Southern Railway of Vancouver Island Limited

Pest Management Plan (2021 to 2026)

SVI Rail Link
PO Box 581, 7 Port Way,
Nanaimo, BC. V9R 5L3
Phone: (250) 754-9222

PMP Application #: SVI-PMP-2020

December 16, 2020

TABLE OF CONTENTS

FIGURES

TABLES

1.0 Introduction

The British Columbia *Integrated Pest Management Act* (IPMA) includes provisions to require that some pesticide applications be conducted under a single, comprehensive Pest Management Plan (PMP). A PMP is required for pesticide use on public land and on some types of private land. On private land used for forestry, transportation or public utility purposes, or otherwise for the commercial transmission of electricity, natural gas, oil or water, to or for the public or a corporation, a PMP is required for the use of pesticides.

This document describes the Southern Railway of Vancouver Island Limited (SVI) vegetation management program using the principles of Integrated Pest Management (IPM). SVI has prepared this PMP in accordance with Section 58 of the Integrated Pest Management Regulation (IPMR).

The PMP consists of a plan for controlling pests using an IPM program and methods for handling pesticides within the plan.

1.1 Identifying Information

The person responsible for the SVI Pest Management Plan is the General Manager, Southern Railway of Vancouver Island Limited.

The principal contact for information relating to the SVI Pest Management Plan is:

Al Kutaj, Roadmaster
Southern Railway of Vancouver Island Limited
PO Box 581, 7 Port Way, Nanaimo, BC V9R 5L3
Phone: (250) 754-9222

1.2 Role and Term of This PMP

This PMP permits SVI to utilize herbicides and identifies the approved procedures and practices that SVI will employ when utilizing herbicides within the geographic boundaries depicted in Figure 1. This PMP shall be in force for a five-year period following expiration of the current PMP (March 31, 2021), or from the date that Confirmation of a Pesticide Use Notice has been obtained from the BC Ministry of Environment and Climate Change Strategy.

1.3 Geographic Boundaries and Proposed Treatment Area

The PMP plan area encompasses the railway ballast areas, within station grounds and railway yards, and around shops, equipment, signals and buildings owned by the Island Corridor Foundation (ICF) and operated by SVI, including the 225 km-long Victoria Subdivision between Victoria and Courtenay, the 5 km-long Wellcox Spur in Nanaimo, and associated yards, shops and other facilities. In addition, the 60 km-long Port Alberni Subdivision between Parksville and Port Alberni owned by ICF is included in this PMP.

The plan area is shown in Figure 1.

Figure 1: SVI PMP Area

2.0 Integrated Pest Management (IPM)

For the purpose of this PMP, the term integrated pest management (IPM) will be used to describe programs that involve vegetation management using the principles of IPM.

2.1 Purpose, Objectives and Scope of the SVI IPM Program

Purpose of the IPM Program

The main purpose for controlling unwanted vegetation on all property operated by SVI is to maintain the safe functioning of train operations and to protect the public, employees and the environment from potential hazards that are associated with railway operations. This PMP has been developed to provide a single document that describes the SVI planning processes, using the principles of IPM, that both ensure effective vegetation management while protecting environmental and human health values. This PMP will outline the factors, policies, procedures, environmental conditions and consultation processes to permit the railway to control vegetation on the track, yards, storage compounds, shops and other facilities, to fulfil obligations to control noxious weeds and invasive plants in these areas, and other problem vegetation that negatively impact operational safety on the railway. The paramount purpose is to maintain a safe railway.

Objectives of the IPM Program

The primary objective of this PMP is to document procedures that effectively protect the public, employees and the environment from the hazards of operating a railway. Contained in this objective is the achievement of a ballast section that is vegetation free.

The PMP will address protection of the environment, public and occupational safety in a broad sense relative to the operation of the railway. Specifically, the PMP contains measures to promote safety of the public at level road crossings, maintenance of a stable track structure that can be readily inspected for defects and sub-standard conditions, and the health and safety of the public and SVI employees.

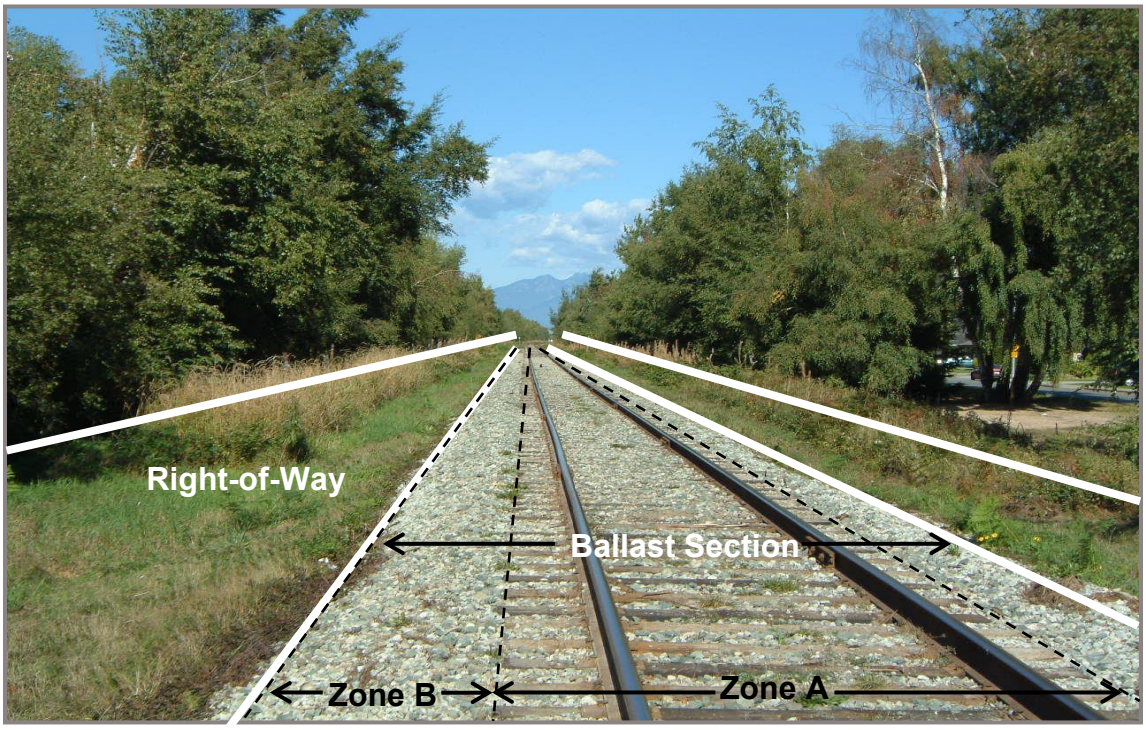
Scope of the IPM Program

This PMP is applicable to the trackage operated by SVI and facilities that require vegetation control, primarily the main track, lead tracks, passing tracks, spur tracks, team tracks, yard tracks and storage compounds. It also includes around signals, switches, buildings, shops, road and pedestrian crossings and station grounds. Herbicide applications for vegetation management on the main track will be restricted to applications only on Zones A and B (as shown in Figure 2). All vegetation management treatments on the rights-of-way will only be by manual and mechanical methods.

2.2 Vegetation Management Zones and Locations

The railway ROW is divided into 2 vegetation management zones: the ballast section (Zones A and B) and the ROW section, which is the remainder of the ROW to its boundary. Since the ballast section (Zones A and B) supports the dynamic train loading, it is the critical area of the ROW. A map of the ballast section (Zones A and B) is shown in Figure 2.

Figure 2: Vegetation Management Zones within the SVI Right-of-Way



Zone A is limited to the tie area of the ballast section. This zone has a total width of 2.4 meters, 1.2 meters on either side of the centerline.

Zone B is the ballast section beyond the tie area to the ballast shoulder, having a typical width extending 1.2 meters on either side.

2.3 The SVI Vegetation Management Policy

Controlling vegetation is necessary on railway ballast areas (Zones A and B), on the main line ROW, within station grounds and railway yards, and around shops, equipment, signals and buildings railway tracks, to maintain safe efficient operating conditions.

General

Weed contamination causes a wet slippery condition that increases the risk of personal injury and damage to locomotive components due to wheel slippage. Weed contamination also causes reduced drainage that results in unstable track bed, deterioration of track ties and switch ties increasing the risk of derailments and the resulting risk to employees, structures, equipment, the public and the environment. Increased risks to the motoring and pedestrian public, private property, employees, railway plant and equipment can be attributed to reduced sight-lines in the vicinity of road crossings due to the presence of excessive brush and grasses.

Other Considerations

When determining the actions required to control vegetation on all property operated by SVI, ALL OF THE FOLLOWING will receive full consideration:

- adjoining property use;
- B. C. Forest Service regulations;
- community relations;
- economics;
- B.C. Ministry of Transportation regulations and practices;
- prevailing weather conditions;
- ROW restrictions;
- safety;
- soil erosion;
- water courses and other environmentally sensitive areas;
- water well intakes; and,
- location of potable water sources (aquifers)

2.4 Laws Governing Vegetation Management

Integrated Pest Management Act

The Integrated Pest Management Act requires that a person applying pesticides must be in possession of a valid permit or Pest Management Plan (PMP) and that the pesticides are applied in accordance with the terms of the permit or PMP.

"pest management plan" means a plan that describes

a) a program, for managing pest populations or reducing damage caused by pests, based on integrated pest management, and

b) the methods of handling, preparing, mixing, applying and otherwise using pesticides within the program;

The *Integrated Pest Management Act* Chapter 58 Section 3(1) states without limiting any other provision of this Act, a person must not

a) use a pesticide that causes or is likely to cause, or use, handle, release, transport, store, dispose of or sell a pesticide in a manner that causes or is likely to cause, an unreasonable adverse effect,

b) use, handle, release, transport, store, dispose of or sell a pesticide other than in accordance with this Act and the regulations, or

c) subject to paragraph (b) and subsection (2), use, handle, transport, store or dispose of a pesticide in a manner that does not accord with the manner specified on the label of the pesticide container or in the manufacturer's instructions that accompany the pesticide.

Railway Act

The provincial Railway Act applies to all railways operating under the jurisdiction of the province of British Columbia.

The British Columbia Railway Act Chapter 395, Part 5, Section 30(j) states that "Subject only to the obtaining of permission or approval from the minister wherever required by this Act, a company may fell or remove any trees which stand within 100 feet from either side of the right-of-way of the railway, or which are liable to fall across any railway track."

Section 3.1.3.2 (1) of The British Columbia Railway Safety Code Part 3 Construction and Maintenance under the Railway Act states that:

Vegetation on the railway right of way must be controlled so that it does not:

a) impair crossing sight lines as required in sections 3.5.1.4, 3.5.1.5 and 3.5.1.6;
b) become a fire hazard to bridges, structures, and adjacent property;
c) restrict the visibility of railway signs and signals;
d) interfere with the railway employee's ability to perform that person's normal duties; or
e) prevent proper operation of signal and communication systems.

The British Columbia Railway Safety Code Part 3, Division 5 outlines required sight line distances that need to be maintained at road, farm and pedestrian crossings in relation to train speed, vehicle speed, type of crossing protection and road gradient.

Forest Practices Code of British Columbia Act

Part 5 Section 26 (1) of the Forest Fire Prevention and Suppression Regulation under the Forest Practices Code of British Columbia Act states that:

A person that operates a railway in British Columbia must:

a) maintain the railway right of way so that it is substantially free from dead or dry grass, weeds and other combustible accumulations, and
b) regularly patrol the railway right of way to provide for early detection of fires.

Weed Control Act

The British Columbia Weed Control Act Chapter 487 Section 2 identifies the duty to control noxious weeds and states "In accordance with the regulations, an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person."

Wildfire Regulation

Part 2 Division 1 Section 9 of the British Columbia Wildfire Regulation states "A person carrying out a railway operation, on or within 300 m of forest land or grass land, must

(a) maintain locomotives and engines, equipment and rolling stock in a manner that does not produce an ignition source capable of starting a fire on or adjacent to the railway operation,
(b) maintain the railway right of way so that it is substantially free from dead or dry grass, weeds and other combustible materials,
(c) having regard to the Fire Danger Class, ensure that there are sufficient patrols of the railway right of way to provide for early and effective detection and suppression of fires on and adjacent to the right of way, and
(d) on or before March 1st of each year, provide to an official an annual schedule identifying the locations, dates and times of proposed rail grinding work.

Legislation Dealing with Land Use Restrictions

Trespassing on railway right-of-way poses a considerable danger to members of the public and therefore railway land is fenced wherever feasible and as required in Division 10 of the British Columbia Railway Safety Code Part 3. For reasons of public safety and railway liability, railway rights-of-way must be considered in every respect to be private land. Berry picking, collection of herbs and mushrooms, fishing, hiking, diving from railway bridges, traverse by all-terrain vehicle, etc. are not considered legitimate uses for a railway right-of-way and in fact trespass is deemed illegal under several different federal and provincial acts specifically related to railways (*Railway Safety Act*, *Trespass Act* and *Motor Vehicle Act*). As a result, all activities including the aforementioned, which involve the presence of non-railway personnel, are discouraged.

2.5 Reasons for Vegetation Management

The following areas may require vegetation management to be undertaken:

- Ballast sections (Zones A and B) on the main track, lead tracks, passing tracks, spur tracks and team tracks, including around signals, switches, and at road and pedestrian crossings;

- ROWs; and,

- Within station grounds, railway yards, including around shops, buildings and material storage areas.

2.5.1 Reasons for Vegetation Management on Ballast Sections

Vegetation management on ballast sections include Zones A and B on the Main Track, Lead Tracks, and Team Tracks and include around signals, switches, and at road and pedestrian crossings.

Structural Integrity of the Roadbed (Ballast)

Ballast is the layer of crushed rock that supports the track and ties where train dynamic forces are applied. Ballast material is selected to:

- Provide free drainage of water;
- Provide structural support for vertical loads; and,
- Prevent the track from moving horizontally because of dynamic train loading and inherent forces resulting from contraction and expansion of the rail during temperature changes.

Total vegetation control in the ballast section is the most critical aspect of the SVI vegetation management program. Any type of vegetation in the ballast sections leads to problems with a stable track structure, which compromises railway safety. The ballast section is also the most susceptible to fires resulting from the closeness to sources of combustion such as ties and dry weeds that may ignite.

Track switches and turnouts and foot traffic associated with train operations, track maintenance and inspection all occur in the ballast section. Their close proximity to combustion sources (e.g. track ties and dry vegetation in the ballast) can result in fires.

Unwanted vegetation will negatively impact the structural integrity of the railway roadbed. Vegetative growth within the track ballast reduces drainage. Proper drainage of the ballast section is critical for a stable track structure. Vegetation retains fine particles such as silt or clays and increases organic matter within the ballast, which, in turn, reduces drainage of water and leads to additional growth of vegetation and decreased ballast integrity. When the ballast's ability to support the weight of trains is reduced the result is problems with track support, alignment and profile that are common causes of train derailments.

Vegetation growing in ditches at the ballast shoulder can impede proper drainage and contribute to flooding or washout of the track structure and surrounding areas. Excessive moisture will also contribute to the premature deterioration of rail ties and track hardware, the failure of which may also result in a train derailment.

Safety and Inspection

Railways are forced by modern competitive pressures to operate longer trains with larger equipment and heavier axle loadings. This results in lower tolerances and factor of safety reductions for the various failure modes including train operation, track structure, mechanical condition of equipment and external environmental factors. Proportionately constricted tolerances require increasingly reliable track maintenance and enhanced failure detection. Railway personnel are required to inspect standing and moving trains from trackside to observe defects in wheels, bearings, couplings and air hoses. Track maintenance personnel are required to visually inspect culverts, switches, rails, ties and fasteners. The condition of the track is monitored by sophisticated instruments that rely on line-of-sight infrared scanning. The presence of vegetation impairs the effectiveness of these instruments and the proper functioning of laser-guided track alignment machinery.

Hazards to the Public

The operation of a railway has many potential sources of ignition including sparks from brakes, diesel engines, wheels, overheated bearings and operation of rail-grinding equipment. These sources of ignition combined with dead brush under hot, dry conditions present a potential for fire that may result in a hazard to the public including possible damage to property, buildings and the environment.

The excessive growth of vegetation near road crossings and adjacent to curves reduces the visibility and increases the risk of collision with pedestrians and the motoring public and potential injury to railway employees.

Tall-growing vegetation can also reduce the visibility of railway signs or signals, and interfere with the operation of switches, that are critical for the safe operation of the railway and protecting the public.

Hazards to the Railway Employees

Vegetation poses a hazard to railway employees performing their regular trackside duties. Operation crews are required to climb on and off slowly moving trains and to walk along the track while switching rail cars, assembling trains or checking for problems. Maintenance crews are required to work on and around track, switches and on the ROW. Vegetation contributes to wet, slippery conditions, which may cause employees to trip or slip. Excessive vegetation also obscures dangerous tripping hazards such as uneven ground, holes, materials or tools lying on the ground. Vegetation that is growing close to the track may strike employees riding railway equipment.

Track Maintenance Programs

Excessive vegetation not only interferes with employee’s ability to carry out maintenance duties such as rail and tie changes and access to material storage areas, but also results in the

loss of tools, track hardware and other equipment, which represents tripping hazards to employees.

Damage to Rail Equipment

The presence of vegetation exceeding the height of the rail may cause wet, slippery conditions that affect traction and braking of locomotives and equipment. The result is costly damage to track and locomotive components. Slippery conditions require increased use of traction by the locomotive, which further contaminates the ballast. Excessive vegetation can also increase the potential for collisions between railway equipment and vehicular and/or pedestrian traffic at public road crossings due to the decreased braking ability.

2.5.2 Reasons for Vegetation Management on ROWs

Selective control of vegetation within the ROW is sometimes required to remove brush and trees. The main concerns about having brush and trees growing within the ROW are being able to:

- Maintain visibility (i.e. sight lines) at road and pedestrian crossings;
- Maintain sight line visibility at curves;
- Provide clear visibility of signs and signals;
- Reduce physical hazards to train crews and track maintenance personnel who must work in these areas;
- Reduce the fire hazard potential;
- Reduce vegetation growing at road and/or pedestrian crossings and on the inside of curves, where sight line visibility is limited;
- Remove woody vegetation and brush that is interfering with the normal functioning of equipment used to detect slides;
- Remove vegetation that is impacting railway site security by providing easier access to the ROW over security fencing; and,
- Remove vegetation that is overhanging too close to electrical equipment, creating a potential fire hazard, or creating a safety hazard if it blows down onto the tracks or trains.

Sight Line Requirements

Maintaining visibility at road and pedestrian crossings is necessary to reduce the potential for accidents with vehicles and pedestrians. Under the Federal Railway Safety Act (Transport Canada), there are mandatory sight line regulatory requirements for road and pedestrian crossings. One requirement under this act is the degree of visibility for both vehicles crossing the tracks and for rail-based vehicles. The greater the posted road speed limit and train speed at these crossings, the greater will be the sight line requirements. The sight line distance is to allow road vehicles sufficient time to see approaching rail movements and to allow sufficient time to react safely. SVI is committed to maintaining these sight line requirements through its vegetation management program. These requirements are illustrated in Table 1.

Table 1: Minimum Distances Required for Sight Lines to Crossings*

Maximum Road Speed (km/hour)	Distance (meters)	Maximum Train Speed (km/hour)	Distance (meters)
Stopped	-	Stopped	30
20	15	20	91
30	20	30	136
40	35	40	182
50	50	50	227
60	70	60	273
70	90	70	318
80	120	80	364
90	145	90	409
100	175	100	455

***** Information obtained from Part 3 of the *Railway Safety Act*, and are in accordance with Division 5, Sections 3.5.1 and 3.5.2 of the Railway Safety Code

Herbicide applications for vegetation management will be restricted to applications only on the ballast section (Zones A and B). All vegetation management treatments on the ROW will only be by manual and mechanical methods.

Noxious Weeds and Invasive Plants

The BC *Weed Control Act (BCWCA)* defines a noxious weed as "*a weed designated by regulation to be a noxious weed, and includes the seeds of the noxious weed*". The Invasive Species Council of BC defines invasive plants as "*any invasive alien plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems*." (2014).

Noxious weeds / invasive plants are typically non-native plants that have been introduced to British Columbia without the insect predators and plant pathogens that help keep them in check in their native habitats and because of their aggressive growth are highly destructive,

competitive and difficult to control. The *BCWCA* mandates the control of noxious weeds. As well, a variety of other provincial and federal legislation explicitly or implicitly requires the control of invasive plants.

Regional District Weed Inspectors traditionally have provided guidance to SVI with respect to the identification and control of noxious weeds. Upon notification of the noxious weed problem, SVI will undertake the necessary control action. In addition, noxious weeds growing in the ballast section are treated along with other vegetation during the spray program with herbicides.

Control Methods for Noxious Weeds and Invasive Plants

The bare ground condition that is required within the ballast section will control any noxious weeds that may be present in addition to other unwanted vegetation. Within the remainder of the ROW (excluding Zones A and B), noxious weeds will be controlled by mechanical treatments, plant removal, or spot treatment using appropriate herbicides.

Control Methods for Noxious Weeds and Invasive Plants

In the ballast section, the chemical treatment method for noxious weeds does not differ from the control methods described for other vegetation control. The tolerance thresholds for noxious weeds are variable. Control/eradication of particular species is often based on the direction of the Regional District Weed Inspector.

2.5.3 Reasons for Vegetation Management within Station Grounds and Railway Yards

The elimination of vegetation within station grounds, railway yards, including around shops, buildings and material storage areas is required for the same reasons as described for the ballast section on the main track, lead tracks, spur tracks and team tracks, including around signals, switches and road and pedestrian crossings. For reasons of safety, housekeeping and fire prevention, the areas require bare ground vegetation control. Where bare ground control is not required, it is sufficient to discourage brush. In areas that require eradication of vegetation, initial control is by mechanical methods followed by chemical control. Herbicides for this type of application are chosen on the basis of overall environmental suitability (e.g. soil, climate conditions) and occupational health (e.g. low volatility, odour, toxicity).

In areas where bare ground is not a requirement, the presence of vegetation can be aesthetically pleasing and important to provide erosion control and surface stability. Grassed areas or low shrubs planted around buildings may be controlled by mowing and trimming. A combination of brush cutting and mowing can be used to alter the plants to a desirable form. Disturbed or bare ground is reseeded with grasses or legumes to encourage this succession.

3.0 The SVI IPM Program for Vegetation Management

The six elements in the SVI IPM program for vegetation management are:

- **Planning (prevention)** and managing ecosystems to prevent organisms from becoming pests;
- **Identifying** pest problems and potential pest problems;
- **Monitoring** populations of pests, the damage caused by the pests, and environmental conditions;
- **Using injury (treatment) thresholds** in making treatment decisions;
- **Suppressing pest populations (pest treatment options and method selection)** to acceptable levels using strategies based on consideration of biological, mechanical, and chemical controls in appropriate combinations (i.e., treatment options), in conjunction with environmental and human health protection; and,
- **Evaluating** the effectiveness of pest management strategies.

3.1 Planning (Prevention)

Preventative measures will be undertaken to minimize the initial growth and spread of undesirable vegetation and reduce the need for control of established vegetation. These measures are utilized when feasible and cost effective and may include the following:

- Ballast reconstruction, surfacing and cleaning;
- Tree removal; and,
- Planting disturbed areas with desirable ground cover, or low growing shrubs in the ROW, (Competition/Re-vegetation).

3.1.1 Ballast Reconstruction, Surfacing and Cleaning

Newly placed ballast (reconstruction) is free of fine particles and organic material and does not provide a suitable medium in which weeds can grow. Over time, fine particles move into the ballast from the continual fracturing and powdering of the ballast rock caused by the movement of trains, by wind action, and by migration from the underlying soils (mud pumping). Weeds that spread via runners (e.g. Himalayan blackberries) can also invade the ballast from adjacent areas outside the ballast shoulder. Vegetation that becomes established also incorporates organic matter into the ballast, which improves growing conditions and furthers vegetative growth.

Ballast “surfacing” is a mechanized track maintenance activity for restoring the geometry of the track vertically and horizontally while making the ballast around the ties denser through

tamping. Tamping disturbs the ballast and temporarily disrupts plant growth but is also very hard on railroad ties. Surfacing does not change the characteristics of the ballast medium; its effect is only short term and is not a practical or cost effective method of control.

Good quality ballast can be cleaned to restore its desirable qualities. "Undercutting" is a ballast-cleaning technique that consists of complete ballast removal from the track and shoulder, cleaning of the ballast and replacement in the track bed. Undercutting operations are only possible in open track, not at highway crossings and switch turnouts. Ballast surfacing and cleaning alone is not feasible for vegetation control due to the high costs associated with its operation, but does provide a secondary benefit as the result of maintenance operations.

3.1.2 Tree Removal

Tree removal may be carried out:

- To remove woody vegetation and brush that is interfering with normal functioning of equipment used to detect slides;
- Within the ROW;
- At road and pedestrian crossing;
- In areas where trees pose a danger of falling onto the track; and,
- Where they are restricting sight lines.

Apart from these reasons, trees on the ROW and near crossings serve as sources of seeds that can become established on the ballast or ballast shoulder, thus necessitating control measures to be implemented.

3.1.3 Re-Vegetation (Planting Disturbed Areas)

Desirable vegetative cover along the ROW consists of grasses and low growth plant species. The use of vegetative cover is very beneficial where the vegetation has been disturbed and mineral soil is exposed. However, it is not an effective method of control in situations where vegetation is well established. The establishment of grasses and low growing vegetation in disturbed areas prevents the establishment of noxious weeds, invasive plants and other undesirable vegetation, but may not be effective in wetter coastal areas where the encroachment by woody species is more prevalent.

3.2 Identification of Pests Targeted by the PMP

The accurate identification of unwanted vegetation growing on SVI property is important for several reasons:

- The method of control for unwanted vegetation is dependent on the recognition of the density and the specific types of pest species;

- Depending on their growth rates, characteristics and location, control may not be warranted or desirable. For example, grasses growing on a site where the soil has been disturbed would be desirable;

- Control methods may differ depending on the species of plant. Some plant species may be easily controlled by non-chemical methods, while other species may be controlled through the use of certain types of pesticides (called herbicides); and,

- Certain plant species may be noxious or invasive and must be controlled by law.

There are three categories into which the pests that are targeted by this PMP can be classified:

- Herbaceous broadleaves and grasses;

- Woody vegetation (i.e. trees and shrubs); and,

- Noxious weeds and invasive plants.

3.2.1 Herbaceous Broadleaves and Grasses

Herbaceous broadleaves and grasses are commonly found in the ROW. Providing they are not invasive plants or noxious weeds, many low-lying grasses can be beneficial within these areas, as they may prevent the establishment of noxious weeds, invasive plants and woody vegetation.

Herbaceous broadleaves and grasses are the most frequent types of vegetation growing on track ballast, within station grounds, railway yards, and around shops, buildings, signal and switching infrastructure, and material storage areas. The tolerance for herbaceous broadleaves and grasses growing in these areas is very low, and often results in control measures being implemented.

3.2.2 Woody Vegetation

Control measures must be implemented when woody vegetation invades the ballast or the shoulder of the ballast. Woody trees and shrubs found on the ROW can reduce safety by limiting visibility and access to switches and other equipment. Woody vegetation has the potential to disrupt the functioning of slide detectors or blow down onto the tracks. Woody vegetation that is overhanging too close to power lines within the ROW can present a fire hazard. Woody vegetation also increases the amount of organic debris that is deposited onto the ballast, thereby increasing the potential for increased growth in unwanted vegetation and/or fire.

Woody vegetation within the ROW comes in two forms, evergreen and deciduous. Under this PMP, all woody vegetation on the ROW (excluding Zones A and B) will be managed by non-chemical methods only.

3.2.3 Noxious Weeds and Invasive Plants

Noxious weeds and invasive plants are considered to be unwanted vegetation because certain species can pose a safety hazard to the operation of the railway (e.g. Himalayan blackberry, field horsetail and tansy ragwort), and also because they have the ability to displace and reduce native plant species in the area. In the province of British Columbia the control of noxious weeds is regulated under the BCWCA. Noxious weeds are of primary concern to agriculture where they pose a threat of infestation to farm crops, pasture and range lands. Invasive plants out-compete native plant species reducing biodiversity and wildlife habitat.

SVI attempts to be proactive in the control of noxious weeds and invasive plants along their railway system. SVI conducts regular inspections and initiates control measures within their regular vegetation management program when required to control noxious weeds and invasive plants.

Under this PMP, all noxious weeds and invasive plants on the ROW will be managed by non-chemical methods wherever appropriate. Where mechanical or manual removal of noxious weeds and/or invasive plants is not recommended, spot treatment with herbicides may be conducted.

Table 2 indicates the web sites where information on the identification and management of tree, shrub, problem vegetation, noxious weed and invasive plant species can be accessed.

Table 2: Website for Identification of Tree, Shrub, Problem Vegetation, Noxious Weeds and Invasive Plants

Author	Title	Website*
BC Inter-Ministry Invasive Species Working Group (IMISWG)	Invasive Plants	https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/priority-species/priority-plants
Invasive Species Council of BC (ISC)	Invasive Plants	https://bcinvasives.ca/invasive-species/identify/invasive-plants
ISC and IMISWG	"Field Guide to Noxious and Other Selected Weeds of BC"	www.bcinvasives.ca/documents/Field_Guide_to_Noxious_Weeds_10th_Edition_3.26.19.pdf
BC Ministry of Forests, Lands, and Natural Resource Operations	Tree Identification	www.for.gov.bc.ca/hfd/library/documents/treebook/index.htm

Author	Title	Website*
E-Flora BC	Electronic Atlas of plants of BC	www.eflora.bc.ca
Vancouver Island and Sunshine Coast, Coastal Invasive Species Committee	Invasive plants of Vancouver Island and the Sunshine Coast	www.coastalisc.com

**Website links were active at the time this PMP was prepared, but may change with time. Readers may wish to notify SVI if the above website links are no longer operable.*

3.3 Monitoring Pest Populations

SVI employees have detailed knowledge of the SVI railway that they maintain, and conduct visual monitoring of weed/vegetation populations on a regular basis. At a minimum, track safety inspections are conducted weekly, including inspection of vegetation conditions. More detailed surveys of the railway are also conducted to determine the condition of the track, assess potential hazards at crossings and determine other concerns relating to vegetation management. This will include, but not be limited to, doing a visual assessment of track conditions with respect to weed growth, visually inspecting road and pedestrian crossings to document if the required sightlines are being maintained, assessing vegetation conditions within the ROW to determine if trees and brush are a safety issue, and documenting the locations of noxious weed and invasive plant species/populations. During visual inspections, the types of weeds/vegetation present, their location, and their density will be noted, as appropriate.

Project and safety meetings take place almost daily, where safety hazards associated with vegetation are brought forward by employees. In addition, concerns received from the public are noted and acted upon where required.

An annual control program encompassing both mechanical and chemical methods is generally conceived in the fall based on an assessment of the control activities that have taken place that year and in previous years, and finalized prior to commencement the following year. More formal monitoring of vegetation for the purpose of program planning is normally performed in the spring during peak growing conditions. This includes a hi-rail trip along the entire length of the railway to assess vegetation conditions, particularly in Zones A and B, during which general treatment areas are identified based on the treatment thresholds that will be described in Section 3.4.

More detailed assessments of each proposed treatment area are conducted immediately prior to application, at which time the treatment area boundaries are finalized and no-treatment zones (NTZs) and pesticide-free zones (PFZs) are identified and marked, if required. Qualitative observations of vegetation conditions along the ROW are considered adequate for the purpose of program planning.

In addition to the above monitoring activities, vegetation problems (e.g. weeds causing slipping or tripping hazards) will be included in the monthly occupational health and safety meetings.

Confirmed safety issues will result in control measures being initiated based on the treatment options contained in this PMP.

Treatment priorities are identified by the Manager, Maintenance of Way based on mandated regulatory safety inspections, Track Inspectors Reports, Hazard Correction Reports from operating employees, and Safety Committee meetings.

Resource Users Database

SVI has developed a Resource Users Database to identify environmental, economic and social sensitivities along the railway. Most of the environmentally sensitive areas are known along the east coast of Vancouver Island between Victoria and Courtenay. In developing this database, searches were made of provincial government databases for wells and water licenses. Information on other sensitivities was obtained from various government agencies, community stewardship groups, and corporate inventory work. Field assessments were conducted to ground truth the information in the database and to determine the location of any additional features of concern. Where knowledge gaps existed as to the sensitivity of an environmental attribute, its status was by default assigned as sensitive until more detailed information was obtained. For example, all water bodies were classified as fish-bearing, pending a formal assessment by a qualified environmental professional. SVI reviews and updates the database annually in advance of each annual herbicide application program, and whenever additional users and management concerns are identified, or existing users/concerns change.

Resource features currently identified in the database include:

- Watercourses (perennial streams, shorelines, wetlands, ephemeral streams, wells);
- Registered or identified drinking water wells and intakes within 30 m of the ROW;
- Certified organic farms adjacent to the ROW;
- First Nations land adjacent to the ROW;
- Provincial Park lands adjacent to the ROW;
- Designated Community Watersheds / community water supplies; and,
- Regional District boundaries.

The information contained in the database will be further discussed in Section 4.0 (Environmental Protection Strategies and Procedures for Vegetation Management).

3.4 Injury/Treatment Thresholds and Decision Making

3.4.1 Injury/Treatment Thresholds

The injury or treatment threshold is the point at which the abundance of pests and the damage they are causing, or likely to cause, indicate that control is necessary or desirable. A treatment decision regarding undesirable vegetation is required when these thresholds are exceeded.

In this PMP, the Treatment Threshold is generally the level of vegetative surface cover or height, typically expressed as the percentage of the total area that can be tolerated, and still maintain the integrity of, or safety at, the site. Treatment thresholds will vary, however, since vegetation control is more critical for certain areas than for some others. Treatment thresholds can be specific and include all species of vegetation in an area, or they can be specific to one species.

Density of Weed Establishment

In sites where the tolerance for vegetation/weeds is low, such as on track ballast, road and pedestrian crossings and certain areas within rail yards, the density of all weed species and dead organic matter on the site determines the treatment threshold.

Specific Problem Weed/Vegetation Species

There are situations where the density of weed/vegetation establishment cannot be used as criteria in determining when to initiate vegetation management action. The following situations, based on specific problem species, are examples of situations that may trigger a vegetation management action:

- The presence of a noxious weed or invasive plant species;
- The height of the brush/trees within the ROW;
- The presence of danger trees;
- Vegetation that is compromising sight line requirements, site security or safety; and,
- Vegetation that is interfering with access to rail equipment.

Table 3 summarizes the Treatment Thresholds used in this PMP that may trigger a treatment decision:

Table 3: Injury/Treatment Thresholds that May Trigger a Treatment Decision

Zone	Location	Treatment Threshold	Control Action(s)
Ballast	main track	Zone A - 3% weed cover Zone B – 5% weed cover	chemical and ballast cleaning
	siding	10% weed cover	chemical
	lead, spur and team tracks	10% weed cover	chemical
	shop and yard tracks	5% weed cover	chemical
Remainder of Right-of-Way	general	brush cover, trees > 80% of distance to track	mechanical (cut)
	signalized and non-signalized highway crossing	sight line formula *	mechanical (blade, cut)
	access crossing	sight line formula *	mechanical (blade, cut)
	pedestrian crossing	7 seconds clear sight at train speed*	mechanical (blade, cut)
	curvature	line of sight > 100 meters	mechanical (blade, cut)
	"danger" tree	tree height >80% of distance to track	mechanical
Station Grounds, Facilities, Railway Yards	shop, building and work area	20% weed cover OR height (10% of weeds are > 0.5 m in height)	mechanical & chemical
Track Power, Communication and Signal Installations	buildings, signal bungalows, communication/electrical infrastructure	1% weed cover	mechanical & chemical
All Locations	noxious weeds and invasive plants	eradication as determined by Regional District's weed inspector	chemical in Zones A and B, and within station grounds, railway yards and around facilities, and mechanical & limited chemical on right-of-way**
	Himalayan blackberries	within 1 meter of track, signals or switch stands	mechanical (cut) & chemical

* Sight line formula in accordance with Division 5, Sections 3.5.1 and 3.5.2 of the Railway Safety Code and Transport Canada RTD 10 Guidelines.

** Where mechanical or manual removal of noxious weeds and/or invasive plants is not recommended, spot treatment with herbicides may be conducted.

3.4.2 Decision Process

Unless circumstances or safety concerns arise necessitating immediate action a decision to control vegetation will depend on whether the infestation exceeds the treatment threshold for the location. An influential factor in the decision process is the extent that the tolerance threshold has been exceeded. The exceeded threshold may involve a small area that in comparison to other locations would not merit mobilizing control or treatment equipment at the current time but would require further monitoring and assessment.

Locations where vegetation control was not considered a priority may require immediate attention upon receipt of hazard correction reports from employees, concerns expressed at safety committee meetings or complaints received from the public. Whether or not to treat a track is never an issue. The needs for control are priority based and may never be satisfied

3.5 Treatment Options and Selection Criteria

Once a decision has been made that treatment is required for an area, the selection of method(s) used will depend on the following criteria:

- Characteristics of the site, including the proximity of water bodies, water sources and environmentally sensitive features;
- Timing of the treatment;
- Percentage, species and composition of weeds/vegetation;
- The possibility of adverse impacts to wildlife, fish, surrounding land, workers and bystanders;
- Existing soil types, weed species present, reasons for control, and how they relate to the suitability of the particular method(s) being considered;
- Potential impact of the weeds/vegetation on safety and site security; and,
- Consequences of not treating.

As was discussed in Section 0, prior to vegetation management being implemented, general site conditions and environmental sensitivities will be confirmed and documented by persons familiar with the treatment areas. These detailed site assessments also re-confirm the type and location of environmentally sensitive features such as proximity to water bodies and water sources, as well as the weed species present, and their distribution by percentage weed cover. Under this PMP, the IPM techniques proposed for use may include manual and mechanical methods (non-chemical), cultural control methods (non-chemical), and herbicide applications (chemical). These are summarized in Table 4.

Table 4: Vegetation Management Options, Methods and Techniques for Vegetation Management

Manual & Mechanical (Non-Chemical)	Cultural (Non-Chemical)	Herbicide Applications (Chemical)
Hand Pulling Manual Trimming Mechanical Mowing and Brush Cutting Ballast Surfacing and Tamping	Stripping and Re-Vegetation	Foliar Applications Soil Applications Wick/Wipe-on Cut Surface Basal Bark

Herbicide identification, use areas, properties and use patterns, application methods and techniques (including rationale/selection criteria, benefits and limitations for each herbicide), and equipment for all herbicides proposed for use under this PMP will be discussed in Section 3.5.3.

3.5.1 Manual and Mechanical Methods

Manual and mechanical methods are the primary and preferred approach to vegetation control in this PMP, whenever possible. These methods include hand pulling, manual trimming, mechanical mowing and brush cutting, ballast cleaning and ballast re-surfacing. The rationale for these control options, including their advantages and disadvantages, are described in more detail in Table 5.

Table 5: Description and Rationale, Benefits and Limitations of Manual and Mechanical Control Methods

Description & Rationale	Benefits and Limitations
Hand Pulling is a viable manual control methods for certain established weeds that can be easily uprooted, such as young tree seedlings, clumps of grass, and small patches of noxious weeds and invasive plants where the roots can be fully removed. Hand pulling may be used around signs, switches, shops and buildings, or where chemical controls (herbicides) cannot be used.	The benefits of this method are that it produces immediate results and can be conducted throughout the growing season. It is effective if the number of weeds to be pulled is small and the site is a manageable size. In areas where there has been little vegetation management undertaken for an extended period of time, hand pulling can be effective in reducing a large volume of vegetation to a manageable level. The limitations (disadvantages) are that this method is costly because it is slow and labour intensive. In addition, vegetative debris must be removed from the site and the re-growth of undesirable vegetation within the disturbed areas often occurs.
Manual trimming of unwanted vegetation is used in areas such as in environmentally sensitive sites, along fence lines, around switches, signs and equipment, and in areas around shops, buildings, bridges and station grounds. Trimming is also an important treatment in the outer zones of the ROW where line-of -sight must be maintained but vegetation growth is desirable for ground stability. When done early in the season, it helps remove seed heads. For small areas in close proximity to environmentally sensitive areas where herbicides cannot be used, it may be an effective non-chemical option	The advantages of manual trimming are that it allows vegetation to be cut to the ground level. Manual trimming allows individual plants to be targeted while releasing desirable plants to become established and therefore plays an important role when species transition is the objective. Trimming achieves immediate results and can be done at any period throughout the year. The limitations (disadvantages) of this method are that repeat treatments may be required, and trimming of brush often leads to suckering and an increasing level of maintenance. The high costs of manual trimming can be prohibitive, it does not remove roots, is only of limited effectiveness against weed species that reproduce from stem pieces, and can be labour intensive and costly.

Description & Rationale	Benefits and Limitations
Mechanical Mowing and Brush Cutting are effective for the removal of brush and small trees from the ROW for the maintenance of sight line requirements. Mowers and brush cutters are generally mounted on hi- rail vehicles that travel on the tracks. They effectively cut most vegetation to a height of 15 cm, and a width of up to 7 meters.	The advantages of mechanical mowing and brush cutters are that they quickly remove vegetation, may reduce seed sources for ballast infestation, and leave treatment areas aesthetically pleasing. The limitations (disadvantages) of these methods are that they are slow, they remove all vegetation (including desirable plant species), and they encourage plant re-growth or suckering of species such as willow, alder, maple, cottonwood and Himalayan blackberry. These techniques also increase maintenance requirements, can create a safety hazard for both workers and animals by leaving sharp, exposed cut stems, and can increase the fire hazard if the plant debris is not removed. Mechanical methods may also increase the spread of some noxious weeds and/or invasive species, and therefore is not a recommended control method for certain species.
Ballast Surfacing and Tamping are activities carried out to increase the strength of the ballast and improve drainage. Surfacing and tamping of the track disturbs the ballast and temporarily disturbs plant growth. This is followed by placing a small amount of clean ballast directly under and along the ties.	The advantages of ballast surfacing and tamping are that it will break up root systems and improve the lateral drainage of water. The limitations (disadvantages) are that it does not change the characteristics of the ballast medium, and the effects on vegetation control are only temporary and do nothing to address long term vegetation control.

3.5.2 Cultural Control Methods (Stripping and Re-Vegetation)

Stripping and re-vegetation can be an effective and inexpensive cultural vegetation control method. Heavy equipment is commonly used to strip vegetation and re-establish sightlines at road crossings. The rationale for this control option, including their advantages and disadvantages, are described in more detail in Table 6.

Table 6: Description of, Rationale and Selection Criteria for, and Benefits and Limitations of Stripping and Re-Vegetation (Cultural Control)

Description & Rationale/Selection Criteria	Benefits/Limitations
Stripping and Re-Vegetation involves the use of heavy equipment to strip vegetation and re-establish sightlines at road crossings, followed by the immediate establishment of a preferred vegetative cover such as grass or legumes.	The **advantages** of stripping and re-vegetation are that the immediate establishment of preferred vegetation cover can assist in preventing the encroachment of unwanted vegetation. Where invasion of unwanted vegetation does occur, the infestation is rarely as extensive as it would be where mineral soil is left exposed. Grass/legume mixtures are generally used along the railway ROW. Some legumes, such as clover have a low growth form, are excellent ground covers and remain green throughout the growing season thereby minimizing fire hazard. The **limitation** (disadvantage) of stripping and re-vegetation are that it requires continued maintenance (i.e. mowing).

3.5.3 Chemical Control (Herbicides)

3.5.3.1 The Need for Herbicide Use

Although a main objective of this PMP is to minimize the use of herbicides for weed management where viable alternatives exist, herbicides are an important tool in the SVI vegetation management program. This is especially true in areas where non-chemical methods cannot be employed or are not effective, or in areas such as track ballast where there are no effective non-chemical methods with the exception of ballast surfacing and tamping.

3.5.3.2 Herbicide Identification

The herbicides active ingredients proposed for use within this PMP are shown in Table 7.

Table 7: Location of Use, Target Vegetation, and Herbicide Active Ingredients Proposed for Use

Location	Target Vegetation	Herbicide Active Ingredient *
Ballast Section (Zones A and B) **(Including Track Power, Switches, Communication and Signal Installations)**	All Vegetation	glyphosate
Right-of-Way	Brush Trees Broadleaf Weeds	**None**
	Noxious Weeds Invasive Plants	aminopyralid** glyphosate**
Within station grounds, railway yards, including around shops, buildings and material storage areas	All Vegetation	aminopyralid chlorsulfuron dicamba diflufenzopyr diuron flumioxazin glyphosate imazapyr indaziflam metsulfuron-methyl triclopyr

** 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. The above list includes all possible active ingredients that may be used within the term of the PMP. Many of the above-listed active ingredients are sold by several chemical manufacturers under a variety of Trade Names. It is not practical to list all of the potential Trade Names for the active ingredients that may be used under this PMP in this document. SVI 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 PCPA.*

*** Where mechanical or manual removal of noxious weeds and/or invasive plants is not recommended, spot treatment with herbicides may be conducted.*

3.5.3.3 Properties of Herbicide Active Ingredients

The properties of herbicide active ingredients proposed for use are shown in Table 8.

Table 8: Properties of Herbicide Active Ingredients Proposed for Use

Active Ingredient	Residual Activity*	Mode of Action	Selectivity **	Where and When Applied ***
aminopyralid	moderate	translocation	non-selective	foliage; post-emergent
chlorsulfuron	moderate	contact	selective	foliage; soil, post-emergent
dicamba	low	translocation	selective	foliage; post-emergent
diflufenzopyr	low	translocation	non-selective	foliage; post-emergent
diuron	moderate	translocation	non-selective	soil; pre-emergent
flumioxazin	moderate	contact	non-selective	soil; pre-emergent
glyphosate	low	translocation	non-selective	foliage; post-emergent
imazapyr	moderate	translocation	non-selective	foliage & soil; pre and post-emergent
indaziflam	moderate	translocation	non-selective	soil; pre-emergent
metsulfuron-methyl	moderate	translocation	non-selective	foliage; post-emergent
triclopyr	low	translocation	selective	foliage & cut surface; post-emergent
Hasten	low			adjuvant
Siloxylated polyether	low			silicone surfactant (adjuvant)

* *LOW generally refers to residual soil activity of up to 40 days, MODERATE for residual soil activity of up to one year and HIGH for residual soil activity of greater than one year.*

** *Herbicides that control all vegetation are termed non-selective, while those that control certain types of vegetation (e.g., only grasses or only broadleaf) are termed selective.*

*** *Post emergent refers to treatments made after the vegetation has emerged through soil surfaces and pre-emergent refers to treatments before the vegetation has emerged through the soil surface*

3.5.3.4 Use Patterns of Herbicide Active Ingredients

Table 9 summarizes the use patterns of the herbicides being proposed for use within this PMP:

Table 9: Use Patterns of Herbicide Active Ingredients Proposed for Use

Active Ingredient	Use Pattern
aminopyralid	Is a selective, residual herbicide, giving season-long control when used at label application rates. It is useful for spot treatment control or suppression of many noxious weed and invasive plant species (e.g. biennial and perennial thistles, knapweeds, yellow starthistle, scentless chamomile and common tansy), woody plants, annual and perennial broadleaf weeds. It is effective only on actively growing plants. It is absorbed through leaves and roots, and translocates throughout the plant. It interrupts cell division and causes the plants to die. It is safe to desirable grasses, and its' systemic and residual properties effectively controls invasive plants at multiple growth stages.
chlorsulfuron	Is useful for the control of hard to manage annual and perennial broadleaf vegetation by both foliar and root uptake. It may be used to spot treat field horsetail, as well as other established species not controlled by other herbicides within station grounds and railway yards. It is effective at very low application rates. It should not be applied near trees or other desirable plants, in areas where their roots may extend, or in locations where it may be moved or washed into contact with the roots. It will not be applied during extremely rainy periods, when soils have been heavily saturated, onto ground which slopes to desirable plants.
dicamba	Is used for the spot treatment of young, actively growing broadleaf vegetation and brush species, including many species of noxious weeds and invasive plants (e.g. Canada thistle, perennial sow thistle, leafy spurge, common tansy, field bindweed, curled dock, diffuse knapweed, sheep sorrel and velvetleaf). It will control many broadleaf herbaceous species that cannot be effectively treated using physical controls or glyphosate applications. It can be safely mixed with other herbicides to broaden the number of target species controlled. Because it is a selective herbicide, it is useful in areas where grasses are to be retained on the site. It has been shown to control invasive plants such as Canada thistle, perennial sow thistle, leafy spurge, common tansy, field bindweed, curled dock, diffuse knapweed, sheep sorrel and velvetleaf.
diflufenzopyr	Is the first active ingredient from a chemical class called semicarbazones. It is low toxicity to humans, birds, aquatic organisms, mammals and bees. It has low residual properties. It causes hormones in plants to become concentrated in the growth regions. When applied with dicamba (Overdrive), it focuses dicamba's translocation to the high growth regions, where it delivers effective weed control at reduced dicamba rates and across a wider range of weed species. It is applied post-emergent to the foliage of target plants.

SVI PMP

Active Ingredient	Use Pattern
diuron	Is used to control many annual and perennial grasses and herbaceous vegetation. When applied to the soil in station grounds and railway yards, it is useful in preventing the germination and growth of seedling vegetation. As it requires moisture (minimum 12 mm) to move it into the root zone, application timing is important in drier areas. As a result of the moisture requirement for activation, the effects on vegetation are slow to appear and will not become apparent until the diuron has been absorbed into the plant and leaves. At the highest label rates, it is a residual, non-selective herbicide. At lower label rates, it is a selective, pre-emergent herbicide for the control of seedling broadleaf vegetation and grasses. It is a soil applied residual herbicide that requires moisture to move it into the root zones of the target vegetation. The best control with this herbicide is when it is applied to the soil shortly before the vegetation begins to grow.
flumioxazin	Is used for non-selective, residual, pre-emergence control of selected grasses and broadleaf weeds on bare ground, non-crop land such as in station grounds and railway yards. It is most effective when applied to clean, weed-free soil surfaces. The length of residual control will decrease as temperature and precipitation increases, and on soils of high organic matter and/or clay content.
glyphosate	Is a non-residual herbicide used to control a very large number of species of noxious weeds and invasive plants. It is only effective for treating plants that have germinated, emerged above the soil, and are actively growing at the time of spraying. It is most useful in areas where low soil residual is required because of the close proximity of wells, water bodies and other environmentally sensitive features. It is deactivated quickly in the soil, where it moves very little from the point of application. Glyphosate is used to control a very large number of herbaceous broadleaf and grass species and woody vegetation. It can be applied to cut vegetation or young seedlings which emerge following trimming or hand pulling to further reduce site organic matter, or where physical control methods are not effectively controlling vegetation. Glyphosate can also be used for selectively treating deciduous tree species, particularly against those species that re-sprout following cutting. **Under this PMP, it is the only herbicide active ingredient that will be applied to the ballast section (Zones A and B).**
imazapyr	Imazapyr is used to control broadleaf vegetation, annual and perennial grass species and woody vegetation (especially maple). It works by preventing germination of seeds. It 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.

Active Ingredient	Use Pattern
indaziflam	Is a pre-emergent, residual herbicide for the control of annual grasses and broadleaf weeds in Station grounds and railway yards.. Indaziflam controls weeds by reducing the emergence of seedlings through inhibition of cellulose biosynthesis (CB Inhibitor). Necrosis or yellowing may also be observed if the herbicide is applied to herbaceous tissue such as leaves and green stems of susceptible plants. If applied alone, it will not control weeds that are already emerged. If weeds have emerged, a foliar active post-emergent herbicide must be added. Treatments are most effective in controlling weeds when adequate moisture is present and the application is followed by rain prior to weed seed germination. Weed seeds and seedlings must come into contact with this herbicide prior to emergence to be controlled. If sufficient moisture is present, some weeds may germinate and emerge from below the treated layer. Excessive plant debris present on the soil surface at time of application may prevent uniform product distribution reaching the soil and reduce weed control. Performance may be improved by removing excessive debris prior to product application.
metsulfuron-methyl	Is a translocated, non-selective herbicide of moderate persistence used for noxious weed and invasive plant control in non-crop areas such as station grounds and railway yards. It is applied as a foliar spray. It rapidly inhibits the growth of susceptible plants, but typical symptoms (discolouration) may not be noticeable for several weeks after application, depending on growing conditions and plant susceptibility. Warm, moist conditions following application promote its activity while dry, cold conditions may reduce or delay activity. Invasive plants hardened off by cold weather or drought stress may not be controlled. Degree of control and duration of effect are dependent on the application rate used, sensitivity and size of the target species, as well as soil moisture and soil temperature. Noxious weeds and invasive plants controlled include common tansy, kochia, scentless chamomile, Canada thistle and sow thistle.
triclopyr	Is effective in controlling established perennial vegetation and brush species. Triclopyr may also be used to selectively control trees that are encroaching on perimeter fences or alongside access roads within station grounds and railway yards. On trees, it is applied as a basal bark treatment. It is particularly effective in controlling trees that commonly re-sprout following cutting. Triclopyr is absorbed by both leaves and roots and readily moves throughout the plant. For control of birch and aspen, it is more effective than glyphosate.
Hasten	Adjuvant*
Siloxylated polyether	Surfactant*

* *See Section for details.*

3.5.3.5 Use of Surfactants 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 are chemicals or agents that are sometimes added to surfactants may also be used to adjust the pH of the herbicide spray mix. Spray mixes that are highly or 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).

3.5.3.6 Herbicide Application Equipment

The equipment proposed for use in applying herbicides includes:

Backpack and Hand Held Sprayers

A backpack is a portable, manually operated, pressurized container with a positive shut-off system and a nozzle for applying herbicides. It operates under low pressure, thus minimizing the possibility of drift. It is particularly useful for spraying small areas, individual trees, shrubs or plants, noxious weeds and invasive plants. Within this PMP, backpack sprayers may be used for the foliar or soil application of all the active ingredients for vegetation management.

Handgun (Power Hose and Nozzle)

A handgun (power hose and nozzle) is a hand-held spray gun and hose attached to a portable tank filled with herbicide solution, usually with a power driven pump to provide pressure to the herbicide solution in the hose. Handguns are generally used where large areas of vegetation have to be controlled, but may also be used for the control of individual trees, shrubs or plants, noxious weeds and invasive plants. Within this PMP, handguns may be used for the foliar or soil application of all the active ingredients for vegetation management, and for the control of noxious weeds and invasive plant.

Boom Sprayer (mounted on a hi-rail vehicle)

These sprayers are designed to distribute pesticide solutions evenly over large areas at low to moderate application rates. They are mounted on a hi-rail vehicle with a power-driven pump, and are used only for the application of herbicides to track and ballast areas. They may be used for the foliar application of the active ingredient glyphosate to the ballast section on the main line, and for the foliar or soil application of all active ingredients on tracks within station grounds and railway yards.

Wick/Wipe-On Applicator

Wick/wipe-on applications may be used to selectively apply herbicides containing the active ingredients glyphosate or triclopyr by wiping it directly onto plants.

Only small amounts of herbicides are applied, so the need for pumps, control devices and spray tanks is eliminated. Wick/wipe on applications are ideal for invasive plant control in areas where no spray drift can be tolerated, or used to apply the pesticide active ingredients glyphosate and triclopyr herbicides onto foliage, basal bark areas, or freshly cut stems or stumps of deciduous stumps or stems to inhibit re-sprouting.

Squirt Bottle

A hand-held, non-pressurized container, used to apply the herbicide active ingredients glyphosate and triclopyr onto foliage, basal bark areas, or freshly cut stems or stumps of deciduous stumps or stems to inhibit re-sprouting.

3.5.3.7 Herbicide Application Methods/Techniques

The herbicide application methods/techniques proposed for use under this PMP include foliar, wick/wipe-on, soil, basal bark and cut surface applications. A description, rationale for use, and the benefits and limitations of each of these application methods/techniques, is shown in Table 10.

Table 10: Description and Rationale, Benefits and Limitation of Herbicide Application Methods/Techniques

Description & Rationale	Benefits/Limitations
Foliar applications involve use of a manually operated pressurized backpack sprayer, handgun, or boom sprayer and can be used to apply all of the active ingredients to ballast, station grounds, railway yards, facilities, and track areas. This method/technique is most effective when the target vegetation is actively growing.	The **advantages** of foliar applications are that they can be carried out at any time of the year, provided the target plants are actively growing. The **limitations** (disadvantages) of foliar applications are that they are susceptible to drift, and caution must be exercised around desirable plants and environmentally sensitive areas. If a non-selective herbicide is being applied, they may control both the target vegetation and desirable plants that are growing among them if they are non-selective.
Soil applications will be used for manually operated pressurized backpack sprayer, handgun, or boom sprayer and can be used to apply all of the active ingredients to ballast, station grounds, railway yards, facilities, and track areas.	The **advantages** of soil applications are that they will give season long control of all vegetation when applied at label rates. The **limitations** (disadvantages) of soil applications are that care must be taken when applying these herbicides in close proximity to environmentally sensitive areas, and to avoid application conditions that will increase herbicide drift.

Description & Rationale	Benefits/Limitations
Wick/Wipe-on applications involve the use of a wick soaked with the active ingredients glyphosate, dicamba or triclopyr that is wiped or dragged over the foliage of the target vegetation. The wick applicators are available in various materials and in many sizes. This technique will generally be used where cut stumps have re-sprouted, or for treating small patches of vegetation, invasive plants or noxious weeds in areas where no drift can be tolerated.	The **advantages** of wick/wipe-on applications are that they virtually eliminate drift, and are useful for the safe and effective treatment of individual plans or stems located in areas of desirable vegetation. The **limitations** (disadvantages) of this technique are that it is labour intensive, and is only practical to use for small treatment areas or for a small number of individual plants.
Cut Surface applications will be used in conjunction with manual treatments for controlling deciduous vegetation. With this method/technique, the problem vegetation is cut as low to the ground as possible and herbicide is applied to the cut surface of the stump to limit re-sprouting. The active ingredients glyphosate, dicamba and triclopyr may be applied using this method/technique.	The **advantages** of cut surface applications is that it is preferable in highly visible areas or in areas where standing dead trees do not meet treatment objectives. Because herbicide application is restricted to the cut surface of freshly cut stumps, there is generally no herbicide drift, resulting in minimal impact to fish, wildlife, and bodies of water, water sources, and food intended for human consumption. Cut surface applications pose little risk of herbicide exposure to workers or the general public. The **limitation** (disadvantage) of this technique is that If treatment is not undertaken immediately following physical control, this technique may not be successful.
Basal bark is technique involves applying the active ingredients dicamba, glyphosate and triclopyr to the bark of deciduous trees from the root collar to a point above the ground, where it The penetrates into the cambium layer and diffuses throughout the tree. It also travels to the roots and prevents re-sprouting. Trees may take 3 years to be killed with basal bark applications.	The **advantages** of basal bark applications are that because they are restricted to the basal areas of the bark, there is generally no herbicide drift, resulting in no impact to adjacent environmentally sensitive areas. They pose little risk of herbicide exposure to workers or the general public. The selective control of the tall-growing deciduous trees generally results in the growth of low growing forage plants for wildlife. The **limitation** (disadvantages) is that this method/technique is not effective in wet weather.

3.6 Vegetation Management Prescriptions

This section describes the vegetation management prescriptions for the ballast section (Zones A and B), for the ROW, and for railway yards and within station grounds.

The choice of vegetation management prescriptions is guided, to a large degree, by the Resource Users Database. As was described in Section 0, this is an actively maintained database that catalogues key environmental, economic and social resource features, collectively termed 'resource users', by track mileage. Track mileage is established accurately by the longitudinal rail system survey and is the operational standard for site location along the railway. Precise track

locations are metered by the maintenance fleet using an onboard RAC-100 track meter accurate to 0.19 m per km (1 foot per mile). The meter can be recalibrated at most major track crossings to ensure accuracy. A key function of the Resource Users Database is to identify the precise locations of features along the railway where no-treatment zones (NTZs) or pesticide-free zones (PFZs) apply.

3.6.1 Zone A (Inner Ballast, Tie Section)

Ballast is the layer of crushed rock which supports and restrains the track and ties. Ballast is designed to provide free drainage of water, provide structural support for vertical loads and keep the ties and rail from moving transversely and longitudinally as a result of dynamic train forces and compressive or expansive forces occurring during rail temperature changes.

Ballast is the single most critical area of railway operations requiring vegetation control. Vegetation of any kind in the ballast section can lead to problems which are incompatible with a stable track structure. Vegetation within Zone A has the potential to short the electronic signal that activates traffic controls at public road crossings. Track turnouts and switching gear are located within Zone A.

Foot traffic associated with train operations, track maintenance and track inspection occurs within this zone. The ballast section is also most prone to fire as a result of the close proximity to sources of combustion which may ignite ties and dry weeds growing on the track.

Despite attempts to develop alternatives, herbicides have proven to be the only effective method for controlling vegetation growth within the Zone A. In areas where Zone A is not adjacent to watercourses, vegetation in the ballast will be controlled only by the application of the non-selective, non-residual herbicide active ingredient glyphosate.

Specific environmentally sensitive areas where glyphosate cannot be applied for vegetation management in Zone A are listed in Table 12 and Table 13.

Where bridges or trestles exist, no glyphosate applications will be made where ballast and growing medium is absent. Mowing and manual hand weeding will become the alternative treatments where glyphosate applications are excluded.

In all areas of the main track, the width of the ROW provides a sufficient buffer to adjacent properties from herbicide treatment occurring in Zone A. As shown in Tables 12 and 13, the presence of watercourses flowing perpendicular to the ROW, the close proximity of track-side ditches discharging to watercourses, or the parallel alignment of adjacent streams will require the appropriate PFZs or NTZs to be established for applications of glyphosate.

3.6.2 Zone B (Outer Ballast and Signal and Switch Stands)

In Zone B, vegetation control remains imperative for track stability, fire control and worker safety. Zones A and B will generally be treated together with the herbicide active ingredient glyphosate. However, in some areas Zone B will have additional restrictions due to its closer proximity to environmentally sensitive areas, for example at stream crossings and wetted ditch sites where the NTZ may limit herbicide application to Zone A. Further details are presented in Table 12.

Although signal and switch stands are sometimes located at, or immediately outside the outer edge of Zone B, they have been included within Zone B for treatment requirements as vegetation control in these areas is imperative for worker safety and fire hazard control. At these sites, vegetation control around signal and switch stands may be undertaken by both mechanical mowing and by the selective application of the herbicide active ingredient glyphosate.

3.6.3 Inner ROW (Sub-Grade and Ballast Edges)

On the SVI main track, much of the vegetation to be managed is located within the inner ROW. Drainage ditches or swales are usually located on one or both sides of the track within this zone. The width of this zone is in fact determined by the maximum reach of the high-rail mounted brush cutter. The inner ROW may also contain some of the signs, signals and portions of switches. Selective control of vegetation is necessary in this zone in order to reduce vegetation height and volume. The elimination of brush and trees in favor of grasses and other ground cover is often an ideal objective. The chief concerns for vegetation control within this zone are:

- Maintaining sight line visibility at all vehicle and pedestrian crossings;
- Maintaining sight line visibility along curves;
- Providing clear visibility to signs and signals;
- Reducing physical hazards to railway crews and track maintenance personnel who must work in these areas;
- Minimizing fire hazards; and,
- Reducing escape barriers to wildlife.

Although mechanical methods will be the dominant vegetation control within the inner ROW, the application of the herbicide active ingredient glyphosate may be made to selectively control vegetation around signals and switch stands. Although over the short term, many of the vegetation control objectives in the inner ROW can be achieved by regular mechanical cutting, frequent re-cutting encourages a growth pattern which leads to a need for

more frequent cutting due to the proliferation of shoots from many species such as willow (*Salix spp*.), maple (*Acer spp*.), alder (*Alnus spp*.) and cottonwood (*Populus spp*.). In addition, the process of cutting results in jagged shoots at a height ideal for tripping and wounding persons or animals walking through the stubble. This condition continues to get worse with each cutting. Cutting also does not discriminate between desirable and undesirable plant species, and the effectiveness of cutting is limited at some sites by irregular terrain.

Within inner ROW areas that are adjacent to watercourses, manual or brush cutting of select vegetation may take place to maintain sight lines. This will minimize disturbance to riparian vegetation so that it will retain its function, providing bank stability, shade, habitat, and intercepting runoff. Vegetation height tolerances will be as high as possible to preserve riparian vegetation. In many instances riparian function may be best preserved while maintaining railway needs by the culture of compatible species. Conifer trees such as Western red cedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*) and Douglas fir (*Pseudotsuga menziesii*) along with short stature bushes such as salmonberry (*Rubus spectabilis*) and thimbleberry (*R. parviflorus*) tolerate repeated topping while retaining healthy roots and lower branches. Deciduous trees such as red alder, broad leaf maple and willow are not desirable due to their rapid vertical growth. The planting and culture of preferred species is a long term objective. This will involve the suppression or eradication of competing vegetation.

3.6.4 Outer ROW

The outer ROW consists of the portion of the ROW beyond the reach of the brush cutter, extending to the edge of the property. Usually, there is little infrastructure located in the outer ROW, although overhead services such as power and telephone lines and underground services such as communications cables and sewer may be found in this zone.

For the typical 100 ft (30.5 m) ROW on the SVI main line, the outer ROW is approximately 18 ft (5.5 m) wide. The degree of vegetation removal that may be required within the outer ROW is considered too costly, except at road crossings (where safety and legal issues require it), as well as on the inside of tight curves where visibility is limited. In these critical locations removal of tall brush and trees to the full width of the ROW will be achieved by mechanical cutting, girdling, manual cutting, blading with earth machinery.

3.6.5 Railway Yards and Within Station Grounds

Elimination of vegetation is required on railway yard tracks for the same reasons as described earlier for main line track. Bare ground is desirable around buildings and storage areas, as well as other service areas, for safety, cleanliness and fire prevention. In other areas of yards, bare ground is not necessary and it is adequate to simply control vegetation for aesthetics and to minimize fire hazards.

Control in areas requiring eradication of all vegetation may be provided first by mechanical methods (track-mounted mowers and brush cutters, brush saws, weed trimmers and manual digging) in overgrown areas, followed by the application of non-selective, residual herbicides. Herbicide active ingredients are chosen on the basis of overall suitability for soil and climate conditions, minimal human toxicity and limited potential for off-site movement. These products are usually low volatility/low odor products that will not be offensive to the work force or public. Where possible, treatment of yards near buildings and other working areas will be conducted during annual shutdowns or after-hours to reduce potential concerns.

Where bare ground is not required, the presence of vegetation provides aesthetic benefits, erosion control, ground stabilization and some biodiversity value. Grassed areas around buildings may be controlled by mowing. Manual cutting of brush using brush saws or weed trimmers is the method of choice where practical. Where problem species exist such as Scotch broom or other species of noxious weeds or invasive plants, a combination of brush cutting, mowing or pulling, and application of a selective herbicides will be used so that the woody plant communities are shifted towards grass communities. Vegetation removal and re-seeding bare ground with grasses and legumes will promote this succession. Diligent vegetation control should ultimately reduce the need for herbicides as the desirable species gradually crowd out and displace woody varieties.

3.6.6 Highway, Access and Pedestrian Crossings

Mandated requirements for sightlines at highway, access and pedestrian crossings are identified by provincial and federal regulations. To meet these regulations, cut slopes are graded back and vegetation is controlled primarily by mechanical methods. Crossing sightlines are particularly well suited to species transition, replacing tall growing brush and trees with lower growing bush and grasses. Longer-term control at crossings may require the use of herbicides in Zones A and B to suppress brush and woody stubble that can become established after repeated mowing. All herbicide applications will be by backpack and hand held sprayers, hand gun (power hose and nozzle) or by boom sprayers.

3.7 Post Treatment Monitoring

Treatment areas are continually monitored following chemical application to ensure the desired results were obtained and to record any unexpected results. Inspections are conducted on a routine and on-going basis in tandem with other prescribed regulatory safety inspections intervals (e.g. applicable safety regulations require most tracks to be inspected at least once/week).

The use of the non-selective herbicide active ingredient glyphosate for ballast treatment usually produces a sharp interface between treated and untreated areas and can often provide visual evidence regarding the precision of its application. With the procedures, application equipment and herbicides proposed for potential use under this PMP, significant off-target movement (via leaching or drift) is not anticipated. Nevertheless, on-going post-treatment monitoring will identify any off-target movement of the herbicides (e.g. irregular treatment pattern results). The

environmental consequence of off-target herbicide movement is limited given the low acute toxicity of the herbicides proposed for use in this PMP as well as the PFZs, NTZs and buffer zones that will be applied when conducting treatments in the vicinity of sensitive areas. These will be further described in Table 12 and Table 13 and in Sections 4.2 and 4.4.

In summary, post-treatment monitoring will document:

- Compliance with the commitments made in the PMP, and the requirements of the IPMR;
- The method(s) of vegetation control;
- Dates and locations of treatment;
- Whether applied rates of herbicides used were adequate;
- Whether application rates can be reduced;
- If resistance to the herbicides used was observed in the unwanted vegetation;
- Evidence of herbicide movement off of the treatment site;
- The amount and rate of re-growth in the unwanted vegetation;
- The effectiveness of the treatment; and,
- Whether the PFZs and NTZs were maintained and were adequate.

4.0 Environmental Protection Strategies and Procedures for Vegetation Management

All vegetation management activities proposed for use under this PMP will incorporate:

- Strategies to protect community watersheds;
- Strategies for protecting domestic and agricultural water sources;
- Strategies to protect fish and wildlife, riparian areas and wildlife habitat;
- Strategies to protect bodies of water;
- Strategies to prevent herbicide contamination of food intended for human consumption;
- Pre-treatment inspection procedures for identifying treatment area boundaries;
- Procedures for maintaining and calibrating herbicide application equipment; and,

- Procedures for monitoring weather conditions and strategies for modifying herbicide application methods for different weather conditions.

In this PMP, all PFZs and NTZs will comply with the standards contained in Division 7 of the BC IPMR.

4.1 Strategies to Protect Community Watersheds

The definition of a Community Watershed set out in section 41(8) of the Forest Practices Code Act of British Columbia (RSBC 1996, c. 159) is:

"*The drainage area above the most down- stream point of diversion on a stream for water use that is for human consumption and that is licensed under the Water Act for a waterworks purpose, or a domestic purpose if the licence is held by or is subject to the control of a water users' community incorporated under the Water Act if the drainage is not more than 500 square kilometers and the water licence was issued before June 15, 1995".*

Six community water supply watersheds are traversed by the SVI main line, five of which are designated community watersheds under the *Water Act.* These are listed in Table 11 below. All community watershed and the community water supply watershed locations will be recorded in the SVI Resource Users Database.

Table 11: Community Water Supply Watersheds Through Which the SVI Main Line Passes

Watershed Name	Stream Name	Watershed Location
Englishman Community Watershed	Englishman River	Parksville
French Community Watershed	French Creek	Parksville, Qualicum Beach
Little Qualicum Community Watershed	Little Qualicum River	Lantzville
Nile Community Watershed	Nile Creek	Qualicum Beach
Shawnigan Community Watershed	Shawnigan Creek	Qualicum Bay
Lantzville District Watershed	Aquifer	Shawnigan, Cobble Hill

BOLD – Designates community watersheds under the *Water Act*

The current Community Watershed Guidelines do not require that community watersheds be protected if pesticide applications occur greater than 100 meters from their boundaries. Consequently, no special considerations are required for their protection above the normal best management practices when conducting the SVI IPM program on the ballast section (Zones A and B) if they are more than 100 meters from the boundary of a community watershed..

For herbicide applications proposed to occur within 100 meters of a community watershed boundary, the following strategies will be followed, where applicable:

- The location of community watersheds to be protected will be verified by accessing the BC Government database (Community Watershed web site maintained by the BC Ministry of Sustainable Resource Management);

  http://www.env.gov.bc.ca/wsd/data_searches/comm_watersheds/index.html

- 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 PFZ consistent with the requirements specified in the IPMR shall be maintained from the point of herbicide application and all bodies of water within the community watershed;

- Herbicides shall not be applied within 100 m upslope of a community water supply water intake;

- Herbicides shall not be applied within 25 m downslope of a community water supply water intake;

- All PFZs shall be measured and marked/flagged, if required, prior to herbicide use; and

- Herbicide use shall be discontinued if herbicide residues or herbicide breakdown products directly resulting from SVI herbicide applications are detected at a community watershed water intake, and further use shall not be undertaken until the BC Ministry of Health Services, Medical Health Officer, has been satisfied that all required measures have been implemented to preserve water quality.

4.2 Strategies to Protect Domestic and Agricultural Water Sources (Wells)

SVI shall ensure that, prior to herbicide use, strategies are developed and implemented that identify and protect domestic and agricultural water sources. Water wells and water supply intakes within the SVI ROW are unauthorized and conflict with railway usage of the ROW. Some water wells and water supply intakes are located on properties adjacent to the ROW within 30 meters of the track. The location of these sites will be recorded in the SVI Resource Users Database, and also identified by employees with local knowledge to applicators/spray vehicle operators prior to any treatments.

Table 12 describes the minimum measures that shall be implemented. The NTZ's in this table are consistent with the standards as specified in in Sections 71(3) and 71(4) of the IPMR.

Table 12: Minimum Protective Measures Specified in the IPMR to Protect Domestic and Agricultural Water Sources

IPMR Section	Uses	Areas Treated	No-Treatment Zone (NTZ)
71(3)	All herbicide applications	All areas	30 m NTZ
71(4)	All herbicide applications	All areas	NTZ may be reduced if reasonably satisfied that a smaller NTZ will ensure no herbicide enters the water supply, intake or well

Definitions:

No-treatment zone (NTZ) – is an area of land that must not be treated with pesticides. NTZ will be identified prior to any herbicide application.

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

4.3 Strategies to Protect Fish and Wildlife, Riparian Areas and Wildlife Habitat

The establishment of NTZs and PFZs will help protect fish and wildlife, riparian areas and wildlife habitat. Riparian areas commonly extend for significant distances from the wetted perimeter of streams, lakes and wetlands and vegetation within these areas is essential for bank stabilization and regulating water temperatures. In addition, riparian areas are frequently high in biodiversity of both flora and fauna species and may be portions of critical habitats or travel corridors for wildlife.

The Federal Species at Risk Act (SARA) protects endangered plant and wildlife species and aims to prevent their extinction and secure the necessary actions for their recovery. Provisions of the *Species at Risk Act* and the *BC Wildlife Act* shall be adhered to. SVI will attempt to avoid or reduce the impact to all listed species at risk and will work cooperatively with regulatory agencies and stakeholders in any recovery planning. SVI will conduct all vegetation management activities in a sustainable and responsible manner to minimize any potential negative impacts on fish and wildlife, riparian areas, wildlife areas and endangered plant and wildlife species. Given the disturbed nature of vegetation and wildlife habitats along the railway, there is a low probability of occurrence of Species At Risk. Possible exceptions include the red-legged frog and rare plants associated with Garry Oak ecosystems. However, given the PFZs that will be applied to water bodies, and that all herbicide use will be restricted to the ballast section (Zones A and B), no impacts on any SARA species are expected as a consequence of vegetation control activities along the SVI railway.

Wildlife use of the ROW is incompatible with the safe operation of the SVI railway. One of the objectives of the vegetation control program is to reduce hazards to wildlife by removing attracting vegetation from the ballast section (Zones A and B) by herbicide application, and from trackside ditches by non-chemical methods. Most wildlife use should be restricted to the

outermost part of the ROW where only non-chemical methods will be used to maintain sight-lines.

Only manual or mechanical methods of vegetation management will be used for the removal of tall shrubs, trees, or snags within this zone will be timed to avoid the bird breeding season of April 1 to July 31. When these activities cannot be scheduled outside this time period, a pre-clearing survey for migratory and resident bird nests and/or raptor nests may have to be conducted by a qualified environmental professional, such as a Registered Professional Biologist.

4.4 Strategies to Protect Bodies of Water

SVI will conduct all vegetation management activities in a sustainable and responsible manner to minimize any potential negative impacts to bodies of water by obtaining the following information and/or implementing the following protective strategies, as applicable, prior to control measures being implemented. All information collected will be recorded in the SVI Resource Users Database, and also identified by employees with local knowledge to applicators/spray vehicle operators prior to any herbicide treatment.

- Locate all bodies of water;
- If applicable, identify all bodies of water as fish-bearing or not fish-bearing;
- Establish the boundaries of any required PFZ and NTZ;
- Select the most appropriate method(s) of vegetation management that should be employed; and,
- Ensure that there shall be no refueling of machinery, herbicide mixing or cleanup or disposal of herbicide materials within 15 meters of riparian zones.

The minimum protective measures for bodies of water that will be implemented, as specified in the IPMR, are shown in Table 13.

Table 13: Minimum Protection Measures for Bodies of Water as Specified in the IPMR

IPMR Section	Permitted Applications	NTZ/PFZ	Exception
71(3)	Around a water supply intake or well used for domestic or agricultural purposes, including water for livestock or for irrigation of crops	**30 m NTZ**	See 71(4)
71(4)	May reduce the NTZ under 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		

	Non-Glyphosate Applications		
73(1)	Around or along a body of water, dry stream, or classified wetland using any pesticide except glyphosate, subject to label restrictions and including all application methods	**10 m PFZ**	Glyphosate applications (see below)
	Glyphosate Applications		
74(1)(a)(i)(ii)	If the treatment area is railway ballast, signal, switch or yard, or another industrial site that must be free of vegetation, or if the pesticide is applied using selective application methods: Along or around a body of water or a classified wetland that is: • fish-bearing, or • that drains directly into a fish-bearing body of water, or • along or around a dry stream that when wet is fish bearing or that drains directly into a fish-bearing body of water	**2 m NTZ**	
74(1)(b)	Along or around a body of water or a classified wetland that is: • fish-bearing, or • that drains directly into a fish-bearing body of water, or • along or around a dry stream that when wet is fish bearing or that drains directly into a fish-bearing body of water	**5 m PFZ**	See 77(2)
74(2)	Up to but not below the high water mark of a temporary free-standing body of water and 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 m PFZ**	
74(1)(c)	Along or around a body of water if the body of water is: • non fish-bearing at any time of the year, • does not drain directly into a fish-bearing body of water	**2 m NTZ**	See 77(2)
76(5)	Along or around a body of water if the body of water if: • the pesticide is applied to railway ballast or yards, and • the body of water is a temporary, free-standing body of water that is not fish bearing at any time of the year and does not drain directly into fish bearing waters	**1 m NTZ**	

.**Definitions:** **Body of water** – is any watercourse or body of water, such as a stream, river, wetland, or lake, but not including a human-made, self-contained, body of water or structure of water.

Stream – a watercourse that contains water on a permanent or seasonal basis, is scoured by water, or contains observable deposits of mineral alluvium, and which has a continuous channel bed that is 100 m or more in length, or flows directly into a fish stream or a fish-bearing lake or wetland, or a licensed waterworks.

Wetland – a swamp, marsh, bog, or other similar area that supports natural vegetation, and which is distinct from adjacent upland areas.

4.5 Strategies to Prevent Herbicide Contamination of Food Intended for Human Consumption

The SVI main line is adjacent numerous agricultural and rural residential areas. Food intended for human consumption is sometimes grown or found within many of these areas.

There are currently 2 organic farms adjacent to the SVI main line, at MP 121.719 and at MP 125.050. Where certified organic farmland borders the rail ROW appropriate buffers will be maintained to ensure that organic certification is preserved. There are numerous certifying agencies in British Columbia, all of which fall under the Certified Organic Association of BC. The Certified Organic Management Standards - Version 7, Book 2 (January 2005) states that a buffer zone is required by the farmer between certified cropland and other land uses: "*Buffer zones should usually be 8 m in width and wherever feasible contain a hedge row or trap crop that is 1.5 times the height of the adjacent crop*". As was stated in Section 3.6, herbicide use on the SVI main line will be limited to the ballast section (Zones A and B) offering a buffer of over 10 m within the ROW itself. This buffer in conjunction with the required farm buffer offers over 18 m of buffer to the certified crop. SVI encourages on-site discussion should certified organic farmers express concerns.

SVI will attempt to identify/verify all areas adjacent to the main line where food intended for human consumption is being grown during pre-treatment inspections. All locations will be incorporated into the SVI Resource Users Database, and also identified by employees with local knowledge to applicators/spray vehicle operators prior to any treatments.

Prior to herbicide applications, the following strategies shall be implemented, as applicable, for the protection of food intended for human consumption:

- Non-chemical methods of vegetation management shall be considered where treatment objectives can be achieved;
- Herbicide applications shall be limited to the ballast section (Zones A and B);
- Non-chemical methods of vegetation management shall only be used on ROWs;
- Where possible, areas containing food plants for human consumption shall be located prior to herbicide application;
- If control methods involving the application of herbicides are required, increased PFZs may be maintained around these areas during herbicide applications; and,
- Where possible, herbicide treatments shall be conducted at times to minimize impacts on food plants.

4.6 Pre-Treatment Inspection Procedures for Identifying Treatment Area Boundaries

Prior to herbicide applications, qualified persons familiar with the treatment areas will inspect proposed treatment areas. An onboard location system will use the track mileage information contained in the Resource Users Database to accurately identify treatment prescription limits. As an additional precaution, and to accurately identify current seasonal water courses, rail maintenance crews will identify the boundaries of all NTZs and PFZs along the SVI main line immediately prior to all herbicide applications. This information will be communicated to the contractor responsible for herbicide applications in a pre-treatment meeting to ensure applicators and spray vehicle operators clearly understand which areas must be excluded from herbicide treatments.

4.7 Procedures for Maintaining and Calibrating Herbicide Application Equipment

All herbicide application equipment used on all property operated by SVI shall be safe, clean, in good repair, compatible and appropriate for the herbicide being used. The 2011 Canadian Pesticide Education Program Applicator Core Manual (British Columbia Edition) will be used for guidance with respect to calibration intervals and procedures for specific types of application equipment. In practice, most sprayers shall be re-calibrated when changing herbicide products or when nozzle output begins to vary. Some relatively more abrasive herbicide formulations such as dispersible granule or wettable powders normally result in greater nozzle wear and will require more frequent calibrations.

4.8 Procedures for Monitoring Weather Conditions and Strategies for Modifying Herbicide Application Methods for Different Weather Conditions

Weather conditions will be measured, monitored and documented prior to and periodically during herbicide applications including: wind speed and direction, precipitation, temperature and cloud cover. Persons applying herbicides are responsible for checking each product label which usually contains instructions or guidelines for applying herbicides under various weather conditions.

5.0 Operational Information

The operational information included in this section includes:

- Qualifications and responsibilities of persons applying herbicides;
- Procedures for safely transporting herbicides;

- Procedures for safely storing herbicides;
- Procedures for safely mixing, loading and applying herbicides;
- Procedures for the safe disposal of empty herbicide containers and unused herbicides; and,
- Procedures for responding to herbicide spills.

5.1 Qualifications and Responsibilities of Persons Applying Herbicides

All herbicide applications 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 for herbicide applications under this PMP.

The responsibilities of the Certified Pesticide Applicator are to:

- Be in continuous attendance at the site;
- Have available proof of certification;
- Supervise no more than 4 uncertified assistants at one time;
- Maintain continuous 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.

All contractors who apply herbicides for vegetation control under this PMP must have a valid BC Pesticide User License, and must comply with the procedures and practices as contained in the following:

- WorkSafeBC's (1998) *Occupational Health and Safety Regulations – BC Regulation 296/97 as amended by BC Regulation 185/99 – Sections 6.70 to 6.109;* including Section 6.77 Mixing, Loading and Applying Pesticides –Qualifications (Amended by BC Regulation 188/2011, effective February 1, 2012.
- B.C. Ministry of Environment (2011) *Canadian Pesticide Education Program Applicator Core Manual, British Columbia Edition;*
- Workers Compensation Board of British Columbia (2009) *Standard Practices for Pesticide Applicators; and*
- The *IPMA* and IPMR.

All contractors applying herbicides on property operated by SVI under this PMP will be directly supervised at all times by qualified persons familiar with the treatment areas. Qualified

persons familiar with the treatment areas will be present to ensure that all herbicide applications are carried out in accordance with all legal requirements. Failure of the contractor to all legal requirements for herbicide applications or the commitments made in the PMP would result in herbicide applications being immediately stopped. Examples of activities that would result in immediate suspension of herbicide applications would include:

- Application of herbicides under inappropriate or unsafe conditions;
- Application of herbicides by uncertified personnel without appropriate supervision;
- Improper disposal of unused herbicide or herbicide containers;
- Improper cleanup of herbicide spills;
- Application of herbicides within prohibited areas (PFZ or NTZ);
- Improper mixing of herbicides or mixing in inappropriate locations such as in close proximity to an environmentally sensitive area;
- Failure to ensure that pesticide applicators use personal protective equipment when required by product labels; or,
- Improper or incompetent calibration of herbicide application equipment.

5.2 Procedures for Safely Transporting Herbicides

Prior to commencing the spray program, the estimated required quantities of herbicides are purchased to satisfy the needs of the current spray program. SVI's employees utilize the storage facility for short-term storage of residual amounts of herbicide that may remain at the end of a seasonal spray program.

Personnel shall follow these procedures for safely transporting herbicides:

- Limit the amount of herbicides that will be carried in any one vehicle. The quantity shall be no more than what is necessary for each project, except where transportation occurs between storage facilities;
- 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;
- Inspect all herbicide containers for defects prior to transporting. Keep herbicides 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 (stored separately from herbicides), 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,

- Read and understand the herbicide labels and the product Material Safety Data Sheet (MSDS) for all herbicides being transported.

5.3 Procedures for Safely Storing Herbicides

Personnel shall follow these procedures for safely storing herbicides on properties operated by SVI:

- 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"; and,

- Keep storage facilities separate from work and living areas, and away from food, flammable materials, bodies of water and water sources.

5.4 Procedures for Safely Mixing, Loading and Applying Herbicides

Personnel shall follow these procedures for safely mixing, loading and applying herbicides:

- Allow only certified pesticide applicators or individuals directly supervised by a certified applicator to mix, load and apply herbicides, and that all manufacturer's recommendations, as specified on the herbicide labels, are adhered to;

- Ensure that the contractor conducts safety briefings, including a review of emergency response plans prior to the commencement of any herbicide handling activities;

- Ensure the contractor has available adequate first aid kits, and that all personnel involved in applying herbicides have the appropriate level of personal protective equipment;

- Ensure that treatment areas are mapped, and that product labels, product information sheets, and MSDS are available on site for the quick reference and use by the applicators;

- Ensure that herbicide containers that have been used to prepare, mix or apply herbicide will not be washed or submerged in a body of water;

- Ensure that all mixing, loading and application of herbicides shall be 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 PFZs, NTZs, bodies of water, fish or wildlife habitat, water sources, or other environmentally sensitive areas;

- Prevent herbicides from entering any body of water or irrigation system by maintaining a gap between the herbicide and the equipment used to draw water; and,

- Ensure all directions and restrictions on herbicide product labels are followed, including adhering to the recommended re-entry times to treated areas unless appropriate personal protective equipment is worn.

5.5 Procedures for the Safe Disposal of Empty Herbicide Containers and Unused Herbicides

Personnel shall follow these procedures for safely disposing of empty herbicide containers and unused herbicides:

- Ensure that all herbicide waste is disposed of in a manner consistent with the requirements of the BC *Environmental Management Act* and the *Hazardous Waste Regulations*, 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 designated location or 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 5.3.

5.6 Procedures for Responding to Herbicide Spills

SVI has a contingency plan covering spills associated with the transportation of dangerous goods. A spill response plan will be available at each work site and given to each herbicide contractor. All personnel and contractors working on a project involving herbicides must be familiar with its contents. The Spill Reporting Regulation specifies minimum reportable amounts for various substances including waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation, for which the minimum reportable amount is 5 kg or 5 L. The following procedure will be followed if a spill occurs:

- All personnel will be protected from herbicide contamination by wearing appropriate protective clothing and safety gear;

- The source of the spill will be addressed and containment will be affected using spill containment equipment and appropriate techniques, possibly including the creation of a berm;

- The project supervisor will notify employees and the SVI Roadmaster or delegate, and will ensure operations cease until the spill is contained;

- The SVI Roadmaster or approved representative will be notified by the project supervisor of the details related to the spill as soon as is practical;

- Where the herbicide involved in the spill results or may result in its release into the environment, the person responsible for the product will immediately report it to the Provincial Emergency Program by telephoning 1-800-663-3456 or, where that is impractical, to the local police or nearest detachment of the RCMP;

- Cleanup will begin immediately;

- Absorbent material will be spread over the spill, if applicable, to absorb any liquid and will be collected into garbage bags or containers, with the contents clearly marked;

- Contaminated soil or other material will be removed from the spill site and placed in garbage bags or containers; and,

- Disposal of contaminated material will be consistent with applicable regulations.

6.0 Reporting, Notification and Consultation

6.1 Reporting

Accurate record keeping allow SVI and the Administrator, *IPMA*, to monitor the quantity of pesticides used, and to ensure compliance with the *IPMA* and IPMR, the commitments made in this PMP, and the contents of the Pesticide Use Notice. SVI will ensure that each of the required records described below are maintained.

6.1.1 Confirmation Holder Use Records

Each contracting firm that applies pesticides for SVI 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:

- The date and time of the herbicide use;
- The name of the pest targeted by the use or the purpose of the herbicide use;
- The trade name of each herbicide used and its registration number under the federal Act;
- For each herbicide used, the method and rate of application and the total quantity used;
- The 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; and,
- 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.

6.1.2 Annual Report for Confirmation Holders

In accordance with Section 39, SVI will provide to the Regional Administrator, *IPMA*, the following information for a 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 the PMP confirmation number;

- Trade name and active ingredient of the herbicide(s) applied, including their PCP numbers;
- Total area treated; and,
- Quantity of each active ingredient applied (kg).

6.2 Notifications

SVI commits to providing the following notifications with respect to this PMP:

6.2.1 Notification of PMP Confirmation

SVI 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 offices to allow inspection by the public.

6.2.2 Annual Notice of Intent to Treat

As per Section 42 of the IPMR, for the purpose of an annual Notice of Intent to treat, SVI will prepare and retain a map and/or diagram showing the treatment locations for the applicable calendar year, which indicate the following for each treatment location:

- The proposed treatment areas; and
- The geographic features that require a pesticide-free zone or a no-treatment zone.

SVI will forward, in writing, to the B.C. Ministry of Environment, 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) for the following year. This NIT will identify the name and business location of confirmation holder, proposed treatment areas, proposed treatments, herbicides proposed for use and their method of application, and the total area proposed for treatment.

6.2.3 Requests to Amend the PMP

SVI will forward, in writing, to the Ministry of Environment, amendments requested for the PMP. Amendment requests to add new application techniques or similar changes will not require further consultation, provided that the amendment request is within land owned or controlled by SVI. Amendments to add new active ingredients will require further public consultation.

6.2.4 Notification of Contraventions

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. SVI commits to abiding by this requirement.

6.2.5 Public Notification Prior to Treatment

Notification of individuals, communities and organizations in the time and manner if agreed during the public consultation process, will be completed prior to treatments. SVI will maintain a record of all public notifications for each treatment area. Public notification is also accomplished via a Pesticide Use Notice (PUN) in a regional newspaper(s) having circulation in the treatment area(s) proposed under the PMP. Contact information is provided in the PUN and feedback is obtained via telephone, written correspondence or where appropriate, in person meetings.

6.2.6 Employee Notification Prior to Treatment

Internal notification of pending pesticide applications is posted for all employees via employee bulletins. These bulletins include treatment date(s), location(s), the pesticide(s) to be applied, PMP Confirmation Number, emergency numbers, personal protective clothing required, safe re-entry time and the material safety data sheet for the pesticide(s) being applied. Manual and mechanical vegetation controls do not require notification or consultation.

6.2.7 Posting of Treatment Notices

Treatment Notices are placed at all **authorized public access points** to railway property (e.g. public entrances at yards and facilities). In addition, Treatment Notices will be posted where there is high pedestrian traffic in adjacent areas, or at locations where due diligence would seem to require them. The signs will identify the PMP Confirmation Number, treatment date(s), trade name of the pesticide(s) intended for use and a telephone contact number where additional information can be obtained.

6.3 Consultations

6.3.1 Public Consultation Plan

Prior to submitting a Pesticide Use Notice to the Ministry of Environment for PMP confirmation, SVI will carry out a public consultation process.

The objectives of conducting public consultations when this PMP is at the draft stage include the following:

- To increase public awareness of the PMP process and of the principles of IPM which are embodied in the PMP;

- To ensure that the public have an opportunity to identify concerns, and for SVI to address those concerns, before the PMP is finalized and submitted and a Pesticide Use Notice submitted for confirmation;

- To ensure a transparent and accountable review process for the PMP;

- To educate the public on the need to manage problem vegetation, noxious weeds and invasive plants; and,

- To explain how the planning process that is described in the PMP recognizes the need to protect human health and the environment.

The public will be consulted of the PMP development via notices in local community newspapers that have circulation within the geographic boundaries of the PMP area. As per Section 61(1) of the IPMR, at least 45 days before submitting a Pesticide Use Notice, the first of 2 notices, at least 40 cm^2 in size, will be published within a 2 week period in newspapers circulated in the various communities (or nearest communities).

In addition to general public consultation, all potentially interested First Nations with territory immediately adjacent to the right of way will be notified of the proposed activity. Using the Public Area Database (PAD) tool, a list of First Nations has been developed and a letter of notification will be issued to each potentially interested First Nation.

During the public consultation process, the draft PMP will be accessible to the public, as stated in the public notifications.

6.3.2 Public Consultation Report

SVI will submit to the Administrator, *IPMA*, a Public Consultation Report that contains:

- A summary of public consultations, including the names and addresses of those who provided input, the nature of their comments and/or recommendations, and the SVI response to the input from the public; and,

- A list of newspapers in which notification of the pending PMP submission appeared, along with the publication dates and a photocopy or tear sheet of a representative advertisement.