Pest Management Plan

For Management of Vegetation at BC Hydro Facilities #105-0980-12/17



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BC hydro

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Chapter 1 – Introduction to Facilities Pest Management Plan

1.1, About BC Hydro

BC Hydro distributes electricity produced by several hydroelectric and other plants to the majority of BC's population. It is responsible for the safe and efficient movement of electricity from the time it leaves the generating plants through the transmission system to the substations until it reaches customers through distribution lines.

BC Hydro operates 30 hydroelectric facilities and three natural gas-fueled thermal power plants.Hydroelectric plants consist of a dam, a reservoir, a powerhouse, and a switchyard. At each hydroelectric plant, water from a reservoir flows into the powerhouse via a tunnel or penstock. The flowing water turns turbines (rotating blades), which in turn drive generators. The generators convert the turbines' mechanical energy into electrical energy. Transformers located within switching stations convert the generators' low-voltage electricity into a higher voltage (greater than 60,000 volts), which is then transmitted over long distances via transmission lines. The BC Hydro high-voltage transmission system consists of 18,286 kilometres of transmission lines, operating at voltages from 60 kV to 500 kV.

Transmission lines terminate at substations, which contain transformers that reduce the voltage of the electricity. The electricity is then distributed to BC Hydro customers via approximately 64,000 km of distribution lines (at less than 60,000 volts).

Administrative buildings and storage sites supporting BC Hydro's electrical distribution are located throughout the province and are also covered under this Pest Management Plan (PMP).

Potential facilities – lands owned or leased by BC Hydro that may be used for or affected by future facilities, including lands in the vicinity of potential dams or reservoirs are included within this PMP.

For the purposes of this Pest Management Plan (PMP), a **facility** is a well-defined site, owned or leased by BC Hydro, which typically has limited public access.

1.2, About This PMP

This Pest Management Plan allows BC Hydro to use pesticides within its operating area. A PMP is a plan that describes:

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

Legal Authority

BC's *Integrated Pest Management Act* and *Regulation* requires organizations to conduct pest management programs under a single, comprehensive PMP. PMPs are required for pesticide use on public and some types of private land.

This PMP has been prepared to comply specifically with Section 58 of the Ministry of Environment's *Integrated Pest Management Regulation.*

The PMP ensures legal accountability with the provisions of the Act and Regulation, as well as all other applicable federal, provincial, and regional laws and regulations.

Purpose of PMP

The primary purpose in developing this PMP is to provide a single document describing BC Hydro's Integrated Pest Management (IPM) planning processes for facilities to ensure effective vegetation management while protecting environmental values and human health. IPM is a decision-making process that uses a combination of techniques to suppress pests.

The PMP is required to:

- guide the responsible use of pesticides
- incorporate the principles of integrated pest management (IPM)
- allow public awareness of, and input into, the BC Hydro facilities vegetation management program
- ensure that the effective use of an IPM program takes into account environmentally sensitive areas and land uses

- ensure continuing investigations into alternative methods of vegetation management, while preventing damage to the environment

PMP Term

PMPs remain valid for five years. This PMP is an updated replacement of a version that was first confirmed in 2007 and expired in 2012. This version will be valid from 2012 to 2017.

Person Responsible, Section 58(1)(b)(c)

Within BC Hydro, the person responsible for managing pests under this PMP is: Rene Roddick, Vegetation/Pest Biologist: 604-543-1533, email rene.roddick@bchydro.com.

Definitions

The following words and phrases are key to this PMP. A more complete Glossary is included in Appendix 1.

Pest — any undesirable organism that should be controlled to ensure the safety and integrity of operating systems. For BC Hydro facilities, this means **Weeds**, defined under this PMP as any undesirable plant, including grass, brush, trees, noxious weeds, or other vegetation.

Integrated pest management (IPM) — a decision-making process that uses a combination of techniques to suppress pests and that must include, but is not limited to, the following elements:

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

Integrated vegetation management — the IPM process specifically for the control of weeds at BC Hydro facilities. The primary objectives are to ensure worker and public safety and system reliability.

1.3, About Vegetation Management

Weeds within and immediately surrounding BC Hydro facilities must be effectively controlled because weeds can cause harm in various ways. Weeds can:

- lead to power outages by interfering with electrical components
- become a fire hazard or serve as a fuel source for fires
- compromise the structural integrity of dams, dikes, and penstocks
- spread seeds and debris into the facility from outside, damaging or contaminating the crushed rock base at electrical facilities, and leading to increased risk of electrical hazard and worker injury
- restrict access to electrical and non-electrical components and areas for maintenance, safety inspections, and emergency response
- interfere with surveillance and inspection abilities
- cover or hide fences, increasing the risk of unauthorized entry and theft
- serve as shelter for structural insect pests, especially rodents
- lead to corrosion of steel equipment and structural deficiencies
- lead to proliferation of noxious weeds
- cause workers to slip, trip and fall

Worker Safety Issues

Vegetation management at substations is critical for safety reasons. If an electrical fault or lightning strike occurs, current flows through the structure and into the ground. Weeds can conduct electricity, putting workers at risk of electrocution through “step and touch” potential. These current flows can also be transferred outside the facility, thereby putting the public at risk.

For the above reasons, buried underneath each of the substations is a grid of bare wires. This provides a common grounding system for electrical and metallic structures. The purpose of the grounding system is to:

- protect staff and the public from electrocution in case of a system fault, equipment failure, or lightning strike by limiting electrical potentials to safe levels
- support the proper operation of the electrical system by providing a low impedance (resistance) path for fault currents

Any weeds growing over or into this grid can seriously compromise the safety functions of the grid and pose an electrical hazard to workers. Therefore, a surface of clean, crushed rock (similar to gravel) is laid over the grid to prevent weeds from establishing.

Many facilities have high voltage equipment located outdoors. Areas around electrical equipment must be kept clear of all vegetation, including nearby trees that might drop debris onto the equipment.

In addition, weeds within facilities can increase the risk of tripping and slipping.

Worker safety around electrical sites is covered under the *Occupation Health and Safety Regulation* of WorkSafe BC.

Pest Management Objectives

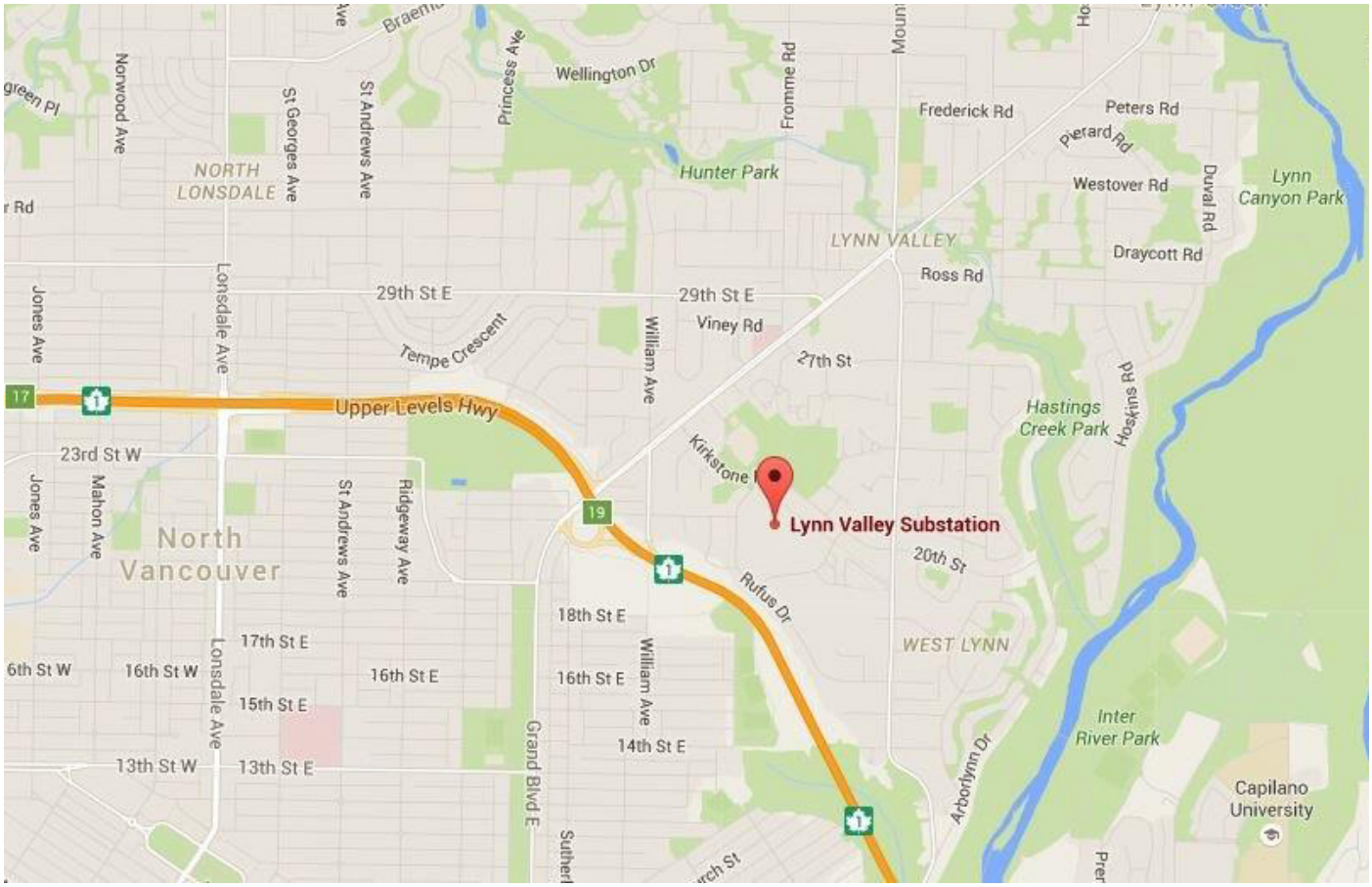
Pest management objectives at BC Hydro facilities are based on system design and prevention measures that are aimed at stopping the initial growth and spread of weeds. Therefore, BC Hydro will:

- manage vegetation in and around facilities in a professional manner
- maintain a reliable supply of electricity
- ensure safe working conditions and public safety
- protect environmental resources
- reduce long-term program costs
- maintain site security

1.4, Geographic Boundaries, Section 58(1)(a)

The BC Hydro service area encompasses most of British Columbia except the City of New Westminster, and those areas of the Kootenays and Boundary between Creston and Rock Creek, the Similkameen Valley, and the Okanagan Valley from the Canada/U.S. Border north to and including the City of Kelowna.

Lynn Valley Substation (see map below) was added to the list of treatment sites in February 2016 to allow for the utilization of a new treatment technique.



Types of Facilities The types of facilities covered by this PMP include:

- substations
- capacitor stations
- microwave sites
- repeater stations
- data collection sites
- helipads
- office buildings and storage yards
- pole yards
- switchyards
- dams
- reservoirs
- dikes
- spillways and diversion channels
- penstocks
- hydroelectric generating stations
- thermal generating stations
- diesel generating stations
- gas turbine stations
- cable termination sites
- access roads to facilities
- gravel pits/quarries
- leased lands for generation development
- drill sites
- till sites
- rinse Stations
- climate stations

- existing and proposed transportation corridors

Substations — facilities that receive high voltage electricity from transmission lines and reduce the voltage to an appropriate level for delivery via distribution lines to residential, commercial, and industrial customers. They consist of a system of transformers, circuit breakers, and other high voltage equipment installed outdoors. BC Hydro has more than 330 substations throughout the province.

Capacitor stations — sites with equipment that controls system voltage.

Microwave sites — telecommunications facilities that house a microwave repeater station. They receive and redirect microwave signals to distant points.

Repeater stations — also known as amprodomes, and similar to microwave sites, except they receive, amplify, and redirect radio signals.

Data collection sites — instrumentation facilities that collect information on weather and reservoir levels. These facilities also monitor performance of dams and transmit geological information to a central control centre, using a computer application called ADAS (Automatic Data Acquisition System).

Helipads — helicopter landing pads for access to facilities in remote areas.

Office buildings and storage yards — corporate, regional, and district administrative office sites, and visitor sites. Most of these office sites are associated with storage yards, which are facilities for storage of electrical system components and other equipment. These are usually fenced with numerous out buildings. BC Hydro has over 90 office sites.

Pole yards — compounds that store wooden distribution poles. These sites are usually fenced and covered with clean, crushed rock.

Switchyards — facilities that receive low-voltage electricity from a hydroelectric powerhouse and increase the voltage to an appropriate level for long distance transmission over transmission lines to substations.

Dams / Reservoirs — dams are concrete or earthfill barriers across a river that are designed to control water flow and/or form a reservoir to store the water. Reservoirs have intakes that feed water into tunnels and penstocks.

Dikes — banks constructed to control or confine water.

Spillways and diversion canals — Spillways are concrete or natural channels designed to pass excess water around the dam without going through the turbines. Diversion canals (or power canals) are open channels that carry water to penstocks or storage reservoirs.

Penstocks — large wooden or metal pipes that carry water from a reservoir to the turbines in the hydroelectric station. Penstocks may be adjacent to surge towers, which divert and hold excess flow from reservoirs.

Hydroelectric generating stations — facilities that generate electricity by harnessing the potential energy from water and transforming it into electric energy. BC Hydro has over 30 stations.

Thermal generating stations — facilities that generate electricity by converting heat energy (through burning of fossil fuels) into electric energy. BC Hydro has one station.

Diesel generating stations — facilities that use diesel generators to produce electricity. BC Hydro has 12 stations.

Gas turbine generating stations — facilities that use natural gas or fuel oil in jet engines to produce electricity. BC Hydro has 2 stations.

Cable termination sites — locations where electrical cables enter the ground or water and connect to underground or submarine electrical cables.

Gravel Pits – gravel pits are sites excavated and used as a source of material for an array of different projects.

Drill sites – small areas for extraction of geological core samples.

Properties – under license of occupation, permitted and those with access agreements used for BC Hydro business/activities for the purpose of managing noxious/invasive species.

Potential facilities – lands owned or leased by BC Hydro that may be used for or affected by future facilities, including lands in the vicinity of potential dams or reservoirs.

Access roads to facilities — transportation corridors that provide access to facilities for routine maintenance, daily operations, safety inspections, and emergency response.

Chapter 2 – IPM Program for Vegetation Management

This chapter describes BC Hydro's integrated pest management program for control of weeds at facilities, as per Section 58 of the *Integrated Pest Management Regulation*, which describes information required for the PMP.

The steps for integrated vegetation management (Fig.1) include:

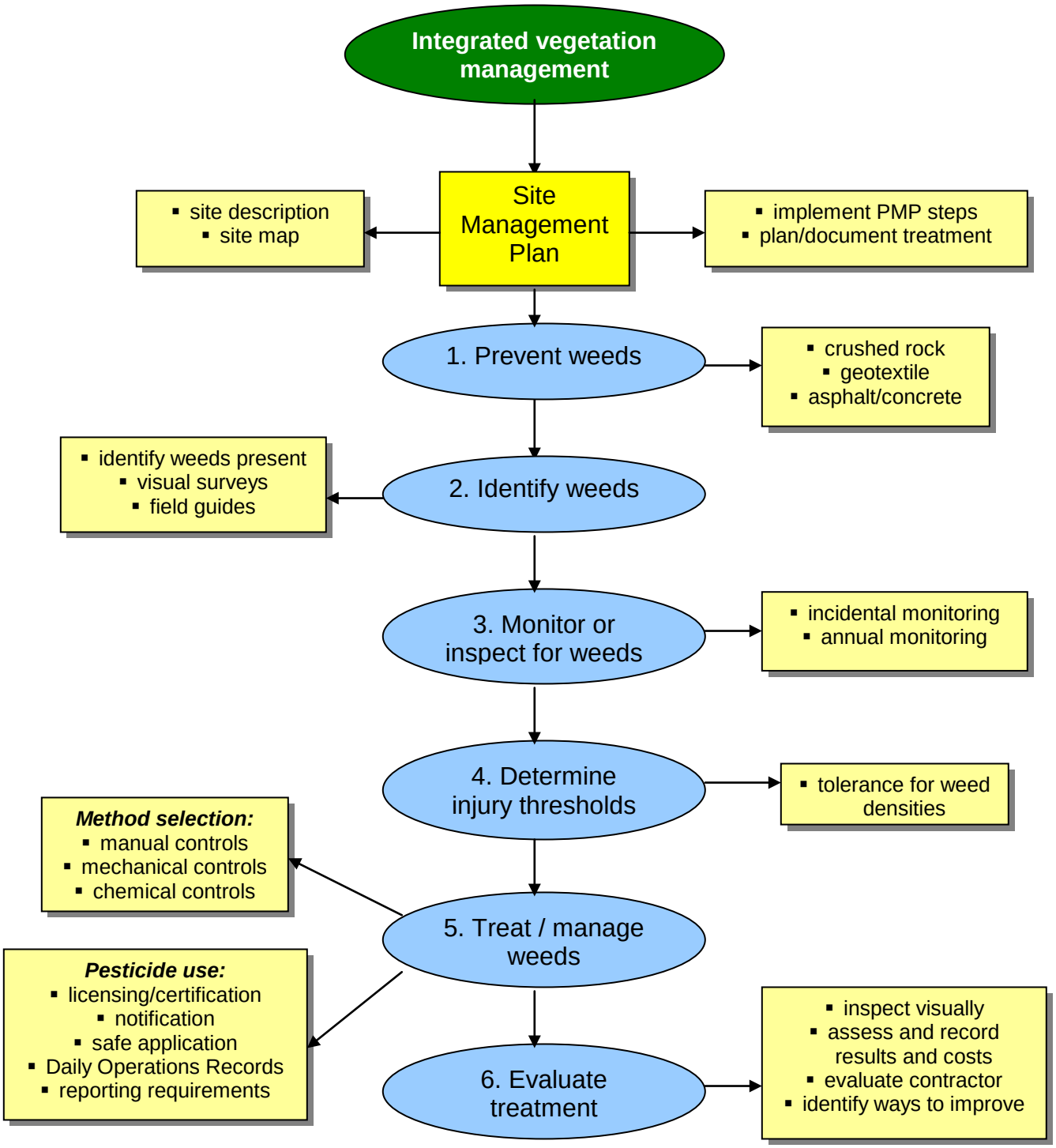
- prevention (planning) — Section 58(2)(a)
- identification of pests — Section 58(2)(b)
- monitoring for pests — Section 58(2)(c)
- identification and use of injury threshold levels — Section 58(2)(d)
- treatment options and selection criteria — Section 58(2)(e)
- evaluation of treatment — Section 58(2)(f)

2.1, Prevention (Planning), Section 58(2)(a)

Vegetation management at BC Hydro facilities depends primarily on system design and preventive measures that are aimed at stopping the initial growth and spread of undesirable vegetation (weeds). These measures are considered during the design stage of facility development, during construction and during upgrades. Preventive measures may reduce the use of herbicides and other non-chemical control methods.

Preventive measures that BC Hydro may implement include improvement of drainage or the installation of crushed rock, asphalt, concrete, geotextiles, and other surfacing materials.

Figure 1. Implementing the Pest Management Plan
For BC Hydro Facilities



Prevention,
Section 58(2)(a)

Crushed Rock

The most effective way to prevent weeds from establishing is by maintaining a 15cm layer of clean, crushed rock (similar to gravel) in and around areas that have zero tolerance for weeds. Crushed rock surfaces may also extend 2m outside the facility fence line to minimize the drift of seeds from outside, and to maintain public safety by reducing electrical exposure adjacent to substations.

Crushed rock has many features that contribute to electrical and engineering safety. In particular, it has a high level of electrical resistivity, which means it does not conduct electricity, thereby reducing the risk of electrocution over the ground grid. Other functions and advantages of crushed rock are:

- It greatly impedes the establishment of weeds.
- It retards the evaporation of moisture from the underlying soil, thus lowering the resistivity of the soil and improving its ability to conduct the fault or lightning current into the ground and away from the surface.
- It allows rapid surface drainage.
- It is economical and readily available.
- It is non-flammable and helps to prevent fires in areas around oil-filled equipment.
- It provides a suitable surface for the movement of equipment and vehicles.
- It helps control dust.

Over time, the resistivity and effectiveness of crushed rock surfaces is reduced due to construction activity, traffic, and organic matter build-up that encourages establishment of weeds. Therefore, for optimal safety and weed control, crushed rock surfaces are monitored and replenished as required.

Crushed Rock Over Geotextile

The effectiveness of crushed rock for excluding weeds can be enhanced with a geotextile layer close to fence lines, and in areas where herbicides cannot be used. Geotextile is a porous, polypropylene fabric that is laid underneath

the crushed rock. It can also be staked to the soil in areas without crushed rock. Geotextile should not normally be used in driveable areas because it may become damaged, or around oil-filled equipment because it will cause the oil to spread during a spill.

Asphalt and Concrete

Asphalt and concrete can also be used near electrical equipment, but are not as favourable as crushed rock. They conduct electricity and are more expensive than crushed rock.

The use of asphalt and concrete is generally limited to access roads and storage areas inside facilities.

Other Surfacing Materials

BC Hydro has tested other surfacing materials, such as limestone surfacing and crushed oyster shell surfacing, to see if they exclude weeds more effectively than crushed rock. Limestone has low resistivity, may impede drainage, is expensive, negatively impacts equipment due to its high dust content, and is not readily available. Oyster shells are expensive and have limited application.

Restricting Organic Matter and Seeds

Organic matter and seeds should be kept from entering the facility and contaminating the crushed rock. This can be done by:

- removing trees (especially deciduous), grass, and shrubs growing close to the facility fence line to reduce debris deposition inside the facility
- maintaining a 2m crushed rock strip outside the fence line (over the ground grid) of sites to reduce the spread of invasive plants, such as blackberry, horsetail, scotch broom, and groundsel

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2.2, Pest Identification, Section 58(2)(ii)

Accurate identification of weeds present at a facility is necessary because control methods work differently on various species. For example, the herbicide treatment for grass will not control horsetail. Some vegetation types at a particular facility may be tolerable or even desirable (such as grass at a landscaped office area). In order to safely operate our facilities, BC Hydro staff and contractors are able to distinguish between desirable and undesirable species.

BC Hydro has Vegetation Management Specialists/Biologists located around the province with experience in weed management. These staff members provide information and support to other staff and to contractors on types of

weeds, how they establish, their biology and growth rates, best strategies for control, herbicide resistance and other information.

As required, BC Hydro staff and contractors will use field guides to help them identify weeds.

For each facility, the BC Hydro Vegetation Management Specialist/Biologist or delegate:

- identifies major vegetation species that have, or may have, an impact on the management of the site
- identifies vegetation species by common name and/or Latin name, to the taxonomic level required for proper control method selection

2.3, Monitoring Pest Populations, Section 58(2)(c)

Monitoring of facilities provides a record of information about weed occurrence, density, and site conditions. Information is recorded in Site Management Plans (SMPs — see below), including changes in weed species composition, distribution and density over time, as well as changes in surface materials and adjacent plant communities that could invade the site.

Incidental Monitoring

BC Hydro maintains site integrity by routinely inspecting and monitoring facilities for potential or existing weed problems. This incidental monitoring is carried out by BC Hydro staff working on-site or visiting sites, such as electricians, security officers, Vegetation Management Specialists/Biologists or delegates, or facility managers.

Staff will notify the facility manager or regional BC Hydro Vegetation Management Specialist/Biologist of any weed problems that require immediate action.

Annual Monitoring

All sites are assessed before treatment by the contractor, agents or staff to make decisions about the timing of treatments and whether they are necessary. Sites are monitored once per year, or sometimes more frequently depending on the specific environmental sensitivities and electrical concerns of the site. Information is collected on the presence of invasive/noxious plants, encroachments of weeds, and any resistance to herbicide treatments and used to constantly improve the program.

Monitoring is done visually and may be documented in writing. Weed percentages are estimated and compared to the threshold levels. Decisions are then made to prescribe treatment, methods, and timing.

Weed control contractors are provided with a map of the facility and asked to sketch in the areas where weeds are present, estimate the total percentage cover for the site, and note the major species present. This is done each time the site is treated, using a single map for each calendar year.

Site Management Plans

A Site Management Plan (SMP) is a document that contains detailed information on a particular site, such as its history, weed coverage, and environmental concerns. The SMP also describes how integrated vegetation management activities will be carried out on the site, and may include a detailed map of the facility.

SMPs have been developed for sites requiring integrated vegetation management, primarily substations. They have been prepared by BC Hydro Vegetation Management Specialists/Biologists or qualified consultants in each region. SMPs may be developed for smaller and lower priority sites on an as needed basis. Lesser sites for which an SMP is not developed will have a prescription prepared prior to treatment.

The prescription will contain the following:

- site sensitivities (nearby water bodies, pesticide-free zones, residual-free zones)
- current conditions (surfacing materials, list of weed species within and outside the facility)
- preventive measures that can be taken
- recommended treatment methods, procedures, and timing

2.4, Injury Thresholds, Section 58(2)(d)

Treatment of weeds within BC Hydro facilities is required when the surface weed cover reaches a predetermined level, called the **injury threshold** (or action level). It is generally expressed as a percentage of the total weed area that can be tolerated while still maintaining the integrity, security, and safety of the site. Any percentage weed cover above the established injury threshold requires a vegetation management action.

Injury thresholds vary because weed control is more critical for certain areas within each facility. They can be general and include all weed species (e.g., within a substation where there is low tolerance for weed growth), or they may be specific to one weed species (e.g., where a single, tall-growing tree or shrub species compromises site safety and security).

Injury thresholds that are deemed acceptable for weeds at BC Hydro facilities reflect the reasons for the control—safety, system security, structural integrity, and economic impacts.

Injury Thresholds for Electrical Facilities

Electrical facilities include substations, switchyards, hydroelectric generating stations, thermal generating stations, diesel generating stations, capacitor stations, and cable termination sites. Injury thresholds for each major type of site are listed on the following pages (threshold percentages are in bold).

Facilities can be divided into several areas with different injury thresholds, as follows.

Within Electrical Compounds

Due to serious electrical safety hazards, there is a very low tolerance for weeds within fenced electrical compounds.

BC Hydro does not allow weed populations to exceed **5%** of the cover of the electrical compound. When weeds reach this density, control is initiated.

In addition, the following areas are maintained weed free (**0%**):

- under or around electrical equipment
- under switch operators and equipment control cabinets because of the high risk of people standing at the equipment during an electrical fault
- around oil-filled transformers and equipment
- around high voltage equipment with ground level insulators

Just Inside or Outside Fence Lines

For safety reasons the ground grid often extends beyond the fence line for 2m. Therefore, requirements for weed control are the same as those inside electrical compounds. Weeds are controlled when densities exceed **5%** of the 2m area inside and outside the fence line.

It is important to control invasive and rapidly spreading vegetation from encroaching on fence line to prevent them from establishing inside the facility.

Pole Yards and Storage Yards

In pole yards and storage yards, weeds are controlled because they can:

- increase fire hazards
- create slipping and tripping hazards
- interfere with equipment access, site security, and storage capabilities
- serve as food and habitat for ants, wood pests and rodents
- lead to corrosion of steel equipment

Storage of woodpoles is governed by the Canadian Standards Association (CSA). CAN/CSA 015, section 5.7, states that “poles shall be piled and supported in such a manner that all poles are at least one foot above the general ground level. No vegetation or decaying wood shall be permitted underneath stored poles.”

Therefore, control is initiated at >**0%** weed cover under pole bunks. Control is initiated at **10%** weed cover in the yard areas.

Hazard trees outside the fence line are removed because they may damage equipment and material (**0%**). (Hazard trees are defective trees that may fall into the site.)

Mowed grass, forbs, and shrubs are acceptable in some open areas.

Hydroelectric Facilities

Hydroelectric facilities include generating plants, earthfill or concrete dams, penstocks, spillways, and canals. Weeds at dam sites are a safety concern and must be removed because they can:

- damage the structural integrity of the dam by penetration of the dam core by roots, increasing the risk of water leaks and erosion
- damage the dam by windthrow (i.e., by tree roots pulling out of dam face)
- impede access to structures and instrumentation for safety inspections
- block sightlines during visual inspections for monitoring seepage and sinkholes
- block sightlines for survey pins in the ground, used as reference points to monitor surface movement of dams and other structures

- provide cover for burrowing rodents and other pests

It is important to control trees before extensive roots become established, since root systems can provide channels for water to move through the dam causing structural weaknesses.

Low-growing vegetation, such as grasses, forbs, and mat-forming shrubs, is desirable at dam sites and along waterway corridors as long as it does not exceed 0.5m in height. Such vegetation helps prevent the growth of weeds and spread of pests. It also improves aesthetics and controls erosion.

Earthfill Dams — All vegetation will be controlled within 6m from the toe of the dam, and on the upstream and downstream dam faces (**0%**). These areas must be kept clear to monitor for seepage, which is an indicator of dam failure. Deep-rooted trees and shrubs will be controlled once they reach 1m in height. Control measures will be implemented once **5%** of the upstream and downstream dam faces are covered in saplings. When control is implemented, all potentially tall-growing vegetation will be removed.

Concrete Dams — Plants can become established around the buttresses and in cracks, contributing to dam deterioration. All vegetation must be controlled within 6m from the toe of the dam to monitor seepage (**0%**). Deep-rooted trees and shrubs should be controlled before they reach 1m in height anywhere within the dam structure (**0%**). Control measures will be implemented once **5%** of the upstream and downstream dam faces are covered in saplings. When control is implemented, all potentially tall-growing vegetation will be removed. Mosses, liverworts, and algae that become established on the concrete may need to be controlled to ensure access for maintenance and inspection.

Penstocks — Penstocks can range from several metres to several kilometres in length. Drainage channels located alongside of penstocks prevent erosion of the concrete cradle foundations. Penstocks are generally inspected at least once a year.

Weeds must be controlled (**10%**) along the penstock right-of-way up to 5m on either side, and around the cradle or saddle support, to:

- maintain the integrity of the penstock structure
- maintain access for safety inspections and maintenance
- prevent trees and debris from impeding drainage in ditches and waterways, and damaging channels
- minimize fire hazards

- provide proper aeration for wooden penstocks to minimize decay
- reduce shade to prevent the growth of moss, algae, and fungi on penstocks

Vegetation management is very important on wooden penstocks because plants can contribute to their deterioration. Weeds, especially resinous species (e.g., broom) that create a fire hazard, and tall-growing trees and shrubs, must be removed. Grasses and other low-growing herbaceous species are acceptable.

Spillways, Dikes and Diversion Canals — Weed control is required around spillways, dikes, and diversion canals to:

- prevent debris accumulation in the canal, especially trees that can lead to downstream log jams
- ensure spillways can function to full capacity (if functioning improperly, water could spill over the top of the dam, resulting in dam failure)
- prevent roots from growing under the slabs of diversion channels and damaging the concrete lining
- maintain access for safety inspections and maintenance

Trees and shrubs alongside canals will be controlled when **10%** of the area is covered. Grasses and other low-growing herbaceous species are acceptable.

Designated Roadways

Weeds established within or alongside roadways can rapidly spread. Even though electrical hazards are not as high, BC Hydro cannot leave weed populations unchecked. When weed levels reach **10%** of the area, control is initiated.

The exception is asphalt roadways, where no weeds are tolerated because the resistivity and surface integrity of the asphalt would be compromised (**0%**).

Mosses, liverworts, and algae may be acceptable and may not require control.

Undeveloped Areas (no buildings or equipment)

Weeds established in undeveloped areas inside the electrical facility (either crushed rock-covered or grass-seeded) can rapidly spread to adjacent electrical compounds. When weed levels reach **10%** of the area, control is initiated.

Mosses, liverworts, and algae may be acceptable and may not require control.

Other Weed Control

There is no tolerance for noxious weeds, which will be controlled at all sites as soon as they are noticed **(0%**). Noxious weeds are any plants that pose a threat to people, animals, or crops as specified under the Weed Control Act.

Within facilities, trees and other tall-growing or deep-rooted vegetation may be removed regardless of the hazard level for the location **(0%**). This is because trees can interfere with required electrical clearances and site security, and pose a risk of fires, property damage or power outages.

In particular, damaged and dying trees (hazard trees) that could fall into the site must be removed (**0%**).

In areas where pedestrian or vehicular access is required and a slipping hazard exists, control of liverworts, lichens, and algae may be required.

Injury Thresholds for Communication Facilities

Communication facilities include data collection platforms, microwave stations, and repeater stations. Weeds at these facilities can interfere with reception of communication signals.

Any weeds interfering with the proper functioning of this equipment should be controlled as soon as possible (**0%**), including:

- trees and tall-growing vegetation, which can disrupt transmission of microwave and radio signals and become energized during lightning strikes
- trees, shrubs, and weeds around data collection platforms, because they can interfere with accurate measurement and transmission of data
- vegetation which interferes with access or may cause slips, trips or falls

Injury Thresholds for Transportation Facilities

Transportation facilities include access roads, parking lots, and helipads that are part of a BC Hydro owned or leased site. These sites must be kept clear of tall-growing vegetation for maintenance, access, emergency response, and safe helicopter landing.

Helipads

The BC Ministry of Transportation has stringent clearance requirements around helipad sites, where contact with trees or other vegetation could cause a fatal crash.

Helipads consist of a critical zone, secondary zone, and manoeuvering area. Vegetation management will vary depending on the topography, terrain, and direction of helicopter approach. Low-growing grass, forbs, and shrubs are acceptable around helipad sites, except within the critical zone.

The following types of weeds are controlled around helipad sites (**0%**):

- all vegetation within the critical helipad area (5m radius passenger and equipment exit zone)
- trees and tall-growing vegetation within the secondary helipad area (15m x 15m area)
- trees and tall-growing vegetation within the manoeuvering area (generally 44m x 44m, but may vary depending on the terrain), if space is required to ensure rotor clearance and manoeuvering room

Access Roads and Parking Lots

The following types of weeds are to be controlled around roads and parking lots (**10%**):

- trees and shrubs within 1m on either side of access roads and roadside ditches
- all vegetation in parking lots and within 1m of the edge of parking lots

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2.5, Method Selection, Section 58(2)(e)

IPM involves the use of different techniques (options) to control weeds within BC Hydro facilities. Methods may differ depending on the type of weeds to be controlled. Treatment options used for larger, established trees are different from those used for herbaceous weeds, grasses, and tree seedlings.

The IPM techniques proposed for the control of weeds in or adjacent to BC Hydro facilities include:

- chemical methods (herbicides); Section 2.6
- physical methods; Section 2.7
- cultural/biological methods; Section 2.8

General Selection Criteria

Selection of a particular option depends on:

- the weed species being targeted
- safety, security, economic impacts, and site accessibility
- treatment timing
- effectiveness
- land use within the facility
- environmental sensitivities in surrounding areas (fish, wildlife, surrounding land use)
- site characteristics, including land use, proximity to water sources, bodies of water, biogeoclimatic zones, and soil type
- budgetary constraints
- the consequences of not treating

Herbicide Selection Criteria

Chemical control involves the use of herbicides to inhibit growth of weeds within or adjacent to BC Hydro facilities. Selection of the herbicide is determined by:

- soil residual activity
- mode of action
- selectivity
- environmental characteristics
- health and safety characteristics

Soil Residual Activity

An herbicide with residual properties is generally effective for the growing season up to 5 years. Herbicide active ingredients are generally classified by their degree of soil residual activity—low, moderate, or high. The most common herbicides used by BC Hydro have low to moderate soil residual activity and are selected to be active for one growing season only.

Mode of Action

An herbicide's mode of action refers to how it affects the plant. Uptake of herbicides is by plant roots, stems, and foliage. All herbicides used under this PMP are translocated with the exception of chlorsulfuron, which works on contact, as well as translocation.

Selectivity

Herbicides that control all vegetation are termed non-selective, while those that are effective in controlling certain types of vegetation are termed selective.

Environmental Characteristics (chemical properties)

The following properties are considered when making an herbicide selection:

- volatility
- adsorption to soil particles
- toxicity to non-target organisms
- selectivity
- residual activity

This information is detailed in Table 1. Properties of Approved Herbicides

Health and Safety Characteristics

All herbicides used by BC Hydro have low to moderate toxicity. Applicators are well-trained and protected by personal safety equipment such as goggles, gloves, coveralls, and chemical-resistant boots based on the label recommendations. To minimize exposure, BC Hydro selects herbicides with the lowest level of toxicity and rates that provide acceptable levels of weed control.

BC Hydro's Quality Management and Technical Resources group is continually looking for and testing new and innovative ways to prevent the growth and spread of weeds.

The cost-benefits, efficiency, and safety of various preventive and control methods have been researched, including:

- burning weeds with a torch (does not kill roots, and risk of fire too high for use around electrical equipment and oil-filled equipment)
- steaming weeds or spraying hot water over weeds (only controls shallow-rooted annuals, not deep-rooted weeds or perennials; requires a lot of water, which many facilities do not have; hot water machines have also proven unreliable and expensive)
- mycoherbicides (limited effect; works well on alder species and some aspen, but not on birch and maple, limited to specific treatment windows)
- infrared light to control seeds and weeds (does not control roots; very expensive)
- spreader grader – a mechanical tiller pulled through crushed rock areas to remove large clumps of vegetation) – may spread seed through site causing a larger problem.

Table 1: Properties of Approved Herbicides

The herbicide active ingredients proposed for use under this PMP, their soil residual activity, mode of action, selectivity, and application mode are shown in the table below.

Active Ingredient	Soil Residual Activity*	Mode of Action	Selectivity (toxicity to non-target organisms)	Where and How Applied
2,4-D	Low	translocation	selective	foliage; post-emergent
aminopyralid	Low	translocation	selective	foliage; post-emergent
amitrole	High	translocation	non-selective	foliage; post-emergent
chlorsulfuron	Moderate	contact/ translocation	selective	foliage; post-emergent
clopyralid	Moderate	translocation	selective	foliage; post-emergent
dicamba	Low	translocation	selective	foliage; post-emergent
diflufenzopyr	Low	translocation	non-selective	foliage; post-emergent
diuron	Moderate	translocation	non-selective	soil; pre-emergent
glyphosate	Low	translocation	non-selective	foliage; post-emergent
flumioxazin	Low	translocation	non-selective	foliage; post-emergent
fluroxypyr	Low	translocation	selective	foliage; post-emergent
imazapyr	Moderate	translocation	non-selective	soil & foliage; pre-and post-emergent
metsufuron methyl	High	translocation	selective	soil & foliage; post-emergent
picloram	High	translocation	selective	soil & foliage; post-emergent
simazine	Moderate	translocation	non-selective	soil; pre-emergent
triclopyr	Low	translocation	selective	foliage, stem, or stump; post-emergent
trifluralin	High (when using Biobarrier)	translocation	non-selective as Biobarrier	sheets with infused beads; soil; pre-emergent

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

Selection and Use of Residual vs. Non-Residual Herbicides

Residual — Residual herbicides are prescribed only for sites that pass soil and site sensitivity assessments. In the Lower Mainland and coastal areas of BC, assessment of weed densities and a recommendation to apply residual herbicides to the soil will generally be made in the fall.

Residual herbicides are only applied a maximum of once per year. For example, the residual herbicides simazine, diuron, or imazapyr may be used alternatively each year in the spring so that the same active ingredient is not applied more than once every two years.

In the interior regions of BC, assessment of weed densities is also made in the fall. However, simazine and diuron are generally applied in the fall, rather than the spring. This is because the herbicides will be protected in the soil by the winter snow pack, and will begin working immediately in the spring to prevent rapid weed growth. Imazapyr is generally applied in the spring.

Non-Residual — if weed density by surface area is less than two times the injury threshold, a combination of hand-pulling and spot treatment with a low residual herbicide such as glyphosate or dicamba is generally used. If broadleaf weeds such as groundsel or fireweed are predominant at the facility, dicamba may be used instead of glyphosate. Weeds can also build up a resistance to glyphosate, so if a weed species seems to persist after glyphosate application, dicamba is generally substituted.

Low residual herbicides are not applied more than three times per year in the same facility.

2.6, Herbicide Types and Equipment, Section 58(3)(c)

BC Hydro only uses the herbicides listed and described below for weed control at facilities. These herbicides are all rated as having low toxicity to mammals, and except for picloram, have either low or moderate soil residual activity.

Approved Herbicides

2,4-D

This herbicide is generally used in combination with other herbicides, particularly picloram (Tordon 101) to control a wide range of weeds; however, it can also be used on its own. It is applied as a foliar treatment to control rangeland vegetation and woody vegetation. 2,4-D depletes the plant's stored energy, causing plant death.

Aminopyralid

Aminopyralid controls a number of noxious and invasive weeds, such as Canada thistle, dandelion, and knapweeds. When tank-mixed with 2,4-D amine, the control spectrum broadens significantly to include such hard to control species as buttercup, curled dock, perennial sow thistle, and hawkweed.

Aminopyralid is absorbed through leaves and roots, and translocates throughout the plant. It interrupts cell division causing the plants to die.

Amitrole

Although it controls a wide variety of weeds and grasses, BC Hydro generally uses amitrole to spot-treat horsetail. It is not used as a soil-applied herbicide. Amitrole hinders or inhibits the production of chlorophyll, thereby killing the plant.

Chlorsulfuron

This herbicide is useful for the control of hard to manage annual and perennial broadleaf weeds. It is generally used by BC Hydro to spot-treat horsetail. Chlorsufuron is not used as a soil-applied residual herbicide.

Clopyralid

This herbicide is useful for spot-treatment control of broadleaf noxious weed species. It is preferred over picloram for the control of noxious weeds such as Canada thistle, perennial sow-thistle, and scentless chamomile. It is effective only on actively growing plants in areas where high-residual herbicides should not be used. For perennial weeds, clopyralid will control the initial top growth and inhibit regrowth during the season of application. Clopyralid is not used as a soil-applied residual herbicide, and will not be used in areas of high rainfall.

Dicamba

This herbicide is used for the spot treatment of actively-growing broadleaf weeds and brush species. Dicamba can be safely mixed with other herbicides to broaden the number of target species controlled. Because it is a selective herbicide, it is useful in areas where grasses will be retained.

Diflufenzopyr

This herbicide is the first active ingredient from a chemical class called semicarbazones. Based on available data, diflufenzopyr has been determined to be of low toxicity to humans, birds, aquatic organisms,

mammals, and bees. It has low residual properties. Diflufenzopyr causes hormones in plants to become concentrated in the growth regions.

When diflufenzopyr is applied with dicamba, it focuses dicamba's translocation to the high growth regions, where it delivers effective weed control at reduced dicamba rates and across a wider range of weed species.

Diuron

This herbicide is used to control many annual and perennial grasses and herbaceous weeds such as dandelion, goldenrod, thistles, and milkweed. It is used by BC Hydro as a soil-applied residual herbicide to prevent germination and growth of weed seedlings.

As diuron requires moisture (minimum 12mm) to move it into the root zone, application timing is important in the drier interior areas of BC. Because it requires moisture to activate, effects on weeds are slow and will not become apparent until the diuron has been absorbed into the plant and leaves.

Flumioxazin

This herbicide can be used for non-crop selective vegetation control to maintain bare ground areas that must be kept weed free. Its water-dispersible granule provides broad spectrum control and can provide season long control on industrial sites.

Flumioxazin provides residual control of weeds such as ragweed, dandelion, green foxtail, lamb's-quarters, and various nightshade plant species. This is a low rate, pre-emergent herbicide and provides a new weed resistance alternative for vegetation managers due to its mode of action and class. Flumioxazin can be tank-mixed with glyphosate products.

The mode of action in this family of chemistry works to inhibit an enzyme that controls the synthesis of chlorophyll.

Flumioxazin degrades rapidly in water and soil. Ultimate environmental products are incorporated into soil organic matter and carbon dioxide.

Fluroxypyr

Fluroxypyr is a post-emergence, systemic herbicide that internally disrupts weed growth resulting in target plant death. It is effective on annual and perennial broadleaf weeds and woody brush.

Fluroxypyr is systemic and rapidly absorbed by foliage of growing plants.

Plant growth is disrupted by the deregulation of cellular growth process following binding of fluroxypyr to plant cell hormone receptor sites. It also interferes with the plant's ability to metabolize nitrogen and produce enzymes.

Glyphosate

This herbicide is the most commonly used herbicide at BC Hydro facilities and is used to control a wide variety of weeds. It works best on annual and perennial weeds that have emerged above the soil and are actively growing. Glyphosate is useful in areas in close proximity to wells, water bodies, and other environmentally sensitive features due to its high soil adsorption properties and low toxicity.

Glyphosate can also be used to control re-sprouting from tree stumps (cut-surface method) or as a foliar spray application to control small patches of weeds. It may be used following manual and mechanical control methods to prevent re-sprouting of deciduous trees.

Imazapyr

This herbicide is used to control broadleaf weeds, annual and perennial grass species, and woody vegetation. It is particularly useful in controlling weeds that have not been effectively managed using a combination of physical controls and glyphosate application. BC Hydro uses imazapyr both as a soil-applied residual herbicide and to control established weeds by spot treatment.

Imazapyr works by preventing germination of weed seeds. It is also readily absorbed through foliage and roots and moves rapidly throughout the plant where it breaks down tissue.

Metsulfuron methyl

The active ingredient (metsulfuron methyl) is used to control broadleaf weeds, trees, and brush, and some annual grasses. It stops cell division in the shoots and roots of the plant, causing plants to die. It is applied pre- and post-emergence (before and after growth begins). The herbicide has low to very low toxicity to humans and animals.

Picloram

Although picloram is effective in controlling a variety of broadleaf weeds, its use under this PMP (as formulated in the product Tordon 22K) will be restricted to the control of broadleaf noxious weed species, including but not limited to diffuse and Russian knapweed, Dalmatian toadflax, and hound's

tongue. Picloram does not control established grasses and will not be used as a soil-applied residual herbicide. Picloram will not be used in areas of high rainfall such as the Fraser Valley and Vancouver Island.

Picloram may occasionally be used in combination with the active ingredient 2,4-D (Tordon 101) for the control of patches of rangeland weeds and woody vegetation.

Simazine

This herbicide is used as a soil-applied residual herbicide to prevent the germination of a wide range of annual and perennial grasses and broadleaf weed seedlings. It is particularly useful where combinations of physical controls and post-emergent spot herbicide treatments have not been effective.

Simazine is absorbed mainly through roots and has very little foliar activity. It has little lateral movement in the soil but can be washed along with soil particles to adjacent areas.

Triclopyr

Although it is effective in controlling established perennial weed and brush species, triclopyr will generally be used to selectively control trees that are encroaching on the fences of electrical facilities or alongside access roads. As a basal bark treatment, it is particularly effective in controlling trees that commonly re-sprout following cutting. It is more effective than glyphosate for control of birch and aspen. Triclopyr may also be used to control certain invasive and noxious weeds.

Triclopyr is absorbed by both leaves and roots and readily moves throughout the plant.

Trifluralin

Trifluralin is generally applied to the soil to provide control of a variety of annual grass and broadleaf weed species. It inhibits root development by interrupting mitosis, and thus can control weeds as they germinate.

Trifluralin has a moderate to high residual activity in the soil environment, depending on conditions. Trifluralin is incorporated into beads and attached to a geotextile fabric for use in new construction to prevent weed growth for long periods of time.

Application Equipment

Depending on the herbicide being applied, the following types of equipment may be used.

Backpack Sprayer

A backpack sprayer is a portable, manually-operated, pressurized container with a nozzle for spraying herbicides. It operates under low pressure, thus minimizing the possibility of drift. It is particularly useful for spraying small areas or individual plants and trees. Backpack sprayers may be used for selective herbicide applications or for spraying individual trees or plants. Backpack sprayers are not effective for large, continuous areas requiring weed control due to problems with effective patterns and overspray or underspray. Within this PMP, backpack sprayers may be used for applying all of the herbicides proposed for use by foliar or soil application.

Powerhose Spraygun

A hand-held spray gun and hose attached to a portable tank filled with herbicide will selectively control a variety of vegetation with directed spray. Its use, effectiveness, and disadvantages are similar to the backpack, except that a spraygun is not as mobile or as convenient to use. However, sprayguns are efficient for larger scale applications. Many of the larger facilities with larger patches of weeds will be treated by powerhose spraygun or boom systems unless restricted by terrain. This equipment can be used for the application of all herbicide liquid mixtures.

Broadcast treatments applied to the ground may be performed with powerhose sprayguns, although terrain conditions may require the use of backpacks. Operating pressures may range from 200–350 kPa at the nozzle of a powerhose spraygun. The volume ranges between 300–2000L per hectare. The hand guns can be fitted with various size nozzles to modify the delivery rate required and to alter the production of fine particles (fog vs. large droplets) in the application pattern.

Boom Sprayer

Boom sprayers are widely available commercially for ATV and agricultural tractor equipment. They use a solution tank and spray apparatus similar to a powerhose sprayer, except that solution is delivered to nozzles mounted at designated intervals along the boom length.

Flat fan or hollow cone nozzles are typically used on ATV boom sprayers, and deliver volumes no less than 55 L per hectare in order to minimize drift. Sprayer manufacturers and dealers should be consulted to assure that proper nozzles and systems are used. Typically, ATV boom sprayers used on BC Hydro sites would range from 2-4m in total spray width.

Wick/Wipe-on Applicator

This tool is used to selectively apply herbicide by wiping it directly onto plants. Wicks are made of rope or absorbent pads. The wick applicators are available in various materials and in many sizes, from hand-operated to vehicle mounted. Only small amounts of herbicide are applied, so the need for pumps, control devices, and spray tanks is eliminated. Applications using this technique are very labour-intensive.

Injection Tools

This tool is used to inject a small capsule containing glyphosate into the stem of a target tree or stump. It is a battery-powered drill or automatic loading lance.

The EZ-Ject® product uses a recycled 0.22 caliber shell casing containing gelled glyphosate. A lance with a multiple capsule tube is used to drive the casings into the tree stem. The magazine holds up to 400 capsules.

Squirt Bottle

A squirt bottle refers to a hand-held, non-pressurized container, usually plastic. It may have a trigger pump sprayer. It is used to spray a solution of low-toxicity herbicides directly onto foliage or tree stumps.

2.7, Herbicide Application Methods, Section 58(2)(e)

BC Hydro uses the following herbicide techniques at facilities:

- cut surface
- capsule injection of stumps
- hack-and-squirt
- wipe-on
- basal bark applications
- foliar applications
- applications to ground surface

Cut-Surface This method (also called cut-and-treat or stump treatment) will be used in conjunction with manual tree cutting (slashing) in deciduous stands. The tree

is cut low to the ground, and then an herbicide is applied to the cut surface of the stump to limit re-sprouting. Herbicide products containing glyphosate, 2,4-D, picloram, or triclopyr may be applied to the stump with a squirt bottle or backpack sprayer. Cut-surface is a selective technique, in that only the unwanted trees are removed and other species are retained.

Capsule Injection of Stumps

In this technique, a small capsule containing glyphosate is injected into the stem of a target tree or stump with an injection tool. The herbicide is slowly released into the sapwood. Capsule injection is best employed when cut-surface cannot be done immediately after slashing. This technique is also effective on re-sprouting stumps, provided the capsules are applied to live tissue.

One capsule of 1ml of glyphosate per 5cm of stem diameter is recommended for control. Trees greater than 20 cm diameter are not effectively controlled by capsule injection. The cutting edge of the capsules must penetrate to the sapwood to ensure translocation of the herbicides throughout the tree.

Hack-and-Squirt

Hack-and-squirt is a type of injection technique that involves making one or more incisions into the tree trunk, down to the sapwood, and placing small amounts of the active ingredient glyphosate into the cuts with a squirt bottle. This technique may be used where tree removal is not mandatory for fire hazard or aesthetic purposes. The cuts should be spaced evenly around the trunk, with at least one cut for each 2.5cm of stem diameter at breast height. The glyphosate is normally applied as a paste, generally with a squirt bottle, within minutes after making the incisions.

Wipe-on Techniques

In this technique, a wick soaked with the active ingredient glyphosate is wiped or dragged over the foliage of the target species. This application technique virtually eliminates drift. Wick application is ideal for vegetation management in areas where no spray drift can be tolerated, or when individually treating the stumps of deciduous trees immediately following manual cutting.

The wipe-on technique is best employed where cut stumps have re-sprouted to a height that raises the tree over the desirable vegetation so that it may be treated safely and effectively.

Basal Bark Applications

This procedure involves treating the bark of a tree from the root collar to a point above the ground using a hand-operated backpack sprayer, with products containing the active ingredient triclopyr. The herbicide penetrates

the bark into the cambium layer of target stems and diffuses itself throughout the tree. It also travels to the roots and prevents re-sprouting.

Although most effective in the late summer, basal bark applications can be made throughout the year, except in wet weather or on frosty stems.

Foliar Applications

With this technique, a backpack, power hose spraygun, or boom sprayer is used to apply post-emergent herbicides. This method is generally used for individual trees or small clusters of trees where the vegetation is between 50 cm and 1.5 m high. It may also be used to treat re-sprouts after mowing or slashing. It is most effective when done in the late summer or early fall, prior to leaf fall, when the re-sprouts are less than 50 cm high.

Applications to Ground Surface

Similar to foliar applications, this technique uses similar equipment to apply herbicides as a pre-emergent application before the weeds have germinated.

2.8, Physical Treatment Methods, Section 58(2)(e)

The physical IPM techniques to control hazard trees and weeds in or adjacent to BC Hydro facilities include:

- tree removal
- pruning
- hedge trimming
- girdling
- mowing
- weed-trimming
- hand-pulling

Physical Treatment Methods for Trees

Trees must be managed around electrical facilities, helipads, access roads, parking lots, pole yards, and storage yards for the reasons described earlier. Trees are removed, pruned or girdled.

Tree Removal (Slashing)

The required equipment for manual tree cutting includes chain saws, circular brush saws, hand saws and axes.

The benefits and limitations of tree cutting include:

- selective (only cuts target species)
- assures electrical safety requirements
- expensive and labour-intensive due to clean-up costs
- deciduous stumps must be removed, ground down, covered, or treated with a herbicide to prevent re-sprouting
- chain saws, hand tools, and falling trees pose safety hazards to workers

Pruning

Pruning is the cutting or removal of branches or parts of trees or shrubs for improving their shape. This is the most common tree maintenance procedure. Usually, trees are pruned as a preventative or as a corrective measure to remove dead branches, crowded or rubbing limbs, eliminate hazards, and increase light and air penetration. BC Hydro mainly concerned about the control of limbs which can provide unauthorized access into facilities, facilitate electrical contact at energized facilities, damage equipment or fence-lines or drop organic matter providing an improved medium for weed growth.

The equipment used for pruning includes hand held pruners, loppers, pole saws, and circular saws operated from bucket trucks.

The benefits and limitations of pruning include:

- well –established contracts with qualified contractors to safely perform the work
- can be a costly operation due to equipment and training requirements
- circular saws pole saw and hand tools pose safety hazards
- assures safety requirements
- reduces probability of damage to equipment and facilities

Hedge Trimming

Hedge trimming is the shearing of trees and shrubs to maintain an established form. BC Hydro utilizes hedging to maintain a safe buffer from electrical facilities and to maintain aesthetics around facilities.

The equipment used for hedging includes hedge trimmers and circular saws operated out of bucket trucks.

The benefits and limitations of hedge trimming include:

- well –established contracts with qualified contractors to safely perform the work
- relatively inexpensive but should be repeated annually

- as hedges age their spread may become unmanageable, requiring removal

Girdling

Girdling involves cutting a strip of bark from around the entire tree trunk with a specialized girdling tool, an axe, or other hand tool. The bark strip is removed along with other tissue down to the sapwood. The above-ground parts of the tree will continue to grow, but the roots starve and the tree slowly dies.

The benefits and limitations of girdling are:

- effective on most trees more than 4cm in diameter
- tools are inexpensive, durable, relatively safe, easy to use, and quiet
- flexible because individual stems and species can be removed or left on a tree-by-tree basis
- close inspection required to ensure adequate depth and width of girdle is maintained to specifications
- possible safety issue if girdled trees snap and fall over
- not all tree species are succumb to girdling such as maple species

Physical Treatment Methods for Weeds

Herbaceous plants, grasses, tree seedlings, mosses, liverworts, and woody weeds both inside and outside facilities are controlled through mowing, weed trimming, or hand-pulling.

Mowing

Grass cutting is recommended in undeveloped areas such as fields and low priority sites. Commercial lawnmowers, garden tractors, or industrial tractors with rotary or flail cutters are used.

The benefits and limitations of mowing are:

- helps control weeds before they go to seed, thus reducing spread into areas where there is low weed tolerance
- promotes aesthetics and is economical
- requires repeated treatments
- safety risks due to flying debris

Weed Trimming

Cutting weeds at ground surface is recommended along fence lines and at low priority sites. Commercial type weed trimmers are available.

The benefits and limitations of weed trimming are:

- helps to remove seed heads
- convenient and economical
- not useful on species that propagate from stem pieces, and it does not remove roots
- flying rocks and debris propelled by the spinning thread or blade may damage windows and equipment and are a safety risk to workers

Hand Pulling

Hand pulling is an important treatment option for areas within facilities where herbicides cannot or should not be used. Weeds will be hand-pulled as soon as they establish, at any time of the year, using gloves and weed wrenches.

The benefits and limitations of hand pulling are:

- in certain areas, weed density can be reduced to a manageable level, allowing use of other control methods to complete the work
- effective for larger, established weeds that can be easily uprooted, such as grass clumps, tree seedlings, and Scotch broom seedlings
- effective if there are only a few weeds on the site (e.g., 100 or less)
- roots can regenerate because many species snap off at ground line
- tends to degrade the crushed rock surface
- tends to expose soil and seeds
- risk of electrical safety hazard when roots are in contact with the ground grid, or where electrical equipment is close to the ground
- must dispose of debris

- labour-intensive and costly
- may expose labourers to unsafe equipment, especially in electrical facilities
- may lead to acute and chronic back problems

2.9, Cultural/ Biological Treatments, Section 58(2)(e)

Biological and cultural control methods use other plants or organisms to help control or displace weeds. BC Hydro often uses grass seeding and may use parasitic insects, where appropriate.

Grass Seeding

Grass seeding refers to the manual planting of turf or agricultural grasses, or to the seeding of large areas of bare soil with grass-seeding machines. This method is used to reduce the establishment of broadleaf weeds with rapidly spreading airborne seeds. It can be used on any undeveloped site or disturbed area. Required equipment may include cyclone spreaders, belly grinders, seed drills, and hydro-seeding machines.

The benefits and limitations of grass seeding are:

- prevents erosion
- inhibits the growth of weeds
- promotes aesthetics
- may require irrigation to establish and maintain
- safety concerns using equipment around electrical wires and equipment
- hydro-seeding has better chances of success than manual grass seeding
- ongoing maintenance of grass once established

Parasitic Insects

The release of parasitic insect species can help control noxious weeds and invasive plants by attacking the plant and slowly killing it, or by reducing seed production and plant vigour. This method will only be used at large-area sites with a high density of noxious weeds or invasive plants, such as fields or areas with adjacent properties where there is a cooperative effort to control weeds. The size of the weed stand must be large enough to support the insect population, and the site itself must be suitable habitat for the insect species. This type of program is generally employed with the cooperation and guidance of an expert from Agriculture Canada.

This method is expensive and labour-intensive, is not usually effective in eliminating weed populations, but does help to reduce the spread of weeds and may reduce weed densities to a manageable level.

2.10, Post Treatment Evaluation, Section 58(2)(f)

All contract vegetation management work will be evaluated to:

- ensure compliance with this PMP and the contract
- ensure compliance with the Integrated Pest Management Act and Regulation
- determine the efficacy of the work done by the contractor

Results of vegetation management will be evaluated on a site to determine the success of the Site Management Plan (SMP) and techniques, and to ensure there was no negative environmental impact.

The timing and procedure for evaluating specific treatment programs will be part of the SMP, and will depend on the treatment used. In general, all sites will be evaluated within one year of the treatment. (This is in addition to an end-of-contract inspection, which focuses primarily on contractor performance.)

Treatment program evaluations will be based on visual estimates of the percentage of weed cover. Evaluations will be conducted by the regional Vegetation Management Specialist/Biologist or delegate.

Information Collected

To evaluate the results of a vegetation management program, all relevant information is collected, such as previous monitoring data and current site conditions. Both formal and informal assessments may be completed.

When evaluating the results of weed control at a facility, BC Hydro will collect the following information:

- the effectiveness of the treatment method/program in controlling the weeds
- the percentage of weeds still present and a percentage estimate of mortality
- the need for follow-up or touch-up treatments, if any
- the amount of herbicide used to determine if increases or decreases are necessary
- the cost-effectiveness of the treatment program and of any follow-up treatments
- any impact of the treatment method/program on adjacent landscaped grounds and surrounding areas
- whether the technique used was the most appropriate one for the job
- recommendations for enhanced preventive measures
- recommendations for future treatment methods/programs

Five-year Review

In addition to the above evaluations, all previously treated facilities will be subject to a review every five years by the regional BC Hydro Vegetation Management Specialist/Biologist or delegate. During these reviews, all monitoring and inspection/evaluation information collected for the facility over time will be reviewed. The results of the review will be incorporated into a revised SMP for the facility.

Water Sampling Audit

To ensure that the recommended treatment program is environmentally sound, some of the sites treated with residual herbicides may be selected for a water sampling program. This ensures that sites and surrounding land and water bodies are not being contaminated by residual herbicides. Sites will be selected according to the following criteria:

- off-site damage to vegetation
- concerns expressed by adjacent landowners
- proximity to water, water sources, the public, and schools
- the environmental sensitivity of the area

- whether herbicide use has increased over time (or whether herbicides are used at all at the site)
- the topography, soil type, and size of the site

Not all facilities have a location that is suitable for water sampling.

At facilities where residual herbicides were used, the water sampling location will be where the majority of surface run-off and discharge from underground drainage systems can be collected. The location of water sampling will be recorded on the SMP map. Water samples will be taken from each site prior to herbicide application to establish a baseline. After herbicide application, samples will be taken again within 24 to 30 hours after the start of the first significant rainfall.

Chapter 3 — Use and Handling of Herbicides

This chapter covers the responsible use and handling of herbicides at BC Hydro facilities, including:

- qualifications of personnel
- transportation — Section 58(3)(a)(i)
- storage — Section 58(3)(a)(ii)
- mixing, loading and application — Section 58(3)(a)(iii)
- disposal — Section 58(3)(a)(iv)
- spill response plan — Section 58(3)(a)(v)

3.1, Qualifications of Personnel

The use and handling of herbicides is governed by federal and provincial legislation. All persons working with herbicides will follow safe handling practices, including workplace requirements for Workplace Hazardous Materials Information System (WHMIS), labeling, and worker education.

The required practices for pesticide applicators are detailed in:

- WorkSafeBC's (1998) *Occupational Health and Safety Regulation* – BC Regulation 296/97 as amended by BC Regulation 185/99 – Sections 6.70 to 6.97 including Section 6.77 Mixing, Loading and Applying Pesticides – Qualifications [Amended by B.C. Reg. 188/2011, effective February 1, 2012.]
- B.C Ministry of Environment (2005) *Handbook for Pesticide Applicators and Dispensers*
- WorkSafeBC's (2009)*Standard Practices for Pesticide Applicators*

Any individual or company (i.e., a contractor) that provides a service to BC Hydro by applying commercial or industrial pesticides must have a valid BC Pesticide Use Licence. Each supervising applicator must have a valid BC Pesticide Applicator Certificate in the Industrial Vegetation and Noxious Weed Control category.

Under the *BC Integrated Pest Management Act* and *Regulation,* a certified pesticide applicator can supervise up to four uncertified assistants, provided the assistants are within continuous auditory or visual range at all times while applying pesticides. Individuals must carry proof of their applicator certification with them when applying pesticides.

3.2, Herbicide Transportation, Section 58(3)(a)(i)

The transportation of herbicides will comply with all current legislation governing their transport, as well as the following requirements under this PMP.

- The quantity of herbicides carried in a vehicle will be limited and no more than what is necessary for each project, except where transportation occurs between storage facilities.
- Herbicides will be carried in a secure lockable compartment.
- Herbicides will be transported in original labeled containers.
- Herbicides will be transported separately from food and drinking water, safety gear, and people.
- Spill containment and clean up equipment will be transported separately from pesticides, but in close proximity to them, on each vehicle during transport and use.
- Appropriate documents such as the Pesticide Use Record form, Material Safety Data Sheets (MSDS), and the PMP document will be available during transport and use of pesticides.
- All documents and placards will be carried in, or placed on, transport vehicles if required under the *Transportation of Dangerous Goods Act* or the *BC Integrated Pest Management Act.*
- All pesticide containers will be inspected for defects prior to transporting and will be secured against spillage or unauthorized removal.

3.3, Herbicide Storage, Section 58(3)(a)(ii)

Pesticides may be stored by BC Hydro or its contractors at facilities owned or operated by BC Hydro or the contractor.

Pesticide storage will adhere to requirements of the *Integrated Pest Management Act* and *Regulation* and the Worker's Compensation Board document *Standard Practices for Pesticide Applicators.*

The storage area must:

- be ventilated to the outside
- be locked when left unattended
- be entered only by authorized persons
- have a placard affixed on the outside of each door with clearly visible block letters saying: "WARNING – CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY"

The person responsible for the storage area must notify the appropriate fire department of the presence of the herbicide on the premises.

BC Hydro has no direct control of the pesticide storage practices of its contractors while not under contract to them. These companies are still governed by the provisions of the *BC Integrated Pest Management Act and Regulation* with respect to storage by a Pesticide Use Licence.

Some contractors may store pesticides for extended periods of time in vehicles when performing a number of pesticide treatments for BC Hydro. The vehicle is considered a mobile storage unit. Persons responsible for the pesticide storage must ensure that all pesticides are stored in a locked canopy or similar arrangement, separate from the driver and personal protective gear.

3.4, Mixing, Loading, and Applying Herbicides, Section 58(3)(a)(iii)

All mixing, loading, and application of herbicides are carried out by certified pesticide applicators who are certified in the appropriate category, or by individuals directly supervised by a certified pesticide applicator with the appropriate category of certification.

Mixing and application of herbicides must be consistent with product label rates.

To help ensure safe mixing of herbicides, the following will be kept on site, as recommended on the respective product labels:

- safety spill kits
- spill response plans
- first aid supplies
- eye wash station(s)
- protective clothing
- product labels
- Material Safety Data Sheets (MSDS)

There will be no mixing or loading of pesticides within 15 m of waterbodies or sensitive environmental features.

3.5, Herbicide Disposal, Section 58(3)(a)(iv)

Disposal of empty containers is done according to the manufacturer's instructions on the product label, or provincial instructions and recommendations detailed in the most recent edition of the BC Ministry of Environment's *Handbook for Pesticide Applicators and Dispensers.*

At a minimum, empty pesticide containers must be either:

- returned to the pesticide distributor as part of their recycling program; or
- triple-rinsed or pressure-rinsed, then crushed, punctured, or damaged so they cannot be reused, and disposed of in a permitted sanitary landfill or other approved disposal site

3.6, Spill Response Procedures, Section 58(3)(a)(v)

Spill treatment equipment will be ready and available at storage sites (including mobile storage sites) and mixing and loading sites. It will include:

- personal protective equipment as recommended on product labels
- absorbent material, such as sawdust, sand, activated charcoal, vermiculite, dry coarse clay, kitty litter, or commercial absorbent

- neutralizing material, such as lime, chlorine bleach, or washing soda
- long handled broom, shovel, and waste-receiving container with lid
- approved spill response kit

A copy of an approved spill response plan will be available at each work site. All personnel working on a project involving herbicides must be familiar with its contents. If contractors working under this PMP have their own spill response plan, it must meet or exceed the contents of the BC Hydro plan.

Contractors will follow these procedures if a spill occurs:

- Ensure all personnel are wearing appropriate protective clothing and safety gear.
- Move persons exposed to a herbicide away from the place of the spill and keep them warm.
- Administer first aid if required.
- Stop the source of the spill, if possible.
- Create a dam or ridge to stop the spilled material from spreading.
- Stop operations until the spill is contained and the source is repaired.
- Spread absorbent material over the spill, if applicable, to absorb any liquid.
- Collect the absorbent material into garbage bags or containers with the contents clearly marked.
- Remove contaminated soil or other material from the spill site and place in garbage bags or containers.
- Contact the environmental coordinator at the BC Hydro Materials Management Business unit for shipping instructions and disposal requirements.
- If the spilled herbicide is released (or may be released) into the environment, immediately report it to the Provincial Emergency Program at 1-800-663-3456. If that is impractical, the local police or nearest RCMP detachment can be called.
- Notify an approved representative of the PMP as soon as possible about the details of the spill.

Chapter 4 – Environmental Protection

All vegetation management activities proposed for use within this PMP (both chemical and non-chemical) will incorporate measures designed to protect the environment, as described in this chapter:

- responsible herbicide application
- strategies to protect community watersheds, and other domestic and agricultural water sources
- strategies to protect fish and wildlife, riparian areas, and wildlife habitat
- strategies to prevent pesticide contamination of food intended for human consumption
- pre-treatment inspection procedures for identifying treatment area boundaries
- procedures for monitoring weather conditions and strategies for modifying pesticide application methods for different weather conditions
- procedures for maintaining and calibrating pesticide application equipment

The size of the pesticide-free zone (PFZ) and no-treatment zone (NTZ) that will be adhered to in this PMP are based on the standards contained in the *Integrated Pest Management Act* and *Regulation.*

4.1, Responsible Herbicide Application

To protect the environment, BC Hydro ensures that the following conditions are adhered to for all application of herbicides under this PMP:

- Applicators must have current labels and MSDS for the herbicide products they will be using.

- Applicators will inspect each site and plan application procedures before treatment begins.
- All herbicides are applied by, or under the supervision of certified applicators using appropriate application and protective equipment.
- All herbicides are applied at the lowest possible application rate to ensure efficacy.
- Where possible, herbicides are applied when target species are at their most susceptible stage.
- Herbicide products and application methods are selected to maximize the degree of selectivity for the weed species, and minimize the degree of toxicity to non-target organisms, herbicide drift, bystander and worker exposure, and persistence in the environment.
- Herbicide use is restricted to periods that minimize human exposure and adverse impacts to the environment. Due consideration is given to the proximity of bystanders, workers, high foot-traffic areas, and other locally sensitive features. Where possible, herbicides are applied during periods of low public presence, in the early morning or evening, or on weekends if necessary, unless otherwise required by product labels.
- Applications are restricted to conditions where wind speeds do not exceed 8 km/h.
- Most applications of herbicide are not acceptable during rainfall as per label instructions.

4.2, Protecting Community Watersheds, Section 58(3)(b)(i)

BC Hydro protects community watersheds as follows:

- Locations of community watershed are verified by accessing the BC Hydro Geographic Information System, which is updated with government information every year.
- Herbicides are not stored within a community watershed for more than 24 hours before use, and are removed within 7 days of use, unless they are stored in a permanent structure; no-treatment zones (NTZs) are maintained around all lakes and other water bodies consistent with those listed in Table 2.

- A 100m NTZ is maintained upslope from all licensed water intakes within the community watershed, except when failure to treat weeds could compromise public or worker safety. In these cases, NTZs are consistent with those listed in Table 2.
- Herbicide use is discontinued if herbicide residues or breakdown products are detected at a community watershed water intake. Further use is stopped until the BC Ministry of Health Services (Medical Health Officer) is satisfied that all required measures have been implemented to preserve water quality.
- Before using herbicides, community watershed maps are reviewed to determine if herbicide treatments are within a community watershed or are within 100 m upslope of any water intake.

4.3, Protecting Water Sources, Section 58(3)(b)(i)

Table 2 lists the minimum no-treatment zones (NTZs) and pesticide-free zones (PFZs) that are followed to protect all waterbodies including domestic and agricultural water sources, such as water intakes and wells.

In addition to these protection measures, BC Hydro will make efforts to identify and protect sources of groundwater before applying herbicides. All registered wells are displayed on the BC Hydro GIS Database, which is updated with government information every six months. In addition, contractors are required to survey the NTZ to determine if there are wells present.

Table 4: Water Protection Table

Section	Permitted Application*	NTZ/PFZ	Exception
All Applications			
71(3) Reg	Potable domestic and agricultural wells and water intakes, including all methods and pesticides.	30m NTZ	NTZ may be reduced if reasonably satisfied that a smaller NTZ will ensure no pesticide enters well or intake (70(4) Reg).
Non-glyphosate Applications			
73(1) Reg	Around or along a waterbody or dry stream and classified wetland using any pesticide except glyphosate, subject to label restrictions and including all application methods.	10m PFZ	Glyphosate applications
—	Catch basins (subsurface drainage intakes).	2m PFZ	No herbicides

Section	Permitted Application*	NTZ/PFZ	Exception
Glyphosate Applications			
71(3) Reg	Non-potable wells and water intakes, including all methods and pesticides.	10m NTZ	
74(1)(c) Reg	Along or around a waterbody if the waterbody is: • not fish-bearing at any time of the year • does not drain directly into a fish-bearing waterbody	2m NTZ	
74(2) Reg	Up to the high water mark of a temporary free-standing waterbody and dry stream, that is: • not fish-bearing at any time of the year • does not drain directly into a fish-bearing waterbody	0m NTZ	
74(1)(a) Reg	Along or around a waterbody or a classified wetland that is: • fish-bearing, or • that drains directly into a fish-bearing waterbody, or • along or around a dry stream that when wet is fish-bearing or drains directly into a fish-bearing waterbody	2m PFZ	
Noxious Weed and Invasive Plant Management			
77(2) Reg	Targeted application of glyphosate to noxious weeds and invasive plants if a selective application is used between 1m and 10m above the high water mark.	1m PFZ	

4.4, Protecting Fish, Wildlife, Habitat, Section 58(3)(b)(ii)

In addition to the PFZs specified in Table 2, BC Hydro exercises caution when working with herbicides adjacent to riparian areas and water bodies. A riparian area is land adjacent to the banks of streams, lakes, and wetlands, and often includes trees and shrubs that are needed to protect or buffer the water body.

BC Hydro follows the protocol agreement signed with the federal Department of Fisheries and Oceans (DFO) and the BC Ministry of Environment that describes procedures for working within 15 m of a stream, pond, lake, or wetland. This protocol agreement is called the *Approved Work Practices for Riparian Vegetation Management* (AWPRV).

A 15 m no fueling, filling, or dispensing zone is maintained around riparian features when cleaning or fueling application equipment and refilling herbicide-dispensing equipment.

Endangered wildlife species are protected under the federal *Species At Risk Act* (SARA). BC Hydro is committed to avoiding and/or reducing the impacts on provincially and federally listed species at risk. If avoiding some impact is not possible, BC Hydro works with regulatory agencies and other

stakeholders on recovery planning processes. The level of participation in recovery planning is determined by the degree of known impact that BC Hydro activities have on species at risk, including:

- the listing status of the species and other associated species
- the likelihood and extent of impacts incurred by other stakeholders
- consideration given to species of concern in existing BC Hydro, federal, or provincial processes
- public interest
- identifying specific species at risk as significant aspects in our environmental management system

4.5, Preventing Contamination of Food, Section 58(3)(b)(iii)

BC Hydro facilities are sometimes located near environmentally sensitive areas such as parks, schools, lawns, gardens, residences, berry-picking and bee-keeping areas, and areas containing agricultural crops and domestic animals. Within these areas, food intended for human consumption is sometimes grown or found.

BC Hydro attempts to identify areas where there is food intended for human consumption (including berries). Appropriate precautions are taken during weed control operations to avoid contaminating these areas, such as timing applications after the berry-growing season, providing increased buffer zones during herbicide applications, or using alternative, non-chemical methods of control.

4.6, Identifying Treatment Boundaries, Section 58(3)(b)(iv)

To protect environmentally sensitive areas, BC Hydro records on maps any sensitive areas such as water bodies. These maps are supplied to the contractor and discussed at the pre-job conference. The contractor is instructed to inspect the site before work begins to verify presence of environmentally sensitive areas and flag areas as required. This may include the use of flagging tape to mark off the NTZ's and PFZ's.

During the pre-job conference, all crew members are instructed in flagging requirements and precautions. They also review the methodology and procedures for applications and handling of the herbicide.

Notification Signs

As per Section 64 of the *Integrated Pest Management Regulation*, notification signs will be posted on land being treated with herbicides. The contractor is responsible for posting notification signs according to regulatory requirements.

Signs will be clearly visible and legible from each approach to the treatment area used by the public. All approaches from highways must be posted. Signs may not be removed for at least 14 days after the herbicides have been applied. Records will be kept on how public notification was given and where notices were posted.

4.7, Weather Monitoring, Section 58(3)(b)(vi)

Prior to, and periodically during herbicide applications, weather conditions are measured and recorded, including wind speed and direction, precipitation, temperature, and sky conditions. These are recorded only for foliar herbicide applications using backpacks, powerhose and handguns, and boom sprayers. For wipe on/wick applications, stem, bark and stump applications, only precipitation and temperature is recorded.

Herbicide applications are shut down if:

- the maximum temperature stated on the herbicide label is exceeded
- the wind speed and/or direction cause the application of herbicide to drift and/or miss the weeds
- it begins to rain, increasing the chances of excessive runoff and leaching

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4.8, Maintaining Herbicide Application, Equipment, Section 58(3)(b)(v)

All herbicide application equipment used on BC Hydro property will be kept safe, clean, and in good repair. Equipment will be compatible and appropriate for the herbicide being used.

At a minimum, all sprayers will be calibrated once per year prior to use and at regular intervals throughout the season of use.

Personnel will follow these instructions:

- Ensure that equipment used meets with the approval of BC Hydro and meets all applicable regulatory requirements.

- Calibrate application equipment at the beginning of the treatment contract to conform to with the application rates on the pesticide label.
- Repeat calibrations:
  - after 25 hours of use with abrasive formulations (such as wettable powders)
  - when another product is used
  - if application rates are questionable
- Keep a record for each piece of calibrated application equipment showing when it was calibrated and the supporting data.
- Ensure that tools and equipment are in good working order and are properly cared for and stored.
- Replace tools that are prone to failure and carry spares.
- Implement a regular maintenance schedule on each piece of equipment.

Chapter 5 — Notification and Consultation

BC Hydro is committed to providing proper notification and consultation with respect to herbicide use under this PMP.

5.1, Notifications

BC Hydro will, within 7 days of the PMP confirmation date, make available to the public at its local offices a copy of the confirmation and the PMP, along with relevant maps. The PMP will also be available on the BC Hydro website.

BC Hydro will immediately report to the Administrator (BC Ministry of Environment) any violation of the *Integrated Pest Management Act* and *Regulations,* the PMP, or the PMP Pesticide Use Notice.

Agency Notification

In the first year of the PMP term, BC Hydro will provide written notification to each Regional Administrator of the *Integrated Pest Management Act* before starting the season's vegetation management work. In subsequent years, written notice will be provided two weeks before starting the season's work.

Annual Notification of Intent to Treat

For each year of the PMP term, BC Hydro will forward to the BC Ministry of Environment a written Annual Notification of Intent to Treat (NIT) for the following year. This NIT will identify which facilities are scheduled for treatment for vegetation management.

5.2, First Nations Engagement

BC Hydro is committed to establishing and maintaining positive relationships with First Nations. BC Hydro engages with First Nations to avoid infringement on aboriginal rights, treaty rights, or cultural values during its vegetation management program. BC Hydro must also attempt to address First Nations concerns and accommodate their cultural interests.

PMP Engagement

BC Hydro's First Nations engagement plan/process for the Pest Management Plan is outlined below:

- Send a letter to all First Nations that have facilities on or adjacent to their reserve lands, inviting their input into the development of the draft PMP (enclose copy or web link).

- Follow up to ensure that the PMP has been reviewed, and comments, if any, are received.

- Maintain a summary of First Nations engagements, including the names and addresses of those First Nations that were invited to provide input, a description of any concerns or recommendations received (in particular if they related to potential for impacts outside of the facility on reserve lands), and BC Hydro's response.

Annual Notification

Once the PMP has been finalized and approved, annual notice of intent to treat (NIT) will be given for planned herbicide treatment in all areas identified during the engagement process as having potential for infringement on aboriginal rights, treaty rights, or cultural values, including areas on or adjacent to First Nations Federal Reserve lands.

BC Hydro will follow these procedures:

- Send a letter referencing the confirmed PMP, and that a facility site inspection has indicated that vegetation management is required. The letter will:

  — describe the methods to be used and why
  — request comments and any concerns
  — offer to meet upon request to review plans

- If treatment is required at facilities within Federal Reserve Lands, permission will be requested to use herbicides with an explanation of the risks and liability associated with not treating the site to control problem weeds or hazard trees. If permission to treat is not received before the contractor needs access to the site, BC Hydro will follow up with the Band Office to obtain permission.

- Follow up to ensure that the letter has been received and to record any concerns. Document all discussions.

- Carry out appropriate follow-up as required, such as sending out a final letter summarizing all previous correspondence and discussions.

Glossary

conifers — trees with cones.

crushed rock — a surfacing material similar to gravel that is used to cover facility areas that have zero tolerance for weeds. Crushed rock has a high level of electrical resistivity, which means it does not conduct electricity, thereby reducing the risk of electrocution over the ground grid.

deciduous — trees that lose their leaves during winter.

evaluation — a formal assessment carried out after weed control, to determine the effectiveness of the vegetation management program. It takes into account monitoring information, contract results, and SMP requirements. Evaluation results are used to revise SMPs.

facility — a well-defined site, owned or leased by BC Hydro, which typically has limited public access. Examples include substations, dams, and generating plants.

geotextile — a porous, polypropylene fabric that may be laid underneath a crushed rock surface, to prevent weeds from establishing.

ground grid —a grid of bare wires buried underneath substations that provides a common grounding system for electrical and metallic structures. It protects staff and the public from electrocution in case of a system fault, equipment failure, or lightning strike by limiting electrical potentials to safe levels, and it supports the proper operation of the electrical system by providing a low impedance path for fault currents.

habitat — a particular environment in which organisms live.

hazard tree — a tree that is defective, has an imminent potential to fail, and is likely to hit or damage a person or target (electrical equipment) when it falls.

herbicide — a pesticide used to control or manage weeds.

injury threshold — the point at which weed control becomes necessary, in order to minimize the risk of outages and optimize safety. It is generally expressed as a percentage of the total weed area that can be tolerated while still maintaining the integrity, security, and safety of the site. Any percentage weed cover above the established injury threshold requires a vegetation management action.

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

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

Integrated Pest Management Act — a provincial Act that regulates the use of pesticides, including the sale, purchase, use, handling, storage, disposal, and transportation of pesticides.

integrated vegetation management — the Integrated Pest Management process specifically for the control of weeds at BC Hydro facilities. The primary objectives are to ensure worker and public safety and system reliability.

monitoring — a visual assessment of facilities that provides a record of information about weed occurrence and density and site conditions. The percentage of the surface that is covered with identified weed species is estimated, and information recorded on Site Management Plans.

no treatment zone (NTZ) — a strip of land between the pesticide-free zone and the pesticide treatment area. Pesticides are not applied directly in the NTZ to prevent entry of pesticides or pesticide residues by drift, runoff, or leachate into the pesticide-free zone.

non-residual herbicide — a chemical that breaks down quickly in the soil and leaves little or no residue.

non-selective herbicide — a chemical that will effectively control a wide range of species.

noxious weeds — plants that are injurious to public health, crops, livestock, land, or other property, and which must be controlled under the BC *Weed Act*.

pest — any undesirable organism that should be controlled to ensure the safety and integrity of operating systems. For BC Hydro facilities, this means weeds.

pesticide — under the *Integrated Pest Management Act*, any substance or mixture of substances, other than a device, intended for killing, controlling, or managing insects, rodents, fungi, weeds, and other forms of plant or animal life that are considered pests.

pesticide-free zone — a strip of land adjacent to bodies of water. Herbicides may not be directly applied to, or allowed to reach the pesticide-free zone via drift, runoff, or leachate. Specific authorization is needed if the pesticide-free zone is to be less than 10m.

Pest Management Plan (PMP) — a legally-binding plan that describes a program for controlling pests or reducing pest damage using integrated pest management, and the methods of handling, preparing, mixing, applying, and otherwise using pesticides within the program. The PMP is the authorization required to use pesticides at BC Hydro-owned or leased property in BC.

pre-emergent herbicide — a chemical that controls weed seeds and sprouts before they leave the ground. These are generally residual herbicides.

post-emergent herbicide — a chemical that is used directly on growing foliage or plant stems. These can be either residual or non-residual herbicides.

residual herbicide — a chemical that tends to persist in the soil for a certain period of time.

re-sprouting — the growth of new stems on deciduous trees that have been injured or where manual or mechanical control methods have been applied.

riparian — the area of land adjacent to a water body that contains vegetation that is distinctly different from the vegetation of adjacent upland areas due to the presence of water.

riparian habitat — vegetation growing close to a water body that is generally critical for wildlife cover, fish food organisms, stream nutrients, and large organic debris, and for streambank stability.

selective herbicide —a chemical that is designed to effectively control specific species and not others.

Site Management Plan (SMP) — a document that contains detailed information on a *particular* site, such as its history, weed coverage, environmental concerns, etc. The SMP also describes how integrated vegetation management activities will be carried out on the site, and may include a detailed map of the facility.

species — a group of living organisms which are similar in structure and physiology and are capable of producing fertile offspring.

water body — any river, stream, creek, lake, pond, marsh, slough, ocean, sea, strait, inlet, bay, or ditch. Also, any temporary or seasonal water body that currently contains water, and any accumulation of water that may discharge into fish-bearing waters.

weeds —any undesirable plant, including grass, brush, trees, noxious weeds, or other vegetation.