

Appendix B Invasive Plants Management Plan

B.1 Background

Invasive and exotic (non-native) plant species can displace native vegetation, altering the composition of vegetation communities and diminishing ecosystem function. The purpose of the Invasive Plants Management Plan (IPMP) is to provide guidance on mitigation measures to avoid the introduction or spread of invasive plants during construction, operation and closure; monitoring to identify when invasive plant control may be necessary; and methods to implement it in the Project Development Area (PDA).

This IPMP provides long-term management measures that can be incorporated in the regular operation and maintenance of the PDA and short-term measures for preventing weed establishment when site disturbance occurs.

B.2 Definitions

For the purpose of the IPMP, an invasive plant is defined as a plant listed by the Ontario Invasive Species Act (2015) as *restricted* or *prohibited*, as a *noxious weed* under the Weed Control Act (O.Reg. 1096), or an aggressive non-native species demonstrated to have allelopathic properties (producing a chemical to inhibit germination or growth of other plants) or to displace native species (see Table B-1). Not all regulated species have been included in Table B-1, as some are highly restricted in their distribution or only known as crop pests. Additional species may be added to Table B-1 as they become relevant.

No invasive plants were identified in the Project LAA during baseline investigations. Table B-1 will be used for guidance with respect to invasive plants with the potential to occur within the Hardrock Site.

Table B-1: List of Invasive Plants

Plant Name	Type	Provincial Status	Regulatory Agency	Found in Northern Ontario? ¹
Dog-Strangling Vine (<i>Cynanchum louiseae</i>)	Woody	Restricted Invasive Species, Noxious Weed	MNRF, OMAFRA	N
Dog-Strangling Vine (<i>Cynanchum rossicum</i>)	Woody	Restricted Invasive Species, Noxious Weed	MNRF, OMAFRA	N
Japanese knotweed (<i>Reynoutria japonica</i> var. <i>japonica</i>)	Woody	Restricted Invasive Species	MNRF	Y

Table B-1: List of Invasive Plants

Plant Name	Type	Provincial Status	Regulatory Agency	Found in Northern Ontario? ¹
European common reed (<i>Phragmites australis</i> var. <i>australis</i>)	Wetland Herbaceous	Restricted Invasive Species	MNRF	Y
Bull Thistle (<i>Cirsium vulgare</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
Canada Thistle (<i>Cirsium arvense</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
Common Barberry (<i>Berberis vulgaris</i>)	Woody	Noxious Weed	OMAFRA	N
Cypress Spurge (<i>Euphorbia cyparissias</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
European Buckthorn (<i>Rhamnus cathartica</i>)	Woody	Noxious Weed, Allelopathic ²	OMAFRA	N
Garlic Mustard (<i>Alliaria petiolata</i>)	Upland Herbaceous	Allelopathic ²	n/a	Y
Giant Hogweed (<i>Heracleum mantegazzianum</i>)	Upland Herbaceous	Noxious Weed, Risk to Human Health	OMAFRA	Y
Leafy Spurge (<i>Euphorbia esula</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
Poison Hemlock (<i>Conium maculatum</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	N
Ragweed (<i>Ambrosia artemisifolia</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
Serrated Tussock (<i>Nassella trichotoma</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	N
Sow Thistle (<i>Sonchus oleraceus</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	Y
Wild Chervil (<i>Anthriscus sylvestris</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	N

Table B-1: List of Invasive Plants

Plant Name	Type	Provincial Status	Regulatory Agency	Found in Northern Ontario? ¹
Wild Parsnip (<i>Pastinaca sativa</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	N
Woolly Cupgrass (<i>Eriochloa villosa</i>)	Upland Herbaceous	Noxious Weed	OMAFRA	N
¹ Ecoregions 0, 1, 2, 3, 4 ² Allelopathic plants produce a chemical which inhibits germination or growth of other plant species nearby.				

Per the Ontario *Invasive Species Act, 2015*:

“invasive species” means a species that is not native to Ontario, or to a part of Ontario, and,

- (a) is harming the natural environment of Ontario or of the part of Ontario in which it is present, or
- (b) is likely to harm the natural environment of Ontario or of a part of Ontario, regardless of whether it is present in Ontario or in a part of Ontario;

There are two classes of invasive plants controlled under the *Invasive Species Act (2015)*. Restricted species are those which it is illegal to import, deposit, release, breed/grow, buy sell lease or trade. Prohibited invasive species are not yet established in Ontario. It is illegal to import, possess, deposit, release, transport, breed/grow, buy, sell, lease or trade a prohibited invasive species in Ontario.

In general, a noxious weed as regulated by the *Weed Control Act (O.Reg. 1096)* is a plant species which is:

- difficult to manage on agricultural land and reduces crop yield and quality; or,
- negatively affects the health and well-being of livestock; or,
- poses a risk to the health and well-being of agricultural workers (OMAFRA, 2015).

B.3 Performance Objective

Invasive plants usually colonize an area after ground disturbance, which provides new colonizing opportunities for aggressive species that are often more tolerant of bare, compacted soil than many native plants. In total, 253 species of vascular plants were recorded in the PDA and the local assessment area studied in the EIS/EA, of which 91% (230 species) were native species to Ontario and 9% (23 species) were non-native. As the Project already hosts invasive and non-native species, the performance objective of the IPMP is to reduce or eliminate potential effects on native vegetation communities from the spread of these invasive species or the introduction of new species. This objective will be achieved through:

- Implementing mitigation measures to avoid the introduction and spread of invasive plants during all phases of the Project
- Completing regular monitoring to identify changes in composition, extent and distribution of invasive plants in the PDA
- Controlling invasive plants, as needed, using appropriate techniques to maintain or restore native vegetation community integrity

B.4 Mitigation Measures

Mitigation measures include:

- Using clean fill material for grading to reduce the potential for introducing or spreading non-native, or invasive plant species
- Minimizing soil disturbance. All disturbed substrates will be seeded with a non-invasive species seed mix and cover crop as soon as possible post disturbance
- Assessing the presence of invasive species in the PDA and targeting removal through manual, mechanical and/or chemical methods
- Implementing a Clean Vehicle Protocol:
 - Vehicles and heavy equipment will stay on formed roads to the extent practical
 - Prior to equipment entering areas that are not yet serviced by roads visual inspections of machinery and equipment will be completed. Particular attention will be paid to inspecting the undersides, wheels, wheel arches, guards, radiator grills and other attachments as applicable.
 - If clods of dirt, seed or other plant materials are found, cleaning/removal will take place by brushing, knocking or washing soil and debris from exterior surfaces of equipment. Removal will occur at least 30 m away from a watercourse, water body or natural vegetation (Halloran et al 2013).

B.5 Monitoring

Preventing invasive plant establishment is one of the most effective management techniques. Regular monitoring of vegetation within the PDA will allow for early detection of invasive plants. Monitoring for invasive plants in the PDA will consist of:

- Monitoring of all disturbed and recently re-planted areas (within two years) and the sides of project roads and the sensitive fen feature will be carried out twice-annually (spring and summer) and will be coordinated with revegetation monitoring as feasible

- Additional monitoring may be undertaken as part of regular scheduled site surveillance monitoring by the environment department staff
- Monitoring will consist of walking through all relevant areas, within 30 m of new project components (with the exception of the fen and restoration areas), and visually scanning for the presence of invasive plants.
- If an invasive plant, or suspected invasive plant, is observed, the location and approximate extent will be recorded. Photo documentation will be used to confirm plant identification and track spread within an area over time, if necessary.
- Any confirmed locations of invasive plants will be marked with flagging tape and either immediately removed or scheduled for targeted removal through manual, mechanical and/or chemical methods and proper disposal (see Attachment B1).
- At the three aggregate pits, invasive species monitoring should be undertaken for two years following rehabilitation of the aggregate pit footprints until all re-vegetated areas have stabilized. Invasive plants will be controlled as necessary based on monitoring results.

B.6 Invasive Plants Control

Some control methods may be appropriate for the entire PDA, whereas others may be best suited to certain soil moisture conditions or where sensitive features are present. The selection of a treatment option or technique will depend on:

- The species, or type of plant, requiring control.
- Timing (time of year, or stage of plant growth cycle).
- Site characteristics, including land use and proximity to water sources and sensitive environmental features.

If weeds become established, there are two general methods of control: (1) manual or mechanical; and (2) chemical. Manual and mechanical methods are those that kill or suppress weeds through physical disruption, e.g., pulling, digging, disking, plowing, and mowing. The degree of success of various mechanical control methods is dependent on the life cycle of the target weeds. Chemical (herbicide) application can provide an effective and timely method of managing weeds. Numerous herbicides are available that provide effective weed control and are selective in that desirable native grasses are not injured. Should herbicide application be selected as a method of invasive plant control, all herbicides must be applied by a licensed applicator in accordance with Ontario regulations and Best Management Practices (BMPs).

An integrated approach combining chemical and nonchemical treatment options can generally be the most effective method when tailored to the species and conditions. **The use of herbicides should only be**

considered where other control methods have proven ineffective in weed management. Control and removal methods, and appropriate timing of management, differ based on plant type and habitat.

Detailed methods for control and removal of wetland herbaceous, upland herbaceous and woody invasive plants are provided in Attachment B1.

B.7 Reporting

The annual Biodiversity Assessment Report will include a description of activities undertaken to prevent the establishment or spread of invasive plants in the PDA, such as:

- Summary of monitoring and control activities, including a photographic record.
- An assessment of the effectiveness of monitoring and control methods, and actions taken to improve the invasive plants management program.
- Proposed changes to the IPMP to address negative trends, if these occur, adjust monitoring programs, or respond to emerging strategies for invasive plant control.

Notifications

New occurrences of invasive species (as per Table B1) will be documented and reported to the relevant provincial authorities responsible for administering the *Ontario Invasive Species Act* (currently MNRF) or *Weed Control Act* (currently OMAFRA) within three months of the end of the monitoring year within which the species was observed.

ATTACHMENT B1
CONTROL AND REMOVAL OF INVASIVE PLANT SPECIES

Attachment B1: Control and Removal of Invasive Plant Species

This attachment provides guidance on the use of herbicides of invasive plant control, if necessary, and more specific steps for removing wetland, herbaceous and woody invasive plants.

General Notes on the Use of Herbicides

Herbicides can be applied by spot spraying to target individual plants, or broadcast spraying to cover an entire area. Care will be taken to avoid application to non-target species, including spraying within optimal weather and wind conditions. Herbicides should only be applied in accordance with MOECC guidelines and according to the application guidelines for the specific product being applied. A permit may be required for the use of herbicide within the regulated area.

Where chemical control is required, application via backpack sprayer or other method of hand application should occur within centimeters to a few meters of target plants to minimize risk of spray drift to non-target species. Risk is negligible when standard mitigation is applied, including key mitigation summarized below (adopted in part from Deveau and Beaton, 2011):

- Spray when winds are light and moving away from sensitive receptors
- Avoid spraying when no wind is present (spray can remain suspended and move off target when wind changes)
- Avoid spraying when relative humidity is < 40% and air temp. is > 25° Celsius (conditions that lead to rapid evaporation)
- Maintain minimally effective nozzle to target distance
- Change sprayer settings and nozzle depending on weather conditions (fine droplets are prone to evaporation and drift); regularly calibrate equipment.
- Use drift-reducing additives compatible with herbicide such as soybean oil

Wetland Herbaceous Plants

Description

Wetland herbaceous invasive plants are found in permanent or temporarily flooded habitats, such as wetlands, riparian areas, roadside ditches, and other low, wet areas. They may spread through rhizomes (horizontal roots that produce new shoots) and establishes new colonies when fragmented, or through seed production and dispersal. Dispersal of root fragments and seeds occurs via natural modes of transportation such as water, air, or animal movement, and through human vectors, such as construction equipment.

Removal and Control Methods

Several methods exist for managing wetland herbaceous invasive plants, including herbicide treatment, mowing, compressing or rolling, and mechanical removal. The following table is adapted from MNRF’s BMP for *Phragmites australis var. australis* and summarizes each method. Some invasive plant colonies have extensive underground networks of rhizomes that are difficult to control. To address this condition, MNRF (2011) recommends an integrated management plan that combines two or more methods.

Table B1-1: Recommended Methods of Wetland Herbaceous Invasive Plant Management

Method	Summary of Considerations
<p>Herbicide Hand-applied (wicking wand, daubing or similar) in new or small colonies OR Non-selective application (controlled back-pack sprayer, carpet method) in large, dense colonies</p>	<ul style="list-style-type: none"> • Most effective method, especially when used in combination with other methods • Can be cost-efficient for large areas • Cannot be used in areas of standing water • Affects non-target species • May interact with wildlife • Detrimental effects often far outweigh negative effects of invasive species • Minimizes soil disturbance
<p>Mowing</p>	<ul style="list-style-type: none"> • Low cost • Most effective when used in combination with herbicide application • Affects non-target species • May interact with wildlife
<p>Compression/rolling</p>	<ul style="list-style-type: none"> • Low cost • Most effective when used in combination with herbicide application • May interact with wildlife
<p>Mechanical removal</p>	<ul style="list-style-type: none"> • Targets Phragmites plants • Very labour-intensive • Most effective on small, isolated stands • Not effective for large stands unless heavy equipment is used • Minimal effects on wildlife • Soil disturbance can increase colonization opportunities for weeds, monitor for colonization by weeds.

Herbicide application in combination with mowing is widely accepted as the most successful method. However, this method is not a viable option when surface water is present (MNRF, 2011). Under wet conditions, some flexibility of application is required, such as applying herbicide to seasonally flooded areas during the dry season. Herbicides should be applied using one of two methods depending on the age, size and composition of the plants as described in Table B1-1. Secondary methods of management

are also proposed to supplement herbicide application, including mowing/compression, or mechanical removal.

Timing of Control

Optimal timing of herbicide application is between early spring (after emergence of new growth) and fall (before the first frost). During this window, herbicide applications should not occur when standing surface water is present. Herbicide application can occur from late spring to early fall, however, after the first frost plants become dormant and application will be less effective. The timing of application must also minimize risk to wildlife, including nesting birds that may be protected by the federal *Migratory Bird Convention Act*. The recommended timing of control is presented by task in Table B1-2. Generally, late summer is considered ideal to minimize impact on wildlife. In the Geraldton area, August application is likely the ideal application time.

Table B1-2: Recommended timing and tasks for wetland herbaceous invasive plant removal

Timing	Tasks	New /Small Colonies	Established / Large Colonies	Colonies in Permanent Standing Water
July/August	Remove and bag flower and seed heads, including any seed heads from previous years to eliminate retained seed. Seal all removed material in plastic bags and dispose at a landfill. Care will be taken to avoid breaking live stems during this task (success of task 3 depends on the plants ability to transport herbicides to roots).	✓		✓
August/September	Apply glyphosate herbicide via hand application (wicking or daubing).	✓		
	Apply glyphosate herbicide via controlled spray applications using a backpack sprayer or other non-selective means.		✓	
October	Cut plant to within 60cm of ground level using a string trimmer or other means to promote germination of native seeds and allow for spot treatment of new growth during subsequent herbicide applications. Cutting will not occur within 2 weeks of herbicide application to allow translocation to the roots. Cut material can be left on site to decompose. For colonies in standing water, stems will be cut below the high water line to prevent oxygen exchange with the roots.	✓	✓	✓

Upland Herbaceous Invasive plants

Description

Upland herbaceous invasive plants are found in agricultural lands, roadsides, meadows, and woodlands, often appearing after a soil disturbance provides new colonizing opportunities for these fast growing species adapted to open conditions. Once established, they may continue to spread by seed or through vegetative reproduction.

Removal and Control Methods

Several methods exist for managing upland herbaceous invasive plants including herbicide treatment, mowing, hand pulling or digging, and deep tilling. Table B1-3 summarizes each method. Perennial invasive plants may have a deep and widespread root system which can make them difficult to control. To address this condition, OMAFRA (2016) recommends an integrated management plan that combines two or more methods.

Table B1-3: Recommended Methods for Herbaceous Invasive Plant Management

Method	Summary of Considerations
Herbicide	<ul style="list-style-type: none"> • Very effective method, especially when used in combination with mechanical methods • Cost-efficient for large areas or persistent invasive plants • Cannot be used in areas of standing water • Affects non-target species • May interact with wildlife
Mowing or String Trimmer	<ul style="list-style-type: none"> • Using a commercial mower such as a flail mower set to the lowest deck height, OR cut weeds at the ground surface using a string trimmer. • Low cost • Most effective when used in combination with Herbicide application • Affects non-target species • May interact with wildlife
Hand Pulling	<ul style="list-style-type: none"> • Undertake hand pulling for small patches of certain established invasive plants that can be easily uprooted • Labour-intensive • Soil disturbance can increase colonization opportunities for weeds, monitor for colonization by weeds
Digging	<ul style="list-style-type: none"> • Suitable for plants with toxic sap (ex. Giant Hogweed) that could be spread by mechanical control methods • Labour-intensive • Most effective when used in combination with herbicide application
Deep Tilling	<ul style="list-style-type: none"> • Suitable for disrupting extensive root systems of perennial invasive plants • May affect non-target species

Timing of Control

Timing of control varies among methods. A pre-emergent herbicide can be used to control perennial weeds early in the growing season. However, this class of herbicide may be less effective than one applied in summer or fall. Control using a post-emergent selective herbicide is best undertaken from mid-summer to fall when the plant has produced extensive above-ground growth and is beginning to store energy in the root system, allowing for herbicide transport directly to the roots (OMAFRA 2016). Recommended timing and tasks for upland herbaceous weed removal are summarized in Table B1-4.

Mechanical removal can take place from summer to fall. When applied without a herbicide treatment, mowing and trimming should occur prior to maturation to prevent the spread of seed. When combining mechanical or hand removal methods with herbicide application, there should be a period of at least two weeks between herbicide treatment and mowing to allow herbicide to be absorbed by the plants.

Hand pulling or digging can be undertaken at any time in the growing season. For perennial invasive plants with an extensive root system, deep tilling (greater than 15 cm) with a disc plough can be effective at disrupting the root system. A standard roto-tiller can be used in small or large areas.

Table B1-4: Recommended timing and tasks for upland herbaceous weed removal

Timing	Tasks
April - May	Apply a pre-emergent herbicide. Recommended only if control in summer or fall is not an option.
July-September	Apply a post-emergent herbicide using a backpack sprayer or other non-selective means.
October	Cut dead plants to ground level using a mower, string trimmer or other equipment. Cutting should not occur within 2 weeks of herbicide application to allow translocation to the roots. Cut material which has been treated with herbicide can be left on site to decompose. For deeply-rooted invasive plants (ex. Canada thistle), deep tilling (greater than 15 cm) can also be effective at disrupting an extensive root system.

Woody Invasive plants

Description

Woody invasive plants include all trees, shrubs and woody vines meeting the definition of noxious or invasive. Due to their perennial habitat, these plants can be more difficult to control or eradicate once established. No woody invasive plants have been identified in the PDA.

Removal and Control Methods

Several methods exist for managing woody invasive plants, depending on their size, including hand pulling or digging, cutting and herbicide application. Table B1-5 summarizes each method. Large, established

trees are best managed using a combination of cutting and herbicide application, and may also require repeat treatments to prevent suckers.

Table B1-5: Recommended Methods for Woody Weed Management

Method	Summary of Considerations
Hand Pulling / Digging	<ul style="list-style-type: none"> Undertake hand pulling or digging up of small trees and their root systems. Small plants (up to 1 m in height) may be pulled by hand, however a tree wrench may be required for larger plants as lateral roots can reach out 2 to 3 m. All roots must be removed to prevent re-sprouting. Labour-intensive
Cutting and herbicide	<ul style="list-style-type: none"> Effective method for large trees Cut large stems (greater than 5 cm in diameter) close to the ground (50 mm) and apply a glyphosate herbicide (20-25% solution) directly on the exposed stump using a wick applicator.

Timing of Control

Recommended timing of management applications for woody invasive plants depends on the risk of disturbance to surrounding vegetation. Recommended timing and tasks for woody weed removal are summarized in Table B1-6. Removing trees late in the year (October to November) reduces disturbance to surrounding vegetation (Anderson 2012). Fruiting trees (mid-July to fall) can be bagged prior to removal to prevent spreading seed. Removing trees prior to fruit maturity (mid-July) eliminates need to bag and dispose of fruit, however, this may result in disturbance to nearby vegetation during the growing season. Follow-up control may be required in subsequent years to hand pull new seedlings or remove suckers from cut stumps.

Removal of any woody vegetation should take place outside of the core nesting period for birds, from April 1 to August 31.

Table B1-6: Recommended timing and tasks for woody weed removal

Timing	Tasks
September	<p>The best timing for glyphosate application is August or September when the tree is actively storing energy for overwintering, thus promoting movement of the active ingredient to the roots (Cowbrough and Sikkema 2005).</p> <p>Cut large trees and apply glyphosate herbicide to stumps via hand application (wicking or daubing).</p> <p>Bag fruit or seeds on fruiting trees to prevent spreading seed when moving to off-site disposal.</p> <p>In subsequent years, a follow-up hand application of glyphosate may be required for sprouting stumps.</p>
September – March	<p>Hand pull or dig smaller trees. Bag fruiting trees to prevent spreading seed when moving to off-site disposal.</p>

Disposal

Viable waste of all weed plants (ex. seed heads, fruit, roots) should be collected in thick black plastic bags and left in a sunny location to kill viable seeds and rhizomes until it can be disposed of at an appropriate waste facility.

B.8 References

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