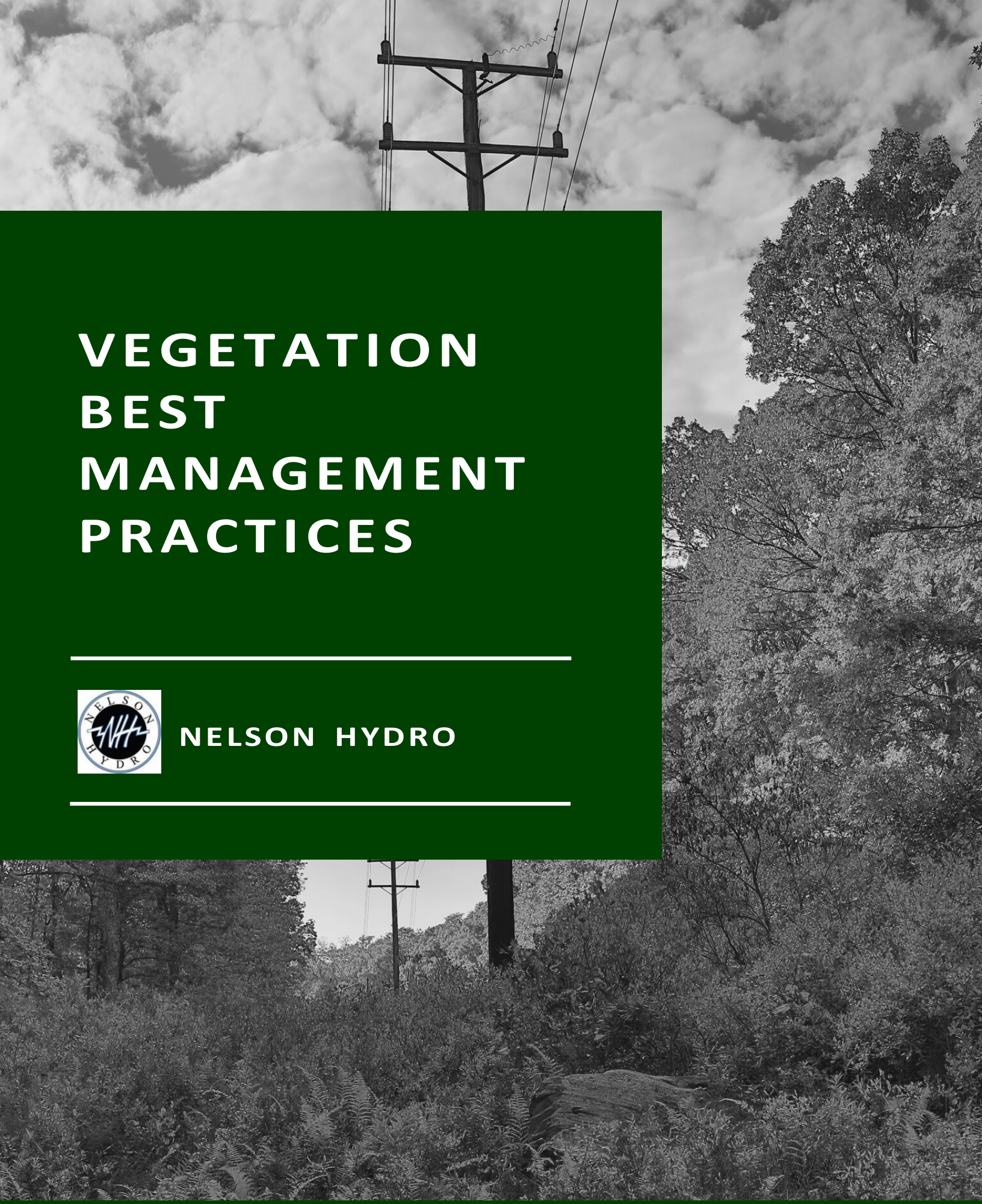

VEGETATION BEST MANAGEMENT PRACTICES

NELSON HYDRO

OCTOBER 2021

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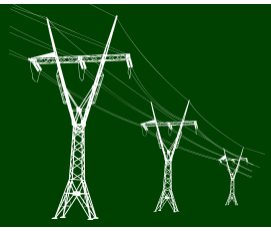
1. INTRODUCTION



Cathro Consulting and B.A. Blackwell and Associates were retained by Nelson Hydro to review vegetation management program and recommend opportunities for improvement and comparative best management practices from other utilities in B.C. and North America wide.

1.1 PROJECT OBJECTIVES & SCOPE

These Vegetation Best Management Practices are designed to meet a suite of objectives unique to the City of Nelson.

The goal of this document is to provide efficient and effective procedures for specific values and locations to protect the public, infrastructure, and values adjacent to Nelson Hydro transmission distribution lines, minimize conflict and reduce Nelson Hydro liability.

A Nesting Bird BMP, Public Engagement Framework, and Consent Form accompany this document, for use by Nelson Hydro staff and vegetation management contractors.

1.2 PROJECT TEAM

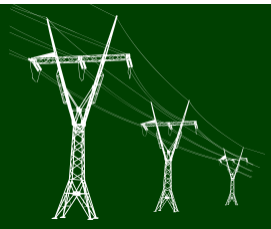
To ensure that skills and qualifications result in operational efficiencies, these Best Management Practices were developed by a team of subject matter experts:

Bruce Blackwell has been working with government, industry and First Nations for 30 years and is at the forefront of BC forest fire risk assessment and fire management planning, on both large and small scales.

John Cathro has extensive experience in community wildfire risk mitigation, forestry and ecosystem stewardship, landscape level community wildfire protection plans, collaborative project management, and communication of technical information to varied audiences.

Neal Dermody has over 30 years' experience in the utility industry with both BC Hydro and Nelson Hydro.

2. . PRE-TREATMENT IDENTIFICATION OF VALUES AND HAZARDS



A variety of values are considered in order to effectively manage vegetation adjacent to Nelson Hydro infrastructure. These values may overlap one another and must be identified prior to vegetation management activities.

2.1 PRIVATE LAND

A significant portion of Nelson Hydro lines cross private land. Most of these landowners are Nelson Hydro customers with the shared interest of maintaining uninterrupted power while reducing the risk of wildfire caused by vegetation igniting when in contact with electrical lines. Homeowners also each have their own sense of privacy, tolerance for risk and aesthetic sensibilities. As a result, issues may arise as to the best approach to vegetation management. Please see the **Public Engagement Framework** for more information.

It is the responsibility of property owners to maintain the service lines on their property clear of vegetation. In the cases where work must be conducted on private land, landowners must be contacted by e-mail, phone or in person 10 working days prior to the commencement of vegetation management work. Danger trees outside of the right of way will require additional engagement with landowners and other stakeholders.

In residential areas, pruning is often a more acceptable and low-impact method of controlling problem vegetation than other physical control methods. It is acknowledged that this is a less efficient means of vegetation management and comes at a higher cost to the rate payer.

2.2 RIPARIAN AREAS

Riparian areas are the transitional habitat between upland dry zones and water bodies such as streams, wetlands or rivers. This habitat type is generally rich in biodiversity and important for water quality and flood mitigation. Riparian areas often contain unique plant species, and special care is required in these areas.

Riparian Management Zones (RMZs) are identified on prescription maps and specific management activities apply within Riparian Management Zones. These may include:

- No machine use within the RMZ
- Vegetable oil in power tools
- No debris piles or broadcasting of chips within RMZs

- Pruning can be used in RMZs to protect habitat integrity where tree removal may not be appropriate or allowed.
- A minimum 15-metre No Treatment Zone (NTZ) may be maintained outside RMZs when using herbicides. Appropriate precautions must be taken when applying herbicide treatments near water sources and in important wildlife habitat areas. See Herbicide section below.

2.3 TERRAIN STABILITY AND SLOPE

The terrain in Nelson and the surrounding area is highly varied and often contains sections of steep inclines or unstable soil, where use of heavy machinery can become a hazard to personnel and infrastructure. Heavy machinery must not be used for vegetation management in the following conditions:

- Steep, treacherous terrain as identified by Qualified Professionals[1] (QP)
- Terrain with >30% slope in municipal areas
- Areas with evidence of erosion, compaction or exposed tree roots
- Areas with loose rock, sensitive soils, or unstable ground
- Riparian zones or banks along water sources, which may be prone to flooding or washouts

In order to maintain terrain stability, alternatives to usage of heavy machinery may be considered, such as pruning. Fully removing trees can compromise slope stability, and machinery can trample or damage the vegetative cover that provides ground stability.

Liabilities increase when working in areas with terrain slope >30%, including safety risks to workers and equipment damage to the soil. Usage of heavy machinery and mowers on this terrain should be limited and restricted to work in non-municipal areas. Safer methods of vegetation management for steep slopes include brushing and localized herbicide application.

2.4 SOIL SENSITIVITY

Soil sensitivity is an important measure of strength relating to terrain stability. Soils that are typically sensitive include clay-based soil, and if disturbed by machinery or tree removal, may result in erosion or compaction problems.

Prior to conducting vegetation management with heavy machinery, the soil type of the work area must be identified with the corresponding prescription maps. If the soil is clay-based or other erosion-related issues are present, the vegetation management must consider the following options:

- Limit use of heavy machinery

[1] A Qualified Professional is someone who has experience and training in the pertinent profession, and who is a qualified expert in the relevant field of study.

- Limit entire tree removals
- Focus on pruning and other methods that retain root system integrity

Herbicides with residual properties are retained in the soil for a certain period of time. Herbicide active ingredients are generally classified by their degree of soil residual activity - low, moderate, or high. Herbicide treatment in areas with sensitive habitats must be restricted to chemicals with low residual activity.

2.5 BREEDING BIRDS

The trees and vegetation in Nelson and the surrounding area provide habitat for breeding birds. Maintaining this habitat is important for bird populations and ecosystem health. Breeding bird nesting season in BC is roughly from mid-March to mid-August. Birds occupy every habitat type, ranging from wetlands to forests to disturbed urban areas.

Areas with known breeding bird populations or nesting sites require special consideration before vegetation management is conducted during this time period, including prioritizing low-impact activities such as pruning or localized herbicide application. Whenever possible, vegetation management in breeding bird habitat should be limited to the timeframe of September to early March. Please see the **Nesting Bird BMP** for more information.

2.6 DANGER TREES

A danger tree is any tree, regardless of size or species, that poses a threat to people or infrastructure due to location or lean, physical damage, or deterioration of limbs or root systems.

Danger tree assessments and management are critical and require ongoing activity. Criteria include dead, dying or infirm trees due to physical conditions (wind-shock, snow loading, lightning, weakened root structure, etc.) or forest health issues (beetle infestation, wildfire, birch worm, spruce bud worm, etc.).

Danger trees are a priority for immediate removal. Danger Trees on private land will require additional engagement with landowners. Please see the **Public Engagement Framework** for more information.

2.7 WILDLIFE TREES

Wildlife trees are standing dead or dying trees, which are also known as “snags” or “cavity trees”. Wildlife trees have significant ecological value and must be given special consideration when vegetation management is conducted. Many bird and mammal species rely on wildlife trees for food, safe nesting sites, and denning sites. Wildlife trees are often easily identified by holes or cavities in the trunk.

Danger tree assessments should be performed on wildlife trees in order to determine any risks to people, infrastructure, or increase of wildfire hazard. Safety and hazard reduction are a priority; however, wildlife trees must be left standing if they pose little to no risk at their location.

2.8 HERITAGE AND LEGACY TREES

According to the **City of Nelson Tree Management Plan**, there are approximately 480 Heritage and Legacy trees in Nelson. Heritage trees are of high value and are typically non-native. Trees in this category merit special considerations for preservation and conservation, as outlined in the **City of Nelson Municipal Tree Bylaw**. The heritage tree component includes many trees in the historic core area of Nelson. The area containing the most heritage trees is roughly measured by Front, Hoover, Falls, and Park Streets, as well as many of the older trees in established parks.

Removing heritage trees is a contentious issue and every effort to find an alternative to a full removal should be considered. Heritage trees must be removed if they are assessed and confirmed as danger trees.

Regular pruning must be conducted on all trees under or near power lines to avoid removal of heritage trees whenever possible.

2.9 AESTHETIC CONSIDERATIONS

Nelson owes much of its character and identity to the trees and urban forest aesthetic found within city limits. Approximately 30,000 trees make up Nelson's urban forest; adding to the natural and historic beauty of the city. Nelson Hydro's service area also includes Taghum Beach Regional Park and Kokanee Creek Provincial Park, as well as several other treed areas that are used for recreation and outdoor enjoyment.

Aesthetic values vary, and the following items must be considered:

- Private Property owners must be contacted prior to vegetation management on private land. This process is outlined in Nelson Hydro's **Public Engagement Framework** and the owners' aesthetic interests can be addressed as part of the discussion. In situations where an imminent hazard needs to be removed and land owners cannot be reached, this must be clearly documented;
- Limit full tree removal whenever possible.
- Limit vegetation management to pruning.
- Replant trees in removal areas, as per the Replacement Trees section below;
- Remove debris as soon as possible.

2.10 INVASIVE SPECIES

Invasive plants or noxious weeds are introduced species that can displace or out-compete native species and negatively impact native ecosystems. The need for controlling invasive plants is outlined in the Provincial Weed Control Act. Several invasive plants are found in the Nelson area and are problematic for ecosystem health and vegetation management, including but not limited to:

- Japanese knotweed
- English ivy
- Giant hogweed
- Scotch broom
- Black Locust
- Common burdock
- Thistles

Invasive plants must be managed to ensure lines and right-of-ways are kept clear of invasive vegetation. Removing invasive species will also result in less repeated maintenance required in work areas, and a healthier ecosystem. These problem species can be managed through a variety of methods; however, other variables must be taken into account, such as terrain slope or nearby water sources, before removal is conducted. Invasive plants can be managed through mowing or pruning, and regrowth can be prevented with localized herbicide application.

2.11 WATER QUALITY

Vegetation management on or near watersheds or points of diversion (eg. dams) can result in changes to water quality and aquatic life. A watershed is an area of land that channels all streams, rainfall and snowmelt to a common outlet such as a reservoir or other body of water.

Mapping and jurisdiction are important factors in determining watershed boundaries and classifications. Nelson Hydro uses mapping tools to clearly define specific classifications:

- Riparian Zones: Riparian areas are the transitional habitat between upland dry zones and water bodies such as streams, wetlands or rivers. See Section 2.2 above for more details.
- Community Watersheds: A community watershed is defined as all or part of the drainage area that is upslope of the point from which water is diverted for human consumption by a licensed waterworks.
- Domestic Watersheds: A domestic watershed is a local area in which rural residents use small surface streams for their drinking water. These watersheds are privately stewarded by a landowner or a collective of landowners.

Herbicide runoff can negatively impact water quality therefore its use in watershed areas should be minimized. When necessary, it should only be used in localized application with low residual activity chemicals.

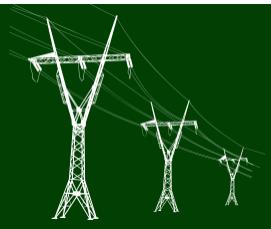
Use of heavy machinery in watershed areas with erosion problems or unstable terrain can create further issues with sediment loading and bank/shoreline damage. Use of machinery is not recommended within riparian management areas. In these areas, other methods such as pruning should be prioritized.

Debris in work areas prone to flooding should be cleaned up immediately to avoid accumulation of logs or other woody debris in the water.

Fish and other aquatic species require shade and cover provided by vegetation adjacent to their water habitat. When managing vegetation in areas of known fish spawning or resting habitats, special consideration must be given to maintaining the shade coverage that is important for their survival.

Figure 1. Nelson Hydro hydroelectric facility on the Kootenay River

3. DIRECTION TO EMPLOYEES AND CONTRACTORS FOR ROLE REQUIREMENTS



Cutting crews and other on-the-ground contractors or Nelson Hydro employees may experience a variety of circumstances in which they must speak with or address the concerns of Nelson Hydro customers and other impacted stakeholders. These workers are often the "face" of Nelson Hydro and have a number of tools to utilize in order to navigate customer relations:

- **Public Engagement Framework**: This document outlines clear employee roles and the objectives and activities required to provide effective customer service while maintaining Nelson Hydro infrastructure. When engaged in customer relations, there are a number of processes to follow to reach an outcome on both private property and Crown or Municipal land.

- **Prescription:** This document is developed by a Qualified Professional and clearly states and outlines the works that are required for an area. The Prescription acts as a guideline for both Nelson Hydro staff and contract crews to clearly articulate intent. It identifies all proposed work, including jurisdiction, sensitive areas and breeding bird requirements. Work should not deviate from what is outlined in the Prescription. Deviations from the prescription must be clearly documented, including the reasons for the deviation.

- **Consent Form**: This is a brief document developed by the Coordinator on a site-specific basis. It includes a map, the legal requirements for vegetation management, and the proposed work. The negotiation of an agreed to Consent Form may include a field visit with the customer.

    - In the event of agreement, the Consent Form will be signed by the Coordinator and delivered to the customer.

    - In the event of no agreement, the Consent Form will be signed by the Coordinator and delivered to the customer with a clear statement that NH has no liability for the issues identified on private land. The land owner is made aware of their accountability (liability) if the NH infrastructure is damaged by the vegetation in the future.

- **Mapping/Data Collection:** Nelson Hydro uses a software application called Fulcrum to locate, map, photograph and outline work that needs to be undertaken. This provides a consistent thread of information for workers and customers, as well as a catalogue for ongoing reference.

Figure 2. Example of Nelson Hydro work site map

4.TRIMMING SPECIFICATIONS

No vegetation is permitted within 6m of three-phase primary lines, 5m of single-phase primary lines, and 1m of secondary lines. These limits of approach are important because electricity can flow through objects that are touching power lines and can move across a gap from a line to an object that is close by. Vegetation that comes into contact with lines is an extreme fire hazard and a liability to public safety, infrastructure and assets.

4.1 TRANSMISSION (60kV)

Table 1. Clearance to Transmission Lines (60 kV and over) [2]

Overhead Clearance	No vegetation overhang is permitted
Side Clearance from Statutory Right-of-Way Centre Line	Optimum No trees or branches capable of falling on lines (all voltages) Statutory Right-of-Way (SRW) 60 kV - 16 metres Minimum 60 kV - 5 metres

[2] Nelson Hydro Rights of Way Pest Management Plan: https://www.nelson.ca/DocumentCenter/View/4065/Nelson-Hydro-ROW-PMP-DRAFT-May-3-2020?bidId=
Fortis BC (Electrical) Rights of Way Pest Management Plan

4.2 PRIMARY DISTRIBUTION (12kV & 25kV)

Table 2. Clearance to Distribution Lines (under 60 kV) Initial Clearing/New Construction[3]

Overhead Clearance	No vegetation overhang is permitted
Side Clearance	• 6 metres from the conductor for 3-phase primary • 5 metres from the conductor for 1-phase primary • 3 metres from the conductor for secondary
Under Clearance	Remove all undesirable tree species in the clearance zone. When removal is not possible, achieve a clearance that is the greater of: • 3 metres from the neutral conductor, or • 1.2 metres from joint use contacts

Table 3. Clearance to Distribution Lines (under 60 kV) for Existing Construction[4]

Overhead Clearance	No vegetation overhang is permitted
Side Clearance	3 metres from the conductor for 3 phase primary
Under Clearance	Remove all undesirable tree species in the clearance zone. When removal is not possible, achieve a clearance that is the greater of: • 3 metres from the neural conductor, or • 1.2 metres from joint use contacts

Table 4. Clearance for Distribution Lines (Under 60 kV) for Radial Circuits to Mountain Repeaters[5]

Overhead Clearance	No vegetation overhang is permitted
Side Clearance	Optimum: 16 metres Minimum: 5 metres

[3] [4] [5] Nelson Hydro Rights of Way Pest Management Plan: https://www.nelson.ca/DocumentCenter/View/4065/Nelson-Hydro-ROW-PMP-DRAFT-May-3-2020?bidId=
Fortis BC (Electrical) Rights of Way Pest Management Plan

4.3 SECONDARY DISTRIBUTION (600V, 347V, 208V & 120/240V)

Table 5. Secondary Voltages [6]

Overhead Clearance	No vegetation overhang is permitted
Side Clearance	Optimum: 16 metres Minimum: 1 metre

Figure 3. City of Nelson lights

[6] Nelson Hydro Rights of Way Pest Management Plan: https://www.nelson.ca/DocumentCenter/View/4065/Nelson-Hydro-ROW-PMP-DRAFT-May-3-2020?bidId=
Fortis BC (Electrical) Rights of Way Pest Management Plan

5.TRIMMING OPTIONS

5.1 TRIM TO CLEARANCE

Clearance specifications are outlined in the above section and vary depending on power line type and vegetation location. Trimming to clearance is the minimum requirement for vegetation management. Lines must be cleared of vegetation from overhead, below and to the sides. Trimming options will also vary depending on customer opinions on their private property, and what is best for the sustainable management of vegetation along a power line.

Directional trimming is sometimes used to encourage growth away from lines, as pictured below. “C” and “V” trimming cuts around power lines are typically a temporary solution to a recurring problem if a tree is located near a power line. Due to regrowth and the manipulation of the tree’s shape with these trimming techniques, further maintenance will be required later, and other portions of the tree’s structure may become compromised. It is recommended in most cases that a tree under a power line be fully removed.
However, due to customer preferences or location of legacy/wildlife trees, the tree removal process may require more negotiation. Please refer to Nelson Hydro’s **Public Engagement Framework** for customer relation protocols in these instances.

Figure 4. Example of "V" cut trimming in Nelson

5.2 TRIM TO TRUNK

Trimming to trunk is an option used when an entire limb or branch must be removed from a tree. These are called “collar cuts”. This is an appropriate trimming method for damaged or rotting branches, or trees with limbs that are encroaching on clearance zones.

Collar Cuts: When removing a lateral branch from a stem or limb, or when reducing an upright to a lateral, the final cut must be made at the correct place to promote tree health and reduce re-sprouting. These cut lines are indicated by the branch collar and by the branch bark ridge. Proper cuts will ensure that decay is minimized and will encourage closure of the cut.

When cutting a stem, cuts must be made close to, and on an angle with, the branch bark ridge. The remaining branch must be at least one third the diameter of the trunk. Stubs cannot be left, as they are entry points for rot-causing fungi.

Figure 5. Hydro contractor trimming to trunk

5.3 CROWNING OF TREE

Removing the top of a tree is sometimes required to maintain visual screening and to meet overhead clearance specifications. This method leaves the tree to languish but helps delay the hazards associated with the tree touching the line above. This method is called "topping" and should be a last resort option, as it typically results in a less aesthetically pleasing tree and can create an entry point for disease. In most cases, it is recommended that the tree is fully removed rather than topped. Similar to directional trimming "C" or "V" cuts, topping a tree is a temporary management solution that will require further maintenance in the future.

Crown Reduction: Crown reduction is the reduction of the crown of a tree to a smaller size. It involves cutting back the leaders and laterals to an appropriate crotch where the branch remaining is no less than one third of the size of the portion of stem removed. Crown reduction provides proper clearance and minimizes re-growth. Directional pruning should be used to ensure that re-growth is directed away from the lines. In cases where tree removal is not possible, crown reduction is the main procedure used for trees growing both under and beside the lines.

Figure 6. Example of tree topping/crown reduction

5.4 COMPLETE REMOVAL OF TREE

Complete tree removal is always the preferred method of managing the powerline right-of-way. When trees are on private property they must be fully removed when they are deemed a safety hazard (classified as a danger tree after an assessment – present apparent rot/disease, deteriorated root system, significant lean, etc.) and there are no other trimming options to mitigate the risks. Complete removal of a tree is typically a last resort when dealing with “heritage” or wildlife trees.

Tree removals must be approved by the City of Nelson or by the landowner on private land. Please see the **Public Engagement Framework** for landowner customer relations processes.

Dead and dying trees can be knocked down or significantly damaged during intense storms or microburst wind events. These danger trees pose a great risk to power lines and infrastructure and must be addressed soon as possible.

5.5 STAND CONVERSION CONSIDERATIONS

An objective of vegetation management is to convert power line corridors from dense stands of tall-growing trees to low-growing plant communities that provide terrain stability. Once a stand conversion is complete, it requires less maintenance and increases public safety.

Stand conversion can be achieved through the following methods:

- Selective control – targeting removal of tall-growing trees so that low-growing plants are left intact and naturally suppress undesirable species
- Pruning existing vegetation – it may not be possible to remove all tall-growing trees from a line corridor or work area, and pruning is the best low-impact method of controlling these species
- Replanting with low-growing, native shrub species,
- Herbicide Use.

5.6 REPLACEMENT TREES AND/OR VEGETATION

Vegetation and trees add much to the practical and aesthetic value in Nelson and the surrounding communities. The planting and maintaining of trees are important, even those close to power lines, as long as these trees are suitable for that location.

Removal and replacement with ecologically and utility friendly trees and or vegetation (trees and shrubs) may be required for soil stability or aesthetic reasons. By managing for the right species, maintenance and overall costs can be reduced. Choosing the ecologically appropriate replacement tree and vegetation depends on the biogeoclimatic zone and site (moisture and nutrient regime) associated with regional climate and geographic region within the province. A variety of other factors must be considered, including flammability, wind firmness, resiliency to climate change and drought, and life span/growth habit. For example, fir and larch species are hardy and resilient, whereas

birch trees are short-lived and highly flammable. For a list of full replacement tree and shrub species recommendations, see Appendix 10.2.

Nelson and the surrounding area is characterized by long, warm summers and cool, wet winters, dominated by coniferous forests that contain the highest diversity of tree species in the province. In summer months, wildfires can occur frequently in drier parts of this area and are an important consideration for vegetation management planning and mitigation. The climate allows for intense storms which can result in lightning damage and windfall of trees close to power lines. Furthermore, the forests in this zone are subject to a variety of forest health and pest infestations including root disease, heart rot and insects. These diseases can kill or damage trees, making them more likely to affect Nelson Hydro infrastructure. In winter months, heavy, wet snow can result in branches and limbs breaking and falling onto power lines.

Figure 7. Hydro infrastructure damage from winter conditions

The following zones are a guide for planting replacement trees:

- Low Zones are the areas directly under the power lines and extend 6 metres on either side of the hydro pole. Trees should not be planted in this area.
- Medium Zones are the areas that extend from the edge of the Low Zone to a distance of 20 metres from the hydro pole. Trees in this zone cause the majority of outages. Weak or damaged trees in particular create a potential for severe public safety hazards. The maximum height of trees growing in this zone should be 12 metres.
- High Zones are the areas more than 20 metres from the power lines. Virtually any strong healthy tree is acceptable in this zone.

6.DISPOSAL OF DEBRIS

Manual and mechanical vegetation treatments (such as hand slashing, mowing, cutting and delimbing) are used as vegetation control measures. These operations result in an accumulation of woody debris, which may increase risk of fire or other hazards in these areas. Debris must be disposed of as quickly as possible. Fine fuels of any extent must not be left behind in work areas, as they create a liability and potentially allow fire to spread and damage assets and adjacent values. Fine fuels under 12.5 cm in diameter need to be less than 1.0 kg/m2 or less than 1.0 ton per hectare.

6.1 LEAVING LARGE WOOD ON THE GROUND

Coarse Woody Debris (CWD), greater than 12.5 cm in diameter and 3 m in length, contributes to biodiversity and soil productivity. Individual pieces of CWD should be at least 3m apart and should be limited in number in order to prevent fire hazard.

CWD scattered on the ground can create safety and tripping hazards, so they should only be distributed in areas with little or no motorized or foot access.

CWD must not be piled in riparian areas, and areas with sensitive soils.

6.2 CRITTER PILES

Fine fuel piles that are not removed from site may have the potential to become home to small mammals such as mice, voles, shrews and squirrels. These critter piles shall be comprised of woody material greater than 2 cm diameter, in piles no greater than 2 m diameter, no closer than 10 m from each other. Critter piles should be limited to 20 m spacing.

Critter piles are particularly useful in sensitive areas and with poor access.

Figure 8. Critter pile

6.3 CHIPPING ON SITE

Chipping on site is an effective way to dispose of large wood left over from tree removal or pruning. Chip dispersal shall be no more than 5 cm deep.

Wood chips may be left on public property where appropriate and as conforming to jurisdictional regulations. Wood chips are often requested by the landowner on private land.

6.4 REMOVAL OF WASTE WOOD FROM SITE

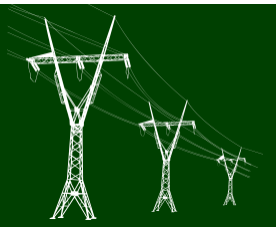
Small diameter wood waste (<7.5 cm diameter) should be removed from the site during cutting and pruning operations to maintain aesthetic values and reduce the risk of wildfire. Where wood waste is left on site due to logistical issues, jurisdictional regulations are to be followed. Nelson Hydro is responsible for removing trees and other vegetation under and adjacent to lines in order to prevent damage to infrastructure or interruptions in service. The responsibility of removing wood waste after these maintenance activities varies depending on land ownership:

On Private Land, the landowner has the option to make use of the woody debris accumulated on their property.

On Ministry of Transportation and Infrastructure (MOTI) Rights of Ways, MOTI has jurisdiction. Nelson Hydro is responsible for clearing the vegetation on its lines within MOTI Rights of Way.

Figure 9. Usage of wood chipper to dispose of large leftover wood

7.USE OF HERBICIDE



Herbicides are chemicals that are specifically used to control undesirable vegetation, whereas "pesticides" are additionally used to chemically control fungus, insects, plant diseases, snails, slugs and bacteria.

Herbicide use is often the only practical and safe method of controlling vegetation in areas inaccessible to motorized equipment.

In certain areas, mechanical methods cannot be used for vegetation control. Steep terrain with >30% may limit access by mowers and can be dangerous for personnel. Dense brush can create both a visibility and a physical hazard to workers and can result in an increase of injuries. Mechanical methods are sometimes less selective and can also lead to soil erosion by removing vegetative ground cover.

However, herbicides are not always supported by the public. Nelson Hydro will only use herbicides to control the sprouting of problem deciduous vegetation.

7.1 TO STOP REGROWTH OF CERTAIN DECIDUOUS SPECIES

Vines are a particularly problematic deciduous species, which can climb up poles and other infrastructure and pose a risk to operations and functionality. Birch trees sucker after being cut and can regrow in dense patches. In order to target certain deciduous species without damaging other vegetation, selective herbicide application should be used to remove problem vegetation and regrowth.

7.2 REFERENCE TO ACCEPTABLE PRODUCTS

Herbicide usage should be restricted to those with low residual activity, or moderate residual activity in special cases only. Nelson Hydro uses the following common herbicides which are rated to having low toxicity to mammals, and have low or moderate residual activity [6]:

- **Dicamba (Vanquish):** Used to control actively growing broadleaf and woody species. This herbicide is selective and is useful in areas where grasses will remain intact.
- **Glyphosate (Vantage Plus Max):** A commonly used herbicide, controlling a wide variety of weeds and resprouting on stumps. It is useful in areas near water bodies or other sensitive habitats, due to its low toxicity. It is non-selective and can damage desirable vegetation as well as the targeted vegetation.
- **Triclopyr (Garlon XRT):** Used to selectively control trees that encroach fences or electrical lines. When applied as a basal-bark treatment, it is effective in preventing resprouting. It is more effective on birch and aspen than other herbicides.

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[6] Nelson Hydro Rights of Way Pest Management Plan: https://www.nelson.ca/DocumentCenter/View/4065/Nelson-Hydro-ROW-PMP-DRAFT-May-3-2020?bidId=

7.3 LIMITS TO APPLICATION: TIMING, SENSITIVE AREAS

Herbicide is generally ineffective on mature vegetation. It is also generally less effective during the flowering and seed production life stage. Herbicide application is most effective in early regrowth stages.

Herbicide application should be limited in the following sensitive areas:

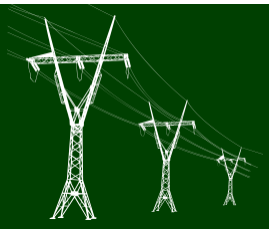
- Riparian zones: A minimum 15-metre No Treatment Zone (NTZ) must be maintained outside RMZs when using herbicides.
- Areas identified by a Qualified Professional as significant watershed areas and fish spawning habitat
- Private lands where the landowner has indicated a preference to avoid herbicide usage
- Breeding bird habitat during the timeframe of mid-March to mid-August
- Areas with sensitive, clay-based soils that may retain chemicals longer
- Areas surrounding playgrounds or schools

Herbicide is applied in a variety of ways, each differing in effectiveness and drift. Herbicide drift refers to the movement of herbicide away from the target area, and may be harmful to human and environment health. Wick-wipe and Cut Surface applications are recommended for reducing the impacts of herbicide drift.

Dicamba, Glyphosate and Triclopyr active ingredients are applied through the following applications:

- **Foliar:** use of manually operated pressurized backpack sprayer. This application can be carried out at any time of year, as long as the plant is experiencing growth. Foliar applications are susceptible to spray drift, and special caution must be used when administering near desirable vegetation or sensitive habitats.
- **Wick-Wipe:** use of a wick that is soaked with a glyphosate herbicide and moved over target vegetation – particularly stump regrowth. This application can be carried out when regrowth is occurring and is highly localized with no drift. It is labour intensive and useful for small treatment areas.
- **Cut Surface:** target vegetation is cut and glyphosate or triclopyr herbicide is applied to the cut surface to prevent resprouting. The herbicide may also be injected into individual stems or applied onto the bark to prevent regrowth. This application is useful in sensitive habitats, as the application is limited to the cut section with little to no risk of drift. It can be used any time of year that regrowth is occurring.

8.MONITORING RESULTS AND CONTINUOUS LEARNING



8.1 EFFECTIVENESS MONITORING OF VEGETATION MANAGEMENT PRACTICES

Effectiveness monitoring is essential for determining the success of vegetation management practices and which elements need to be improved. Some vegetation management practices may need to be modified to increase their effectiveness. A database system must be used to properly assess and compare what has been done, with what is happening after treatment. This requires monitoring of what has been treated and when, and regular data updates.

To fulfill data and monitoring requirements, a Vegetation Management Monitoring Program must be implemented. Monitoring is generally conducted through site inspections or aerial monitoring.

Areas that received vegetation management along transmission lines must be monitored regularly, with no more than 18 months passing between inspections. Danger tree assessments and monitoring are an ongoing and critical requirement.

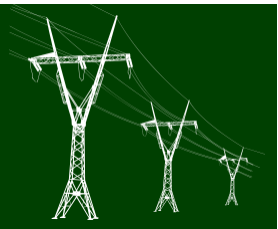
The following information should be collected during monitoring:

- Tree heights and proximity to clearance limits
- Presence of danger trees
- Amount of regrowth in treatment areas – desirable and undesirable species
- Presence of debris or wood waste
- Damage to structures and lines
- Presence of environmentally sensitive factors such as rare and endangered species or riparian areas

This information is used to determine:

- Areas where vegetation management must continue to be conducted
- How effective the prescribed vegetation management methods are
- Danger tree ratings
- Estimated work volume and equipment required to perform the work

9. ECONOMIC CONSIDERATIONS: INCREMENTAL COSTS ABOVE EXISTING COSTS



The implementation of vegetation management practices is associated with many costs, including staffing, equipment, training, purchase of herbicides, hiring contractors, monitoring, and more.

However, long-term effective vegetation management results in more cost-effective, ecologically responsible, and safer operations.

Implementing an Integrated Vegetation Management Plan is an ideal way to incorporate a hazard/danger tree program and an effectiveness monitoring program into everyday operations – both of which are important for ongoing vegetation management.

The following items should be considered for cost-analysis and budgeting:

- Mechanical vs herbicide: Mechanical vegetation removal methods have been shown to cost, on average, four times more than using herbicides. Usage of herbicides in certain settings and timeframes is also more localized and effective than machinery.
- Hazard/Danger tree program: Implementing a Danger Tree Program will require staffing costs to administer assessments and possible removals of dangerous trees. The costs of implementing a preventative program such as this are fewer than those associated with fallen trees on lines and damaged infrastructure.
- Effectiveness Monitoring: Regular monitoring requires costs associated with staffing and vegetation maintenance. With more effective monitoring in place, areas will eventually require less work and therefore fewer long-term costs.
- Wood Waste Program: Wood waste and debris is a common byproduct of hydro activities and vegetation management practices. With an accumulation of wood waste, there is an opportunity to recycle these products into usable biomass.

10. APPENDICES

10.1 REFERENCES

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10.3 3 CONSENT FORM

The Consent Form fillable PDF template can be found **here**.

101-310 Ward Street
Nelson, BC V1L 5S4
250-352-8240

NELSON HYDRO

CONSENT FORM

Property Name/Lot #:

Pole #:

Location:

Landowner Name & Contact Info:

Summary:

Proposed Solution:

We have prepared this document in accordance with the Administrative Fairness Policy in order to meet our legal obligations to protect public safety and Nelson Hydro infrastructure. If you have further questions please contact Nelson Hydro Design at (250) 352-8240 or NHydro@nelson.ca

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NELSON HYDRO

CONSENT FORM

Photos/Maps:

SAMPLE MAP

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