

Pest Management Plan

**for Distribution Line Corridors
by the BC Hydro and Power Authority**

#: 1- 2010- 2015

Confirmation Number: 105-0978-10/15

December 1, 2010



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2010

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Executive Summary

About BC Hydro

BC Hydro is a provincial Crown corporation and one of the largest electric utilities in Canada. The company's mandate is to generate, purchase, distribute, and sell electricity.

BC Hydro distributes electricity produced by several hydroelectric and other facilities to the majority of BC's population. 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. The flowing water turns turbines (rotating blades) which in turn drive generators. The generators convert the turbine's 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. 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 55,000 km of distribution lines (less than 60,000 volts).

Note that BC Hydro has a separate Pest Management Plan for the transmission system which represents lines rated at 60 kilovolts and greater.

About the PMP

As defined in the *Integrated Pest Management Act (IPMA)*:

A Pest Management Plan (PMP) describes

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

This PMP confirms BC Hydro's strategy to employ herbicides under the *IPMA* and the *Integrated Pest Management Regulation (IPMR)*[*IPMA & R*].

This PMP is a requirement under Section 58 of the *IPMR*. In addition, the PMP ensures the following:

- legal accountability with the provisions of the *IPMA* and all applicable federal, provincial and regional laws and regulations;

- public awareness of, and input into, BC Hydro's pest management activities in the context of IPM;
- effective, cost-efficient pest control on distribution line corridors; and
- responsible use of herbicides.

BC Hydro maintains approximately 47,800 km of overhead distribution lines (less than 60,000 volts) across BC. The PMP permits BC Hydro to utilize herbicides, in certain situations, on distribution line corridors within its operating areas. The PMP shall be in place for a five-year period from the date that the Pesticide Use Notice has been confirmed. BC Hydro intends to submit a Pesticide Use Notice to the BC Ministry of Environment (MoE).

Distribution Corridor Herbicide Program

BC Hydro conducts distribution line corridor maintenance to ensure a safe and reliable power supply system, while protecting the environment.

Vegetation is managed on a cyclical basis using a variety of methods including pruning, mowing, brushing, girdling, removal, and herbicide application. The methods used to control vegetation are chosen based on an Integrated Vegetation Management (IVM) decision making process.

Why Use Herbicides?

Contact between the power system and tall-growing vegetation (target vegetation), growing on or near distribution line corridors, is a major cause of electrical outages, can create wildfires and cause a public safety hazard. BC Hydro must control the vegetation under, above and near its distribution lines to maintain the safe, reliable, and continuous distribution of electricity to its customers. Target vegetation can negatively impact both the engineering and operational components of this objective. Worker and public safety, environmental protection considerations, as well as security within the distribution line corridors are issues that must be addressed and protected.

Herbicides can assist BC Hydro by restricting the growth of tall-growing vegetation while promoting growth of favorable, low-growing species. Over time, this helps reduce ongoing vegetation maintenance costs and can reduce impacts on fish, wildlife, bodies of water and the general public by reducing the number of times individual sites are visited.

Responsible Treatment

BC Hydro will utilize the principles of IPM to manage target vegetation. Regular inspections of the distribution system shall be conducted to determine the physical location of hazard trees and vegetation clearance requirements. Where possible, vegetation that could grow, or is expected to fall onto distribution lines shall be removed. If removal is not possible, adherence to required clearances shall be achieved by the methods described in this PMP. The vegetation management practices discussed in this PMP include manual and mechanical, cultural, biological and chemical

(herbicides) methods, as well as the selection criteria used to decide which technique or combination of techniques will be utilized.

Only applicators certified through the MoE are permitted to handle and apply herbicides. Certified applicators must adhere to all legislation, standards, and safety requirements.

About Distribution Line Corridors

Most distribution lines in BC are located on Ministry of Transportation rights-of-way. A few distribution lines are located on private land easements or Crown rights-of-way. The corridor width is generally five to seven metres but may be much larger on cross-country sections (i.e., areas where power lines pass through undeveloped land and are not accessible by road).

Environment and Safety Issues

BC Hydro recognizes the importance of protecting aquatic, marine, and riparian ecosystems to ensure their long-term sustainability. The safety of the public, BC Hydro staff and its contractors is also paramount. Operations are planned based on triple bottom line objectives and consider safety, the environment, and financial targets.

When vegetation management involves the use of herbicides, extra caution shall be exercised around bodies of water, water intakes and wells (domestic and agricultural), environmentally sensitive areas, and areas where food for human or livestock consumption is grown or found. Pesticide-free zones, no-treatment zones and buffer zones will be established and maintained adjacent to the above areas, following regulations.

BC Hydro uses only certified and authorized applicators to minimize the risks of misapplication, over-application, or spillage of herbicides. All applicators have spill kits and other protective equipment on site and are trained in their use.

Definitions

For BC Hydro distribution line corridors, a **pest** is vegetation which, primarily, is likely to grow into or fall onto overhead conductors before the next regularly planned maintenance cycle.

Herbicides: chemicals that are applied to vegetation to either inhibit growth or kill the target species.

Integrated pest management (IPM), as defined in the *IPMR*, is a process for managing pest populations that includes the following elements:

- (a) planning and managing ecosystems to prevent organisms from becoming pests;
- (b) identifying pest problems and potential pest problems;
- (c) monitoring populations of pests and beneficial organisms, damage caused by pests, and environmental conditions;
- (d) using injury thresholds in making treatment decisions;
- (e) suppressing pest populations to acceptable levels using strategies based on considerations of:
 - (i) biological, physical, cultural, mechanical, behavioural, and chemical controls in appropriate combinations, and
 - (ii) environmental and human health protection;
- (f) evaluating the effectiveness of pest management treatments.

Integrated vegetation management (IVM) involves selecting and combining vegetation treatments to target specific plant species that pose a risk to safety or reliability, while minimizing impacts to the environment and the public. Implementing IVM using a “Pest Management Plan” is a common practice on utility corridors, railways, roadways, oil and gas pipelines, forestry plantations and at electrical and industrial facilities in BC.

Program Description

This section of the Pest Management Plan (PMP) fulfills the requirements of Section 58 of the *Integrated Pest Management Regulation (IPMR)*. Each heading covers a particular subsection of Section 58, which is reproduced from the Regulation in the boxed text.

BC Hydro's distribution vegetation management program objectives are to:

- ensure vegetation management practices and procedures are safe, environmentally sound, practical, efficient and cost-effective;
- utilize appropriate technologies;
- integrate vegetation management information with a geographical information system (GIS);
- ensure public awareness;
- pursue partnership opportunities with various resource experts;
- identify and quantify maintenance requirements;
- utilize a hazard tree rating and removal system; and
- consider compatible alternative uses of its corridors, thus, reducing the need for vegetation management.

Geographic Area of the PMP: Section 58(1)(a)

58 (1) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following identifying information;

(a) a description of the geographic boundaries of the area to which the plan applies and maps or diagrams showing proposed treatment areas within that area;

This PMP covers all areas of the province where BC Hydro operates a distribution system, typically roadside circuits or on distribution easements. They are located throughout BC, and this PMP covers the entire provincial program. Areas where BC Hydro does not carry out distribution operations include: the City of New Westminster, the City of Kelowna, areas of the Kootenay and Boundary Districts between Creston and Rock Creek, the Similkameen Valley, and the Okanagan Valley south of Summerland to the Canada/US Border. Also exempted are the Nisga'a Lands, near Terrace.

Attached, and marked as Schedule 1, is a copy of a map depicting the geographic boundaries of the area to which this PMP applies.

BC Hydro maintains about 47,800 kilometres of overhead distribution lines. About 90% of BC Hydro's distribution lines run along public road allowances. In addition to the distribution line corridor, this plan also includes access roads and helipads adjacent to the corridor.

BC Hydro is mandated to manage these areas per Section 20 of the *BC Hydro and Power Authority Act*, and per right-of-way agreements.

**Person
Responsible:
Section 58(1)(b)(c)**

58 (1) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following identifying information;

(b) the person responsible for managing pests in relation to the land described in paragraph (a);

(c) the name and phone number of an individual who is the principal contact for information relating to the pest management plan.

The person responsible for managing vegetation on distribution line corridors for BC Hydro is Chris Smith, Senior Manager, Vegetation Management, Transmission and Distribution Engineering and Operations.

The principal contact to obtain information relating to the BC Hydro Distribution PMP is Rene Roddick, Vegetation Pest Biologist. Phone 604-543-1533.

**Prevention
Program:
Section 58(2)(a)**

58 (2) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following integrated pest management elements:

(a) a description of the program that will be employed to prevent organisms from becoming pests;

*Prevention and
Planning*

For a number of years, BC Hydro has been actively involved in gathering information to implement long-range planning for its distribution vegetation management program. This information has been derived from vegetation inventory surveys and from the results of inspections and patrols of distribution lines by BC Hydro staff and contractors. Prevention of vegetation

management issues is achieved, where possible, through a robust planning process. This planning process starts prior to the clearing of land for new line construction and continues through the lifetime of the power line.

Initial Clearing for New Construction

Initial clearing of vegetation for distribution lines provides the foundation for future vegetation management activities and associated costs. Due consideration must be given to long-term management costs, even if this entails an increase in initial capital costs.

The vegetation management objective is to eliminate all tall-growing tree and shrub species from new distribution line corridors, and to remove any hazard or problem trees that are outside the corridor, prior to construction. Throughout the BC Hydro service area, the emphasis is to remove tree or shrub species that can grow to heights that will allow them to make contact with energized conductors. In the case of deciduous species, herbicide treatment of the stump may also be required to reduce re-sprouting or suckering. Whenever possible, tall-growing species are selectively removed leaving low-growing species intact and undisturbed.

Once a new distribution line has been cleared, consideration will be given to planting vegetation which will not exceed six metres in height at maturity. A list of trees and shrubs which are compatible with distribution lines can be found in a BC Hydro publication entitled *Planting Near Power Lines – A Guide to Trees Recommended for Planting and Growing Near Power Lines*.

Long-Range Plans

BC Hydro operates under a long-term strategic maintenance plan as well as annual operational plans. Planned activities are based on a cyclical rotation of work areas. This plan is used to optimize the length of the maintenance cycle as well as to estimate future budget requirements.

Establishing Work Management Areas

It is BC Hydro standard to plan vegetation management activities on a cyclical basis in specific work management areas. In a cyclical control program, the total work is divided into yearly management areas based on vegetation growth rates and available resources. The cycles are generally fixed between two to seven years, but the program is reviewed yearly to optimize the cycles where possible.

There may be limitations to obtaining the desirable clearance distances due to such factors as riparian areas, customer sensitivities, or unusual terrain features which cause low ground-to-conductor clearance. In these cases, alternative control methods or shortened cycle intervals will be considered.

Annual Workload Reviews

These workload reviews are part of the annual planning process and may have impacts on the long-term strategic maintenance plan. During the budget planning process, the vegetation coordinator does an overview of the planned work areas and provides base information to the Regional Vegetation Manager who uses this information to develop a work plan. The work plans for each region are compiled and submitted to the Asset Investment

Hazard Tree Inventories

Identification of hazard trees on the BC Hydro distribution system is a critical and ongoing activity to ensure system reliability and public safety. The criteria used for determining the hazard tree priority rating are based on type and severity of the tree defect(s), tree species, and the location of the target tree.

The distribution lines exist in a dynamic environment due to the continuous growth and decline of tall-growing vegetation in and around the distribution line corridors. Thus, the hazard tree inventory is continually evolving as vegetation moves along its life cycle. Prevention is the best vegetation management technique; however, the objectives of safety, environment, reliability, customer sensitivities, and cost-effectiveness are considered in setting action thresholds for the hazard tree removal component of the vegetation management program. Hazard trees in the inventory are systematically prioritized for removal based on risk rating and available budgets.

Identification of Pest Species: Section 58(2)(b)

58 (2)(b) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following integrated pest management elements – either:

- (i) a description of the program that will be employed to identify pests targeted by the plan, or***
- (ii) identification of the pests targeted by the plan;***

The accurate identification of target vegetation on, or adjacent to, BC Hydro distribution line corridors is important for these reasons:

- control may or may not be required, depending on vegetation growth rates, height at maturity, characteristics such as susceptibility to rot, windthrow, or branch-breakage, and the physical location of the targets;

- control methods may differ depending on the plant species. Some may be easily controlled by non-chemical methods, while others may only be effectively managed through a combination of non-chemical and chemical methods (e.g., certain deciduous tree species are best controlled by manual cutting followed by the application of a herbicide to control re-sprouting).

For BC Hydro distribution line corridors, vegetation maintenance is applied mainly to the control of shrubs and trees. As a group, shrubs and trees are commonly referred to as woody plants. Few non-woody plants require maintenance by BC Hydro for distribution line security.

It is important to have a basic understanding of plant and tree biology, including knowledge of growth stages, life cycles and classification so that the safest, most appropriate and effective control methods may be used.

Vegetation Categories

Vegetation encountered along and adjacent to BC Hydro distribution line corridors can be classified into two categories:

- desirable vegetation (sometimes referred to as 'low-growing'); and
- target vegetation (i.e., trees and shrubs impacting lines including hazard trees)

Desirable Vegetation

Desirable vegetation is vegetation which when mature will not interfere with the distribution system or the overhead conductors either due to its maximum growth height or to its proximity to the lines, or a combination of both reasons. This category includes ferns, grasses, sedges, forbs and low-growing shrubs and trees.

The vegetation management approach to all desirable vegetation is to encourage its retention and propagation. The presence of appropriate low-growing vegetation inhibits the growth of the less desirable species.

Target Vegetation

Target vegetation includes; vines, trees, or shrubs growing on and adjacent to BC Hydro distribution line corridors which are likely to grow into or fall onto overhead conductors or infrastructure before the next regularly planned maintenance cycle. Target vegetation includes the following:

Vines

Vines are broad-leaved plants that can be either woody or herbaceous. Vines, however, often have persistent woody stems. They can climb utility poles and signs, contact energized lines, and can severely reduce access to structures on corridors. For these reasons, control of vines may sometimes be necessary.

Woody Plants (Shrubs and Trees)

Woody plants are those that form secondary tissues from the vascular cambium (wood). Woody plants include shrubs and trees. Shrubs are woody plants that have several stems, while trees are woody plants that usually have a single stem and generally reach greater heights at maturity than shrubs.

Hazard Trees

For BC Hydro, hazard trees are trees or parts of the tree which demonstrate a potential to fail, and are likely to come into contact with or otherwise damage the BC Hydro distribution system.

Monitoring Program: Section 58(2)(c)

58 (2) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following integrated pest management elements:

(c) a description of the monitoring program that will be employed before or during the pesticide use for assessing pest populations, environmental conditions and damage caused by pests, which program must include a description of

(i) the monitoring methods,

(ii) the frequency of monitoring, and

(iii) the data that will be collected;

Description of Monitoring Program

BC Hydro staff and contractors monitor target vegetation, including hazard trees, on a regular basis. BC Hydro believes that monitoring of potential target vegetation through regular inspections and line patrols is an essential planning and prevention tool. The results of inspections and patrols are used

to determine actions, if required, to reduce the possibility of vegetation coming into contact with distribution lines and thereby creating a safety hazard, power outage, or risk of fire.

Frequency of Monitoring

Monitoring consists of an ongoing assessment of sites. Its objective is to identify emergent issues as well as future vegetation management concerns.

Sites are monitored on a cycle. The cycle is determined by species composition, projected growth rates, and clearance requirements from the energized electrical system. The majority of cycles range from two to seven years across BC.

Monitoring Methods and Data Collection

BC Hydro will maintain site integrity by routinely inspecting and monitoring corridors for potential or existing vegetation problems. Urgent public safety or system integrity threats will be dealt with immediately. Data is recorded on a site specific basis using BC Hydro's GIS.

The following types of data are collected during the monitoring of distribution line corridors:

- tree species and condition,
- work type required,
- quantity of vegetation requiring treatment,
- debris management required,
- riparian information,
- location and customer issues,
- estimated time and equipment required to perform work, and
- hazard tree rating

Injury Thresholds: Section 58(2)(d)

58 (2) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following integrated pest management elements:

(d) a description of the injury thresholds that will be applied in deciding whether a pesticide treatment is necessary and an explanation of

(i) how the thresholds were chosen, and

(ii) how the thresholds will be applied;

As defined in the *IPMR*:

Injury threshold: the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.

*Two to Seven Year
Cycle Threshold*

In the case of electrical corridors, where there is no tolerance for any vegetation that could contact the power lines or cause disruption in service the generally accepted model for injury threshold based on percentage surface vegetation cover is not applicable. The decision to initiate treatment is based solely on the presence of target vegetation that has the potential to grow into or fall onto distribution equipment. Treatment decisions may also consider public safety, line security, accessibility, species growth rates, and social, economic and environmental considerations.

**Treatment
Methods:
Section 58(2)(e)**

58 (2) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following integrated pest management elements:

(e) pest treatment options including

(i) a description of the pesticide and non-pesticide treatment methods of controlling pests that may be used,

(ii) the rationale for selecting the treatment methods described under subparagraph (i),

(iii) the benefits and limitations of each treatment method described under subparagraph (i), and

(iv) a description of how a decision to use treatment methods will be made.

*Treatment Rationale
and Options*

IVM involves the use of different techniques to control undesirable vegetation on BC Hydro distribution line corridors. The selection of a particular technique will depend on:

- seasonal timing of treatment;
- vegetation characteristics including species, size, height, and spatial distribution;
- site characteristics including land use, proximity to water sources and/or bodies of water, biogeoclimatic zones, soil type, and other environmental features;
- environmental sensitivities in surrounding areas;
- safety, security, economic impacts and site accessibility; and
- the consequences of not treating.

The IVM techniques proposed for the control of target vegetation on, or adjacent to, BC Hydro distribution line corridors include:

- manual and mechanical;
- cultural (natural);
- biological; and
- chemical (herbicide) methods; or
- a combination of any of the above.

Mechanical and Manual Methods

The following information gives a complete listing of currently available mechanical and manual techniques and tools utilized by BC Hydro. BC Hydro

will search for and consider adopting new technologies as they become available.

The types of mechanical and manual methods which BC Hydro employs for target vegetation management include:

- pruning
- tree removal
- girdling
- brushing and
- mowing

Mechanical clearing employs various vehicle-mounted cutting equipment, either on track or rubber tires. Manual clearing methods involve the use of hand-operated clearing equipment – mainly chainsaws and occasionally brushsaws, sandviks, and machetes. The method or methods chosen depends on factors such as terrain, safety, effectiveness, and economics.

BC Hydro shall evaluate, select and combine the methods that best suit the vegetation management site. Specific techniques are not always appropriate for use in every region or situation. In addition, the exclusive use of manual and mechanical methods to control some target vegetation species often provides only temporary control, may compound the problem by encouraging multi-stem regeneration, and may impact fish and wildlife habitat.

Limitations associated with manual and mechanical methods include; species re-sprout, access restrictions, soil compaction concerns from equipment, operational constraints in the bird nesting season and fire season, species at risk habitat protection, and crew safety due to terrain.

Cultural (Natural) Control

Where appropriate, BC Hydro shall actively encourage the establishment of suitable low-growing vegetation to replace tall-growing species.

Re-planting with appropriate, low-growing vegetation can be an effective vegetation management technique, particularly in small areas with high public exposure, or in riparian habitats or shelterbelts. Where plant competition is feasible on a distribution line corridor, manual, mechanical and chemical control techniques that enhance compatible vegetation shall be carefully selected. In rural or wilderness areas, the retention of plant species that are already present in the native flora will be encouraged.

Compatible, alternative uses for distribution line corridors such as rangeland, agricultural crops, pasture and nurseries are encouraged. The cultural practices of these compatible uses usually eliminate target vegetation species.

Limitations associated with cultural methods include; difficulty in maintaining plantings, high costs associated with nursery stock and planting, and limitations on available, appropriate sites.

Biological Control

Biological control is the reduction or suppression of unwanted organisms by introducing or enhancing the presence of natural enemies. With respect to vegetation management, biological control involves the introduction and establishment of organisms from the target vegetation's native habitat to control it. For example, there is currently a fungus that has been used with variable results as a biological control agent for target species. There are no insects currently available which control the woody species that are target vegetation on distribution line corridors.

Biological control may become more viable as an increased number of biological agents become available. BC Hydro will monitor any products which become available and add them to the list of vegetation management techniques, where appropriate and operationally feasible.

Chemical Controls (Herbicides)

Chemical control involves the use of herbicides to inhibit growth of vegetation on or adjacent to BC Hydro distribution line corridors. Herbicides are an important tool in IVM.

The factors that must be considered when selecting and using a herbicide are:

- soil residual activity – activity of any herbicide residue that is found in the soil.
- mode of action – the way in which the herbicide affects a plant.
- selectivity – the ability of some herbicides to affect specific types of vegetation while not having any negative impact on other plant species.
- toxicity – herbicides with low environmental and health impacts are selected.
- type of vegetation – coniferous trees generally do not require herbicides for control as long as the lowest whorl of branches can be removed. Deciduous trees re-sprout and become more difficult and expensive to manage after repeated cuttings.
- size of vegetation – vegetation < 1.5 metres in height is best controlled by a foliar application of herbicides. Larger vegetation is best controlled by basal applications such as stump or stem treatment.
- Proximity to water or wells – herbicides selected for these sites may have reduced efficacy but better soil adherence and faster

- degradation characteristics to protect the environmental feature.
- Use of land – herbicide use may be timed or the technique modified to avoid berry, food, or plant harvest windows.

The benefits of using herbicides include; conversion of vegetation on the corridor from tall-growing target species to low-growing non-target species, increased length of management cycle, reduced long-term costs, and reduced interruptions to birds, wildlife, and customers.

The limitations associated with chemical treatments include; public concerns, weather restrictions, concerns regarding aesthetics, spill potential, and environmental sensitivities (proximity to water bodies and wells).

Evaluating Effectiveness: Section 58(2)(f)

58 (2)(f) a description of the monitoring program that will be employed for evaluating the effectiveness of the pesticide use on pest populations and the environment, including effects on organisms other than targeted pests, by comparison with the information collected under the program described in paragraph (c), which program must include a description of

- (i) the monitoring methods,***
- (ii) the frequency of monitoring, and***
- (iii) the data that will be collected.***

Monitoring Methods

BC Hydro completes a comprehensive evaluation program to ensure efficacy of the herbicide treatments including:

- contract inspections – at least once during field work, a contract inspection is carried out to ensure proper procedures and contract specifications are being followed.
- pre- and post-treatment evaluations – at least once during contract implementation and during the growth season following treatment, efficacy is reviewed and follow-up treatments are initiated, where required.
- annual program review – programs are evaluated for merit and adjustments are made to the overall program based on post-treatment evaluations, regulator input, and First Nation and public input.
- research – new techniques, herbicides, environmental issues, and cost/benefit assessments are investigated based on need. Promising innovations will be field tested for feasibility before being added to the program.

Contract Inspections

BC Hydro shall inspect the work carried out under this PMP during the period of contract activity. Each contractor's work shall be inspected to assess public and worker safety, environmental concerns, completion schedules and adherence to standards, specifications and the commitments made in this PMP. BC Hydro uses staff certified by the MoE in the appropriate category to inspect herbicide contracts. Staff will undertake assessments and complete a pesticide inspection form. Many of the items identified in the inspection form have been derived from standards contained in the *IPMA & R*. For each contract, inspection results are documented and maintained by BC Hydro.

All contract work will be inspected and evaluated to ensure:

- compliance with commitments made in this PMP;
- compliance with the *IPMA & R*; and
- efficacy of the work that has been undertaken by the contractor.

Pre and Post-treatment Evaluation

Pre- and post-treatment evaluations are a more formal process than an inspection. Pre-treatment evaluations will be conducted to monitor site conditions and to ensure that the proposed treatment is the most effective for the targeted vegetation. Treatment timing is especially important if herbicides will be used. The effectiveness of many herbicides depends on the growth stage and condition of the target plants. Ensuring that herbicide applications are as effective as possible will help reduce the need for future herbicide use at a site. Post-treatment evaluation is undertaken to determine the effectiveness of the vegetation management program. Evaluation results are used to revise site prescriptions and to provide the basis for improvements and changes to the vegetation management process.

When evaluating the results of a herbicide application on a site, BC Hydro shall consider the following:

- effectiveness of the herbicide treatment in controlling the target vegetation;
- the need for follow-up treatments;
- the amount of herbicide used;
- the need to adjust the application rate;
- the cost-effectiveness of the treatment program; and,
- any impact of the herbicide application on the surrounding areas.

The timing and procedure for evaluating specific treatment programs will depend on the treatment method. BC Hydro shall take reasonable efforts to ensure that treatment sites are evaluated within one year of the treatment.

Annual Program Review

Treatment program evaluations shall be based on discussions and interviews conducted by Vegetation Coordinators, Vegetation Specialists, Vegetation Pest Biologists, Operations Managers, or others qualified and experienced to undertake the evaluations.

Research

BC Hydro works in conjunction with the Integrated Vegetation Management Association of BC (IVMA), the Integrated Plant Council of BC (IPC), the International Association of Arborists (ISA) and the Utility Arborists Association (UAA) and attends the International Symposium on Environmental Concerns in Rights-of-Way Management to ensure the most up-to-date research, tools and techniques for vegetation management are considered and incorporated into both operational and strategic vegetation plans.

In addition, information from the research divisions of major chemical suppliers is reviewed on an ongoing basis to ensure new and potentially better products are utilized where possible.

**Herbicides:
Section 58(3)(c)**

58 (3) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following operational information:

(c) identification of each pesticide that will be used under the plan, the manner of its application and the type of equipment required for each manner of application.

Chemical control involves the use of herbicides to inhibit growth of vegetation on or adjacent to BC Hydro distribution line corridors. Herbicides are an important tool in IVM.

Table 2 identifies the manner of application, active ingredients, and equipment required to apply herbicides utilized on the distribution line corridors.

*Table 2:
Herbicides Used for
Distribution Corridor
Maintenance*

Manner of Application	Active Ingredient	Equipment Required
Foliar	glyphosate	backpack sprayer, boom sprayer, powerhose / nozzle
	triclopyr	
Cut Stump	glyphosate	backpack sprayer, spray bottle, modified brush saw
	triclopyr	

Manner of Application	Active Ingredient	Equipment Required
Basal Bark	triclopyr	backpack sprayer, spray bottle
Injection	glyphosate	injection lance
	triclopyr	
	imazapyr	

Per the definitions in the *IPMR*:

Pesticide: a micro-organism or material that is represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest, and includes:

- a) a plant growth regulator, plant defoliator or plant desiccant,
- b) a control product as defined in the Pest Control Products Act (Canada), and
- c) a substance that is classified as a pesticide by regulation
but does not include micro-organisms, materials, substances or control products excluded from this definition by regulation

Handling of Herbicides: Section 58(3)(a)

58 (3) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following operational information:

(a) a description of the methods of handling, preparing, mixing, applying and otherwise using pesticides that will be employed under the plan including a description of the following procedures:

(i) procedures for safely transporting pesticides;

(ii) procedures for safely storing pesticides;

(iii) procedures for safely mixing, loading and applying pesticides;

(iv) procedures for the safe disposal of empty pesticide containers and unused pesticides;

(v) procedures for responding to pesticide spills;

Responsibilities of Personnel

The transportation, storage, handling, application, and disposal of herbicides are governed by federal and provincial legislation. BC Hydro shall 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 (1998) *Occupational Health and Safety Regulations*
- BC Ministry of Environment, Lands and Parks (1995) *Handbook for Pesticide Applicators and Dispensers*; and,
- WorkSafeBC(1990) *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 herbicide must have a valid BC Pesticide User Service License. This license must be in the name of the contractor. The use of a license issued to an alternate firm will not be permitted by BC Hydro.

Each supervising applicator must have a valid BC Pesticide Applicator Certificate in the Industrial Vegetation and Noxious Weed Control, Forestry General, or Forestry Non-Broadcast categories.

Herbicide applications must be performed or supervised by a certified applicator as per the *IPMR* (Section 72). The certified applicator must:

- Be in continuous attendance at the site while herbicides are being applied.
- Have proof of certification at or near the treatment location, readily available for inspection.
- Supervise no more than four uncertified individuals at one time.
- Maintain continuous contact, auditory and/or visual, with the uncertified individuals.
- Be within 500 metres of persons being supervised.
- Comply with requirements set out in Division 7 of the Regulation, *Records and Reporting Requirements*.

General Requirements

Personnel must adhere to the following legal requirements when preparing to apply herbicides, per the *IPMR*:

- Check the *Notice of Intent to Treat* to ensure that the proposed treatment locations, the proposed treatment (including the herbicide and its method of application), and the total area to be treated are correct.
- Know (be informed of) the boundaries of the proposed treatment area, the requirements for personal protection (including Material Safety Data Sheets [*MSDS*]), and the procedures required to protect human health and the environment.
- Carry out a site inspection to ensure that the applicable regulatory requirements and standards can be met in carrying out the use.
- Keep herbicides in their original containers and with original packaging and labelling affixed, or in appropriate containers with trade name, name of active ingredient, concentration of active ingredient, and pesticide registration number affixed.
- Ensure that domestic and agricultural water sources and soil used for agricultural crop production are protected.

In addition to the *IPMR* requirements, BC Hydro requires personnel to:

- Ensure that application equipment is in good working order, and is properly cared for and stored.

- Calibrate equipment to conform to the application rates on the herbicide label.
- Hold a pre-job meeting or conference call to discuss the following:
 - intended work schedule
 - work plan for the site
 - types of herbicides being used
 - specific issues relating to the site, such as First Nations or public concerns
 - environment and safety issues
- Have current *MSDS* and product labels for the products they are using, read and follow product labels, and keep a copy of this PMP available at all times.
- Have the BC Hydro contract specifications available at all times.
- Complete Daily Operations Records, and closely follow all specifications.

Storage Herbicides must be stored in a manner that minimizes hazards to human health and the environment.

Personnel must adhere to the following legal requirements for all storage facilities for herbicides, per the *IPMR*:

- Store herbicides separately from food intended for human or animal consumption.
- Keep herbicides in storage facilities that are locked when unattended, accessible only to authorized persons.
- Keep facilities clean, well-marked, and ventilated to the outside.
- Mark storage facility in block letters “WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY” so signs are visible to persons approaching each door that provides access to the facility.
- Keep storage facilities separate from work and living areas, flammable materials, and bodies of water.
- Store herbicides that release vapours or that display a poison symbol on the label in a storage facility that is not attached to or within a building used for living accommodations.

Handling, Mixing, and Loading

All mixing, loading, and application of herbicides shall be carried out by certified pesticide applicators in the appropriate category of certification. Mixing of herbicides must always be conducted in a safe manner. Safety plans, spill kits, spill response plans, and first aid supplies shall be present on or near the treatment site. Eye wash station(s) and protective clothing, as recommended on the respective product labels, shall be available on or near the treatment site. Product labels and *MSDS* will be available on or near the treatment site to ensure that quantities of herbicides being mixed and used are consistent with label rates.

In addition, BC Hydro requires personnel to:

- Ensure that adequate water for washing, first aid equipment, spill kits, and emergency phone numbers are close at hand.
- Ensure no mixing or loading of herbicides within 15 metres of sensitive environmental features.
- Keep containers well below eye level to prevent splashing or spilling herbicides in the face or eyes.

Transportation

Personnel must adhere to the following legal requirements for the transportation of herbicides, per the *IPMR*:

- Ensure that the herbicide is properly secured during transport to prevent accidental discharge or unauthorized removal, and to prevent contamination of food or drink intended for animal or human consumption, household furnishings, toiletries, clothing, bedding, or similar items transported with the herbicide.

In addition to the *IPMR*, BC Hydro requires personnel to:

- Be familiar with the product label and *MSDS* outlining the transportation requirements for each regulated product used by BC Hydro.
- Keep in the vehicle a first aid kit, fire extinguisher, spill response contingency plan, and spill contingency kit (with WorkSafe BC-regulated contents). The contractor must be trained to handle spills.
- Inspect containers for defects prior to transport. Transfer any defective packages to empty pesticide containers of the same type, or secure any defective containers into secondary containment vessels for transportation.

Application

In general, personnel who will be applying herbicides will follow these BC Hydro requirements:

- The contractor must avoid spray drift or leaching which will damage landscaping.
- Spray operations will be carried out under moderate temperatures as outlined on the pesticide label (e.g. 27°C).
- Nozzle pressure should be regulated to eliminate drift.
- Cease and postpone spray operations if heavy rainfall is predicted or occurring.
- Must not engage in broadcast spraying or foliar spraying if the wind speed exceeds 8 km/hr.
- Must not engage in basal or cut stump applications if stems or stumps covered by ice or frost or saturated.
- Must not spray a herbicide on foliage covered by ice or frost or if water is flowing on the foliage.
- Must ensure that use of herbicide does not remove vegetation that is necessary to:
 - (a) prevent erosion of a stream bank,
 - (b) prevent debris that would cause an unreasonable adverse effect from entering a stream, or
 - (c) maintain slope stability in areas where landslides have occurred.
- Do not treat more area or different areas than those specified on the *Notice of Intent to Treat*.
- Refer promptly to BC Hydro any complaints regarding herbicide applications.

Disposal

The *Hazardous Waste Regulation* (Section 42) requires BC Hydro to:

- Rinse the containers according to the following table.
- Dispose of containers at an approved sanitary landfill or send them back to the manufacturer for appropriate disposal.

Type of Container	Rinsing Method
Rigid plastic or metal (non-pressurized*)	Pressure rinse, or single rinse three times
Glass bottle	Rinse three times
Paper bag	Rinse
Plastic bag	Rinse

*No pressurized containers are used in the distribution vegetation management program. All contractors working for BC Hydro must follow these disposal requirements.

Spill Response

Applicators must ensure that an appropriate spill containment kit and a spill contingency plan are at the application site at all times.

In the event of a spill, BC Hydro staff and contractors must adhere to the following BC Hydro spill response requirements:

- Ensure safety – prioritize critical issues; use appropriate personal protective equipment; follow safe work procedures; and consult *Manufacturer’s Safety Data Sheet (MSDS)* and product label.
- Stop the flow – act quickly; close valves; shut off pumps; plug leaks; set containers upright; and carry out any emergency repairs.
- Secure the area – limit access to essential personnel only, and eliminate ignition sources.
- Contain the spill – protect drains, sewers, culverts, waterways and ditches as required; contain spilled product with sorbents, booms, earth and/or sod; identify all potential spill sources and extent of the spilled material; monitor containment measures; stabilize the spill; and get assistance.
- Report / Notify – all spills are to be reported to BC Hydro immediately and Provincial Emergency Program, MoE and Fisheries and Oceans Canada (DFO), as required.
- Clean up the site – remove contaminated soil and collect and clean-up supplies/materials; label and store waste appropriately in a secure location until disposal can be arranged; store waste material in leak proof, sealed containers and ensure it is protected from the weather; and restore site as required.

Environmental Protection: Section 58(3)(b)

58 (3) A pest management plan prepared for the purpose of section 7(1)(a) of the Act must include the following operational information:

(b) a description of the environmental protection strategies and procedures that will be followed under the plan, including a description of the following strategies and procedures:

(i) strategies to protect community watersheds and other domestic and agricultural water sources from adverse effects of pesticide use;

(ii) strategies to protect fish and wildlife, riparian areas and wildlife habitat from adverse effects of pesticide use;

(iii) strategies to prevent pesticide contamination of food intended for human consumption;

(iv) pre-treatment inspection procedures for identifying treatment area boundaries;

(v) procedures for maintaining and calibrating pesticide application equipment;

(vi) procedures for monitoring weather conditions and strategies for modifying pesticide application methods for different weather conditions;

Environmental Protection Strategies

To ensure that treatments are done in an environmentally sound manner, BC Hydro personnel will:

- Complete pre-job meetings with certified applicators.
- Ensure that buffer zones, no-treatment zones (NTZ), and pesticide-free zones (PFZs) are adhered to.
- Ensure that additional protection strategies outlined in contract specifications are adhered to by contractors.

All herbicide applications are carried out by MoE certified applicators. All applicators carry spill kits.

*Community
Watersheds, Domestic
and Agricultural
Water Sources*

Watersheds, Wells, and Water Intakes

Many communities have designated watersheds where surface water is managed as the water source for the community. The MoE defines a “community watershed” as a stream used for human consumption, where the stream is licensed as such by a community under the *Water Act*, and the drainage area is not more than 500 km². No herbicides will be applied within 30 metres upslope from the water intake for the community watershed.

In many BC communities, homeowners use private groundwater or surface water sources for domestic water, instead of a watershed. BC Hydro is restricted from applying herbicides within defined NTZs (per Table 3) around wells and intakes.

No-Treatment Zones

Bodies of Water

Bodies of water are provided protection through the *IPMA & R* of BC. BC Hydro ensures that herbicides will not be applied within established NTZs, and will respect PFZs, NTZs and special requirements set out in buffer zones.

No-treatment zone: an area of land that must not be treated with pesticide.

Pesticide-free zone: an area of land that:

- a) must not be treated with pesticide, and
- b) must be protected from pesticide moving onto it.

The *IPMR*, Sections 79(1) and (2), require the following NTZs. The NTZs apply to wells used for domestic or agricultural purposes, including water for livestock or for irrigation of crops.

Table 3: Size of No-Treatment Zones*

Section of IVMR	Permitted Application	Required Distance	Comments
All Herbicides			
71(3)	Domestic and agricultural wells and water intake, including all methods and pesticides	30m NTZ	NTZ may be reduced if confirmation holder is reasonably satisfied that a smaller NTZ will ensure no pesticide enters well or intake (70(4))
Glyphosate Applications			
74(1)(b)	Along or around a body of water or a classified wetland that: <ul style="list-style-type: none"> • is fish-bearing, or • drains directly into a fish-bearing body of water, or • is along or around a dry stream that when wet is fish-bearing or drains directly into a fish-bearing body of water 	5m PFZ	
74(1)(a)(ii)	Along or around a body of water or classified wetland that: <ul style="list-style-type: none"> • is fish-bearing, or • drains directly into a fish-bearing body of water, or • is along or around a dry stream that when wet is fish-bearing or drains directly into a fish-bearing body of water. 	2m PFZ	Glyphosate must be applied using selective application methods**
74(1)(c)	Along or around a body of water if the body of water: <ul style="list-style-type: none"> • is not fish-bearing at any time of the year, or • does not drain directly into a fish-bearing body of water 	2m NTZ	
74(1)(a)(i)	A substation or switch yard that must be maintained vegetation-free for safety reasons along or around a body of water or wetland that is fish-bearing or drains directly to fish-bearing waters	2m PFZ	
74(2)	A temporary free-standing body of water that is not fish-bearing and does not drain directly into fish-bearing waters	0m PFZ	
Non-glyphosate Applications			

Riparian Issues and Fish

In addition to the PFZ's specified in Table 3 for bodies of water, BC Hydro shall exercise extra caution when working with herbicides adjacent to and within sensitive ecosystems.

Riparian vegetation management considerations shall include provisions to ensure there is no harmful alteration, damage or destruction to fish or their habitat. This includes procedures to minimize impact to vegetation cover, bank stability, turbidity, and nutrient cycling.

To achieve these protection strategies, contract documents and prescriptions shall describe best management practices. These practices will be reinforced at the pre-job meeting, held between BC Hydro staff and contract supervisors before work begins, as well as at field meetings between BC Hydro staff and field workers. There shall be regular inspections and, where needed, there shall be detailed and direct supervision by subject experts.

Standard clauses in site prescriptions and contract documents include:

- no refueling of machinery or mixing of herbicides within 15 metres of a riparian zone;
- no clean up or disposal of herbicide materials within 15 metres of riparian zones; and,
- requirements to install descriptive flagging such as “Riparian Zone” and/or “Pesticide-Free Zone” placed at regulated distances.

Riparian management strategies will confer some protection to wildlife in these Riparian Management Areas. The impact on cover, which provides protection from predators, cooling/warming, nesting and roosting sites, residences, travel corridors and food sources, will be minimized. If two-thirds of cover cannot be retained, the area will be re-planted to achieve future cover and improved biodiversity.

BC Hydro will work closely with agencies responsible for critical species at risk and will rely on best management strategies as derived from documents on species habitat, lifecycle information, and known locations. This information will be relayed to contractors to ensure all involved in the vegetation management process can competently protect these species and habitats during the course of the work.

Wildlife

Wildlife and Habitat

Prior to the release of any herbicide contracts, the Vegetation Specialist/Biologist will review the Species at Risk information available from the Conservation Data Centre to determine the presence of protected habitats. In cases where treatment areas potentially intersect with protected habitats, appropriate buffers and required protection measures will be prescribed to the contract crew. Where critical habitat has been mapped and a recovery plan is in place, there will be communication with the recovery team to ensure activities meet the strategy requirements.

All herbicides used in the distribution vegetation management program have been shown to have no unreasonable adverse effects on fish and wildlife when used as a site specific application following all label recommendations and regulations. Many studies have shown the application of herbicides to

have had no negative impacts on habitat, and in some cases have been shown to have had a positive impact.

Protection of Food

BC Hydro distribution line corridors are frequently located near environmentally sensitive areas, vegetable gardens, berry picking, and bee-keeping areas, and areas containing agricultural crops and domestic animals. BC Hydro shall attempt to locate areas where there is food intended for human or livestock consumption (including berries) and take the appropriate precautions during vegetation management operations to avoid contamination of these areas. Such precautions may include providing increased buffer zones around these areas during herbicide applications, timing applications to provide additional safety measures or using alternative, non-chemical methods of vegetation management.

In the vicinity of certified organic farms, it is the responsibility of the grower to maintain an 8 metre buffer zone between their organic crops and power poles, as recommended by the Certified Organic Associations of British Columbia (CAN/CGSB-32.310-200 5.1.7). During the pre-treatment planning, identified organic farms will be contacted to ensure they are aware of required buffer zones.

Pre-treatment Inspection

A pre-treatment inspection shall be completed to protect environmentally sensitive areas. During this inspection, sensitive areas such as bodies of water are designated in the GIS database and marked in the field with flagging tape. This GIS database is provided to the contractor and discussed at the pre-job. The contractor is instructed to follow the flagging requirements, which may include the use of Riparian Zone and PFZ flagging tape. The contractor is also instructed to flag areas which may have been missed or have become visible at time of treatment (i.e., due to rainfall).

Maintaining and Calibrating Application Equipment

All herbicide application equipment used for BC Hydro contracts shall be safe, clean, in good repair, compatible and appropriate for the herbicide being used. As a minimum, all sprayers will be calibrated once per year prior to use, and at regular intervals throughout the season when changing pesticide products and when nozzle output begins to vary. The frequency of calibration will be dictated by factors such as the formulation of herbicides used. For example, abrasive formulations will result in greater nozzle wear and will require more frequent calibrations.

Monitoring Weather during Application

Measurements will be made to record weather conditions prior to and periodically during herbicide applications. Wind speed and direction, precipitation, temperature, and sky conditions will be recorded for foliar herbicide applications using backpacks or handguns. Temperature, precipitation, frost, and dew conditions will be recorded for stem, bark, wick/wipe-on, and stump applications.

Herbicide application will be shut down if:

- the maximum temperature stated on the herbicide label is exceeded;
- the wind speed and/or direction cause the handgun or backpack application of herbicide to drift and/or miss the target vegetation; or;
- it begins to rain, increasing the chances of excessive runoff and leaching;
- Frost, snow, dew, or rain prevent the penetration of herbicides during basal treatments; or
- Humidity is too low for penetration in foliar applications.