area;
• The PMP confirmation number;
• The plan holder(s) contact information;

For each treatment location, the applicator will maintain a record of where notices were posted.

The Treatment Notices shall be:

• A minimum size of 550 sq. cm;
• Water resistant;
• Display the title “Notice Herbicide Application” in bold letters that are clearly legible to a person approaching the treatment area.
### 6.3 Ongoing Engagement and Plan Amendments

#### 6.3.1 Ongoing Engagement

In compliance with IPMA Regulations, consultation was conducted with both the public and First Nations. Input received during this consultation was reviewed and, where appropriate, was incorporated into this document. Ongoing engagement will occur throughout the life of this document and as new information is received it will be considered and incorporated into annual operating plans where necessary.

Table 5 includes the ongoing engagement agreed to in the consultation process.

<table>
<thead>
<tr>
<th>Persons, Group or Organization</th>
<th>Consultation Item or Issue</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Council of the Haida Nation (CHN)</td>
<td>Use of herbicides on Haida Gwaii</td>
<td>Agreement to not use herbicides for invasive plant management on Haida Gwaii without further engagement with the CHN. With approval of the CHN, herbicide treatment of knotweeds was demonstrated in 2013 and 2014.</td>
</tr>
<tr>
<td>Heiltsuk Tribal Council</td>
<td>Use of herbicides in the Heiltsuk Territory.</td>
<td>Agreement to not use herbicides for invasive plant management in the Heiltsuk Territory without further consultation and agreement.</td>
</tr>
<tr>
<td>Halfway River First Nation</td>
<td>Use of herbicides in specific areas.</td>
<td>Agreement to use mechanical treatment means where practical and operationally feasible.</td>
</tr>
<tr>
<td>Lhtako Dene Nation</td>
<td>Requested information on where herbicide will be used.</td>
<td>Agreement to provide site information and maps 45 days prior to application of herbicide.</td>
</tr>
<tr>
<td>Xatśūll First Nation</td>
<td>Requested information on where herbicide will be used.</td>
<td>Agreement to provide site information and maps 45 days prior to application of herbicide.</td>
</tr>
<tr>
<td>Tsay Key Dene First Nation</td>
<td>Requested a list of all sites and active engagement in any invasive plant management activities within their consultation territory.</td>
<td>Agreement to provide a list of sites. Staff will continue to work with this Nation on invasive plant management activities within their consultation territory.</td>
</tr>
</tbody>
</table>
6.3.2 Requests to Amend the PMP

The plan holder will forward in writing to MOE any request for an amendment to the PMP. Amendment requests concerning new application techniques or similar changes will not require further public advertising or First Nations consultation, provided that the amendment request is within land owned or controlled by the plan holder. Amendments to add new active ingredients will require further public advertising and/or First Nations consultation.
Appendix 1: Map of PMP Area
Appendix 2:  Additional Definitions and Glossary of Acronyms

**Control:** Manage invasive plants on a site to prevent spread from that site.

**EDRR:** Early Detection Rapid Response – is a strategy that will prevent a species from establishing by detecting it when it first arrives and responding quickly to reports so that effective eradication can occur. EDRR involves having systems for recruiting and training a large number of people to act as ‘spotters’ who look for newly arriving species. This is coupled with a reporting and evaluation system that quickly confirms identity and indicates the degree of risk presented by the newly arrived species and begins a course of action or response to eradicate the species from BC while communicating Province wide alerts. Regional Invasive Plant committees are key players in BC’s EDRR program.

**Ditches with water:** Ditches with water are considered to be a water body under the IPMR unless they are "self-contained" (i.e., there is/will be no outflow at any time of year). A 10 m PFZ must be maintained around a water body for all herbicides except glyphosate. For noxious weed control using glyphosate, the PFZ can be reduced to 1 m if selective treatment is used. If the water in the ditch is temporary and free-standing (is not flowing into other water bodies) and at no time is, or flows into, a fish bearing water body, then glyphosate can be applied up to but not below the high water mark of the ditch.

**Ditches that are dry:** If a dry ditch is a dry stream as defined by the IPMR then the same regulations apply as if it had water in it as above, except glyphosate may be applied over a dry stream that does not drain directly into a fish bearing water body at any time.

There are no regulations with respect to pesticide use in or around a dry ditch that is not a dry stream. However, given the possibility of transport of products such as picloram, it may be prudent when using such products to maintain a PFZ around dry ditches that when wet flow into fish bearing water bodies or riparian areas. Such a PFZ is especially recommended if treatment of the dry ditch is within 100 m of a fish bearing water body or riparian area.

**Ditches that are contained:** There are no regulations with respect to pesticide use beside water in ditches that are self-contained (i.e., are not a body of water under the IPMR).

**Eradicate:** Remove all plants from a site. This may require several years of treatment.

**IAPP:** Invasive Alien Plant Program - The Invasive Alien Plant Program (IAPP) Application is the database for invasive plant data in BC. It is intended to co-ordinate/share information generated by various agencies and non-government organizations involved in invasive plant management. The application has been developed to allow the entry, edit and query of invasive plant information including: site details; invasive plant inventory information;
Invasive Alien Pest Management Plan for Provincial Crown Lands in Central and Northern British Columbia

Invasive Alien Pest Management Plan for Provincial Crown Lands in Central and Northern British Columbia

planning; treatment methods and data; and, monitoring data.
https://www.for.gov.bc.ca/HRA/Plants/application.htm

Industrial area: Industrial is considered as one type of non-cropland that encompasses facilities where manufacturing, processing or storage of commercial goods occurs.

IMISWG: Since 2004, the Inter-Ministry Invasive Species Working Group (IMISWG) has provided policy direction, coordination and collaborative delivery of provincial invasive species programs for the Province of BC.

Several land-based ministries have responsibility for noxious weed and invasive plant management, including Ministries of Forests, Lands and Natural Resource Operations, Agriculture, Environment, Transportation and Infrastructure, and Energy and Mines. The IMISWG functions to bring together provincial ministries and agencies, each with unique mandates, program goals and technical expertise. Other participating agencies include the Ministry of Community, Sport and Cultural Development, the Oil and Gas Commission, Ministry of Health, Ministry of Aboriginal Rights and Reconciliation, and the Solicitor General.

IPCPRRD: The Invasive Plant Committee of the Peace River Regional District was originally formed in 2003 (as the North East Invasive Plant Committee – NEIPC) as a subcommittee of the Peace River Regional District Weed Committee. It delivers invasive plant management programs that integrate awareness with site reporting, inventory, planning, treatment and evaluation and assessment so that the goals of EDRR, containment and rehabilitation in the IPCPRRD Strategic Plan can be accomplished.

NRIPC: The Northern Rockies Invasive Plant Committee was originally managed under the PRRD. As a separate Committee of the North Rockies Regional Municipality this committee delivers invasive plant management programs using a partnership delivery model that integrate awareness with site reporting, inventory, planning, treatment and evaluation and assessment so that the goals of EDRR, containment and rehabilitation in the NRIPC Strategic Plan can be accomplished.

No-Treatment Zone (NTZ): is defined in the IPMR as an area of land that must not be treated with pesticide. NTZs will be identified, marked/flagged prior to any herbicide application.

NWIPC: The North West Invasive Plant Council, NWIPC, was established in 1992 to provide resolution of issues and coordination for invasive plant management programs first in northwest BC and later expanding to central and northern BC. The Council is made up of agencies, organizations and individuals that carry out invasive plant programs or have an interest in those programs. NWIPC is a not for profit organisation that integrates aspects
of invasive plant management such as awareness, site reporting, inventory, planning, treatments and assessments. NWIPC operates under a partnership delivery model where the partners and stakeholders may contribute resources to a funding pool to deliver programming based on shared strategies and goals. NWIPC is subdivided into 7 Invasive Plant Management Areas, IPMAs, Haida Gwaii, Stikine-Skeena, Bulkley, Lakes, Nechako, Prince George and the Robson Valley. Each IPMA has an IPMA Contractor / manager whose responsibility it is to ensure that the NWIPC Strategies are implemented so that work towards the shared goals occurs. The contractors / managers conduct or coordinate inventory and treatments for all stakeholders and partners. First Nations, through partnerships with NWIPC, are developing invasive plant programs and taking on invasive plant management throughout NWIPC’s area. NWIPC has a web page at: www.nwipc.org

**Pesticide-free zone (PFZ):** an area of land that must not be treated with pesticides, and must be protected from pesticides moving into it. PFZs are measured by the horizontal distance from the high water mark. PFZs will be identified, marked/flagged prior to any herbicide application.

**REDDR:** Regional Early Detection Rapid Response – is a strategy that will prevent a newly arrived species from establishing by detecting it when it first arrives in a Region and responding quickly to reports so that effective eradication can occur. REDDR involves having systems for recruiting and training a large number of people to act as ‘spotters’ who look for newly arriving species. This is coupled with a reporting and evaluation system that quickly confirms identity and indicates the degree of risk presented by the newly arrived species and begins a course of action or response to eradicate the species from a Region while communicating Region-wide alerts.

**Rehabilitation / Restoration:** When invasive plant species manage to establish and spread they can have long lasting and sometimes irreversible impacts. If the lost values or degradation of the impacted habitat have significant and important consequences, e.g., critical wildlife habitat, economically important agriculture impacts or loss of culturally valued plants and habitats, rehabilitation of sites may be justified. Given adequate resources, planning and time frames ongoing rehabilitation efforts may result in restoration of the degraded habitats to native habitats.

**Residential:** Residential is defined on some herbicide labels as "sites where bystanders including children may be potentially exposed during or after spraying. This includes around homes, schools, parks, playgrounds, playing fields, public buildings or any other areas where the general public, including children could be exposed."

**Selective Application:** is defined in the IPMR. It means the application of a pesticide to individual plants so that the vegetation between the individual plants is not treated.
**Spot treatment**: The IPMR, Section 77.1 states: “...must not apply herbicide more than 1.5 m from a targeted weed or plant.” It is important to try and control seedlings and seed drop from the plants while not impacting competing vegetation or risking contamination of sensitive habitats. The applicator will ascertain what constitutes spot treatment with applications being equal or less than the 1.5 meters specified in the regulations. Examples, if seed drop has occurred and a herbicide that has some residual nature is being used then it may be desirable to treat up to 1.5 meters from the plant. When using glyphosate, because of impacts on competing vegetation, only the individual plants should be treated and no or minimal application of glyphosate should occur on non-target vegetation or the ground.

**Urban**: Urban is defined as areas within town or city legal limits or boundaries.
Appendix 3: Site & Invasive Plant Inventory Record and Chemical & Mechanical Treatment Record

### IAPP Site & Invasive Plant Survey Record

<table>
<thead>
<tr>
<th>Entered into IAPP <em>(YYYY-MM-DD)</em></th>
<th>By:</th>
<th>Assigned Site IDs recorded on this form:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Created Date <em>(YYYY-MM-DD)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invasive Plant Survey Date <em>(YYYY-MM-DD)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site ID: <em>(assigned at IAPP data entry)</em></td>
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#### Site Details

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<thead>
<tr>
<th>Jurisdiction: <em>(see reverse for choices/codes)</em></th>
<th>District Lot Nr:</th>
<th>Range Unit:</th>
<th>Site Paper File ID:</th>
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</thead>
<tbody>
<tr>
<td>UTM Zone: * <em>(no initial zero)</em></td>
<td>UTM Easting: *</td>
<td>UTM Northing: * <em>(7 digits)</em></td>
<td>Site Soil Texture:</td>
</tr>
<tr>
<td>Slope:</td>
<td>Aspect:</td>
<td>Elevation (m):</td>
<td>coarse</td>
</tr>
</tbody>
</table>

**Site Location** *(and directions how to get there)*: **Site Comments** *(anything else important/useful)*:

#### Invasive Plant Survey Details

<table>
<thead>
<tr>
<th>Invasive Plants *</th>
<th>Area *</th>
<th>Distr. Code</th>
<th>Density Code <em>(see reverse for codes)</em></th>
<th>Survey Type *</th>
<th>Proposed Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species name or code</td>
<td>Dimension or Ha</td>
<td></td>
<td></td>
<td>C</td>
<td>O</td>
</tr>
</tbody>
</table>

**Site Image Details**

<table>
<thead>
<tr>
<th>Date taken <em>(YYYY-MM-DD)</em></th>
<th>Reference No. *</th>
<th>Perspective: * <em>(see reverse for codes)</em></th>
<th>Image Comments:</th>
</tr>
</thead>
</table>
Appendix 4: Environmental, Toxicological and other Parameters of Herbicides

As discussed in Section 4, there is a large volume of studies, information and other sources used by the Federal Pest Management Regulatory Agency (PMRA) to determine whether to register a product and if registered what use conditions and mitigation actions, such as buffer zones, should be included on the product label. It is not the intent of this PMP to go into great detail on the science behind the label as the responsibility and authority to do that rests with the PMRA. PMRA has the resources including hundreds of scientists to evaluate the thousands of studies required from different habitats, using different laboratory and modelling techniques and measuring methods. These resources are also needed to sort and assess the variability resulting from such a volume of studies. PMRA works with its counterparts in other countries to align the processes used to regulate pest control products and ensure the protection of health and the environment.

From the Health Canada Web Page:


“One of the mandates of the Pest Control Products Act is to increase transparency in the pesticide registration system. A key mechanism for meeting this mandate is the Pesticide Public Registry.

The Public Registry is a collection of non-confidential information on pesticides and the pesticide regulatory system. All publicly available information on currently registered pesticides is available here.”

The Public Registry and other search engines, indicated in the following table, are some of the information sources used in development of this PMP. There is also a large volume of unpublished studies that are available in the public reading room of PMRA.

Principal Information Resources Used in Determining Status and Parameters Considered in Herbicide Use.
Table 6 - Principal Information Resources Used in Determining Status and Parameters Considered in Herbicide Use

<table>
<thead>
<tr>
<th>WEB PAGE</th>
<th>ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECOTOX database of the U.S. Environmental Protection Agency</td>
<td><a href="http://cfpub.epa.gov/ecotox/">http://cfpub.epa.gov/ecotox/</a></td>
</tr>
<tr>
<td>Ecological and Environmental Safety</td>
<td><a href="http://www.sciencedirect.com/science/journal/01476513">http://www.sciencedirect.com/science/journal/01476513</a></td>
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<tr>
<td>Journal of Environmental Quality</td>
<td><a href="http://jeq.scsjournals.org/cgi/search">http://jeq.scsjournals.org/cgi/search</a></td>
</tr>
<tr>
<td>Science direct</td>
<td><a href="http://www.sciencedirect.com/science">http://www.sciencedirect.com/science</a></td>
</tr>
<tr>
<td>The Extension Toxicology Network</td>
<td><a href="http://extoxnet.orst.edu/">http://extoxnet.orst.edu/</a></td>
</tr>
</tbody>
</table>
Appendix 5: Invasive Plant Treatment Calibration Records

Calibrating Backpack Sprayers

Even small backpack sprayers require calibrating. Accuracy and knowledge of the sprayer output is essential for proper application of herbicides. Knowing the sprayer output will ensure correct rates of herbicide is being applied so as to achieve the required level of control.

Before Calibration:

1. Make sure the tank is clean to prevent clogging of hoses and nozzles.
2. Check that all hoses and fittings are not leaking,
3. Ensure the nozzle is not worn or damaged.

These inconsistencies will certainly affect the output.

Calibrating:

First measure the delivery rate or the output of your backpack sprayer by:

1. Accurately measure and mark a test area in the field. For example, a 50 square meter area.
2. Pump up pressure on the backpack sprayer and begin spraying over the measured test area, while maintaining a steady, uniform walking speed and a steady pumping pace, ensuring you are covering the ground evenly with spray and keeping the height of the nozzle at the same distance above the ground. (Variation in speed and pumping pressure will change the output)
3. Track the amount of time it takes you to spray the area you have marked out.
4. Accurately measure the amount of water required to refill the tank by spraying water from your backpack into a container for the same period of time it took you to spray the measured area. (Ensure you maintain constant pump pressure)
5. Calibrate the sprayer delivery rate (output) by using the following formula to find the correct amount of herbicide to measure into your backpack.

\[
\text{Sprayer Delivery Rate (L/ha)} = \frac{\text{Liters used in test} \times 10,000 \text{ m}^2}{\text{Test area (50 square meters)}}
\]

i.e:

\[
\frac{L \times 10,000 \text{ m}^2}{10 \text{ m} \times 5 \text{ m}} = \frac{50 \text{ m}^2}{50 \text{ m}^2} = \text{L/ha (sprayer delivery rate)}
\]
Secondly, calculate the area that can be treated with a full tank:

\[
\text{Area sprayed by 1 tank} = \frac{\text{Volume of spray mixture in tank (capacity in liters)}}{\text{Sprayer Delivery Rate (Liters per hectare)}}
\]

i.e:

\[
\frac{\text{L}}{\text{ha}} = \text{ha. sprayed by 1 tank}
\]

Thirdly, calculate the amount of herbicide to add to the backpack sprayer tank as follows:

\[
\text{Amount of herbicide to add to tank} = \text{application rate of herbicide (Liters per hectare)} \times \text{area sprayed by one tank}
\]

i.e:

\[
\text{Amount of product to add to tank} = \text{rate (L/ha)} \times \text{ha.} = \text{liters or milliliters (amount of herbicide to add to tank)}
\]

(To convert liters to milliliters, multiply x 1,000)
Calibrating ATV / Boom Sprayers

Unit type: ____________________________ Date: __________________

Determine spray volume to a test area:

(A) Test strip area: (_________m long) x (_________m wide) = _________m²

(B) Equipment specifications (where applicable)

- Transmission gear: ____________________________
- Engine RPM: ____________________________
- Speedometer setting: ____________________________ km/h

(C) Spray tank pressure: ________________Kpa or _________ p.s.i.

(D) Amount of time used to spray area: _____________ seconds

(E) Volume of water used in test: _____________ liters

(F) Calculate spray volume per unit area:

1. Spray volume (L/ha) = "water used in test" (=E) x 10,000m/ha
   Area of test strip in m² (=A)

2. Spray volume = ________________ L/ha

(G) Calculate # of Ha. one full spray tank will cover:

   - # of Ha = Sprayer tank volume (# of Liters)
               Spray volume (L/ha) (=F)

(H) Amount of product to add to tank:

   - Product amount (Liters) = 
     Ha tank will cover (=G) x Application rate (L/ha)

**Note:** always refer to label for appropriate application rate and spray volume that corresponds with the herbicide and target weeds.