

Southern Railway PMP

Southern Railway of British Columbia Limited

Pest Management Plan

(2025 to 2029)

October 30, 2024

(PMP Application #: SRY-PMP-2024)



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1.0 Introduction

The British Columbia *Integrated Pest Management Act* (IPMA) includes provisions requiring 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 will describe the Southern Railway of British Columbia Limited (Southern Railway, SRY) vegetation management program and wood preservation program (for timber bridges) using the principles of Integrated Pest Management (IPM). Southern Railway of British Columbia Limited 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 identifies appropriate methods for handling pesticides within the plan.

1.1 Southern Railway of British Columbia Limited

SRY was originally part of the BC Electric Railway and celebrated 100 years of service in 1997. The BC Electric Railway (BCER) was incorporated in 1897 to unite the separate interurban and street railway systems in Vancouver, Victoria and New Westminster. It operated the largest system of interurban railways in Canada, shuttling passengers and express trains back and forth across the Fraser Valley for 40 years. Since 1950, the line has been a short-line freight railway.

The BCER was taken over by the provincial government in 1961 when the British Columbia Hydro and Power Authority was created. BC Hydro continued to operate the railway until 1988, when the railway trackage was sold to ITEL Rail Corp. and it became Southern Railway of British Columbia Limited. In 1994, the Washington Corporation based in Missoula, Montana purchased Southern Railway of British Columbia Limited. BC Hydro continues to own the right-of-way and Southern Railway has been granted a licence area. The licence area varies in width from 15 feet (4.5 metres) on either side of the track centre-line to the full width of the right-of-way (30 feet / 9.1 metres to 100 feet / 30.4 metres) in certain areas. Southern Railway also has a statutory right-of-way on Queensborough and Annacis Island.

Southern Railway operates exclusively in the Lower Mainland and Fraser Valley Region of British Columbia beginning in Burnaby and terminating in Chilliwack. Currently operating over 129 miles (207 km) of track of which 107 miles (171 km) of track are owned, and 22 miles are leased or under trackage rights / joint use.

Southern Railway has interchange connections with three North American Class 1 railroads at six locations that provide access to all rail-served points in North America. Revenues are generated

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from interchanging and handling over 50,000 railcars annually, which includes automobiles, forest products, building, agricultural, chemical, consumer and steel products. Personalized short-line service is combined with the long-haul capabilities of Canadian Pacific Railway, Canadian National, Burlington Northern Santa Fe and Union Pacific. In addition to maintaining its own fleet of locomotives, Southern Railway's locomotive and car shops provide repair services to both Canadian and U.S. customers. Southern Railway provides specialty railcars to customers and currently has over 1,000 cars in its fleet. It is part of the Rail Link System of the Washington Companies.

Southern Railway has over 150 full time employees stationed in New Westminster and Abbotsford (Huntingdon).

1.2 Identifying Information

At Southern Railway the person responsible for vegetation management program and the wood preservation program (for timber bridges), and who will be the principal contact for information relating to this Pest Management Plan is:

Chub Lovey
Senior Manager Engineering Services
Southern Railway of British Columbia Limited
2102 River Drive, New Westminster, B. C. V3M 6S3
Phone: 778-773-5306 E-mail: clovey@sryraillink.com

1.3 Role and Term of This PMP

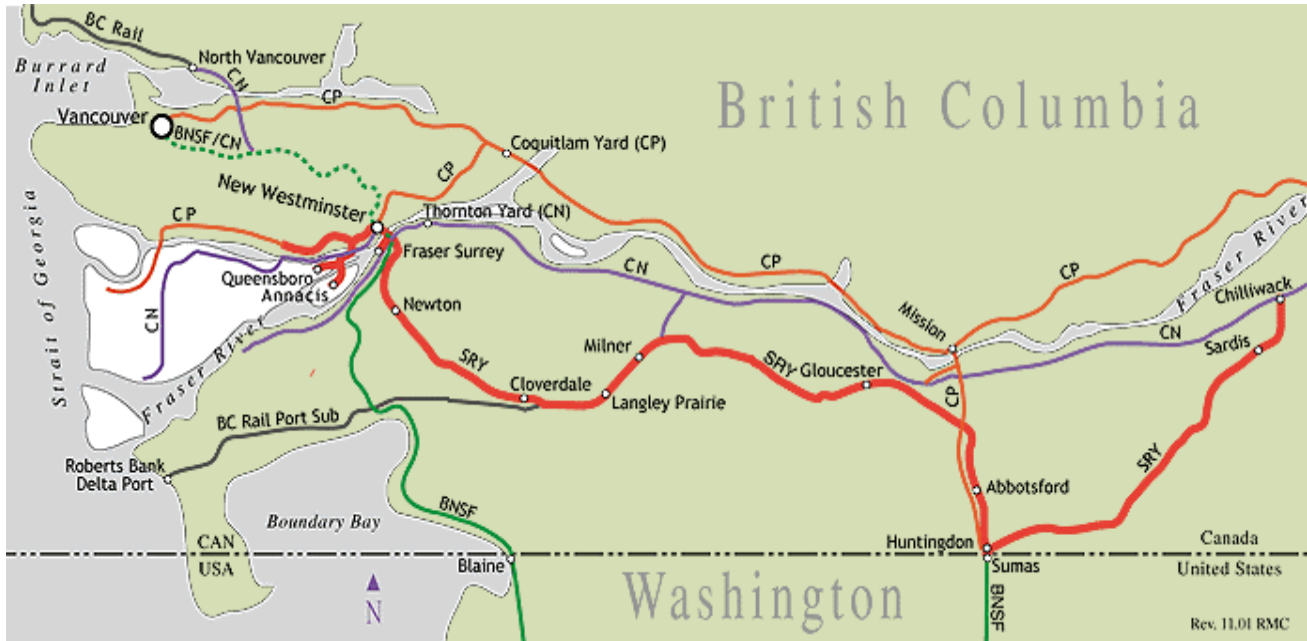
This PMP identifies the approved procedures and practices that Southern Railway will employ when utilizing herbicides and wood preservatives, in certain situations, within the geographic boundaries depicted in Figure 1. This PMP shall be in force for a five-year period following expiration of the current PMP (January 30, 2025), or from the date that Confirmation of a Pesticide Use Notice has been obtained from the BC Ministry of Environment.

1.4 Geographic Boundaries and Proposed Treatment Area

Southern Railway traverses parts of Burnaby, New Westminster, Delta, Surrey, City of Langley, Township of Langley, Abbotsford and Chilliwack. Southern Railway operates through agricultural, industrial, rural, suburban and urban areas. The geographic boundaries of the proposed PMP area are illustrated in red on Figure 1.

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Figure 1: Southern Railway System Map



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 and programs that involve the use of wood preservative pesticides for pest management on timber bridges using the principles of IPM.

The elements of an IPM program 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.

PART A VEGETATION MANAGEMENT

3.0 The Need for an IPM Program for Vegetation Management

3.1 Purpose, Objectives and Scope

Purpose of an IPM Program

The main purpose for controlling unwanted vegetation along the Southern Railway 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 Southern Railway planning processes, using the principles of IPM, that both ensure effective vegetation management while protecting environmental and human health values.

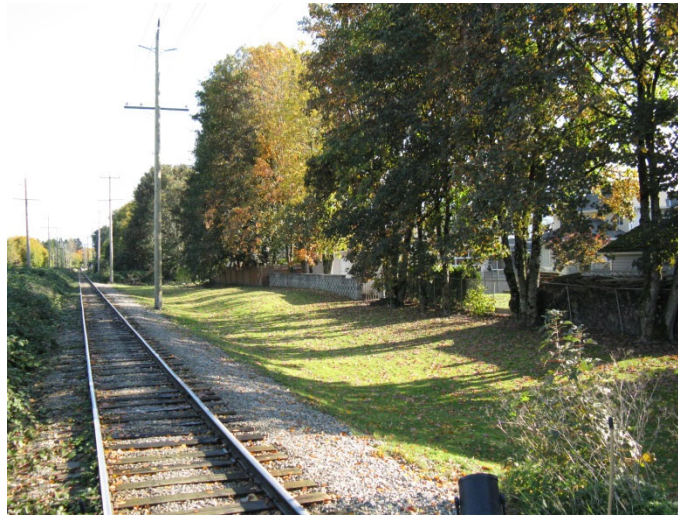
This PMP will outline the factors, policies, procedures, environmental conditions and consultation processes to permit Southern Railway to control vegetation on the track, yards, storage compounds, shops and other facilities, to fulfil obligations to control Noxious Weeds and other weeds that negatively impact operational safety on the railway. The paramount purpose of the PMP is to maintain a safe railway.

Objectives of an IPM Program

A PMP's primary objective is to document procedures that effectively protect the public, employees and the environment from the hazards of operating a railway, while being compliant with the *Integrated Pest Management Act* (IPMA), the *Integrated Pest Management Regulation* (IPMR) and other relevant legislation. Contained in this objective is the achievement of a ballast section that is vegetation free and a right-of-way that consists of desirable vegetation.

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, prevention of right-of-way fires, maintenance of a stable track structure that can be readily inspected for defects and sub-standard conditions, health and safety of the public, health and safety of employees working within the right-of-way, and the integrity of the railway with respect to the transportation of goods and personnel.

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This photograph shows the desirable level of vegetation on the right side and the undesirable amount of vegetation on the left side including blackberry vines that are creeping into the track.

Scope of an IPM Program

This PMP is applicable to the trackage owned by Southern Railway 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 the management around signals, switches, buildings, shops, road and pedestrian crossings, and station grounds.



This photograph taken west of 20th Street in New Westminster shows the proximity of Southern Railway's Trapp Yard in relation to CN and CP Rail trackage along the North Arm of the Fraser River.

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Southern Railway is divided into two (2) Districts: District 1 and District 3:

District 1

- Annacis Island Branch
 - New Westminster and Delta
- Queensborough Branch
 - New Westminster and Richmond
 - Includes a portion of CN Rail's Lulu Island Branch from 4th Avenue to Quayside Drive in New Westminster Central Park Branch
 - New Westminster and Burnaby
 - Includes a portion of CP Rail's Vancouver – Lulu Island Line from 5th Avenue to 20th Street in New Westminster and from Trapp Road to Marshland Avenue in Burnaby

District 3

- Fraser Valley Subdivision
 - New Westminster, Surrey, Delta, Langley, Abbotsford and Chilliwack
 - Includes portions of CN Rail's Lulu Island Branch from Front Street crossing in New Westminster and across the Fraser River Bridge, and on CP Rail's Page Subdivision from Pratt Junction to Livingstone Junction

The railways listed above own the respective portions of track identified and Southern Railway operates over the trackage under an operating agreement. The portions of trackage under the operating agreement are maintained by the respective railway companies, which includes vegetation control.

Southern Railway has five railway yards within the system that are used for rail car classification, marshalling and storage. These are identified and located as follows:

- Trapp Yard – New Westminster
- Sixteenth Street Yard – New Westminster
- Annacis Yard – Delta
- Abbotsford Yard – Abbotsford
- Huntingdon Yard – Abbotsford

3.2 Southern Railway's Vegetation Management Policy

Controlling vegetation is necessary on railway tracks and rights-of-way to maintain safe efficient operating conditions.

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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 result from reduced sight-lines in the vicinity of road crossings due to the presence of excessive brush and grasses.

Integrated Vegetation Management techniques shall, whenever possible, protect and enhance desirable, low-growing vegetation that is compatible with the railway right-of-way.

Other Considerations

When determining the actions required to control vegetation on Southern Railway or B.C. Hydro property or right-of-way, 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;
- right-of-way restrictions;
- safety;
- soil erosion;
- water courses;
- water well intakes; and,
- topography potable water sources (aquifers)

3.3 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

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- 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.

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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.

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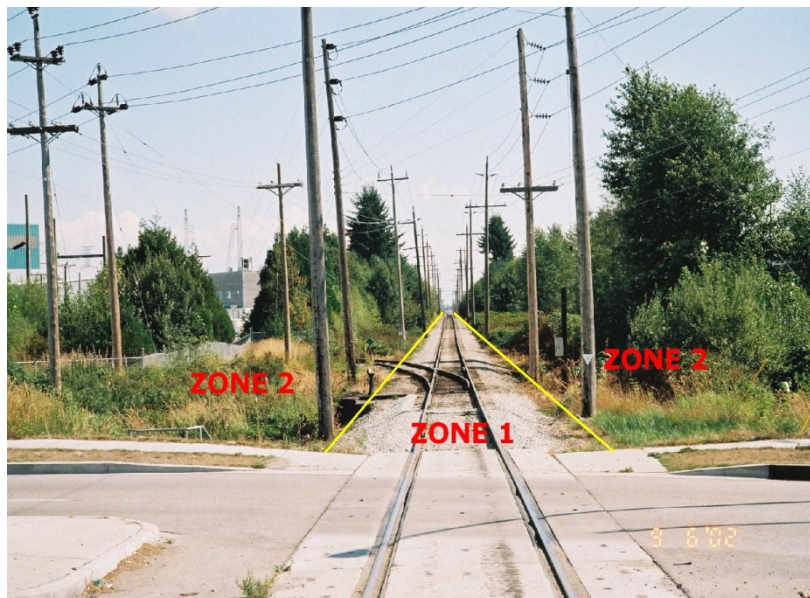
3.4 Vegetation Management Zones and Locations

The Southern Railway right-of-way is divided into 2 vegetation management zones: the ballast section (Zone 1) and right-of-way section (Zone 2).

Zone 1 consists of the ballast and the sub-ballast sections having a maximum total width of 24 feet (7.3 metres). Most standard railway herbicide application vehicles can treat at least 18 feet (5.4 metres) wide permitting the treatment of the ballast section (as shown in the picture below). Since Zone 1 supports the dynamic train loading, it is the most critical area of the right-of-way.

Zone 2 is the remainder of the right-of-way from the outer limit of Zone 1 to the right-of-way boundary.

The two vegetation management zones are shown in the following photograph:



Vegetation Management Zones within the Railway Right-of-Way

Zone 1 – Ballast Section

The ballast section is the portion of crushed rock that supports the track and rail ties. Ballast is required to provide free drainage of water, structural support for vertical loading and to prevent the track from moving horizontally due to dynamic train loading and inherent forces resulting from contraction and expansion of the rail through temperature changes. The most critical area of the railway operations that requires vegetation control is the ballast section. Vegetation within the ballast section promotes problems that are incompatible with maintaining stability of the track structure.

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Turnouts and other related track appliances are located within Zone 1. Activities within Zone 1 include foot traffic associated with train operation and inspection, as well as track maintenance and inspection. Zone 1 is also the most susceptible to fires resulting from the proximity to sources of combustion such as ties and dry weeds that may ignite.

The relatively narrow width of the ballast section (24 feet / 7.3 metres) in comparison to the overall right-of-way width (30 feet / 9.1 metres to 100 feet / 30.4 metres) provides an inherent buffer zone to the adjacent properties. Watercourses flowing perpendicular and parallel to the right-of-way and the proximity of trackside ditches that drain into the watercourses are influential in the selection of herbicides and where they can be applied.

The only method proven feasible to control vegetation within the ballast section is herbicide use. In areas where watercourses are substantially separated from Zone 1, vegetation within the ballast will be controlled by using non-selective residual herbicides suitable for the climate, soil type and target plant species. The use of residual herbicides can provide multi-season control, thereby reducing the amount and frequency of herbicide application.

Where conditions for potential herbicide mobility are high, use of non-residual, non-mobile herbicide(s) will be selected for use.

Zone 2 – Right-of-Way

Zone 2 represents the remainder of the right-of-way from the edges of Zone 1 to the right-of-way boundary. Drainage ditches, swales, signs, signals, switches, passing tracks and sidings are usually located on both sides of the track within this zone. The desirable method of controlling vegetation within this zone is selective cutting to eliminate brush and trees in favour of grasses or other ground cover. The objectives for vegetation control in this zone are:

- to maintain sightlines at access, farm, highway and pedestrian crossings.
- to maintain sightlines at curves
- to maintain unobstructed visibility of signs and signals
- to reduce hazards to train crews and track maintenance personnel who must work in these areas;
- to reduce the potential of fire, and
- to manage and control the spread of invasive and noxious weeds

Zone 2 is managed using a combination of manual, mechanical cutting and selective herbicide usage for spot treatment of noxious weeds and invasive plants (where required). Mechanical cutting has a limited effect in areas where the terrain is uneven, and encourages a growth pattern that requires frequent re-cutting due to the excessive shoots produced. Mechanical cutting cannot be used in locations where the potential of property damage or injury from cut flying debris exists. Mechanical cutting can also facilitate the spread of noxious and invasive species.

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Herbicide applications for vegetation management will be restricted to applications only on Zone 1 (Ballast Section), with limited herbicide usage for spot treatment of noxious weeds and invasive plants within Zone 2. All other vegetation management treatments in Zone 2 (right-of-way) will only be by manual and mechanical methods.

Railway Yards

The elimination of vegetation within railway yards is required for the same reasons as described for the main track and sidings. For reasons of safety, housekeeping and fire prevention, the areas around buildings, in storage compounds and other service areas require bare ground vegetation control. Where bare ground control is not required, it is sufficient to manage brush growth.

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 are used to alter the plants to a desirable form. Disturbed or bare ground is reseeded with grasses or legumes to encourage plant succession.



Aerial view of Trapp Yard looking towards Burnaby

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Crossings

Mandated sightline requirements for highway, access and pedestrian crossings are provided in the BC Railway Safety Code, Part 3, Division 5. To meet crossing sightline regulation requirements a combination of non-chemical approaches are usually used to manage vegetation including: brush cutting and tree trimming.

3.5 Reasons for Vegetation Management in Track Ballast, Station Grounds, Railway Yards, and Around Shops, Buildings and Material Storage Areas

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,
- Keep the ties and rails from moving as a result of compressive and expansive train forces occurring during rail operations, and as a result of changes in temperature.

Total vegetation control in the ballast section is the most critical aspect of the Southern Railway vegetation management program. Any type of vegetation in the ballast sections leads to problems with a stable track structure, which compromises railway safety.

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.

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The track in the above photograph is overgrown by vegetation. The ties, spikes, rail, joint bars and bolts are not clearly visible, severely inhibiting safety inspection of the track structure. Excessive vegetation is also a tripping hazard for railway employees.



This photograph shows the same track after rehabilitation, including vegetation control.

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

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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.



Vegetation in the ditches prevents the proper drainage and permits the retention of fine soil particles that promotes additional vegetation growth

Hazards to the Public

The operation of a railway has many potential sources of ignition including sparks from brakes, internal combustion engines, wheels, over-heated bearings, rail saw with abrasion blades, welding and 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 vegetation reduces the visibility of signs, signals and switch targets and interferes with the operation of switches, which is critical for the safe operation of the railway and protecting the public.

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Hazards to 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 right-of-way. 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.

Damage to Equipment

Leaves and weeds exceeding the height of the rail causes wet, slippery conditions that affect traction and braking. The result is costly damage to track and locomotive components. Out-of-round wheels caused by skidding pound the rail and are the primary contributor of brittle fracture of rail and joints especially in cold weather. The extra stopping distance attributed to the slippery track increases the potential for collisions involving railway equipment or vehicular traffic. The application of traction sand by the locomotive under slippery conditions contributes to the contamination of the ballast.

Work Programs

Excessive vegetation hinders the employee's ability to perform inspection duties, rail relaying, tie renewals and other maintenance projects. Work efficiency is affected by vegetation and may result in the loss of tools, materials and other equipment, which present tripping hazards to employees.

3.6 Reasons for Vegetation Management on Right-of-Way

Selective control of vegetation within the right-of-way is sometimes required to remove brush and trees. The main concerns regarding brush and trees growing within the right-of-way include:

- Maintaining visibility (i.e. sight lines) at road and pedestrian crossings;
- Maintaining sight line visibility at curves;
- Providing clear visibility of signs and signals;
- Reducing physical hazards to train crews and track maintenance personnel who must work in these areas;
- Reducing the fire hazard potential;
- Preventing the transport and dispersion of noxious and/or invasive species along the rail corridor and to adjacent properties;
- Vegetation growing at road and/or pedestrian crossings and on the inside of curves, where sight line visibility is limited;
- Woody vegetation and brush that is interfering with the normal functioning of equipment used to detect slides;

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- Vegetation that is impacting railway site security by providing easier access to the right-of-way over security fencing; and,
- Vegetation overhanging electrical equipment that creates a potential fire hazard, or creates 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 the greater the train speed at these crossings, the greater will be the sight line requirements. The sight line distance is to allow both vehicles (road and rail) sufficient time to see and to stop for the approaching vehicle. Southern Railway 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

Noxious Weeds and Invasive Plants

Noxious Weeds are defined as “a weed including seeds designated by regulation or arbitrarily defined by laws as being especially undesirable, troublesome and difficult to control. Definition will vary according to legal interpretations.”

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 BC *Weed Control Act* mandates the control of Noxious Weeds and other provincial and federal legislation explicitly or implicitly requires the control of Invasive Plants.

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Regional District Weed Inspectors have historically provided guidance to Southern Railway with respect to the identification and control of Noxious Weeds. Upon notification of the Noxious Weed problem Southern Railway will undertake the necessary control action. In addition, Noxious Weeds growing in the ballast section are treated along with other vegetation during the prescribed herbicide application.

Control Methods for Noxious Weeds

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 right-of-way, Noxious Weeds will be controlled only by mechanical treatments, plant removal, or spot treatment using appropriate herbicides.

Tolerance Thresholds for Noxious Weeds

In the ballast section, the chemical treatment method for Noxious Weeds does not differ from the control methods described for other Industrial Vegetation control. The tolerance thresholds for Noxious Weeds are variable. Control and eradication of a particular species is often based on the assistance and direction provided by the Regional District Weed Inspector.

Public Awareness and Interagency Cooperation

Southern Railway continues to be actively involved with the Regional Districts to help control or eradicate Noxious Weeds and Invasive Species, and to increase public awareness regarding the requirements and procedures for implementation of vegetation management.

4.0 The Southern Railway IPM Program for Vegetation Management

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

- **Planning (prevention)** and managing ecosystems to prevent organisms from becoming pests;
- **Identifying** vegetation problems and potential vegetation problems;
- **Monitoring** populations of vegetation, the damage caused by vegetation, and environmental conditions;
- **Using injury (treatment) thresholds** in making treatment decisions;
- **Suppressing vegetation 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 vegetation management strategies.

4.1 Prevention

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Preventative methods available to railways for vegetation management may also be considered as control options (e.g. track surfacing and ballast cleaning).

The greatest difficulty for a railway is the size of the right-of-way involved and the conflict with normal track operation and maintenance activities. Vegetation suppression techniques that may be feasible for a municipality's parks, structures and streets do not transfer well to railway applications, which involve miles of track. For example: routine maintenance activities such as tie replacement, shoulder ploughing, track surfacing and tamping would destroy surface or underground membrane installations which may be suitable in non-railway operating environments.

Since there is a danger to animals, their attendants and to trains, animal grazing on the railway right-of-way is not a plausible solution to vegetation control.

The following preventative measures may 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:

- Track surfacing and ballast cleaning;
- Tree removal; and,
- Planting disturbed areas with desirable ground cover, or low growing shrubs in the right-of-way, (Competition/Re-vegetation)

4.1.1 Track Surfacing and Ballast Cleaning

Vegetation control on recently surfaced track with new ballast is not usually required for a few years. Since new ballast is normally free of fine particles and organic material it does not provide a suitable setting for vegetation growth. As time progresses, fine particles migrate into the ballast from continual abrasion of the ballast caused by train movement, dust deposition from atmosphere and from 'mud-pumping' from the underlying soils. Vegetation that multiplies by producing runners, invades the ballast from the track shoulder.

Eventually established vegetation dies and decomposes producing organic material that promotes the growth of additional vegetation. Track surfacing is a mechanical maintenance method used for restoring vertical and horizontal track alignment by increasing the density of the ballast underneath and between the ties. Track surfacing disturbs the ballast and disrupts vegetation growth temporarily. Track surfacing damages the ties and does not change the ballast properties, resulting in a temporary solution. Consequently, track surfacing is not an effective method for controlling vegetation growth.

Track ballast that has become contaminated with fine particles, organic materials or mud requires cleaning to restore the desired ballast qualities. Most railways utilize a common ballast cleaning method referred to as "undercutting". Undercutting is the process of removing the ballast from the track and shoulder and passing the material through a series of sieves; the cleaned ballast is then deposited back in the track, removing the fine particles, organic material

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and mud. The equipment that performs this task is an undercutter, and is capable of cleaning ballast from a depth of 8 inches to 18 inches (20cm – 46cm) below the bottom of the ties.

This method of ballast cleaning can only be performed in open track. Road crossings and switches require alternate methods of ballast cleaning. This method is not feasible for vegetation control as it is not economically viable.

Southern Railway is unable to consider undercutting as a method of ballast cleaning since most of the locations involve switches or areas between switches. The alternative method utilized by Southern Railway is track removal followed by blading the fouled ballast to one side replacing the track and placing new ballast. Ballast cleaning performed by this method may cost as much as \$200,000 per mile of track and therefore is not a feasible option (specifically) for vegetation control.

4.1.2 Tree Removal

Tree removal may be carried out:

- To remove woody vegetation and brush that is interfering with the normal functioning of equipment used to detect slides;
- Within the right-of-way;
- At road and pedestrian crossings;
- 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 right-of-way and near crossings serve as sources of seeds that can become established on the ballast or ballast shoulder, thereby requiring control measures to be implemented.

4.1.3 Re-Vegetation (Planting Disturbed Areas)

Desirable vegetative cover along the right-of-way 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, although this method may not be effective in the long-term for the wetter coastal areas where encroachment by woody species is more prevalent.

4.2 Identification of Pests Targeted by the PMP

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

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- 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 plant species . Some plant species may be easily controlled by non-chemical methods, while other species are better controlled through the use of certain types of 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.

4.2.1 Herbaceous Broadleaves and Grasses

Herbaceous broadleaves and grasses are commonly found in the rights-of-way. Providing they are not invasive plants or noxious weeds, many low-lying grasses can be beneficial within these areas, as they may compete to 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 requires control measures to be implemented.

4.2.2 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 right-of-way 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 right-of-way 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 potential.

Woody vegetation within the right-of-way comes in two forms, evergreen and deciduous. Under this PMP, all woody vegetation not identified as an invasive plant or noxious weed will be managed by non-chemical methods only.

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4.2.3 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 BC *Weed Control Act*. Noxious weeds are of primary concern to agriculture where they pose a threat of infestation to farm crops, pasture and range lands. Invasive Plants often out-compete native plant species reducing biodiversity and wildlife habitat.

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

4.3 Monitoring Pest Populations

Southern Railway employees conduct visual monitoring of weed/vegetation populations on a regular basis. During monitoring:

- A visual assessment of track conditions will be made (with respect to weed growth);
- Road and pedestrian crossings will be visually inspected with respect to the extent of weed/vegetation growth and to document if the required sightlines are being maintained;
- Vegetation conditions within the rights-of-way will be visually inspected to determine if trees and brush are a safety issue; and,
- The locations of noxious weed and invasive plant species/populations will be documented.

During visual inspections, the types of weeds/vegetation present, their location, and their density will be noted, as appropriate.

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.

4.4 Tolerance Thresholds and Decision Process

4.4.1 Tolerance Thresholds

The tolerance 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 tolerance 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. Tolerance thresholds will vary, however, since vegetation control is more critical for certain areas than for some others. Tolerance 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 right-of-way;
- 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 2 summarizes the Tolerance Thresholds used in this PMP that may trigger a treatment decision:

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Table 2: Tolerance Thresholds

Location		Threshold Vegetation or Brush Cover	Treatment Method
Zone 1 (Ballast Section)	main track	1 % cover	chemical and ballast cleaning
	sidings	1 % cover	chemical
	spur track	1 % cover	chemical
	storage track	1 % cover	chemical
	shop track	1 % cover	chemical
	yard track	1 % cover	chemical
Zone 2 (Remainder of Right-of-Way)	general	brush cover trees >80 % of distance to track	cut
	signalized highway crossing	sight line formula in accordance with 3.5.1 and 3.5.2 of the Safety Code	blade, cut
	non-signalized highway crossing	sight line formula in accordance with 3.5.1 and 3.5.2 of the Safety Code	blade, cut
	access crossing	sight line formula in accordance with 3.5.1 and 3.5.2 of the Safety Code	blade, cut
	pedestrian crossing	7 seconds warning time at train speed	blade, cut
	curvature	line of sight > 300 feet	blade, cut
Station Grounds Facilities Railway Yards	all vegetation	10 % vegetation or brush cover	blade, cut, chemical and dig out.
All Locations	Noxious Weeds Invasive Plants	Eradication as determined by Regional District's weed inspector	chemical, and/or cut and dig out
	blackberries	within 10 feet of track, signals or switch stands	chemical and/or cut

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4.4.2 Decision Process

Unless circumstances or safety concerns arise, necessitating immediate action, a decision to control vegetation will depend on whether the infestation exceeds the tolerance threshold for the location. An influencing factor in the decision process is the extent to which the tolerance threshold has been exceeded. For example, the threshold exceedance may involve a small area that in comparison to other locations would not merit (practically and financially) mobilizing control or treatment equipment.

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.

4.5 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.

Prior to vegetation management being implemented, general site conditions and environmental sensitivities will be assessed and documented by qualified persons familiar with the treatment areas. These detailed site assessments also document 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 and chemical control (herbicides).

4.5.1 Mechanical and Manual Methods

Manual cutting of brush and grass at switches, storage compounds, bridges, near structures, signs, signals and along fences is performed by qualified personnel using scythes, gas weed trimmers, brush cutters and chainsaws.

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Vegetation control using mechanical and chemical treatments at railway overpasses allow visual inspection of the structural components and reduce the possibility of fire.

Mechanical cutting of right-of-way vegetation is performed using a mower head attachment on a hi-rail backhoe, Excavator and mowing machines.



Vegetation control using an Excavator removes tree branches and brush that may potentially injure employees, damage equipment and cargo.

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Vegetation control using weed trimmers and brush cutters where required.

Tall growing brush on the right-of-way needs to be controlled so that it does not impair the visibility of signs, signals and crossings or impede employees from walking along the track. Mechanical and manual methods may include hand removal or cutting, weed trimming, mowing, brush cutters and chain saws. The rationale for these control options, including their advantages and disadvantages, are described in more detail in Table 3.

Table 3: Description and Rationale, Benefits and Limitations of Manual/Mechanical Control Methods

Description & Rationale	Benefits and Limitations
Weed Trimming using scythes or gas weed trimmers can be used in areas such as along fence lines, around switches, signs and equipment, and in areas around buildings, shops, and material storage piles.	Weed trimming allows the problem vegetation to be cut to the ground level. 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. Weed trimming does not remove roots, however, and is only of limited effectiveness against weed species that reproduce from stem pieces.
Brush Cutters are effective for the removal of brush and small trees from the inner right-of-way for the maintenance of sight line requirements. Brush cutters are generally mounted on high rail vehicles that travel on the tracks. They effectively cut most vegetation to a height of 10 to 20 cm, and extend from the shoulder of the ballast out into the inner right-of-way for 4 to 6 meters.	Brush cutting quickly removes vegetation, may reduce seed sources for ballast infestation, and leave treatment areas aesthetically pleasing. These methods, however, 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 are not removed.
Chain Saws are generally used in the outer right-of-way to remove or prune trees and tall shrubs that cannot be reached by mowers or brush cutters, for the removal of “danger trees” that pose a hazard of falling onto the track, and for tree removal to maintain sight lines on the inner and outer right-of-ways, at curves, and at road and pedestrian crossings.	The use of chain saws provides immediate results and provides selective control of vegetation. They can also be used in areas where herbicides cannot be used such as adjacent to bridges and watercourses. The use of chain saws, however, is physically demanding, and there is a risk of injury to the operator from wood debris and broken chains.

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4.5.2 Chemical Control (Herbicides)

4.5.2.1 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 railway vegetation management. 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 reconstructing or cleaning the ballast.

4.5.2.2 Herbicide Identification

The herbicide active ingredients proposed for use within this PMP are listed in Table 4:

Table 4: List of Potential Herbicides Proposed for Use

Active Ingredient	Trade Name*	Persistence**	Selectivity**
2,4-D	2,4-D Amine 600 2,4-D Ester 700	Residual	Selective
Aminopyralid	Milestone®	Residual	Selective
Bromacil	Calmix®	Residual	Non-selective
Chlorsulfuron	Telar® XP	Residual	Selective
Dicamba	Banvel® VM Vanquish®	Residual	Selective
Diuron	Karmex® DF	Residual	Non-selective
Flumioxazin	Fierce®	Residual	Selective
Fluroxypyr	Sightline™	Residual	Selective
Glyphosate	VP480™	Non-residual	Non-selective
Imazapyr	Arsenal® Powerline	Residual	Selective
Indaziflam	Esplanade™	Residual	Non-selective
Metsulfuron-methyl	Escort®	Residual	Selective
Picloram	Tordon™ 22K	Residual	Selective
Triclopyr	Garlon™ XRT	Non-residual	Selective
Other registered herbicides suitable for industrial right-of-ways, in accordance with the product label			

* List of products shown are common examples. Actual products used may vary although will include only the active ingredients listed above.

** Actual performance of herbicide may vary depending on the product and application method used

Note: spray adjuvants may also be used in conjunction with the herbicide active ingredients listed above:

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Herbicide application will be administered at specific locations as identified in Table 5

Table 5: Potential Herbicide Use Locations

Location	Target Vegetation	Herbicide Use
Zone 1: Ballast Section	All Vegetation	Yes
Zone 2: Right-of-Way	Brush Broadleaf Weeds	None
	Noxious Weeds Invasive Plants	Yes, appropriate herbicides only*
Station Grounds Facilities Railway Yards	All Vegetation	Yes

* Herbicide application limited to spot treatment only.

4.5.2.3 Herbicide Application Equipment

The equipment proposed for use in application of herbicides includes:

Backpack and Hand Held Sprayers

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

Vegetation control in off-track areas such as around buildings and storage compounds can be conducted using spot treatments with a backpack sprayer.

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 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 plants.

Vegetation control in off-track areas such as around buildings and storage compounds can be conducted using spot treatments with a hose and handgun.

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Boom Sprayer (Mounted on a High Rail Vehicle)

These sprayers are designed to distribute pesticide solutions evenly over large areas. They are used to deliver low to moderate application rates. Under this PMP, they are mounted on a high rail vehicle with a power-driven pump, and are used only for the application of herbicides to track and ballast areas and adjacent areas (Zone 1). Within this PMP, boom sprayers 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 plants.

Herbicide application to the railway ballast section by hi-rail truck with a truck mounted spray boom is the most practical method. This method permits the application of the herbicide mix up to a 24 ft (7.3m) total width at a height of 12 inches (30cm) or less above top of rail using a nozzle pressure of less than 275 kPa producing droplets that do not significantly drift. Application restrictions, such as a maximum allowable vehicle speed of 30 km/hr and a maximum wind speed of 16 km/hr when using a shrouded boom, are specified in the IPMR.

Vegetation control on the remainder of the right-of-way is required to maintain sightlines at crossings, the visibility of signs, signals, switches and other track appliances.

Herbicide applications on railway yard tracks and all other tracks by hi-rail truck with a truck mounted spray boom is the most practical application method in these areas as it permits application of the herbicide mix to avoid treatment overlap on adjacent tracks.

Herbicide Application Methods/Techniques

The herbicide application methods/techniques proposed for use under this PMP include foliar, wick/wipe-on, soil, and cut surface applications. A description, rationale for use, and the benefits and limitations of each of these application methods/techniques, is presented in Table 6.

Table 6: Description, Rationale, Benefits and Limitations of Herbicide Application

Description & Rationale	Benefits/Limitations
Foliar applications involve use of a manually operated pressurized backpack sprayer or a handgun, and can be used to apply all of the active ingredients. This method/technique is most effective when the target vegetation is actively growing.	Foliar applications can be carried out at any time of the year, provided the target plants are actively growing. As foliar applications are susceptible to drift, caution must be exercised around desirable plants and environmentally sensitive areas. If a non-selective herbicide is being applied, it will control both the target vegetation and desirable plants that are growing among them.

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Description & Rationale	Benefits/Limitations
Soil applications will be used for the application of the non-selective residual herbicide active ingredients to ballast, station grounds, railway yards, facilities, and track areas.	The soil applied herbicides proposed for use will give season long control of all vegetation on ballast, station grounds, railway yards, facilities, and track areas and track areas when applied at label rates. 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.

4.6 Post Treatment Monitoring

Treatment areas are routinely monitored following chemical application to ensure the desired results were attained and to record observed results. Inspections can be conducted in conjunction 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 non-selective herbicides for ballast treatment usually produces a sharp interface between treated and untreated areas and can often provide visual evidence regarding the precision of any applications. 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, the buffer zones provided by Zone 2 and the no-spray setbacks required for sensitive areas.

In summary, post-treatment monitoring will document the following:

- 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 to treat vegetation;
- Whether application rates can be reduced for future applications;
- If resistance to the herbicides used was observed in the unwanted vegetation;
- Evidence of herbicide movement away from the treatment site;
- The amount and rate of re-growth in unwanted vegetation;
- The effectiveness of the treatment; and,
- Whether the pesticide-free zones and no-treatment zones were maintained.

5.0 Environmental Protection Strategies and Procedures for Vegetation Management

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

- 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, pesticide-free zones (PFZ) and no treatment zones (NTZ) comply with the standards contained in Division 7 of the *BC Integrated Pest Management Regulations*.

Prior to commencing treatment, all pesticide free zones are identified using stakes in the field, maps, GPS, direct radio communication or a combination of these and other measures to ensure applicators and spray vehicle operators clearly understand which areas must be excluded from herbicide treatments.

5.1 Strategies to Protect Community Watersheds

Present information indicates that no community watersheds are located within 1 km of the geographic boundaries of the PMP area. This information will be verified prior to herbicide treatments in the application season.

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

Southern Railway 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 railway right-of-way are unauthorized and conflict with railway usage of the right-of-way. Some water wells and water supply intakes are located on properties adjacent to the right-of-way within 30 metres of the track. The location of these sites will be identified by employees with local knowledge to the applicators / spray vehicle operators prior to any treatments.

Table 7 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.

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Table 7: Minimum Protective Measures Specified in the IPMR to Protect Domestic and Agricultural Water Sources

IPMR Section	Uses	Ballast, Signal, Switch or Yard	Right-of-Way (excluding the ballast)
71(3)	All herbicide applications	30 m NTZ	30 m NTZ
71(4)	All herbicide applications	NTZ may be reduced if reasonably satisfied that a smaller NTZ will ensure no herbicide enters the water supply, intake or well	NTZ may be reduced if reasonably satisfied that a smaller NTZ will ensure no herbicide enters the water supply, intake or well

Definitions: **Pesticide-free zone (PFZ)** – is 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.

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.

5.3 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. Southern Railway will avoid causing impact to all listed species at risk and will work cooperatively with regulatory agencies and stakeholders in any recovery planning. Southern Railway 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.

5.4 Strategies to Protect Bodies of Water

Southern Railway 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 implementing control measures:

- Locate all bodies of water;

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- If applicable, identify areas of fish habitat, and whether water bodies are 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.

Table 8: Minimum Protection Measures for Bodies of Water as Specified in the IPMR

Herbicide Applications	Ballast, Signal, Switch or Yard	Right-of-Way (excluding the ballast)
Non-glyphosate applications. Bodies of water, dry streams and classified wetlands using any pesticide except glyphosate, subject to label restrictions and including all application methods.	10 m PFZ	10 m PFZ
Selective application to trees at highway crossings where a dry stream or a temporary, free-standing body of water is not fish bearing at any time of the year and does not drain to fish bearing waters.	N/A	1 m NTZ
Glyphosate Applications		
A body of water or classified wetland that is fish bearing or drains directly into a fish bearing body of water; or dry stream that when wet is fish bearing or drains into a fish bearing body of water.	2 m PFZ or 1 m PFZ if selective application for noxious weeds or invasive plant management.	5 m PFZ or 2 m PFZ if selective application methods or 1 m PFZ if selective application for noxious weed or invasive plant management.
A body of water that is not fish bearing at any time of the year and does not drain into a fish bearing body of water.	1 m NTZ	2 m NTZ
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.	Application up to high water mark.	Application up to high water mark.
A dry stream that is not fish bearing at any time of the year and does not drain directly into a fish bearing body.	Application over a dry stream.	Application over a dry stream.

Definitions: **Pesticide-free zone (PFZ)** – is 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.

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.

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.

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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.

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

The Southern Railway is adjacent numerous agricultural and rural residential areas. Food intended for human consumption is sometimes grown or found within many of these areas. Southern Railway will attempt to identify areas where food is intended for human consumption during pre-treatment inspections.

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;
- Where possible, adjacent 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;
- Where possible, herbicide treatments shall be conducted at times to minimize impacts on food plants.

5.6 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. The location of all environmentally sensitive areas will be identified. This information will be communicated to the contractor responsible for herbicide applications in a pre-treatment meeting.

5.7 Procedures for Maintaining and Calibrating Herbicide Application Equipment

All herbicide application equipment used on Southern Railway shall be safe, clean, in good repair, compatible and appropriate for the herbicide being used. The 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

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granule or wettable powders normally result in greater nozzle wear and will require more frequent calibrations.

5.8 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.

6.0 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.

6.1 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 *Integrated Pest Management Regulation*.

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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:

- Worker's Compensation Board of British Columbia (1998) *Occupational Health and Safety Regulations – BC Regulation 296/97 as amended by BC Regulation 185/99 – Sections 6.70 to 6.109*;
- B.C. Ministry of Environment (2005) *Handbook for pesticide Applicators and Dispensers*;
- Workers Compensation Board of British Columbia (2009) *Standard Practices for Pesticide Applicators*; and
- The *Integrated Pest Management Act* and Regulations.

All contractors applying herbicides on Southern Railway property 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 comply with 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.

6.2 Procedures for Safely Transporting Herbicides

Prior to commencing the spray program the estimated required quantity of herbicides are purchased to satisfy the needs of the current spray program. Southern Railway'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;

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- 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.

6.3 Procedures for Safely Storing Herbicides

Southern Railway has one storage facility located in Abbotsford where small amounts of herbicides may be stored periodically. The storage facility meets all requirements of the IPMA and WorkSafe BC Standard Practices for Pesticide Applicators including: forced ventilation, locked entry, sealed floor, fire resistant construction and exterior warning signs.

Personnel shall follow these procedures for safely storing herbicides:

- 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.

6.4 Procedures for Safely Mixing, Loading and Applying Herbicides

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

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- 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 pesticide-free zones, no treatment zones, 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.

6.5 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 6.3

6.6 Procedures for Responding to Herbicide Spills

Emergency Response Planning

Maintaining good communication with local Emergency Response Agencies is a critical element in ensuring that Southern Railway facilitates an effective response to any emergency situation

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that may arise. Southern Railway maintains the following equipment to aid in establishing and maintaining good communications in the event of an emergency situation:

- Radio communications between train staff and the Southern Railway Rail Traffic Controller;
- Cellular phones carried by certain (road) train crews for alternate communication with the Southern Railway Rail Traffic Controller or direct communication with police or other emergency responders;
- Cellular phones carried by Operation Supervisors and other Southern Railway supervisory staff.

In addition, Southern Railway has retained Quantum Murray Environmental Services to provide an Emergency Response Plan for Southern Railway and to respond to any incident involving a chemical spill or dangerous goods handled by Southern Railway involving all property and vehicles owned or leased by Southern Railway. To activate the Emergency Response Plan a call must be placed (through the Rail Traffic Controller or directly) to 1-877-378-7745 (24 hours) to the Quantum Murray Emergency Response Team coordinator on duty indicating that there is a chemical spill or dangerous goods incident. Upon activation, Southern Railway is to provide the Material Safety Data Sheet (MSDS), the Emergency Response Guidebook ID number, or the Transportation of Dangerous Goods (TDG) information from the bill of lading for the commodity involved. All Southern Railway operating personnel, including the Rail Traffic Controllers, are trained in Transportation of Dangerous Goods Regulations and are required to carry, accessible while on duty, a copy of the Emergency Response Guidebook.

Southern Railway is also required to provide an on-site technical advisor at the incident site. This may be the Superintendent, Operations Manager, or any Operations Supervisor.

7.0 Reporting, Notification and Consultation

7.1 Reporting

Accurate record keeping allow Southern Railway and the Administrator, *Integrated Pest Management Act*, to monitor the quantity of pesticides used, and to ensure compliance with the *Integrated Pest Management Act and Regulation*, the commitments made in this PMP, and the contents of the Pesticide Use Notice. Southern Railway will ensure that each of the required records described below are maintained.

7.1.1 Confirmation Holder Use Records

Each contracting firm that applies pesticides for Southern Railway must maintain daily records of herbicide use.

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Section 37(1) of the *Integrated Pest Management Regulation (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.

7.1.2 Annual Report for Confirmation Holders

In accordance with Section 39, Southern Railway will provide to the Regional Administrator, *Integrated Pest Management Act*, 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).

7.2 Notifications

Southern Railway commits to providing the following notifications with respect to this PMP:

7.2.1 Notification of PMP Confirmation

Southern Railway 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.

7.2.2 Annual Notice of Intent to Treat

As per Section 42 of the IPMR, for the purpose of an annual Notice of Intent to treat, Southern Railway 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:

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

Southern Railway 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.

7.2.3 Requests to Amend the PMP

Southern Railway 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 Southern Railway.

7.2.4 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. Southern Railway commits to abiding by this requirement.

7.2.5 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. Southern Railway 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.

7.2.6 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.

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7.2.7 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). 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.



Above is a sample Notice Sign that is installed at an authorized public access point to a railway yard or facility prior to the commencement of a herbicide treatment.

7.3 Consultations

7.3.1 Public Consultation Plan

Prior to submitting a Pesticide Use Notice to the Ministry of Environment for PMP confirmation, Southern Railway 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 the principles of IPM that are embodied in the PMP;
- To ensure that the public have an opportunity to provide comment, and for Southern Railway to address those comments, 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 for the use of wood preservative on wood timber bridges to prevent fungal decay and mechanical damage; and,

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- To explain how the planning process 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 cm² 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.

7.3.2 Public Consultation Report

Southern Railway will submit to the Administrator, *Integrated Pest Management Act*, 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 Southern Railway 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.

PART B WOOD PRESERVATIVES

8.0 Use of Wood Preservatives on Timber Bridges

8.1 Purpose of Wood Preservative Use

Wood structures utilized by Southern Railway are typically constructed with preservative-treated lumber to prevent decay and infestation with organisms that may damage the wood structures. Former practices would re-treat structures when tests indicated the presence of decay and/or insect pests that would damage the lumber used in the structures.

Changes in management practices mean that on-site treatment of wooden structures no longer occurs. Instead, any infected or damaged lumber is replaced with purchased pre-treated lumber. As such, the on-site treatment of lumber with preservatives is no-longer applicable to this PMP.

8.2 Land Use Covered by Wood Preservative Use

Wood preservatives are no longer used to treat/re-treat wooden structures. Any damaged wood requiring replacement is replaced with pre-treated lumber.

8.3 IPM for Wood Preservative Use

Wooden structures are maintained by replacing damaged lumber with pre-treated lumber. No on-site treatment is conducted; however, there are general practices conducted to evaluate the condition of structures to determine when physical maintenance is required:

- Monitoring program;
- Using injury thresholds in making decisions for replacement of a structure's components.

8.3.1 Prevention

Prevention of damage to timber bridges involves both pre-planning and moisture control.

Pre-Planning

Southern Railway tries to minimize wood deterioration by purchasing high quality and pre-treated wood for use in timber bridges, pilings, trestles and stringers. All lumber purchased for timber bridges, trestles and stringers is pressure and/or thermal treated with the oil-based wood preservative pesticides such as creosote, pentachlorophenol or copper naphthenate, or with the water-based preservatives chromated copper arsenate, ammoniacal copper or zinc arsenate.

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The service life of pre-treated wood is influenced by wood species, initial preservative treatment, climate, location, and maintenance practices. In general, timber bridges, pilings, trestles and stringers suffer little decay for the first 20 years of their life.

Moisture Control

The fungi that cause wood decay require moisture, air, favourable temperature and food in order to propagate and survive. Wood with moisture content below 20% is generally safe from fungal attack. Freezing temperatures stop fungal growth but seldom kill it. Fungi develop most rapidly when air temperatures are between 24 and 32 degrees Celsius and the moisture content of the wood is greater than 30%. The climate in the geographic area where the timber structures are located is conducive to the rapid growth of wood decaying fungi.

Moisture control involves identifying areas that are visibly wet or show high moisture content, locating the source of the water, and taking corrective action to eliminate that source. Cleaning dirt and debris from the decks, curbs and other horizontal surfaces reduces trapped moisture and improves air circulation. Seals or coverings applied to the end surfaces also prevent entry of moisture into the wood. As part of their regular track inspections, Southern Railway personnel will document the above and hire subcontractors to take corrective action as required.

8.3.2 Identification of Species

There are two basic groups of pests that can attack wood structures on Southern Railway property: above ground pests and below ground pests. Some pest species can be present both above and below ground.

The main pest species identified on Southern Railway structures are wood decaying fungi, of which 80 % are soft rot fungi and 20% are brown/white rot fungi. Several species of insects are also known to infest wood structures.

Wood decaying fungi may destroy the structural integrity of wood. Attack by wood decaying fungi can be rapid and can result in dramatic loss of wood weight and strength. The rate of decay is limited by the natural variation in temperature and moisture content of the wood. Decay-causing fungi attack the cell walls of the wood, thus reducing its' strength. Most species enter the wood from the soil or through above ground checks, bolt holes or as a result of mechanical damage during its' service life, although some may have been present in the production.

Decay can be observed on the wood in the form of heart rot (rotten heart wood at the center of the timber) or shell rot (rotten sapwood). Either can result in weakening of the timber. Occasionally, the combination of wood decaying fungi and weathering action (rainfall) can result in decay. Rain that collects in depressions (caused by fungal attack) causes the wood fibers to swell and shrink during freezing and thawing. Checks develop that allow this moisture and the decay spores to travel internally throughout the timber.

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Because wood decaying fungi are plants that lack chlorophyll, they cannot produce their own food and must obtain their energy and carbon requirements from wood. Fungi grow via tubular cells that can penetrate through the wood. They reproduce by releasing millions of tiny spores that can be distributed by wind, water or insects that are capable of starting new infections if they land on damp, unprotected wood.

In addition to the above, mechanical damage to wood may result in remedial action having to be taken. The most common causes of this damage are a result mechanical injury from vehicle (including marine vehicles) as well as nesting cavities and beak damage from woodpeckers. Additionally, checks, splits and de-lamination may result from environmental factors. All of these can create entry points for wood decay fungi.

When damage to wood from these identified factors reaches a threshold, timbers are replaced with pre-treated lumber. No on-site treatment is conducted.

8.3.3 Monitoring Program

In conjunction with the purchase of high quality and pre-treated wood for timber bridges, pilings, trestles and stringers, Southern Railway's inspection (testing) program is a combination of prevention, monitoring and the establishment of injury thresholds through the inspection process. The testing of timber bridges, pilings, trestles and stringers involves an evaluation of the integrity of the wood's physical characteristics and serviceability despite deterioration or damage, and taking measures to extend the service life or replace the damaged portions.

8.3.4 Injury Thresholds (Inspection / Testing Program)

This section describes the procedures to be followed by Southern Railway (or their contractors) when undertaking maintenance inspections of timber bridges, pilings, trestles and stringers for the presence of wood decaying fungi.

Depending on the locations of the structures being inspected/tested, inspections may be:

- External above ground;
- Internal above ground;
- Partial below ground; or,
- Full below ground.

Below ground inspections are generally undertaken only on wood structures that are physically set into the ground. The timber bridge covered under this PMP is located in, or directly adjacent to, the north arm of the Fraser River, and, as such, will only have external and internal above ground inspections performed.

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External Above Ground / Ground Line Inspections

All timber bridges will be inspected starting at a point 60 cm above the water line or high tide mark, or by excavating to a depth of 45 cm for structures located on land. Above ground inspections are visual inspections to identify bad checks, lateral breaks or cracks, above ground decay pockets, woodpecker holes, signs of insect infestation, shell rot, end rot, rotten or split areas, physical damage and broken stringers or hardware.

Internal Above Ground Inspections

Internal inspections of wood structures located in aquatic areas involve probing, sounding and the resistograph to determine the extent of wood decaying fungi or the soundness of the structure.

Partial Below Ground

Resistograph

Resistograph testing is a non-destructive method of examining the integrity of timber. The resistograph is an instrument that detects decay and cavities in timber by drilling a needle-sized hole into the wood and recording resistance data through the drill. The machine outputs a density graph that demonstrates the solidity of the wood member, displaying possible voids or areas of low density, which could be caused by rot or insect damage. The resistograph is an ideal device for estimating structural stability and longevity.

Probing

Probing is used to detect decay in checks and pockets and is generally done with a wire brush. Rot should be suspected when wood yields after firm pressure is exerted on the wood within deep cracks and pockets. Care must be taken during probing to avoid jabbing into the surface of the wood being tested, as this may damage fungus resistant wood and allow rot to start in less resistant areas.

Sounding

Sounding is used to detect internal decay in wood. Sounding will be performed on all wood that is inspected. A hammer is used to strike the surface of the wood at specified locations. A sharp ring indicates sound wood, whereas a hollow sound or dull thud indicates hollow heart or decay. Seasonal checks, internal checks, and shell rot can affect the sound. Suspicious areas will be further investigated by boring.

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8.3.5 Management and Selection Criteria

The end result of the inspection / testing process is a decision to replace the wood structure. The decision to replace the wood structure depends on both the strength of the structure and the presence of rot or other damage. Because inspections are carried out on a periodic basis the presence of wood decaying fungi and the extent of their spread can be documented over time. Damaged wood is replaced when it is deemed to be compromised and will ultimately fail if it were left in-place.

8.3.6 Treatment with Wood Preservative Pesticides

No wood structures are treated in-situ. Damaged components of structures are replaced with pre-treated wood.

8.3.7 Application Techniques for Internal Treatments (Vials)

Internal treatments are no longer conducted.

8.3.8 Post-Treatment Evaluations

As on-site treatments are no longer conducted, post-treatment evaluations are no longer necessary.

9.0 Environmental Protection Strategies

Section 58(3)(b) of the IPMR requires that confirmation holders (i.e., PMP holders) must have the environmental protection strategies and procedures in place prior to pesticide use. On-site treatment with wood preservatives is no longer conducted and consequently the corresponding environmental protection strategies are no longer applicable.