Appendix I

Invasive Species Management Plan

2026

Niagara-on-the-Lake EST.1781

Table of Contents

Section 1: Introduction

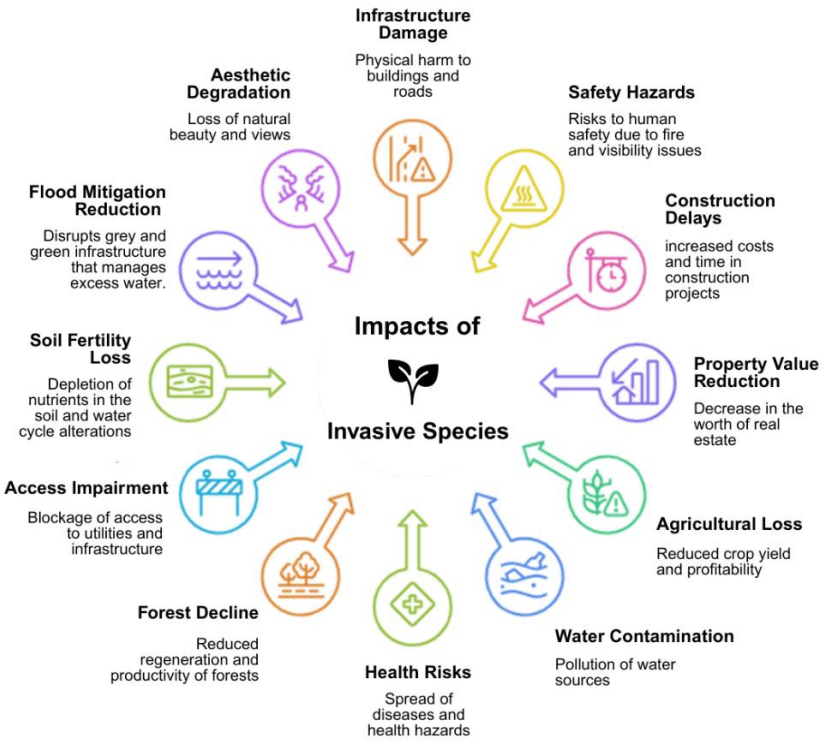
What are invasive species?

Invasive species are organisms that do not originate from a local area and, when introduced to a new environment, cause harm to the ecosystem, economy, or human well-being. Invasive species are characterized by outcompeting native species, disrupting natural ecosystems.

> Their enormity created the *Invasive Species Act*, 2015, S.O. 2015, c. 22 - Bill 37, which states “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

Why are they important to manage?

Invasive species reproduce at alarming rates, and without proper management, they can quickly dominate and overwhelm landscapes and ecosystems. Municipalities and conservations authorities approximately spend **$50.8 million / year** on invasive species in Ontario, with an average Township spending **$28,976 / year** (Invasive Species Centre).



Key Legislation

Both federal and provincial legislation exists that regulates invasive species to prevent and control populations.

Legislation	Purpose
Plant Protection Act (Federal)	"To protect plant life and the agricultural and forestry sectors of the Canadian economy by preventing the importation, exportation and spread of pests and by controlling or eradicating pests in Canada".
Invasive Species Act (Provincial)	"Sets out a legislative framework that provides for the identification of invasive species that threaten Ontario's natural environment, including mechanisms for detecting the appearance of invasive species and bringing them within the legislative framework as quickly as possible after they first appear".
Weed Control Act (Provincial)	Regulates the designation and management of noxious (harmful, destructive) weeds in Ontario.

**Note: Other legislation exists both federally and provincially that focuses on invasive species, listed in the appendix.*

Key Agency Roles

Multiple groups play a role in invasive species management, from resource- and collaboration-focused organizations to federal and provincial regulators.

Agency / Partner	Role / Mandate	Legislation / Framework	Contact
Canadian Food Inspection Agency (CFIA)	Federal lead for detection, surveillance, and response to invasive pests or diseases (e.g., oak wilt, spotted lanternfly, hemlock woolly adelgid).	Plant Protection Act	Phone: 905-937-7434 Address: 10-350 Ontario Street, St. Catharines, ON L2R 5L8 Online Contact Form
Pest Management Regulatory Agency's (PMRA)	Registers and re-evaluates pesticide products on the market in Canada, while promoting sustainable pest management.	Pest Control Products Act	Phone: 613-996-9231 Address: 2 Constellation Drive Ottawa, ON K1A 0K9 Email: pmra.info-arla@hc-sc.gc.ca
Ministry of Environment, Conservation and Parks (MECP)	Get, renew, replace or update information on an exterminator or operator licence and permits to apply pesticides in Ontario.	Pesticides Act; O. Reg. 63/09	Phone: 416-314-8001 Address: 135 St. Clair Avenue West, Toronto, ON M4V 1P5

Agency / Partner	Role / Mandate	Legislation / Framework	Contact
Ministry of Agriculture, Food, and Agribusiness (OMAFA)	Monitors agricultural invasive species; outreach via tree banding, newsletters, blogs, and presentations; supports insecticide research.	Provincial ministry mandate	Phone: 519-826-3100 Email: ag.info.omafra@ontario.ca
Ministry of Natural Resources	Lists prohibited and restricted invasive species, provides educational material and resources	Invasive Species Act; Invasive Species Strategic Plan	Phone: 1-800-563-7711
Natural Resources Canada (NRCan)	Researches invasive species biology and cold tolerance to inform management strategies.	Federal department mandate	Phone: 1-343-292-6098
Agriculture and Agri-Food Canada (AAFC)	Supports surveillance, funds research, coordinates with provinces and international partners.	Federal department mandate	Phone: 1-855-773-0241
Invasive Species Centre (ISC)	Provides resources, training, and support for invasive species prevention and management across Ontario/Canada.	Non-profit, collaborative with governments	Phone: 705-541-5790 Email: info@invasivespeciescentre.ca Website: invasivespeciescentre.ca
Ontario Invasive Plant Council (OIPC)	Promotes awareness and best practices for managing invasive plants through training, guides, and collaboration.	Non-profit, provincial network	Email: info@oninvasivespecies.ca Website: ontarioinvasiveplants.ca

Niagara Agency Roles

There are serveral agencies in the Niagara Region specifically that contribute to invasive speceis management, including the Town of Niagara-on-the-Lake, that offers local opportunities for collaboration.

Agency / Partner	Role / Mandate	Legislation / Framework	Contact
Town of Niagara-on-the-Lake (NOTL)	Municipal lead for invasive species detection and management on Town property and provides public education to support coordinated action.	Niagara-on-the-Lake Official Plan	Phone: 905-468-3266 Address: 1593 Four Mile Creek Road, Virgil, ON L0S 1T0 Email: info@notl.com Website: www.notl.com
Niagara Region	Leads management on regional lands, promotes native species, and supports collaboration with municipalities, agencies, and conservation groups.	Niagara Region Official Plan	Phone: 905-980-6000 Address: 1815 Sir Isaac Brock Way, ON L2V 4T7 Website: https://www.niagararegion.ca
Niagara Peninsula Conservation Authority (NPCA)	Manages invasive species in NPCA conservation areas on a priority basis, or as prescribed by CFIA. May provide resources, guidance or information to partners and individuals. Coordinates some collaborative working groups.	Conservation Authorities Act	Phone: 905-788-3135, Email: info@npca.ca Website: www.npca.ca
Niagara Phragmites Management Area Collaborative (PMAC)	Led by NPCA. Regional initiative (launched Feb 2025) coordinating phragmites control efforts among municipalities and local groups.	Regional collaborative	Contact via NPCA and NOTL
Niagara Invasive Species Strategy Advisory Committee	Led by NPCA. Developing a coordinated invasive species strategy for Niagara Region (launched Jan 2026).	Regional initiative (in development)	Contact via NPCA and NOTL

Introduction

Town Commitment and Current Practices

The Town of Niagara-on-the-Lake actively manages invasive species, identified as a key priority in **Council's Strategic Plan**, **Official Plan**, and **Climate Change Adaptation Plan**.

In recent years, the Town has focused on mechanically removing invasive phragmites, which have obstructed stormwater ponds and roadside ditches. Phragmites are among Canada's most damaging invasive species, costing Ontario municipalities on average **$2.8 million annually** (Invasive Species Centre, 2019). In 2025, the Town expanded its efforts by hiring a contractor to treat stormwater ponds at Sandalwood, Bunny Glen, and Centennial Arena with Habitat Aqua herbicide, following best-practice control methods.

The Town has also addressed the significant loss of ash trees caused by the emerald ash borer, the most costly invasive species for Ontario municipalities, with average annual expenditures exceeding **$22 million** (Invasive Species Centre, 2019). Hundreds of ash trees have been removed in Niagara-on-the-Lake and replaced through restoration initiatives such as the Trees 4 NOTL project, partnership with **Friends of One Mile Creek**, the **Niagara Peninsula Conservation Authority**, **Niagara-on-the-Lake**, and **Communities in Bloom Committee**.

Collaboration with **Federal and Provincial agencies** has supported early detection and prevention of emerging threats such as oak wilt and spotted lanternfly, through trap installations and monitoring by the Parks Division. The Site Alteration By-law further supports prevention by requiring soil inspection and proper disposal of invasive materials.

Town staff regularly participate in **training and educational workshops**, while the Communications Team promotes public awareness through campaigns and online resources. These efforts reflect the Town's commitment to protecting infrastructure, urban forests, green infrastructure, and community well-being.

New in 2025, Niagara-on-the-Lake joined the **Niagara Invasive Species Strategy Advisory Committee (ISSAC)** and the **Niagara Phragmites Management Area Collaborative (PMAC)**, strengthening regional cooperation and accelerating progress through shared expertise and resources.

Introduction

Town Commitment and Future Opportunities

The Town will continue to apply the latest research and best practices from leading organizations such as the Invasive Species Centre and the Ontario Invasive Plant Council to guide invasive species management.

Recognizing that invasive species impact all areas of municipal Divisions, from **By-law and Planning** to **Public Works and Communications**, the Town aims to strengthen a coordinated, corporate wide approach. This can include enhancing policies for proper disposal during development, prohibiting the planting of invasive species, and expanding monitoring and removal activities.

Prevention offers the greatest opportunity for long-term success. The Invasive Species Centre emphasizes that proactive investment in prevention is far more cost effective than addressing the economic impacts of invasive species once they become established. The Town can explore new **policies and procedures** for decontamination, and early detection and rapid response to limit the spread of invasive species.

Community engagement could also be prioritized through volunteer programs to survey and report invasive species, forming the foundation of a Town-wide **Invasive Species Program**. Data on sightings and management actions can be tracked through a **GIS database** to help identify priorities and allocate resources effectively. Increased **education and outreach**, through events, workshops, and resource distribution, would further support public awareness and participation. Community science platforms, including iNaturalist and EDDMapS, can be used to support monitoring and early detection by tracking observations and generating alerts for priority invasive species within the Town.

Protecting Niagara-on-the-Lake's communities, local economy, and natural environment requires coordinated and collective action, and the Town remains fully committed to this important initiative.

Introduction

Purpose of the Document

This document outlines the steps that Town Staff will take to manage invasive species. Its completion fulfills an action item identified in Council's 2022–2027 Strategic Plan (Appendix I: Implementation and Indicators of Success) and supports the goals outlined in the Climate Change Adaptation Plan.

Navigating the Plan

This plan is broken into three subsequent sections to manage invasive species:

- Prevention
- Best Management Practices
- Management Framework & Actions

Each section is organized using a combination of paragraphs, tables, figures, and action item tables to present the information effectively. As invasive species management is an ongoing process, specific timeframes are not assigned to each action. Instead, actions are linked to general start periods, identified by quarters of the year, intended to be ongoing efforts afterwards. The action item tables should be interpreted as follows:

Action Item Header	Action Item	Lead	Start	Indicators of Success

Lead Department/Division Key:

BL – By-Law
OPST – Organizational Performance, Strategy & Transformation
CC – Climate Change
PBDS – Planning, Building & Development Services
COM – Communications
CS – Corporate Services
ENG – Engineering
ES – Environmental Services
FN – Finance
CPS – Community & Protective Services
LS - Legislative Service
PRK – Parks
PLN – Planning
PW – Public Works
PWI – Public Works & Infrastructure
RDS – Roads

Section 2: Prevention

Prevention is the most crucial and cost-effective stage of invasive species management, serving to stop both the initial introduction and further spread of invasive species within and beyond the Town**.** As the **foundational step** in any successful management strategy, prevention must be an ongoing effort, integrated into all aspects of invasive species control and management.

Preventive measures are far **less costly** and **easier to implement** than responding to well-established populations, making prevention the top priority. This approach involves preventing species from becoming established in the area and implementing rapid response actions to contain and eliminate any new detections before they can spread. To effectively address these threats, the Town will implement a prevention framework focused on four key focus areas designed to stop the spread of invasive species.

1 **Inform:** Prevent harmful introductions by raising awareness on invasive species, response methods, pathways of spread, decontamination strategies, and alerts.

2 **Detect:** Identify invasive species early with regular surveillance and report them on EDDMaps, iNaturalist, or by calling the Invading Species Hotline at 1-800-563-7711.

3 **Respond:** Take rapid response to invasive species detections to prevent their establishment or spread.

4 **Manage & Adapt:** Implement proactive management strategies and take effective measures to mitigate the impacts of invasive species.

Prevention

Engagement Campaign

An engagement campaign will be key to the success of this management phase. The Town will do its best to promote topics on its website, social media platforms, public events, and within internal communications with Staff. A variety of topics will be discussed including but not limited to:

- **Spot It**: Learn how to identify invasive species and monitor high-risk areas (parks, trails, boat launches, ditches). Early detection is crucial for easier and cost-effective removal.
- **Stay on Trails**: Stick to marked trails to prevent the spread of invasive species. Keep pets on leashes and on the trail.
- **Stop the Spread**: Inspect and clean mud, seeds, plant parts, and insects from clothing, pets, vehicles, and equipment. Wash gear on-site and before leaving the area.
- **Keep it Natural**: Avoid disturbing soil and never remove native plants, as this can create space for invasive species to thrive.
- **No Dumping**: Never dump plants, fish, pets, or bait into waterways or natural areas. This includes weeds/compost from gardens and dumping in natural areas to prevent vectors spreading invasive species. Even small pets, such as goldfish, can be invasive.
- **Use Local Firewood**: Only use firewood sourced locally to prevent the spread of pests and diseases.
- **Groom Your Pets**: Brush off mud, seeds, and insects from pets after walks to prevent the spread of invasive species.
- **Garden Responsibly**: Plant native species in your garden and avoid invasive ones. If you remove invasive plants, dispose of them properly by sealing them in a bag before disposal. Never dump garden waste or compost in natural areas, as this can spread invasive species. For alternatives, consult the Ontario Invasive Plant Council's Grow Me Instead guide.

These tips will be shared on the Town's website, social media, and through internal communications to promote awareness and prevention of invasive species.

Prevention Action Items:

Inform

Prevent harmful introductions by raising awareness on invasive species, response methods, pathways of spread, decontamination strategies, and alerts. Public engagement campaigns will be key and target messaging to groups at risk, such as anglers, boaters, cottagers, gardeners, and hikers.

The Town will implement the following action items to help keep the community informed and prevent invasive species from being introduced and establishing in the area.

Action Item	Lead	Start	Indicators of Success
P-1.1 Prohibit invasive species planting in development applications	PLN CC	Q2 2026	• Ensure landscape plans (private and public) do not include invasive species, characterized as being listed on the Invasive Species Act, Noxious Weed under the Weed Control Act, pest under the Plant Protection Act, Invasive Species Centre, or Ontario Invasive Plant Council • Create a summary list of prohibited invasive species to post on Town's website or in applications
P-1.2 Enhance current systems on fill requirements	PLN CC	Q3 2026	• Develop a system to ensure imported and exported fill in development does not transport invasive species (partial fragments or complete)
P-1.3 Promote invasive species awareness	COM CC	Q2 2026	• Post an annual invasive species prevention campaign on social media • Update Town website content on invasive species
P-1.4 Provide educational opportunities on invasive species	CC	Q2 2026	• Host at least one annual invasive species event open to the public (i.e. workshop, biolitz etc.) • Offer community informational sessions on identifying invasive species, decontamination strategies, and prevention practices • Arrange educational events for Town Staff as new information becomes available • Distribute educational materials on invasive species, highlighting their impact, reporting methods, and prevention strategies

Prevention Action Items:

Inform

Action Item	Lead	Start	Indicators of Success
P-1.5 Stay informed on invasive species	CC	Q2 2026	• At least one Town Staff member will attend at least two invasive species events annually • At least one Town staff member will subscribe to the invasive species centre e-newsletter • At least one Town staff will be a member of the Niagara Invasive Species Strategy Advisory Committee and the Niagara Phragmites Management Area Collaborative • Investigate resources and literature as needed
P-1.6 Distribute alerts with staff and public	COM CC	Q2 2026	• Be aware of alerts to new information (i.e. inaugural species sighting, novel management methods, etc.) • Use communication channels (website, social media, newsletters) to send timely updates on new invasive species reports and prevention measures with the public • Share alerts as required with Town Staff virtually or in person (i.e. email, meetings, conversations)
P-1.7 Identify how to report invasive species	PWI	Q2 2026	• Identify the platform(s) the Town will use to report invasive species
	COM CC	Q3 2026	• Communicate platform(s) to report sightings (EDDMaps, iNaturalist, etc.) • Encourage residents and visitors to report sightings through EDDMaps, iNaturalist, or the Invading Species Hotline (i.e. games or rewards) • Provide easy access to reporting tools on the Town's website and social media

Prevention Action Items:

Inform

Action Item	Lead	Start	Indicators of Success
P-1.8 Integrate strategies in by-laws, policies, and plans	CC BL PLN	Q2 2026	• Update by-laws, policies, and plans as needed to incorporate invasive species strategies for prevention and effective management • Inform staff of invasive species to be able to incorporate knowledge in new by-laws, policies, or plans
P-1.9 Communicate pathways of spread	CC COM	Q2 2026	• Develop an infographic to highlight pathways of spread • Create social media posts featuring ways invasive species can spread • Update Town website to include pathways of spread on the Invasive Species page • Inform Town Staff on pathways of spread to carry into decision-making • Create tailored educational messages for groups at risk (i.e. anglers, boaters, cottagers, gardeners, hikers)
P-1.10 Create decontamination strategies	CC COM	Q3 2026	• Create an infographic summarizing decontamination strategies • Utilize social media to inform viewers of decontamination strategies to prevent invasive species spread

Prevention Action Items:

Detect

Identify invasive species early with regular surveillance and report them on EDDMaps, iNaturalist, or by calling the Invading Species Hotline at 1-800-563-7711.

If a new invasive species is suspected, contact the St. Catharines Canadian Food Inspection Agency (CFIA) at 905-937-7434 or complete the online form, ensuring to include the location and a photo when possible.

The Town will implement the following action items to help detect invasive species introduced to the area to prevent establishment.

Action Item	Lead	Start	Indicators of Success
P-2.1 Create a reporting system	ENG CC	Q2 2026	• Set up a streamlined process for staff and residents to report suspected invasive species, including instructions on capturing photos and noting GPS coordinates
P-2.2 Build an early detection and rapid response program	CC	Q3 2026	• Collaborate with local environmental groups or volunteers to monitor key areas for early detection, such as parks, trails, and waterways • Create an Early Detection and Rapid Response (EDRR) program utilizing partners and volunteers • Dedicate Town Staff to monitor sites of concern and work with a lead individual to develop a program
P-2.3 Partner with agencies	CC PWI ENG PRK	Q2 2026	• Work with the CFIA to ensure rapid reporting and action on suspected new invasive species • Collaborate with organizations to share data for mapping
	CC	Q2 2026	• Utilize the Niagara Invasive Species Strategy Advisory Committee and Niagara Phragmites Management Area Collaborative to share resources

Prevention Action Items:

Detect

Action Item	Lead	Start	Indicators of Success
P-2.4 Use technology	CC COM	Q3 2026	• Encourage the community to use tools like EDDMaps, iNaturalist, and other mapping software to track and report invasive species sightings
	CC ENG	Q2 2026	• Create the Town's first invasive species inventory database • Establish monitoring and mapping inspection process for infrastructure and natural assets
P-2.5 Establish invasive species inventory	CC	Q2 2026	• Compile a comprehensive list of all known invasive species in the area • Establish a list of invasive species with human health impacts • Develop a list of invasive species that are most likely to impact infrastructure
	CC COM	Q3 2026	• Distribute species lists with corresponding distribution maps to Staff and the public
	CC ENG	Q2 2026	• Update inventory layers based on reports and new findings on a regularly basis

Prevention Action Items:

Respond

Take rapid response to invasive species detections to prevent their establishment or spread. Early action is key to minimizing their impact.

The Town will implement the following action items to quickly and effectively respond to invasive species.

Action Item	Lead	Start	Indicators of Success
P-3.1 Develop a response plan	CC	Q2 2026	• Develop a rapid response protocol to include clear, actionable response plans for detected invasive species, including immediate containment and removal strategies • Determine priority species, candidates for eradication, immediate eradication is the goal but containment or long-term management may be needed depending on the detected site and intensity • Establish a Response Team responsible for managing invasive species outbreaks, (i.e. experts from local agencies, environmental groups, and Town Staff) • Identify High-Risk Areas for prioritization (i.e. wetlands and sensitive ecosystems) to prevent further spread of invasive species
P-3.2 Approve a clean equipment protocol	CC	Q3 2026	• Create a clean equipment protocol • Investigate decontamination methods • Correlate methods to pathways of spread
P-3.3 Decontaminate equipment	PWI	Q3 2026	• Ensure all equipment, including boots, gets washed with water at the site of invasive species as per protocol • Provide business case for installation of boot brushes and boat washing stations in areas of concern

Prevention Action Items:

Respond

Action Item	Lead	Start	Indicators of Success
P-3.4 Coordinate with partners	PWI	Q2 2026	• Collaborate with local, provincial, and federal agencies for expert advice, funding, and additional resources in response to new invasive species threats • Establish a shared "watch list" for emerging threats not yet present in Niagara
P-3.5 Public communication	CC COM	Q3 2026	• Keep the public informed about response efforts via social media, the Town's website, etc. • Provide continual updates to inform the public of actions they need to take (i.e. avoiding certain areas or reporting new sightings)

Prevention Action Items:

Manage and Adapt

Implement proactive management strategies and take effective measures to mitigate the impacts of invasive species.

The Town will implement the following action items, emphasizing adaptive strategies to protect local ecosystems, prevent further harm, and remain informed of innovative solutions that help minimize the negative impacts of invasive species.

Action Item	Lead	Timeframe	Indicators of Success
P-4.1 Implement management plan	CC	Q4 2026	• Utilize this document to develop long-term management strategies for controlling and eradicating established invasive species in the area
P-4.2 Review development applications for invasive species removal and disposal plans	PLN CC	Q3 2026	• Initiate process to require invasive species Removal and Disposal Plans, if they are present at a development site, consistent with best management practices and Town By-laws • Store Removal and Disposal Plans into reporting database or system
P-4.2 Stay informed	CC	Q2 2025	• Town staff will stay informed about new invasive species management methods and technologies • Adjust strategies as needed based on emerging science and best practices
P-4.3 Restore Ecosystems	CC ES PRK RDS	Q3 2026	• Launch restoration projects to reintroduce fast-growing native vegetation that can effectively outcompete invasive species • Prioritize restoration efforts in areas most vulnerable to invasive species establishment
P-4.4 Promote resilience	CC	Q4 2026	• Implement programs that strengthen the resilience of local ecosystems (i.e. planting native species, maintaining biodiversity, reducing human activity)

Prevention Action Items:

Manage and Adapt

Action Item	Lead	Timeframe	Indicators of Success
P-4.5 Monitor and evaluate	CC	Q4 2026	• Annually assess the effectiveness of management actions and adapt the approach based on monitoring results • Establish environmental indicators to track success over time
P-4.6 Train staff	CC	Q2 2026	• Provide ongoing training for Town Staff on invasive species identification, management techniques, and response protocols to ensure a knowledgeable and prepared staff

Section 3: Best Management Practices

A range of control measures exists for invasive species management, each with unique advantages suited to specific species and site conditions. There is no one-size-fits-all solution, which makes management a challenge. For instance, flying insects require different control methods than rooted plants, and smaller, early-stage infestations are more manageable than widespread ones. Even among a single species, the products and methods used for removal can differ.

Common control measures have been identified from the Invasive Species Centre and Ontario Invasive Plant Council. Following their guidelines on best management practices (BMPs), the Town will apply current strategies, remain informed by the latest research, and adapt its approaches to address both species-specific characteristics and site-specific conditions. These common control practices include:

- **Pulling & Digging**
- **Cutting & Mowing**
- **Chemical Application**
- **Traps and Barriers**
- **Solarization**
- **Flooding**
- **Prescribed Burns**
- **Grazing**

While these represent standard approaches, they are not exhaustive, and the Town will adapt strategies as new methods emerge. All treatments will be timed to coincide with the lifecycle of the target species, maximizing effectiveness and minimizing the spread. Most methods require repeated applications over consecutive years, though early and well-timed intervention can reduce the need for follow-up. Each technique presents its own benefits and challenges. It is important to recognize that invasive species management is inherently complex, and the presence of challenges does not necessarily rule out the use of a particular control method. Instead, these challenges should be acknowledged and addressed as part of a thoughtful and adaptive management approach.

Prior to any implementation of control measures, each site will be assessed to protect non-target species, with special attention to those that are endangered or at risk. The Town will also apply best practices for identifying priority sites for invasive species management and proper biomass disposal.

Best Management Practices

Pulling & Digging

Pulling and digging are often categorized under the broader management approach of manual, physical, or mechanical practices, which are frequently used interchangeably. However, the term 'pulling and digging' most commonly refers to the use of non-motorized, handheld tools. This control measure is the most versatile and least complicated to implement in both terrestrial and aquatic ecosystems, especially for early infestations or small, isolated populations of invasive seedlings or young plants. With additional personnel and proper tools, it can also be scaled for larger efforts.

Effectiveness depends on the size and distribution of the population; removal is most successful in areas with sparse or newly established growth and less effective for well-established infestations. It is important to determine whether the site contains new, isolated plants or sprout regrowth from larger, existing populations.

Hand Pulling:

Plants are removed slowly and steadily to minimize soil disturbance, followed by refilling the soil. Complete root removal is essential to prevent regrowth. All uprooted material must be removed from the site, especially if seeds are present, to avoid re-rooting.

Digging:

Using handheld tools (i.e. shovel), the entire root system is extracted by digging a wide hole around the plant, followed by soil replacement. As with hand pulling, all plant material must be removed to prevent regrowth.

Equipment & Supplies

- **Aquatic Ecosystem:**
  Spades or other hand tools; hip waders for shallow water work; canoes or floating devices for plant transport and access.
- *Note: Removal of aquatic species may require permits. Please refer to the appendix for details.*
- **Terrestrial Ecosystem:**
  Spades, weed wrenches, shovels, buckets, bags, and other hand tools.
- *Note: Excavators can also be used in practice but are typically **not recommended**, due to their ineffectiveness in removing all plant material, soil disturbance, expense, time consumption, and inability to use in natural habitats.*

Best Management Practices

Pulling & Digging

To determine if pulling and digging control measures are appropriate, the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Woodlots, parks, open spaces, rivers, lakes, etc.
Prohibited Areas:	None
Affects:	Terrestrial and aquatic plants
Benefits:	• Less training required for operators • Flexibility on application timing (best prior to seed emergence – April to August) • Community engagement opportunities • Ability to apply at all sites (terrestrial and aquatic) • Suitable for a wide range of invasive species (terrestrial and aquatic)
Challenges:	• Time-consuming and labour intensive • Impracticable at larger sites (greater than 0.5 hectares) • Difficult or impossible to remove large root systems • Regrowth/occurrence can occur quickly • Requires multiple applications annually • Risk spreading fragments to new areas • More personnel can be required for reducing species • Can cause soil compaction

Best Management Practices

Cutting

Cutting (or mowing) involves the removal of above-ground plant biomass using various types of equipment, typically making cuts as close to ground level as possible to separate the material from the roots. This technique is versatile and relatively simple to implement in both terrestrial and aquatic environments. Similar to pulling and digging control measures, it is classified under the broader management approach of manual, physical, or mechanical practice.

It is best suited for small to medium-sized populations of invasive species and is most effective when used in combination with chemical application controls, as cutting does not remove root systems and allows for regrowth.

The effectiveness of this method depends on using the appropriate equipment, which can range from basic hand tools to motorized machinery. Hand tools are ideal for managing small, isolated infestations, while brush cutters or vehicles are commonly used for larger-scale efforts. Larger equipment may be required for intensive work, but it often necessitates specialized training or licensing.

Equipment & Supplies

Aquatic Ecosystem:

- Common handheld tools include raspberry cane cutters, loppers, and other cutting implements suitable for shallow water. Hip waders may be used for standing in water, while canoes or floating platforms assist in transporting plant material. Boats or heavy machinery may be needed for large-scale aquatic removal.
- *Note: Work permits may be required for aquatic species removal -refer to the appendix for permitting information.*

Terrestrial Ecosystem Equipment:

- Loppers, hand tools, brush cutters, chainsaws, and vehicles (i.e. rollers).

Best Management Practices

Cutting

To determine if cutting control measures are appropriate, the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Woodlots, parks, open spaces, rivers, lakes, etc.
Prohibited Areas:	None
Affects:	Terrestrial and aquatic plants
Benefits:	• Less training required for operators • Flexibility on application timing (best prior to seed emergence – April to August.) • Community engagement opportunities (handheld tools) • Ability to apply at all sites (terrestrial and aquatic) • Suitable for a wide range of invasive species (terrestrial and aquatic)
Challenges:	• Does not remove root systems • Time-consuming and labour intensive • Regrowth/occurrence can occur quickly and requires multiple treatments annually • Risk spreading fragments to new areas • More heavy equipment is needed for larger sites • Can cause soil compaction

Best Management Practices

Chemical Application

Chemical control measures are a widely used and effective method for managing invasive species. They are often combined with other best management practices to improve results. In Canada, the term "pesticide" encompasses all chemical applications, including herbicides, insecticides, fungicides, rodenticides, acaricides, and acaricidal. Pesticide use is regulated by both federal and provincial authorities.

In Ontario, all pesticides must be:

- **Federally registered** under the *Pest Control Products Act* by Health Canada's Pest Management Regulatory Agency (PMRA), and
- **Provincially classified** under Ontario's Pesticides Act and Ontario Regulation 63/09 by the Ministry of the Environment, Conservation and Parks (MECP).

  For details on obtaining permits and licenses, please refer to the appendix section. Permits and authorizations are best obtained between August and January to ensure application schedules can be met.

Chemical control can be effective as a standalone method or in combination with other management strategies. When chemical treatment is applied, either by contractors or Town staff, all products must be registered by the Pest Management Regulatory Agency for use on the specific target species. A full list of registered products, along with instructions for using the search engine, is provided in the appendix. Site-specific work plans must be developed prior to application, and treatment activities must be communicated in advance to Council, staff, and the public.

For insect pests, pesticides may be applied directly to the insects or to host plants, where the chemicals are absorbed and ingested during feeding. Timing for applications must follow the product's label but typically is best applied Late Summer to Early Fall (August to October). Whereas herbicides applied to invasive plants can be applied directly when the plants are at a manageable height, and the risk of spray drift is low. When plants are too tall or dense, increasing the risk of drift, they should first be cut and the biomass properly contained or removed before applying herbicide to the regrowth. Depending on the product, a buffer zone may be needed when applying pesticides.

Equipment & Supplies

Terrestrial Ecosystem Equipment

Backpack sprayer, injection syringe, or vehicle systems for application; pesticide signs, communications and notice of time of re-entry with date/time of application.

Chemical Application

Application Methods

Chemical treatments target plants and insects using various techniques for application methods:

Systemic Treatment	• Absorbed throughout the plant • Requires less volume of herbicide • Minimizes impact on non-target species • Typically requires annual applications
Foliar Sprays	• Applied directly to leaves or insects (coated, not dripping) • Cost-effective for treating large areas • May affect non-target species • Often requires multiple applications per year • Adding vegetable or tracker dye can improve spray accuracy and reduce drift
Basal Bark	• Herbicide is applied in a 5–10 cm band around the base of the stem • Less labour intensive than some other methods • May affect non-target species • Most effective on small to medium shrubs or trees under 2.5 cm in diameter
Hack-and-Squirt	• Herbicide sprayed into downward-angled cuts spaced 2.5 cm apart on the trunk • Cuts create cavities for herbicide absorption without severing the plant • Highly species-specific, minimizing non-target impact • Labour intensive • Best suited for trees or shrubs over 2.5 cm in diameter
Cut Stump	• Tree or shrub is cut near the base (30–45 cm high) • Herbicide is applied to the exposed stump surface • Severs the connection between roots and foliage • Selective and cost-effective • Prevents seed production and regrowth • Suitable for a range of population sizes and large stem diameters • Typically requires annual application or re-treatment as regrowth occurs

Best Management Practices

Chemical Application

Pesticide Products

A variety of pesticide products exist, with continual updates occurring on the Health Canada Consumer Product Label Search website. Common best practices will highlight the active ingredient in chemicals and not the product name, but some examples are listed below:

Glyphosate	Roundup, Aqua Neat
Triclopyr	Garlon, Renovate, Element
Imazapyr	Habitat, Polaris, Arsenal

To determine if chemical control measures are appropriate, the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Woodlots, trails, open spaces, and with precaution parks
Prohibited Areas:	Near or in waterbodies unless granted permission
Affects:	Terrestrial plants and insects; occasional aquatic use
Benefits:	• Most effective control measure for eradicating invasive species • Applicable at small to large sites • Effective in various surroundings • Horticulture or insecticidal soaps and acetic acid (vinegar) based products available for lower chemical impact
Challenges:	• Requires licenses/permits that differ for landscape settings, forests, and agricultural lands • Must apply at a specific timing/schedule • Debated to be the most harmful control measure to the environment • Spray drift poses risks for human and environmental health • Must restrict human access until the point of return • Extra precautions required in high profile areas such as parks and sport fields • May increase species' tolerance/resistance to pesticides and limit effectiveness • Can affect other desired species and cause adverse effects • Must comply with the *Pesticides Act* and Regulation 63/09 regarding herbicide storage, disposal, use, transport and sale

Best Management Practices

Prescribed Burns

Prescribed burning is the intentional use of fire by trained and authorized personnel as part of a planned land management strategy. It is commonly used in terrestrial restoration projects where fire plays a **natural role** in the disturbance regime. This technique helps reduce above-ground vegetation and is most effective when integrated into a broader invasive species management plan.

Prescribed burns involve clearly outlined burn areas, bordered by **firebreaks** such as gravel paths, pavement, or saturated zones of desirable vegetation to prevent the spread of fire. Low-intensity, slow-moving burns are generally preferred for greater control and effectiveness.

These burns are typically scheduled annually or within specific seasonal windows to align with natural ecological cycles. The **optimal time frame** for burns is from late Fall to the end of Winter (October to March) and should never be conducted in late spring and summer during nesting periods. If the desired species are known or suspected to be present, adjacent areas with similar habitat should be left unburned to serve as a refuge and support their survival.

Prescribed burning is especially effective in large monoculture areas and combined with other methods, such as cutting or herbicide application. **Post-burn monitoring** is essential to observe if target species begin to resprout, and if so, a follow-up herbicide treatment should be applied. When herbicide treatment is used, allow **at least three weeks** after the last herbicide application before implementing a controlled burn.

In some cases, fire can also be used as a method for **disposing** of plant material. A thorough site assessment should always be conducted prior to implementation.

Equipment & Supplies

Terrestrial Ecosystem Equipment: A prescribed burn plan, necessary permits, fuel, ignition source, coordination with the fire department, internal staff, and public notification. A trained professional must oversee the operation, supported by on-site staff.

Additional requirements include a water truck for fire control and safety, as well as advanced public communication.

Best Management Practices

Prescribed Burns

To determine if prescribed burn control measures are appropriate the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Savannah habitat, grasslands, slightly sloped areas (with no infrastructure), open spaces, meadows, woodlots
Prohibited Areas:	Under powerlines
Affects:	Terrestrial plants
Benefits:	• Natural management of some ecosystems (i.e. grassland) • Suitable for larger areas • Effective at removing invasive plants • Greater environmental benefits (i.e. soil nutrient cycling) • Reduces leaf litter/fuel source for igniting unpredictable fires • Access to Fire & Emergency Services Department Staff
Challenges:	• Requires trained professionals • Highly site-specific to implement • Must implement in specific timeframes or schedules • Heavy planning of site prior to burning • Communication with Staff, including alerting the Fire & Emergency Services Department and the public • Requires permits and compliance with regulations • Needs multiple staff to be in attendance to ensure safety at the time of the burn • Risk of difficulty in controlling fire • Potential to damage other vegetation • Adverse impacts on air quality • Root systems are not removed • Established populations may re-establish more aggressively if restoration planting is not completed

Solarization

Solarization (or tarping) involves covering an area with invasive plants using dark or clear material (typically tarps or heavy-duty sheets) to draw sunlight, disrupt photosynthesis, and effectively "cook" the root systems beneath. Before tarping, the vegetation should be cut to ground level to maximize contact with the material.

This method is most effective when initiated in late spring and maintained throughout the growing season. It is a viable option for controlling small to medium-sized infestations, particularly in areas where chemical treatments are not appropriate or permitted.

Regular monitoring is essential to ensure the tarp remains intact and undisturbed by both wildlife or human interference. Any new growth around the edges should be promptly removed to prevent further spread.

Solarization is also a practical method for disposing of invasive plant biomass. When plant material must be moved off-site, it can be piled in direct sunlight under tarps to dry out and neutralize seeds or viable fragments. Although it depends on weather conditions, the practice typically takes a week to dry all biomass.

Equipment & Supplies

Terrestrial Ecosystem Equipment: Dark or clear tarp, sheet or bag for covering the invasive species. In addition: stakes, string, and a mallet to securely anchor the covering to the ground.

Solarization

To determine if solarization measures are appropriate the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Terrestrial landscapes or shallow water with small to medium populations
Prohibited Areas:	None
Affects:	Terrestrial and aquatic plants
Benefits:	• Environmental conscious approach • Affects all plant parts (including roots) • Minimal equipment required
Challenges:	• Needs direct sunlight most of the day • Time-consuming – tarp needs to remain for the entire growing season • Requires monitoring for rips/tears and growth from the edges of the tarp • Restricted to small populations • Labour-intensive

Best Management Practices

Grazing

The use of grazing animals as a landscape management tool is not typically recommended as a best practice to implement, however has become a relatively recent and increasingly popular approach for controlling invasive species. This method has been most effective when implemented using a managed herd of goats supported by a trained farmer and herding dog. In the Niagara Region, targeted grazing has demonstrated effectiveness as a control strategy, however, research into its long-term outcomes is ongoing. While grazing can help manage invasive plants and offers positive public engagement benefits, other control methods, such as chemical treatments, have generally demonstrated greater effectiveness in achieving sustained control.

In successful implementations, farmers transport goat herds to infested sites using trailers. While it is uncommon for organizations to raise and maintain their own goats, partnering with farmers who provide this service is a viable and often preferred alternative.

Upon arrival, goats are enclosed within an electric fence surrounding the targeted area. In Niagara, the goat grazing program typically consists of two one-week grazing periods during the summer, with goats on site for approximately 8 hours per day. Desirable vegetation is protected from trampling and consumption with fencing, and sites must not contain endangered or at-risk species as an additional precaution. Goats have access to food and water on-site and will rest as needed. At the end of the day, they are transported back to the farm.

The success of this method relies heavily on proper planning and coordination, including hiring an experienced and dedicated farmer. As the practice evolves, grazing protocols may be adapted to improve outcomes.

Important Note: Grazing should not be used on sites where herbicides have been applied within the past three years.

Equipment & Supplies

Terrestrial Ecosystem Equipment: A herd of grazing animals, electric fencing, on-site farmers or trained staff, food and water supplies, a trailer for transportation, and signage.

Best Management Practices

Grazing

To determine if grazing control measures are appropriate, the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Open spaces, woodlots, cliff edges, rocky terrain, tight spaces where machinery cannot reach, shorelines
Prohibited Areas:	Sites with pesticide use in the last 3 years
Affects:	Terrestrial and aquatic plants
Benefits:	• Goat digestive enzymes break down plant seeds, making them inviable and unable to spread • Nature-based solution to invasive species management • Ability to reach difficult landscapes (i.e. sharp angled cliffs, rocky terrain) • Niagara-on-the-Lake publicity for innovative approaches • Practical for large areas
Challenges:	• Effectiveness is highly debated and often considered a public relations move to increase awareness • Requires specific farmer participation or extensive knowledge of grazing animals • Newly adopted herds can take years to train • Several materials/equipment are needed for animals. Communications required (i.e. internal, public, farmer)

Flooding

Flooding (or drowning) invasive plants works by ensuring there is at least 30 cm depth of water (ideally more) with vegetation cut to the substrate or ground. The lack of above-water plant material will limit the amount of oxygen that can travel to the root system, suffocating the plant, and can prevent germination of seeds or establishment of seedlings. The lower oxygen level will decrease the growth of the plant or cause die-off.

However, flooding less than 30 cm does not kill seedlings, and mature plants thrive in these conditions, so caution is needed when applying. Short-term or temporary flooding of a natural area can actually cause a disturbance that may allow some invasive seeds in the seedbank to germinate, grow and proliferate once water levels have returned to a previous level.

Equipment & Supplies

Aquatic Ecosystem: Common handheld tools include raspberry cane cutters, loppers, and other cutting implements suitable for shallow water. Hip waders may be used for standing in water, while canoes or floating platforms assist in transporting plant material. Boats or heavy machinery may be needed for large-scale aquatic removal.

Terrestrial Ecosystem Equipment: Loppers, hand tools, brush cutters, chainsaws, and rollers.

Best Management Practices

Flooding

To determine if flooding control measures are appropriate the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Aquatic sites or areas with water level control (stormwater management ponds, dam infrastructure, hydro infrastructure)
Prohibited Areas:	No prohibited areas are specified; however, caution can be given around drainage areas
Affects:	Aquatic and terrestrial plants
Benefits:	• Effective in medium to large areas • Environmental conscious management option • Impacts the root system (when done at appropriate depths)
Challenges:	• Can affect non-targeted species • Site specific to utilize at least 30 cm of water

Traps & Barriers

Traps and barriers are effective tools for isolating invasive organisms within a designated area, preventing their spread to surrounding environments. These methods require initial setup and ongoing monitoring to determine whether any target species have been captured.

However, it's important to note that some traps and barriers are non-selective and may pose risks to non-target species. This makes careful planning essential. For instance, terrestrial sticky band traps can be fitted with protective cages around tree trunks to prevent harm to birds and small mammals.

The success of traps and barriers heavily depends on strategic placement, which should be guided by species-specific behaviours. Traps are often positioned near preferred host plants, nesting or spawning sites, or areas known to be vulnerable to invasive species. One widely used product is the *BugBarrier Tree Band® Kit*, used for a variety of insects and vectors such as the spotted lanternfly.

This approach is especially useful for Early Detection and Rapid Response (EDRR) efforts, helping to quickly identify and address new invasive species before they become established. When a potential invasive is found, it's critical to report sightings to the Canadian Food Inspection Agency (CFIA). If a species is confirmed in a trap, follow CFIA guidance, with typical disposal at a landfill or, where suitable, at composting facilities is recommended.

Equipment & Supplies

Aquatic Ecosystem:
Netting, wall barriers, electric fencing, and dams.

Terrestrial Ecosystem Equipment: Tree bands, cages, hormonal hanging traps.

Best Management Practices

Traps & Barriers

To determine if traps and barrier control measures are appropriate the Town will review the site and species while evaluating the following summary:

Suitable Sites:	Terrestrial and aquatic sites
Prohibited Areas:	None, but site-specific planning required to select the trap/barrier
Affects:	Aquatic and terrestrial non-plant species (i.e. insects, fish, vectors of pathogens, etc.)
Benefits:	• Affects terrestrial and aquatic sites • Effective in medium to large areas • One-time major setup and less continual labour
Challenges:	• Can harm the desired species • Requires regular monitoring

Best Management Practices

Site Prioritization

Due to invasive species being wide spread, resources will be allocated to specific sites deemed as priority. The Site Prioritization Tool for Control of Invasive Phragmites will be used as a guideline and adopted for all invasive species. The following will be evaluated to determine prioritization:

- **Safety**: Species with human safety concerns, such as skin irritation/toxins, blockage to roadside/intersection sightlines, fire prone near buildings/homes, obstruction to flood mitigation infrastructure, etc., will be prioritized first.
- **Landownership:** Sites where the Town only owns and manages the area will be given first priority over those that share land ownership or management.
- **Population size**: Isolated and smaller populations (less than 50m^2 with less than 25% density at site) will be given priority over increasingly larger populations, unless deemed a priority for other reasons.
- **Technique**: When managing large populations, working from the perimeter of the site towards the middle is the most effective strategy to not disturb and promote further spread.
- **Shape**: Linear sites will be preferred over non-linear features.
- **Full or partial treatment**: Sites that will be completely treated for removal will be prioritized over ones with partial treatment.
- **Paths of Spread**: Areas that function as pathways for invasive species dispersal, such as roadsides, will be given higher priority for management compared to locations with minimal potential for spread.
- **Accessibility**: Sites with easy access to the entire population of invasive species will be given priority of management over ones that are difficult to access.
- **Habitat Value**: Sites with strong habitat quality, conservation value, and natural area will be given first consideration.
- **Sensitive Areas**: Sites near provincial or national parks, crown land, provincially Significant Wetland (PSW), Area of Natural and Scientific Importance (ANSI), or similar areas of local natural history importance will be given higher priority for management.
- **Recreation:** Species severely impacting recreation activity (i.e. obstruction of boat access, restricted use of trails/parks, etc.) will be given priority.
- **Coordination of Sites**: Sites that are neighbouring other confirmed areas to be treated for invasive species will take priority to share resources rather than ones that have neighbouring invasive species with no plan of treatment.
- **Aesthetics:** Species entirely affecting scenic views will be considered over ones partially or not affecting aesthetic views.

Best Management Practices

Disposal

Proper disposal is essential to effectively manage invasive plants and prevent further spread. The method selected should depend on the type and amount of biomass, site conditions, and available resources.

Solarization

The first step in disposing of invasive plant material is solarization, which involves exposing the material to direct sunlight to kill it. To prevent further spread, the plant matter should remain at the removal site until it is thoroughly dried. If roots or seeds are present, they should be sealed in bags to prevent dispersal when unattended. For large volumes where bagging is impractical, the material should be placed on a raised platform away from soil and covered with a tarp to reduce risk of regrowth; if this is not feasible, piling is acceptable but requires frequent monitoring to ensure it is not disturbed by wind, animals, or human activity.

Smaller plant material can be placed in dark plastic bags, which retain heat effectively, or in yard waste bags if composting is an option, though they are more prone to tearing, moisture damage, and slower drying. Whether bagged or piled, the material must be left in direct sunlight for one to three weeks, depending on size and weather, until completely dry. Once solarized, the plant material can be safely composted at an approved facility, sent to a landfill, or burned at appropriate sites.

Composting or Landfill

Composting is only recommended at large-scale municipal facilities capable of reaching sufficient temperatures to destroy living plant material, viable seeds, and that accept invasive species for processing. It is important to consult with the facility before sending any plant material for composting. Backyard or home composting should not be used, as these systems do not achieve the temperatures necessary to kill seeds. If a waste facility cannot reach adequate temperatures to neutralize viable biomass, the material should be securely bagged and sent to a landfill.

Disposal

Leave-On-Site

This is the most cost- and time-efficient method, involving on-site drying and natural decomposition of plant material. It is best following herbicide application, when biomass can safely decompose without the risk of spreading invasive species through transport. For cut vegetation with no herbicide, on-site disposal is generally suitable for stems, depending on the species, but roots must be removed to prevent resprouting. Plant material free of seeds and roots may also be piled to create wildlife habitat or a food source. However, there should be no safety concerns with piles, and aesthetic impacts should be considered with frequent site monitoring to detect any regrowth. Piles should also not be next to waterbodies. Biomass can also be chipped, mulched, or burned on-site when approved. If roots or seeds are present, the material should be bagged for solarization and then sent to a landfill or composted at approved facilities.

Trees

Invasive tree species or ones infected by invasive pathogens can generally be removed using standard tree removal practices, with particular attention given to the proper disposal of roots and seeds to prevent regrowth or spread. Depending on the size of the tree, either chainsaws or handsaws may be used to cut the trunk and associated branches. Stump removal is essential, and all tree material should ideally be dried, debarked, and have all root connections severed. Once prepared, the wood may be chipped or burned. As a last resort, logs may be buried to minimize the risk of regrowth.

Insects

In certain situations, insect disposal may be necessary. Whenever possible and safe to do so, it is best practice to first capture the insect, take a clear photograph for documentation, and then proceed with disposal. If the insect is suspected to be a novel invasive species to the area, such as the spotted lanternfly, notification to the Canadian Food Inspection Agency (CFIA) may be required. Captured insects should be securely sealed in a plastic bag or container. Once documented, they should be disposed of through a landfill or composted at a municipal facility approved for such materials.

Best Management Practices

Restoration

Once the invasive species have been removed, it is best practice to implement a site restoration plan to prevent their return. Following best practices from the Ontario Invasive Plant Council, the following restoration practices will be considered for implementation after control measures have been completed:

Mulching

Mulching is a common practice that brings organic matter back into the soil to enhance plant growth. It can be made from various chipped plants, including invasive species (without seeds or roots). Thick layers of mulch (> 5 cm) can smother vegetation and change nutrient composition. Adding a thick layer of mulch over a landscape right after a control measure (i.e. cutting, chemical, etc.) can be an effective measure to prevent regrowth of all invasive species and reduce soil compaction. However, if desirable vegetation is present, it is best to avoid heavy mulching for the entire site and select site-specific spots, typically best suited for urban parks and gardens.

Planting

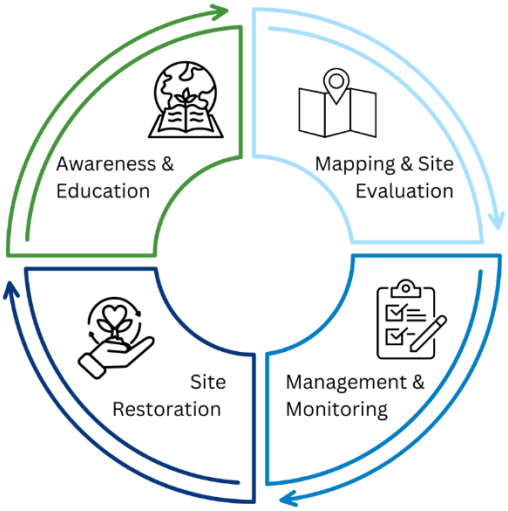
Planting native species is strongly recommended following the completion of invasive species control efforts, especially when nearby areas still contain invasive populations. However, native plantings should be delayed until all removal activities are finalized, including follow-up efforts in subsequent years, to prevent accidental damage during continued management. When selecting native species, consider site-specific conditions such as sunlight exposure, available space, and water capacity to ensure successful establishment and competitiveness. Prioritize fast-growing species that produce abundant seeds, as these are more likely to outcompete remaining invasives and support native ecosystem recovery. Incorporating a diverse mix of native plants increases resilience, and using more mature plants further enhances their ability to establish dominance. Transplanting mature native species from healthy sites can also be an effective strategy for accelerating restoration.

Seeding

Distributing native seeds can be an effective restoration strategy once invasive species control measures are complete. The success of this method often depends on site conditions. For example, in urban areas, seeds may be more vulnerable to being eaten by wildlife due to limited food sources, unlike more natural settings where alternative resources are abundant. To improve effectiveness, it is best to select fast-growing native species that produce abundant seeds, as these can help offset seed loss and more effectively outcompete invasive plants. It is also essential that native seed collection is carried out ethically and sustainably to protect source populations and maintain ecological integrity.

Section 4: Management Framework & Action

The invasive species management framework provides a clear and consistent approach for addressing all types of invasive species. It is grounded in four key pillars: awareness and education, mapping and site evaluation, management and monitoring, and site restoration. Staff can work towards completing each pillar when managing any invasive species, with more specific removal actions for select invasive species mentioned in the Priority Species Control Plan.



Awareness and Education: Provide communication and outreach to the public, interested parties, and Staff to share information on invasive species.

Mapping and Site Evaluation: Collect baseline data and continue to update it in correspondence with the location to inform priority areas and species of concern.

Implementation and Monitoring: Identify priority areas and species, define management goals, identify management practices most suitable for the area and species, and monitor management activities.

Site Restoration: Utilize restoration techniques such as mulching, planting native species, and soil rehabilitation to improve the area. Circle back to spread awareness and education on restoration while continually mapping and monitoring the area.

Awareness & Education

Provide communication and outreach to the public, interested parties, and staff to share information on invasive species.

Action Item	Lead	Start	Indicators of Success
1.1 Launch social media and web campaign	COM CC	Q2 2026 (Last week in February is annual invasive species awareness week)	• Launch a targeted social media and web campaign on invasive species • Create monthly posts highlighting species of concern • Track social media engagement metrics (i.e. likes, shares, clicks) • Provide clear instructions on how to report invasives through social media and the website • Promote decontamination and prevention strategies on social media and the Town website • Distribute informative resources via email to local groups, organizations (i.e. hiking centers, volunteer groups, Ontario Federation of Anglers and Hunters (OFAH), Federation of Ontario Cottagers' Association (FOCA)
1.2 Host public education events	CC COM	Q2 2026	• Host at least one public event per year (i.e. workshop, info session, workshop) • Promote events online and at public buildings to aim for at least 20 attendees at events • Reach out to volunteer groups and local organizations, informing them of events • Create post-event surveys to receive feedback and integrate into future events

Management Framework & Action

Awareness & Education

Provide communication and outreach to the public, interested parties, and staff to share information on invasive species.

Action Item	Lead	Start	Indicators of Success
1.3 Provide staff training on invasive species	CC	Q2 2026	• Distribute the Invasive Species Management Plan • Provide Staff training on invasive species • Hold internal info sessions for all relevant Departments • Share Departmental opportunities and challenges with Staff on invasive species and provide shared resources • Send timely alerts to Staff about new invasive species threats • Support Staff in feeling confident recognizing, reporting, and managing invasive species
1.4 Distribute educational materials to local partners	CC REC	Q3 2026	• Place brochures, posters, or signs in parks, trails, and community facilities (i.e. Community Centre) • Communicate with staff so they can spread information on invasive species and are aware of the materials available at sites
	CC	Q3 2026	• Maintain active participation with the Phragmites Management Area Collaborative, provincial, local, and federal communities of practice, or working groups • Partner with schools and youth groups to develop presentations, learning kits, and/or engagement sessions

Management Framework & Action

Mapping & Site Evaluation

Collect baseline data and continue to update it in correspondence to the location to inform priority areas and species of concern.

Action Item	Lead	Start	Indicators of Success
2.1 Develop and implement a standardized mapping protocol	CC	Q2 2026	• Mapping protocol created and shared • Staff and/or volunteers trained on standardized mapping protocol • Baseline data collected for at least one high-priority area
2.2 Update and maintain the GIS database	CC ENG	Q4 2026	• Update and maintain a centralized GIS database of invasive species occurrences • Update GIS layers and surveys as needed and review them on an annual basis • Ensure data is accessible to relevant departments • Promote the use of data results to inform management priorities
2.3 Promote public reporting	CC COM	Q4 2026	• Create and promote a public survey reporting tool using the Join the Conversation platform or a similar platform for standardized site evaluation • Tool launched and promoted via outreach • Increase community-submitted data for mapping and site evaluation • Host community events to collect data and engage the public
2.4 Establish partnerships and collaborative opportunities	CC	Q2 2026	• Maintain active participation in Phragmites Management Area Collaborative and other regional initiatives • Stay informed from the Invasive Species Centre and the Invasive Species Plant Council for opportunities to collaborate • Seek partnership opportunities with local organizations • Access shared data and resources • Organize student or volunteer-led invasive species reporting and mapping

Management Framework & Action

Mapping & Site Evaluation

Collect baseline data and continue to update it in accordance with the location to inform priority areas and species of concern.

Action Item	Lead	Start	Indicators of Success
2.5 Establish priority sites	CC	Q2 2026	• Identify priority areas through site assessments using the criteria outlined in the site prioritization section • Prioritize removal of invasive species that have human health impacts in public spaces • Coordinate with staff to align planned infrastructure and asset maintenance activities with invasive species management • Engage all bordering municipalities and relevant organizations to unite work • Use mapping data to determine priority and high-risk areas for management • Integrate GIS data into site-specific planning • Reassess priority invasive species each year to inform priority sites • Share updates across departments annually and as needed
2.6 Conduct annual site evaluations	CC	Q3 2026	• Conduct annual site evaluations to prioritize and reassess areas of concern • Complete evaluation reports as needed for sites of concern • Prioritization site and species list reviewed annually and updated as needed • Results and public reports integrated to inform the following year's work plan

Implementation & Monitoring

Identify priority areas and species, define management goals, identify management practices most suitable for the area and species, and monitor management activities.

Action Item	Lead	Start	Indicators of Success
3.1 Develop site-specific work plans	CC	Q2 2026	• Develop comprehensive work plans for staff or contractors, including pre-assessment of potential impacts to species at risk and other environmental considerations • Work with the Invasive Species Centre and relevant agencies to develop plans • Engage a licensed pesticide contractor as needed and ensure the plan is clearly understood by all parties • Ensure RFP/RFQ processes require completion of environmental pre-assessments • Consult with contractors, as needed, to confirm project work is on track and removal activities do not pose environmental risks prior to implementation • Collaborate with Indigenous communities and organizations • Establish clear goals and timelines for each target site • Engage with private landowners and form public-private partnerships • Workplan approved and communicated • Progress tracked and reported annually
3.2 Seek funding opportunities and develop a budget	CC	Q1 2027	• Integrate invasive species management into operational budgets and workplans • Approve a Natural Area Stewardship Technician in budget • Submit an application to the Invasive Species Action Fund and/or Invasive Species Phragmites Fund • Investigate other funding streams • Seek out collaborative opportunities to expand projects, share resources, and strengthen grant applications • Explore joint procurement opportunities

Management Framework & Action

Implementation & Monitoring

Identify priority areas and species, define management goals, identify management practices most suitable for the area and species, and monitor management activities.

Action Item	Lead	Start	Indicators of Success
3.3 Monitor and document actions	CC	Q3 2026	• Monitor and document all management actions using standardized forms or tools • Identify trends to inform future management efforts
3.4 Develop an inspection and monitoring plan	CC	Q4 2026	• Inspect and monitor vulnerable/priority sites throughout the year • Create proposal on boating inspection stations and biomass disposal areas • Map and record any sighted invasive species • Establish policies and/or by-laws requiring inspection and decontamination of watercraft/vehicle before use
3.5 Evaluate management practices	CC	Q4 2026	• Evaluate the effectiveness of management practices through pre- and post-treatment surveys • Establish species specific key performance indicators (e.g.% reduction in invasive cover) • Results used to adapt methods as needed • Review best practices biannually to ensure the most appropriate techniques are being used • Share phragmites data with the Niagara working groups to refine practices
3.6 Engage the community	CC COM	Q1 2027	• Launch volunteer or community scientist monitoring program • Schedule volunteer monitoring days with training provided • Encourage participation by sharing community contribution impact (i.e. increase of area covered, photo submissions, surveys completed)

Site Restoration

Utilize restoration techniques such as mulching, planting native species, and soil rehabilitation to improve the area. Circle back to spread awareness and education on restoration while continually mapping and monitoring the area.

Action Item	Lead	Start	Indicators of Success
4.1 Develop site-specific restoration plans	CC	Q1 2027	• Develop site-specific restoration plans following invasive species removal • Restoration plans completed for each major treatment site using native plantings, mulch, and soil rehabilitation • Plans shared across departments for implementation
4.2 Plant native species	CC	Q1 2028	• Develop guidelines or best management practices for plantings, gardens, and beautification projects that prioritize the use of native species • Plant native species and apply mulch in restored areas • Native species planted in at least one priority area per year • Mulch applied where appropriate to suppress invasive species regrowth • Survival rates of plantings monitored seasonally
4.3 Improve soil health	CC	Q2 2028 (after no re-growth of invasive species)	• Improve soil health through targeted rehabilitation (i.e. mulch, aeration), especially around shorelines • Test soil after treatment to amend as needed • Improvement in soil quality indicators tracked over time • Work with partners (i.e. Vineland Research and Innovation Centre) to improve soil health

Site Restoration

Utilize restoration techniques such as mulching, planting native species, and soil rehabilitation to improve the area. Circle back to spread awareness and education on restoration while continually mapping and monitoring the area.

Action Item	Lead	Start	Indicators of Success
4.4 Monitor restored sites	CC	Q3 2027	• Monitor restored sites to assess establishment and identify maintenance needs • Follow-up visits conducted at least once per year • Restoration success documented (e.g., % native cover) • Maintenance actions recorded and scheduled
4.5 Develop a native seed collection program	CC	Q3 2028	• Explore options to collect native seeds to house ethically and sustainably • Develop native seed collection protocols • Engage with the Native Tree Seed Collection Community of Practice • Gather required data and create a strategy to establish a Town nursery to support restoration initiatives
4.6 Share restoration stories	CC COMS	Q3 2028	• Share restoration stories and successes with organizations and the public to encourage stewardship • Collect before/after photos and stories posted online • Signage installed at restored sites • Encourage public engagement in restoration activities and recognition of local efforts

Key Performance Indicators

To effectively measure the success of invasive species management through the framework mentioned above, key performance indicators (KPIs) will be established for each site-specific work plan. Although they can differ on a case-by-case basis and be specific to the project, some general indicators the Town will incorporate are as follows:

KPI	Description	Target/Benchmark
Species early detection reports	Number of early detections (insects or plants) submitted through internal or public reporting	≥ 10 verified early detections annually
Rapid response time	Time from detection to management action for new invasions	≤ 2 weeks from verified detection to action plan initiation
Number of educational campaigns on invasive insects	Social media posts, workshops, newsletters, etc. focused on pest prevention and ID	At least 1 campaigns annually
Decontamination awareness compliance	Trailheads or facilities with signage and boot brush stations installed	≥ 90% of priority sites equipped and maintained
Volunteer/community participation rate	Number of community members involved in invasive species work (events, monitoring, etc.)	≥ 25 participants annually
Public reporting rate	Number of invasive species reports submitted via public platforms (e.g., Survey123)	20% increase in reports per year
Infestation area (ha or m^2)	Total area affected by specific invasive species	Annual reduction in the total infestation zone
Number of priority sites treated	Total number of identified high-priority sites where invasive species management occurred	Annual increase; e.g., 5+ sites treated per year
Pre- and post-treatment species counts	Count of invasive species at a site before and after management activities	≥ 50% reduction in invasive plant individuals over 1–2 seasons; ≥ 50% increase in native cover
Tree mortality rate from invasive insects	Tracks number of trees lost to invasive pests like EAB or LDD moths annually	≤ 5% mortality rate in managed zones
Pheromone or trap capture rate	Number of insects captured in monitoring traps for early detection (i.e. spotted lanternfly, spongy moth)	Stable or decreasing capture trend over time

Key Performance Indicators

To effectively measure the success of invasive species management through the framework mentioned above, key performance indicators (KPIs) will be established for each site-specific work plan. Although they can differ on a case-by-case basis and be specific to the project, some general indicators the Town will incorporate are as follows:

KPI	Description	Target/Benchmark
% Reduction in invasive cover	Percentage decrease in ground/area cover of invasive species at treated sites	≥ 60% reduction in invasive cover within 1 year
Native species establishment rate	Percentage of planted native species that survive after 1 growing season	≥ 70% survival rate of planted native species
Restored Area (in hectares or m^2)	Total area restored with native planting, soil rehab, and other actions post-treatment	≥ 500 m^2 restored per year, depending on scale
Native tree replanting after insect infestation	Number of native trees planted to replace insect-killed trees	≥ 2 native trees planted per tree lost

Connect to the Town

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Contact the Town:

905-468-3266

info@notl.com

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If you spot an invasive species, report it through the Government of Ontario:

- **Phone**: Invading Species Hotline at Toll-free **1-800-563-7711**
- **Online**: Visit **EDD MapS**, or visit the **Invasive Species in Ontario project** to report a sighting
- **Mobile app**: Download the **EDDMapS** Ontario app on your mobile phone

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Appendix

Ontario Invasive Species Act

There are two classes of invasive species regulated under the act: prohibited and restricted. A link to both lists is available here.

Prohibited Invasive Species

The Invasive Species Act defines prohibited invasive species as “it is illegal to import, possess, deposit, release, transport, breed/grow, buy, sell, lease or trade prohibited invasive species”. Species listed as prohibited in Ontario are as follows:

Fish:

- Bighead carp (*Hypopthalmichthys nobilis*)
- Black carp (*Mylopharyngodon piceus*)
- Grass carp (*Ctenopharyngodon idella*)
- Silver carp (*Hypopthalmichthys molitrix*)
- Snakeheads (All species in the family Channidae)
- Stone moroko (*Pseudorasbora parva*)
- Wels catfish (*Silurus glanis*)
- Zander (*Sander lucioperca*)
- Tench (*Tinca tinca*)
- Prussian carp (*Carassius gibelio*)
- Ide (*Leuciscus idus*)
- Red shiner (*Cyprinella lutrensis*)
- Eastern and Western mosquitofish (*Gambusia holbrooki* and *Gambusia affinis*)

Insects:

- Mountain pine beetle (*Dendroctonus ponderosae*)

Aquatic invertebrates

- Common yabby - Crayfish (*Cherax destructor*)
- Golden mussel (*Limnoperna fortune*)
- Killer shrimp (*Dikerogammarus villosus*)
- Marbled crayfish (*Procambarus virginalis*)
- Red swamp crayfish (*Procambarus clarkii*)
- New Zealand mud snail (*Potamopyrgus antipodarum*)
- Pacifastacus crayfish (*Pacifastacus spp.*)
- Procambarus crayfish (Procambarus spp.)

Plants:

- Brazilian elodea - Brazilian waterweed (*Egeria densa*)
- European water chestnut (*Trapa natans*)
- Hydrilla (*Hydrilla verticillate*)
- Parrot feather (*Myriophyllum aquaticum*)
- Water soldier (*Stratiotes aloides*)
- Oxygen weed (*Lagarosiphon major*)
- Watermoss (*Salvinia spp.*)

Restricted Invasive Species

In Ontario, restricted invasive species are defined as species for which "it is illegal to import, deposit, release, breed/grow, buy, sell, lease or trade restricted invasive species". While possession of restricted species is permitted, all other activities remain prohibited, including importation and release. The following species are listed as restricted in Ontario:

Plants:

- Black dog-strangling vine (*Cynanchum louiseae*)
- Dog-strangling vine (*Cynanchum rossicum*)
- Japanese knotweed (*Reynoutria japonica var. japonica*)
- Phragmites - European common reed (*Phragmites australis subsp. Australis*)
- Tree-of-heaven (*Ailanthus altissima*)
- Carolina fanwort (*Cabomba caroliniana*)
- Yellow floating heart (*Nymphoides peltate*)
- Bohemian knotweed (*Reynoutria × bohemica*)
- Giant knotweed (*Reynoutria sachalinensis*)
- Himalayan knotweed (*Koenigia polystachya*)
- European frog-bit (*Hydrocharis morsus-ranae*)
- Waterferns (*Azolla spp.*)
- Floating primrose-willow (*Ludwigia peploides*)
- Flowering-rush (*Butomus umbellatus*)
- Eurasian water-milfoil (*Myriophyllum spicatum*)

Mammals

- Wild Pigs (*Sus scrofa*)
- Nutria (Myocastor coypus)

These are currently the listed regulated invasive species in Ontario; however, other species have invasive "traits" and new ones are emerging on this list continually with species classification evolving. Please refer to the Managing Invasive Species in Ontario link for the most updated list and information.

Federal Legislation

Focused on invasive species:

- (2001) Canada Shipping Act
- (1990) Health of Animals Act
- (1990) Plant Protection Act
- (1985) Fisheries Act
- (1985) Great Lakes Fisheries Convention Act

Related to invasive species:

- (2009) Environmental Violations Administrative Monetary Penalties Act
- (2008) Federal Sustainable Development Act
- (2002) Pest Control Products Act
- (2002) Species at Risk Act (SARA)
- (2000) Canada National Parks Act
- (1994) Migratory Birds Convention Act
- (1992) Transportation of Dangerous Goods Act
- (1992) Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act
- (1990) Canada Environmental Protection Act
- (1985) Freshwater Fish Marketing Act
- (1985) Seeds Act

Ontario Legislation

Focused on invasive species:

- (2015) Great Lakes Protection Act
- (2015) Invasive Species Act
- (1990) Forestry Act
- (1990) Pesticides Act
- (1990) Weed Control Act

Related to invasive species:

- (2009) Animal Health Act
- (2008) Lake Simcoe Protection Act
- (2007) Endangered Species Act (Species Conservation Act to come into force at future date)
- (2006) Provincial Parks and Conservation Reserves Act
- (2003) Kawartha Highlands Signature Site Park Act

- (2001) Municipal Act
- (1997) Fish and Wildlife Conservation Act
- (1994) Crown Forest Sustainability Act
- (1990) Conservation Authorities Act
- (1990) Environmental Assessment Act
- (1990) Plant Diseases Act

Additional Partner Agencies

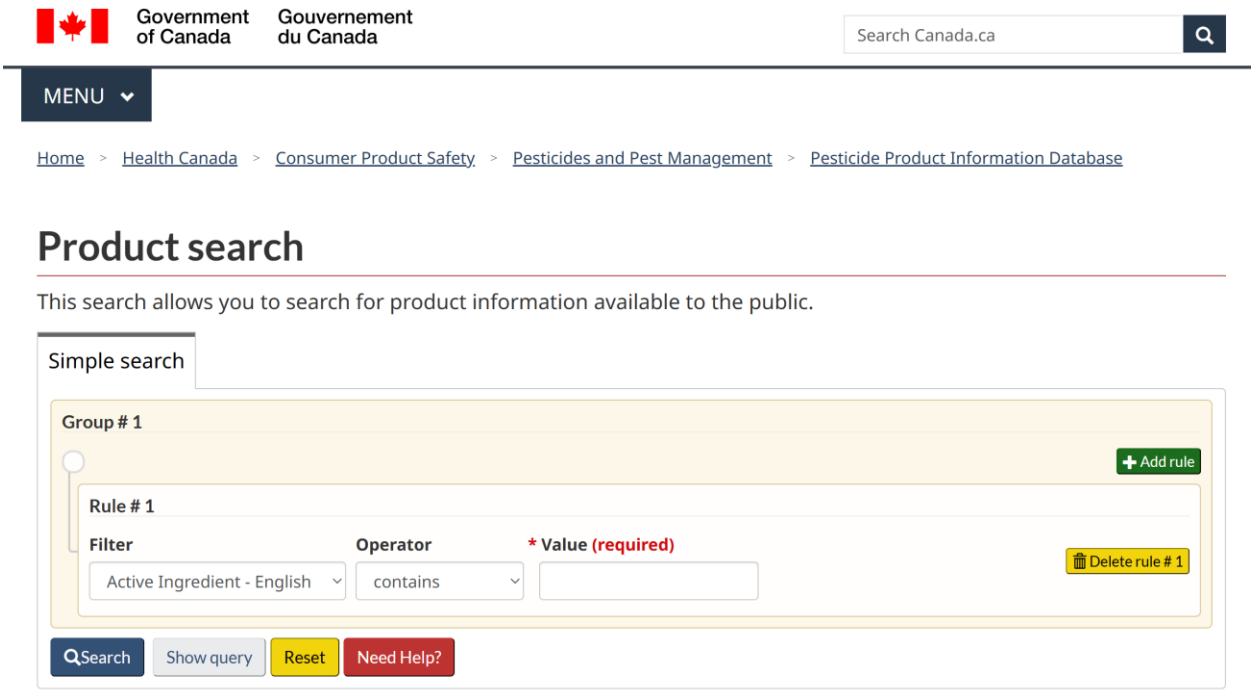
Additional Partners	
Ministry of Natural Resources (MNRF) – forest health & natural heritage	https://www.ontario.ca/page/ministry-natural-resources
Grape Growers of Ontario – vineyard protection	https://grapegrowersofontario.com/resources/
Landscape Ontario Horticultural Trades Association	https://landscapeontario.ca/
Canadian Lumber Standards Accreditation Board – forestry standards	https://www.clsab.ca/
Eastern Ontario Model Forest – forest health collaborative network	https://imfn.net/regional-networks/eastern-ontario-model-forest/

Health Canada Search Product Label Tool

A full list of registered pesticides can be found on the Pest Management Regulatory Agency's (PMRA) website linked here.

Their product search tool (linked here) can allow viewers to search for products that are registered for use on specific invasive species and other applications.

On this page the viewer will have to agree to the disclaimer. They will then be redirected to see a homepage for the product search. A table with a series of three columns to fill in will be displayed, as shown here:



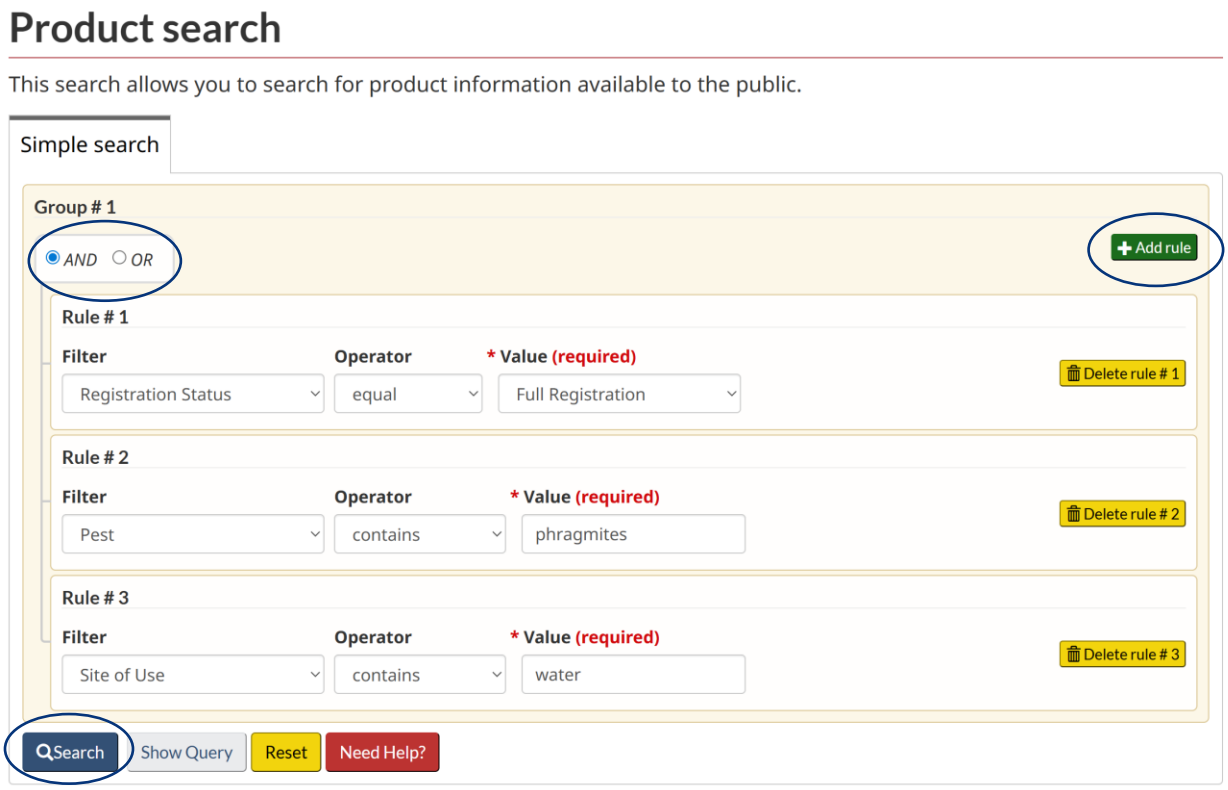
It will automatically show one row of available search criteria that the user can choose to filter from and enter selected text. The first column under "Filter" provides a list of options to sort from including active ingredient, current/historical, date first registered, exclusive period start date, expiry date, marketing type, pest, product name, product type, registrant, registration number, registration status, site of use, or use-site category. The most useful options for searches on invasive species products are pest, site use, and registration status. However, anyone could be used at any time.

Under the "Operator" column the user can select either equal, contains, does not equal, does not contain, or empty to match the desire search. This will allow the individual to search for items that include or exclude specific text entered from the last column "Value". This column allows the user to input the specific item they are seeking to find.

For example, if it is an invasive species the user might enter "phragmites", if needed for an aquatic site they may enter “water”, etc. Typically, entering one or two words works best in the search query.

The user can also click the “Add rule” button to add a combination of filters for the search such as registration status, pest, and site of use that would be helpful for determining products to use for invasive species. When listing more than one rule, an additional option at the top left corner will appear to select either “and” vs. “or”. Selecting “and” will make sure products listed meet all criteria specified while “or” will list products that contain one or more criteria specified. When all fields have been entered, the user can click “Search” at the bottom left corner and view the list of products available.

An example search entry is illustrated below:



Chemical Control Licenses and Permits

Permits must also be obtained for pesticide use on land and water, with applications available online.

Licensing Requirements

To apply certain pesticides, a valid exterminator license is required. Specific license classifications, such as Forestry or Landscape, must be identified and obtained to use in appropriate settings. The application process includes:

1. Submitting an application form and $195 fee to the University of Guelph Ridgetown Campus.
2. Studying provided materials: a Core Manual and a License Category Specific Module.
3. Writing and passing a two-part exam (Core: 1-hour, closed book; Category: 1.5-hour, open book) with a minimum **75%** on both parts.
4. Sending your certification letter to the Ministry of Environment Conservation and Parks (MECP) to receive your license.

If failed, you may rewrite the exam (max. two more times in 12 months, $75 per attempt). The license ($90) is valid for **five years**.

Contact MECP's Client Services and Permissions Branch at 416-314-8001 | 1-800-461-6290 | enviropermissions@ontario.ca

Aquatic Herbicide Application

Herbicides used in water require a permit from MECP. Licensed exterminators must follow strict guidelines, including timing, dosage, setback distances, and environmental protections. Treatments for aquatic invasive plants can be applied **July 15 to March 14**, after fish spawning has ended. If endangered species are present, approval under the **Endangered Species Act, 2007** may also be required.

Search for approved products using PMRA's pesticide label database. **Always consult the current product label** before use.

Manual Control Permits

For aquatic plants a work permit under the Public Lands Act is not required if **all** of the following rules are met:

1. Applicant is the waterfront property owner or conducting work on behalf of the property owner
2. Minimizes the removal of native aquatic vegetation (e.g., wild rice)
3. Disposes of the plants/material removed on dry land to prevent it from re-entering the water
4. Use, operate or store any wheeled or tracked machinery/equipment on dry land, or on a barge or vessel
5. Only uses mechanical devices (e.g., rake, cutter bar) or your hands to remove plants, and do not dredge the bed of the waterbody
6. Does not carry out work during fish spawning season or during the time of other critical fish life stages, as set out in the In-water Work Timing Window Guidelines

If rules cannot be met, then a work permit will be required. To apply for the permit:

1. Download and complete the Application for Work Permit Part 1 (PDF)
2. Download and complete Application to do Work on Shore lands Part 3 (PDF)
    - Include proof of ownership (i.e. deed)
    - Include sketches/drawings/survey plans indicating your property lines and where the work is taking place
3. Submit complete application by mail or in person to a local ministry office. Southern Ontario Region: 4th Flr S, 300 Water St Peterborough, ON K9J 3C7

Removal methods can begin for aquatic plants after July 15 to March 14, when spawning activities are over for fish species according to the Ontario Ministry of Natural Resources in-water work timing window guidelines.

In addition to the rules above, if you undertake certain activities for research or education, or for the prevention, control or eradication of a regulated **prohibited** invasive species, you will either:

- Require authorization under the *Invasive Species Act*; or must
- Adhere to conditions specified in a prevention and response plan

For invasive plants regulated as **restricted** invasive species, an authorization under the *Invasive Species Act* is not required for specified activities if you take reasonable precautions to prevent the spread of the restricted invasive species outside the immediate

area where the activity is taking place. For more information on Ontario's invasive species regulations, including a list of prohibited and restricted invasive species, visit Managing invasive species in Ontario.

If you have questions about the need for an authorization under the *Invasive Species Act*, please contact invasive.species@ontario.ca.