Agenda Item # Page #

Ecologist Planner: J. MACKAY

TO:	**CHAIR AND MEMBERS PLANNING & ENVIRONMENT COMMITTEE ON SEPTEMBER 25, 2017**
FROM:	**J. M. FLEMING MANAGING DIRECTOR, PLANNING AND CITY PLANNER**
SUBJECT:	**LONDON INVASIVE PLANT MANAGEMENT STRATEGY**

RECOMMENDATION

That, on the recommendation of the Managing Director, Planning and City Planner regarding the London Invasive Plant Management Strategy, the following actions **BE TAKEN** with respect to the Strategy:

a) The London Invasive Plant Management Strategy and attached as Appendix 'A', **BE ENDORSED**;
b) The recommendations from the London Invasive Plant Management Strategy **BE INITIATED** to be prepared for spring 2018 implementation; and,
c) The Civic Administration **BE DIRECTED** to prepare a Budget Amendment for consideration through the 2018 Budget Update process; it being noted that funding may be available through the Woodland Acquisition and Management Reserve Fund to fund all or a portion of the increased funding requirement.

PREVIOUS REPORTS PERTINENT TO THIS MATTER

None.

PURPOSE

This Strategy has been developed to:

- be consistent with Council's Strategic Plan for the City of London (2015-2019), which identifies areas of focus for the city's long-term vision and includes the protection and enhancement of the Natural Heritage System and specifically the control of invasive species;
- be consistent with the London Plan environmental policies that require the City to protect, restore and enhance the Natural Heritage System; and,
- establish a City-wide strategy and framework to address the growing concern and negative impacts of invasive plant species in the City of London.

BACKGROUND

The City of London is an identified leader among other municipalities and other levels of government in demonstrating a proactive approach to the management of invasive species in our Parks, Woodlands and Environmentally Significant Areas (ESAs) since 2006. Within our ESAs, Council approved Conservation Master Plans (CMP) direct and emphasize the need for invasive species control projects. At this time, $75,000 is spent annually from the ESA budget on invasive species management. Additional funding is required to fully address invasive species in ESAs. In addition, the City has an annual woodland management program that is used in part to address invasive species management in our ninety public Woodlands. On average $50,000 is spent on invasive species management in woodlands per year.

However, the City of London, as with all Ontario municipalities, lacks a comprehensive City-wide strategy to address broader invasive species concerns over the short and long-term. It is widely recognized that if invasive species are ignored, not only does this affect the health of

ecosystems in the long-term, but drastically increases costs associated with controlling invasive species, once action must be taken. Delaying action will also not address human health and safety concerns.

The London Invasive Plant Management Strategy (LIPMS) was developed based on the Ontario Invasive Plant Council's (OIPC) document "Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities" and with assistance from Owen Williams (former President of the OIPC). As a leader in this field, the City of London will be one of the first municipalities to bring forward a comprehensive City-wide invasive plant management strategy.

A major component of the strategy is to include multiple City Service Areas including Planning Services, the Stormwater Management Unit, and Parks Operations, in the identification and control of the priority species, making the strategy truly "City-wide". These departments will take active roles in controlling invasive species in existing facilities, conducting inventories to identify priority invasive species and implement Best Management Practices to actively control priority invasive species on City lands. Working with regional partners and the province will enhance the effectiveness and sustainability of invasive species control efforts over the long-term. For example, City of St. Thomas, has recently adopted a "Phrag Free City by 2020" program and the Ministry of Transportation is piloting management practices along the 401.

City staff have involved EEPAC in the review of the LIPMS. The draft was circulated to EEPAC on October 20th, 2016. Comments were received from individual members of the EEPAC working group and have been reviewed and incorporated as part of the final document. Responses to EEPAC's comments are included in Appendix B.

RECOMMENDATIONS FROM THE LIPMS

The LIPMS sets out a detailed vision for controlling multiple invasive species across the entire City. The following recommendations are needed to implement the strategy. Some recommendations require their own specific strategy to fully and effectively address the problem:

1) Develop a *Phragmites* control program according the Strategic Process (Section 5.0) outlined in the LIPMS. This is the City's highest priority species, as it poses the biggest threat to the ecological integrity and long term health of the City's Natural Heritage System, and creates potential health and safety concerns. As such, this program is already being developed in conjunction with other City departments outside of Planning Services to make it a city-wide control program. This program will include reaching out to City of London neighbours and provincial partners with the intent of creating a larger regional approach to controlling this species as quickly as possible.

2) Further expand what the City is already implementing in our ESAs. The UTRCA's ESA team funded by the City has been paramount in the City's invasive plant control activities for many years. Further expanding their capability to implement additional control measures following the Strategic Process (Section 5.0) on a regular basis throughout the ESAs will provide a significant net benefit to the City's ESAs over the long-term.

3) Further expand the City's Woodland Management Program to address invasive species City-wide more quickly.

4) Implement the Council approved Thames Valley Corridor Plan (TVCP), including the Natural Heritage, stewardship, and protection sections of the TVCP Action Plan regarding invasive species.

5) Over the long-term, develop further control programs for listed priority species over time, once recommendations 1-4 have been implemented and their effectiveness has been tracked, monitored, and verified.

6) Develop a process to include in the LIPMS a trigger to identify, map and treat Phragmites on vacant lands and future development lands and to work with the various owners. This process could start as early as pre-consultation, be included as standard recommendations in an EIS, form part of Draft approvals and drawings, development agreements, and draft a standard condition to be used. Further opportunities can include proactively identifying Phragmites on vacant lands and future development lands without an application as a trigger and have permissions in place to control.

FINANCIAL PLAN

As noted, addressing invasive plant species in London is currently not fully funded. The City has led the way with base funding over many years for our ESAs and woodlands, and annual efforts have addressed many site specific issues. The following table outlines the current annual budget allocated to these activities, as well as the annual budget that would be required to fully implement the LIPMS, subject to the availability of funding:

Funding Destination	***Annual Current Budget***	***Annual Proposed Budget***
Thames Valley Corridor	$0	$100,000
City of London ESAs	$75,000	$150,000
City of London Woodlands	$50,000	$150,000
City of London Parks	$25,000	$75,000
Other Vectors	$0	$25,000
Totals	**$150,000**	**$500,000**

Recently, Council endorsed a revision to the Woodland Acquisition and Management Reserve Fund to permit the use of the reserve fund for the expanded management of invasive species that are impacting our natural features and areas. The proposed budget amendment to be considered through the upcoming budget process identifies the Woodland Acquisition and Management Reserve Fund as the source of funding for this enhanced Program, subject to administrative analysis of the Reserve Fund to ensure that available funding can accommodate both these management activities and needed acquisitions.

NEXT STEPS

City staff are currently working on developing a City-wide *Phragmites* Management Strategy with the assistance of *Phragmites* expert Dr. Janice Gilbert and a London *Phragmites* Working Group. This working group includes the representatives from the following groups:

- Environmental and Ecological Planning Advisory Committee (EEPAC)
- Agricultural Advisory Committee (AAC)
- Lower Thames Valley Conservation Authority (LTVCA)
- Upper Thames River Conservation Authority (UTRCA)
- Kettle Creek Conservation Authority (KCCA)
- Ministry of Transportation – Ontario (MTO)
- City of London: Stormwater Management Unit, Sewer Operations, Parks Operations, Transportation Planning and Design, Roadside Operations, Environmental Programs, Urban Forestry, and Environment and Parks Planning

The goal is to have a London *Phragmites* Management Strategy document endorsed by the working group in Q1 2018, which will then proceed to PEC and Council.

The Stormwater Management unit will help to conduct invasive species inventories of stormwater management facilities (SWMFs) (specifically for the priority species *Phragmites*) and look to implement invasive species control works on SWMFs adjacent to the Natural Heritage system or when conducting maintenance of

their facilities.

A new dedicated team in Parks Operations is conducting invasive species inventories of natural areas located within the parks and green space system. The next step for this team is to be directly implementing EDRR protocols for priority invasive species. This will greatly improve addressing invasive species invasions within City Parks and adjacent Natural Heritage features by eliminating vectors and promoting native species in naturalized areas.

PREPARED BY:	**SUBMITTED BY:**
J. MACKAY, M.Sc. **ECOLOGIST,** **ENVIRONMENTAL & PARKS PLANNING**	**A. MACPHERSON, OALA** **MANAGER** **ENVIRONMENTAL & PARKS PLANNING**

RECOMMENDED BY:
JOHN M. FLEMING, MCIP, RPP **MANAGING DIRECTOR, PLANNING AND** **CITY PLANNER**

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Appendix A – LONDON INVASIVE PLANT MANAGEMENT STRATEGY

LONDON INVASIVE PLANT MANAGEMENT STRATEGY

London
CANADA

Thames River

CONTENTS

EXECUTIVE SUMMARY

The London Plan policies support and direct the City to protect, restore and enhance the Natural Heritage System. Council's Strategic Plan for the City of London (2015-2019) identifies areas of focus for the city's long-term vision which includes the protection and enhancement of the Natural Heritage System and specifically the control of invasive species. In addition, the newly adopted London Plan (2016) builds on the City's environmental policies and the importance of the Natural Heritage System, its biodiversity, ecosystem health, and how it is an essential component of the City's landscape and character.

The City of London is an identified leader among other municipalities and other levels of government in demonstrating a proactive approach to the management of invasive species in our Parks, Woodlands and Environmentally Significant Areas (ESA) since 2006. Within our ESAs, Council approved Conservation Master Plans (CMP) direct and emphasize the need for invasive species control projects. In addition, the City has a woodland management fund that is used in part to address invasive species management in Woodlands.

However, the City of London, as with all Ontario municipalities, lacks a comprehensive city-wide strategy to address invasive species concerns over the short and long-term. It is widely recognized that if invasive species are ignored, not only does this affect the health of ecosystems in the long-term, but drastically increases costs associated with controlling invasive species once they can be no longer ignored and action must be taken. This lack of a strategy and clear focus limits our ability to control priority invasive species throughout the Natural Heritage System and substantially increase control and restoration costs.

With the help of the Ontario Invasive Plant Council's (OIPC) strategic framework for developing a city-wide invasive species management strategy, London will continue to be a leader in Ontario in addressing invasive species control over the long-term. This will be accomplished through applying the strategic process identified in this London Invasive Plant Management Strategy (LIPMS) in addition to specific management programs for priority invasive plant species, including *Phragmites australis* (Common Reed), Japanese Knotweed, Dog Strangling Vine, Common and Glossy Buckthorn, and Giant Hogweed.

A major component of the LIPMS is to include multiple City departments in the identification and control of the priority species, making the LIPMS truly "city-wide". The City of London currently manages Phragmites in ESAs and is developing a Phragmites control program for London, in consultation with Dr. Janice Gilbert, Wetland Ecologist and the City of St. Thomas, which has recently adopted a "Phrag Free City by 2020" program (see Appendix B). Working with regional partners and the province will enhance the effectiveness and sustainability of invasive species control efforts over the long-term. The LIPMS is intended to be a working document and the recommendations identified in this report will form the basis for the implementation of the LIPMS.

#1

Develop a Phragmites control program according the strategic process outlined in the LIPMS.

#2

Extend the UTRCA's ESA team capability to implement control measures.

#6

Identify, map and control Phragmites on vacant lands and future development lands

#3

Expand the City's Woodland Management Program

#5

Develop further control programs for listed prioirty species

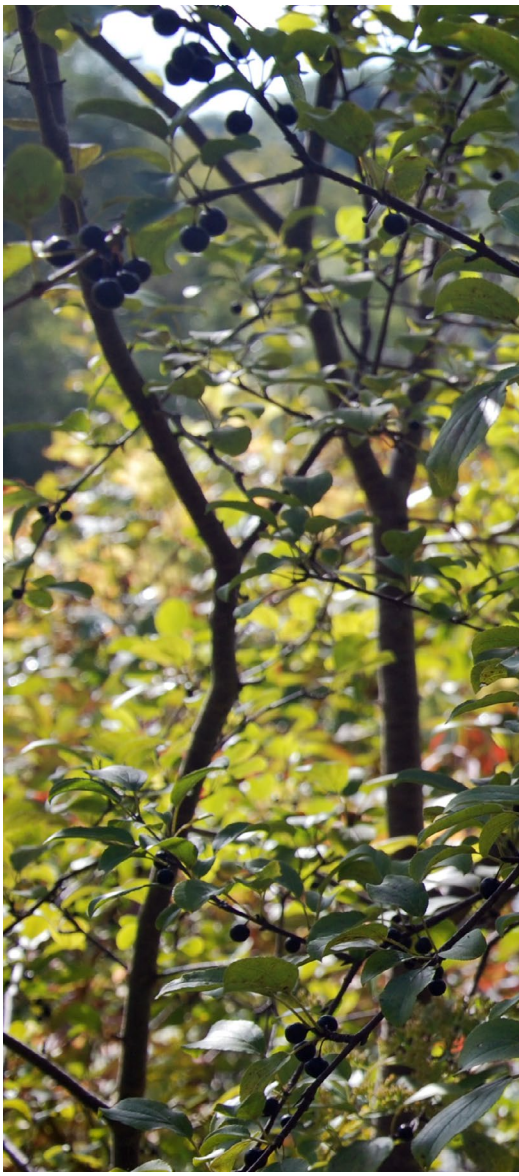
#4

Implement Thames Valley Corridor Plan

1.0 INTRODUCTION

Defined as any plant species that has been introduced and exerts substantial negative impact on native biota, wildlife habitats, economic values, or human health (Lodge et al. 2006), invasive plants are an increased threat to London ecosystems, economy, and social and recreational environments. As many invasive plant species lack natural enemies, they can out-compete colonies of important native vegetation, negatively altering existing ecosystem function and recreational enjoyment.

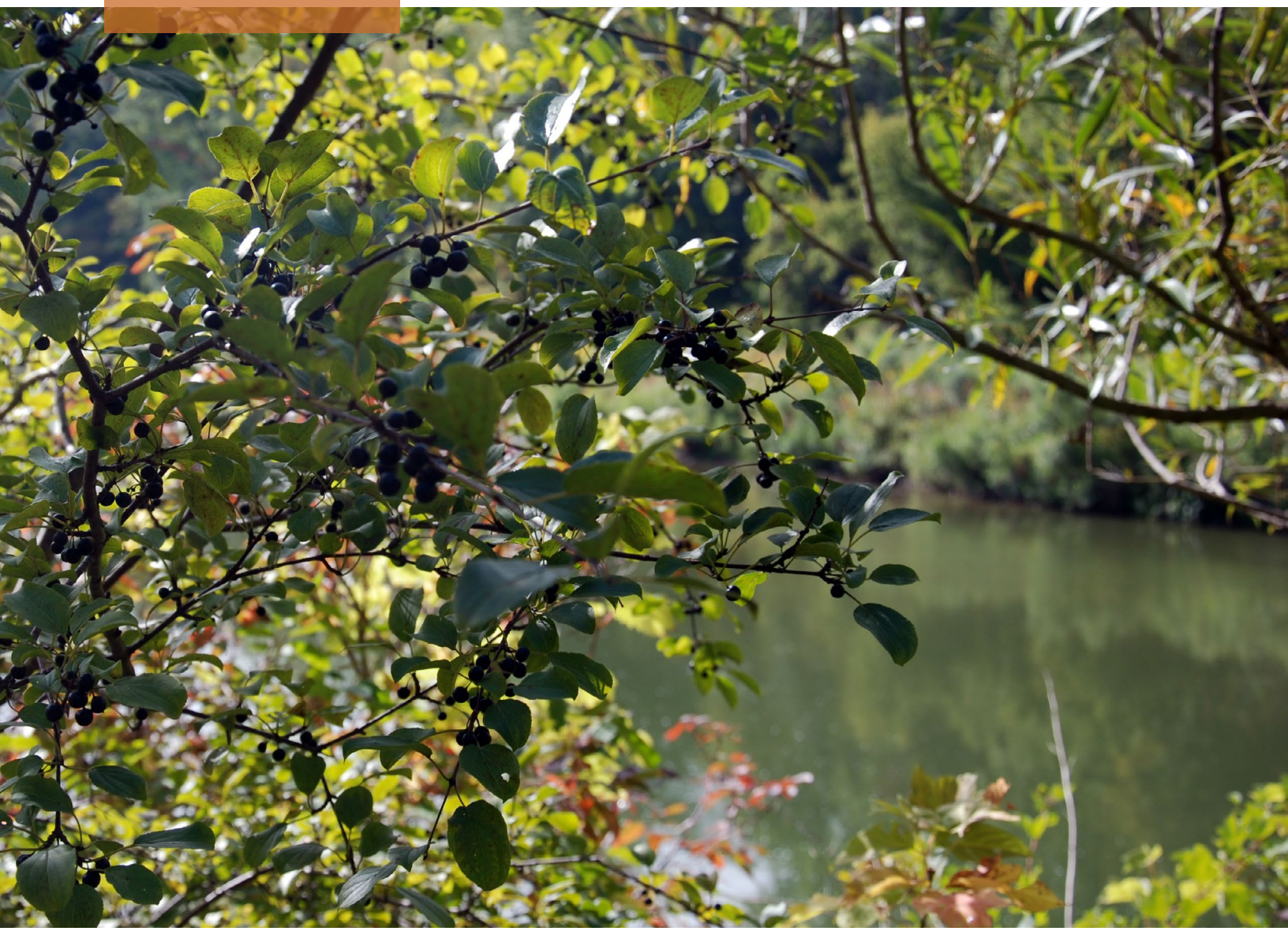
Invasive species are the second most significant cause of species extinctions worldwide, after habitat loss (IUCN, 2014). The ecological effects of invasive species can be irreversible and, once established, they are difficult and costly to control.



A survey conducted in 2012 by the OIPC with the Invasive Species Centre (ISC), the Ontario Ministry of Natural Resources and Forestry (MNRF) and the Ontario Federation of Anglers and Hunters (OFAH) identified that many municipalities face significant challenges with regards to invasive plant management. Policy 1417 of the London Plan states that "The City will encourage rehabilitation and enhancement measures that protect the ecological function and integrity of the Natural Heritage System." The City of London will continue to lead and set an example for other municipalities in Ontario to create a comprehensive invasive plant management strategy that follows the principals identified in "Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities" by the OIPC (March 2015). Establishing a city-wide strategic plan with specific attention drawn to ESAs, wetlands, significant woodlands, and the Thames Valley Corridor, recognized by the City as "its most important natural, cultural, recreational and aesthetic resource (Policy 122, London Plan, December 2016), will be a crucial step towards achieving this goal for the City of London.

Of particular concern to London is the presence and spread of the invasive plant species *Phragmites*. See *Appendix A: Phragmites australis (European Common Reed) – Canada's Worst Invasive Plant* for a more in-depth look at the threat of Phragmites currently present in London's Natural Heritage System. A stronger focus on this species is necessary. London's neighbour, the City of St. Thomas, has recently approved a "Phrag Free City 2020" management plan, which outlines action items to reach the goal to eradicate Phragmites from all public and private lands by the year 2020. See *Appendix B Case Study 1 – City of St. Thomas* for more information.

Common Buckthorn blocking views of the Thames River



2.0 IMPACTS OF INVASIVE PLANTS

2.1 Danger to Human Health and Safety

Some invasive plants such as Giant Hogweed cause human health concerns because their sap is toxic to skin. Certain fast-growing invasives, such as *Phragmites*, can lead to reduced visibility for drivers and pedestrians, increasing the risk of accidents. Dead, dry stalks of these plants are also highly combustible and can become a fire hazard. Many native plant species can pose similar risks to human health and safety, but a key difference with invasive plants is they become widespread and prevalent much faster than native plants. This makes preventing their spread and controlling them and the risks they pose to humans more difficult and important.

2.2 Socio-economic

Invasive plants can have a large economic impact on individual landowners, businesses and municipalities. In Ontario, the MNRF has been involved with *Phragmites* control pilot projects since 2007 and to date control costs range between $865 and $1,112 per hectare (OMNRF, 2012). Invasive species have a negative impact on approximately 20% of Species at Risk in Ontario (OMNRF, 2012), the cost to protect and restore these species will likely increase over time. The Trinational Commission for Environmental Cooperation reported that economic losses and the costs of environmental impacts caused by invasive species exceed $100 billion annually in the U.S. alone (OMNRF, 2012).

$865 - $1,112
PHRAGMITES CONTROL COST PER HECTARE

Phragmites along Highbury Avenue

2.3 Degradation of the Natural Heritage System

Natural areas such as forests, prairies, wetlands and aquatic habitat provide many services and benefits to the economy, society, and the environment. Natural areas provide shelter and food for wildlife, remove pollutants from air and water, produce oxygen through photosynthesis and provide valuable recreational and educational opportunities. They are the green infrastructure that helps buffer the impact of climate change and severe weather, which in turn reduces the impact on the municipal budget. Invasive plants can have a large negative impact on natural areas and threaten these important services that they provide.

Invasive plants reduce species diversity and species richness by competing heavily for resources such as light, moisture and soil nutrients that native plants require to establish and grow. These changes in species composition affect wildlife that are adapted to native plant communities. Invasive species can change the entire composition of vegetation over time changing the overall nature and function of the community. Invasive plants can reduce forest regeneration through direct competition with native tree seedlings, resulting in reduced density and slowed growth rate. In turn, reduction in forest regeneration results in the loss of wildlife habitat, and decreases the diversity of a stand, making it more vulnerable to insects and disease as well as to the incursion of other invasive species. Ultimately, invasive plants affect the intricate linkages that make ecosystems strong and resilient.

Protecting the City's Natural Heritage features from the threats of invasive plant species is imperative to maintaining the overall ecological integrity and ecosystem health of the Natural Heritage System.

3.0 THE NEED FOR A STRATEGIC PLAN

The City of London is located within the Carolinian Life Zone, which although only totals <1% of Canada's land mass, is home to over 2,200 species of herbaceous plants. This species diverse life zone is also Ontario's most ecologically threatened region (Carolinian Canada, 2016). Unfortunately, Ontario is home to the largest number of invasive species compared to any other province or territory. This is due to many factors including favourable environmental conditions, the nature of our industrial and urbanized society, population density, large quantity of imports, the geographical location in close proximity to multiple access points to the American border, and the degraded habitat and ecosystems in the ecological regions.

THE CAROLINIAN LIFE ZONE

TOTALS

<1%

OF CANADA'S LAND MASS,

The LIPMS is designed to address the need to identify and prioritize invasive plants posing a direct threat to the City of London's Natural Heritage System. This strategy will provide direction for municipal action currently absent from documentation at the federal and provincial level. Canada's National Strategy, An Invasive Alien Species Strategy for Canada, and the provincial strategy, the Ontario Invasive Species Strategic Plan (2012), are essential tools in developing the framework of a London-specific strategy.

London is in need of additional strategies designed to assist in protecting the health of the Natural Heritage System. The LIPMS will use existing provincially-recognized best management practices for the identification, monitoring, treatment, and eradication of priority invasive plant species within the City of London. This management strategy will "encourage rehabilitation and enhancement measures that protect the ecological function and integrity of the Natural Heritage System," a priority identified in policy 1417 of the London Plan. The maintenance and protection of the Natural Heritage System through the use of the LIPMS will reduce economic costs associated with invasive plant species control in the future, as well as improve social and recreational experiences and opportunities within the City of London.

THIS LIFE ZONE IS THE MOST

ECOLOGICALLY THREATENED

REGION IN ONTARIO

The LIPMS is a working document that sets clear direction for the management of invasive plants within the City of London, specifically the Natural Heritage System; it includes the identification of priorities for management, control, and public and landowner education.

The bottom line from the taxpayer's perspective is that invasive plants require residents to pay multiple times. They pay their share of the City's necessary control actions through their property taxes, they pay to control or respond to invasives on their own property, and they pay their provincial and national share of the increased costs of many amenities such as for electricity, food and clean water.

Having a complete LIPMS in place may allow the City to apply to additional granting agencies or government programs to fund implementation.

Autumn Olive growth

4.0 LIPMS VISION

“To further enhance the City’s commitment to leadership in managing and protecting the Natural Heritage System from the threats, dangers and costs associated with invasive plant species presence.”

As identified in policy 1417 of the London Plan, management of invasive plant species and associated restoration efforts will focus on specific components of the Natural Heritage System including the following:

a) Environmentally Significant Areas - to protect the existing ecosystem features and functions, to increase the amount of interior forest habitat, and to strengthen corridors.

b) Significant Wetlands - to protect the natural features and ecological functions of all provincially significant wetlands and wetlands.

c) Significant Valleylands - to protect existing ecosystem features and functions, maintain water resource functions, and rehabilitate eroded banks and channels.

d) Significant Woodlands and Woodlands - to protect existing ecosystem features and functions, to increase the amount of interior forest habitat, and to retain or restore linkages between isolated natural areas.

e) Upland Corridors - to retain or create linkages between otherwise isolated natural areas.

While not specifically identified in the above list, City of London Parks are included as part of the management and restoration efforts to control invasive species and remove vectors into the Natural Heritage System. The implementation of the LIPMS will build on the successes achieved by current management practices in the City's ESAs and woodlands. These practices have occurred as outlined in various CMPs and the City of London's Urban Forest Strategy, and should expand into the Thames Valley Corridor and associated features.

When controlling invasive species it is important to work with regional partners and neighbours, as dispersal of invasive species can occur from areas beyond a City's control. Co-operation at the local, regional, provincial, and federal levels will provide for the best opportunities to effectively control a species more quickly and reduce the long term economic costs and ecological consequences of priority invasive species. The policy context for the LIPMS can be found in Appendix C.

Phragmites growth along Veterans Memorial Parkway

5.0 STRATEGIC PROCESS

The LIPMS proposes to respond to the City's priority of rehabilitating and enhancing the Natural Heritage System as outlined in policy 1417 of the London Plan by addressing the spread of priority invasive plants in London through a hierarchical approach prioritizing the following processes:

1) Inventory/Mapping of existing priority invasive plants;
2) Early Detection and Rapid Response to new invasions;
3) Management of established invasive plant colonies (using containment, eradication control measures);
4) Restoration of native communities; and
5) Prevention of new invasions.

This strategic process will act as a guide to highlight invasive species management techniques suggested for implementation above and beyond those currently performed by the City of London.

Phragmites growth in Thames Park

5.1 Inventory/Mapping

Goal: Identify and record specific priority invasive plant species within the Natural Heritage System in London, with a focus on the City's ESAs, Wetlands, and the Thames Valley Corridor.

Purpose: To create a benchmark for future management activities and ability to monitor the spread and reduction of priority invasive plants within the focus areas.

An invasive plant inventory provides the foundation for all management decisions and supplies critical information including the following details:

- What invasive plant species are present
- Where the invasive plant species located
- Potential vectors/pathways of introduction
- Presence of rare species and/or rare community types
- What control activities have already been taken
- How effective previous control activities were and status of the infestation

The LIPMS will focus on addressing priority invasive plants on City-owned lands. Identifying priority invasive plants found within Natural Heritage Features on City lands will be the focus for City resources, invasive plant inventories and management.

Where feasible, the City will work with partners and owners of significant features and/or large land parcels to coordinate efforts on private lands.

Early Detection and Distribution Mapping System (EDDMapS) Ontario is a web-based mapping system for documenting invasive species distribution. This existing provincial system is a fast and easy way to map invasive species without requiring any GIS or technical computer experience. Promoting the use of EDDMapS to the public not only helps homeowners become more engaged, but also educates them about invasive species recognition. Using a common reporting tool allows the distribution information to be kept in one central database. Invasive species tracked by EDDMapS can be found at https://www.eddmaps.org/ontario/Species/.

Currently identified invasive plant species of concern in London's Natural Heritage System on the City of London's "watch-list" will include, but are not limited to:

Plant Species	Current Management Activities
Phragmites australis (Common Reed)*	Multiple sites in ESAs, parks, VMP
Japanese Knotweed*	Several sites in ESAs, parks, woodlands
Dog Strangling Vine*	Ongoing management – Kilally Meadows ESA
Common and Glossy Buckthorn*	Multiple sites in ESAs, parks, woodlands
Giant Hogweed*	Eradicated when identified on public property
Garlic Mustard	Site specific control when budget permits
Goutweed	Site specific control (Medway Valley, Coves)
Periwinkle	Site specific control (multiple sites)
Purple Loosestrife	Support Beetle releases as needed
Black Locust	Site specific control when budget permits
Scots Pine	Multiple sites in ESAs
Non-Native Honeysuckle	limited areas when budget permits
Russian Olive/Autumn Olive	limited areas when budget permits
Black Alder	limited areas when budget permits

*denotes priority species

THERE ARE CURRENTLY

14

INVASIVE SPECIES ON THE CITY OF LONDON

WATCH-LIST

5

OF THESE SPECIES ARE DESIGNATED AS

"PRIORITY"

Due to both economic reasons and potential significant impacts to the City's Natural Heritage System, social impacts, or human health and safety concerns, efforts must be focused on "priority species". Effective invasive species control can only come from focused and sustained efforts over the long term. Without this, reintroduction into managed areas is likely and the original time, resources, and funds put into the project could be wasted. The City of London will focus on the following species and designate them as "priority species": While all 'watch-list' species can have negative impacts, these species have been identified as "priority" due to either the ongoing significant impacts to the NHS, potential significant impacts to the NHS, and/or public health and safety.

- *Phragmites*
- Japanese Knotweed
- Dog Strangling Vine
- Common & Glossy Buckthorn
- Giant Hogweed

Developing a watch list to highlight particular species of concern in the London area will increase the likelihood of new invaders being caught quickly. Identifying and recording all vectors (or pathways of introduction) is crucial to managing the introduction of future invasive plant species. Vectors (pathways of introduction) can include the following:

- River, stream and ravine corridors
- Drainage ditches (along roadways)
- Garden escapes/disposal of yard waste in natural areas (and other encroachments)
- Nursery sales
- Contaminated topsoil/mulch
- Contaminated equipment
- Long lasting seedbank on heavily invaded sites

5.2 Early Detection & Rapid Response

Goal: Identify new, priority listed invasive plant species within the Natural Heritage System as early as possible to prevent establishment and future spread.

Purpose: Initiate Best Management Practices when environmental, social, and economic costs are lowest.

Early Detection and Rapid Response (EDRR) is a proactive approach to managing invasive plant species within the Natural Heritage System by reducing the likelihood that new arrivals will establish. Early detection of newly arrived invasive plants, followed by a well-coordinated rapid response, increases the likelihood of control or eradication. EDRR has proven to be the most cost-effective means of controlling the expansion of invasive species in North America.

Autumn Olive

Purple Loosestrife along Thames River

An EDRR plan consists of six key steps:

1) Early detection – Observation, preliminary identification and reporting of invasive plants believed to be new to the area
2) Identification – Species verification
3) Alert Screening – Confirms whether the species is new to the area and present at an extent deemed eradicable; evaluated risk and determines if the species is designated as prohibited provincially or federally
4) Risk Assessment – Measures probability of entry, establishment and spread, and the associated economic, environmental and social impacts. Assign assessed species a risk rating of high, medium, or low – this determined how the EDRR process will proceed
5) Rapid Response – Development and implementation of a response plan, including obtaining land access and treatment permits
6) Monitoring & Reassessment – Evaluation of the success of the response and whether the EDRR objectives were achieved; reassessment of the pan as new monitoring becomes available

Areas within the Natural Heritage System with a priority invasive plant species present that are within or in close proximity to rare native species or rare community types should be addressed with a higher priority. Newly established areas that contain priority invasive plant colonies are also important to identify and control as early as possible to prevent spreading and long-term establishment of the priority invasive species in the area.

5.3 Management

Goal: Use published Best Management Practices (BMPs) for invasive species removal and control.

Purpose: Control invasive species in London's Natural Heritage System.

Appropriate biological, physical/mechanical, and/or chemical strategies can be determined through the consultation of current BMPs for each identified priority invasive plant species. Control decisions should be made based on the knowledge of potential costs, and ecological benefits.

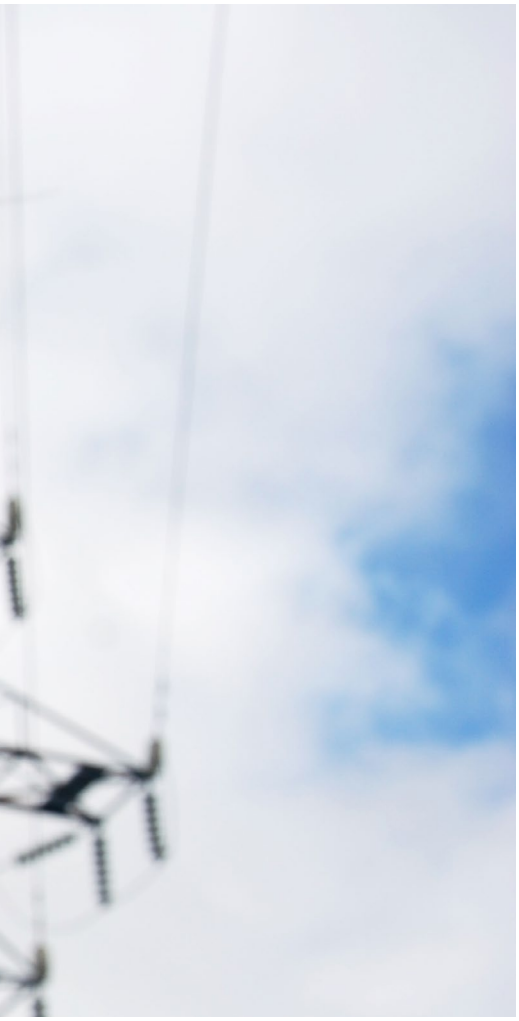
Phragmites along hydro corridor

5.4 Restoration

Goal: Reintroduce native species to management areas following invasive species removal.

Purpose: Restore native vegetation to the Natural Heritage System.

Removing invasive plants can result in the loss of all vegetative cover, creating an ideal condition for new invasive plants to move in. In some areas, native plants will return naturally after treatment. In these cases, there are enough native plants to re-vegetate newly cleared areas through seed germination or plant spread. However, other areas may require restoration through selective planting and/or other methods to reduce the risk of soil erosion and re-invasion by non-native plants. Suggested restoration methods include:



- Natural colonization or succession
- Seeding with native grasses/herbaceous species
- Planting appropriate native trees and shrubs
- Planting live cuttings
- Use of landscape cloth or heavy mulching

Native seeding should also be used in areas where new naturalization plantings occur to reduce the risk of invasive plant establishment on newly disturbed soils. Seed mixes and procedures shall follow the updated City of London's Construction Specification for Seeding and Cover protocol (2015). The use of native, pollinator-friendly seed mixes is required.

Current BMPs for select invasive plant species have been identified and outlined on the OIPC website and associated publically available documents. These BMPs will be the reference for mechanical, chemical, and biological control measures when managing invasive plant species using an integrated pest management approach.

5.5 Prevention

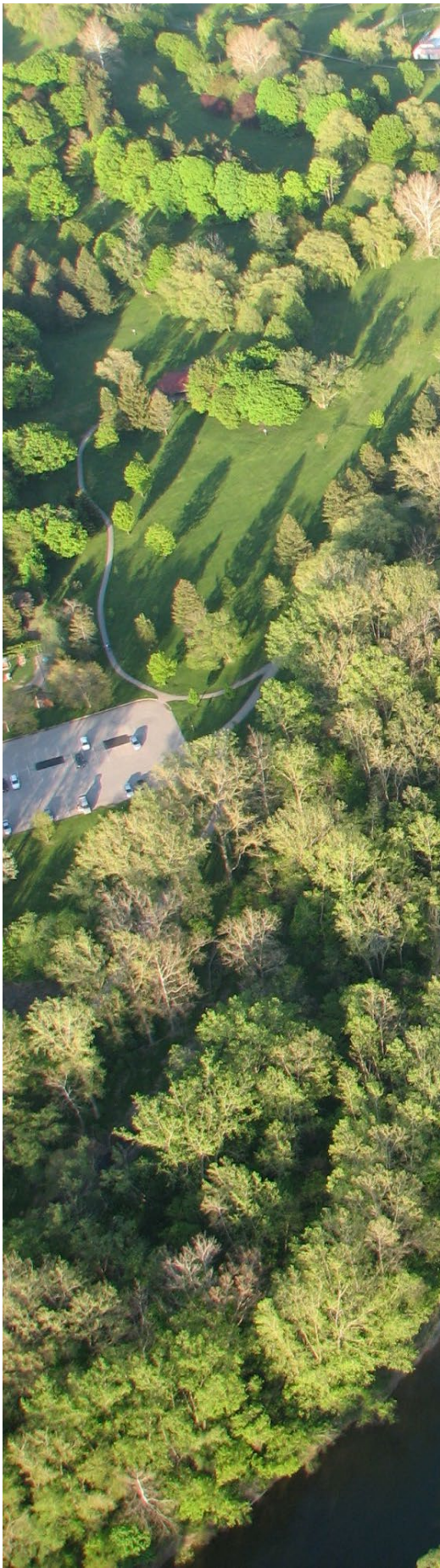
Goal: Reduce the risk of reintroduction and spread of invasive species into the Natural Heritage System.

Purpose: Minimize the rehabilitation costs associated with delayed treatment of established and new invasive species colonies.

Risk analysis and technical measures will be utilized to minimize the risk of unintentional invasive plant species introductions. Prevention strategies will include increasing risk assessment capacity, accessing and conducting scientific research and staying up-to-date on the more current BMPs for identified priority invasive plant species, and the development of public education and engagement programs to promote awareness of invasive plant species management to engage local homeowners and volunteers on municipal properties.

Continued promotion of the Clean Equipment Protocol (available on the OIPC website) is essential to preventing additional spreading of invasive plant species from various sites near the Natural Heritage System. This will also require City projects such as Storm Water Management Facilities and road projects to implement the protocol and will need budgets for controlling invasive species during construction and post construction.

Private landowner education is imperative to the reduction of invasive species presence and dispersal, especially to those homeowners with property within or adjacent to the Natural Heritage System.



Aerial view of the Thames River

Eliminating and/or prohibiting the growth and resale of invasive plant species in nurseries, as well as at non-commercial plants sales and "swaps", is a necessary future step to reducing the establishment of new invasive plant species in London. Educating homeowners about the risk of impacting environmental health with the introduction of invasive species in private gardens, and promoting native species is also important. The City of London's existing "Growing Naturally" program is an example of how the City is currently educating homeowners about ways to conserve water, and plant native species at home.

Other municipalities, conservation authorities, Aboriginal communities, and many private and non-government organizations are also active in the management of invasive plant species. Building an effective communication network with these external stakeholders will be imperative to invasive plant species prevention.

The London Environmental Network (LEN) is currently a not-for-profit organization in London that hosts a variety of workshops and develops resources for local businesses and community partners looking to learn how to make more environmentally friendly decisions. Utilizing local partners like LEN and their existing networks can be beneficial to the City's goal to educate the public about responsible invasive species management practices and reach a larger audience.

6.0 WHAT HAVE WE DONE?

a) Invasive Terrestrial Plant Species Overview – UTRCA, 2012

The Upper Thames River Conservation Authority (UTRCA) completed a survey in 2012 of invasive terrestrial plant species in seven City owned ESAs: Kains Woods, Warbler Woods, Medway Valley Heritage Forest, Kilally Meadows, Sifton Bog, Meadowlily Woods, and Westminster Ponds/Pond Mills.

In this project, priority invasive plant species were identified based on species listed by the MNRF; species posing a significant threat to Ontario's biodiversity; previous knowledge of London's invasive species presence within ESAs; easily identifiable species; and invasive species with available control methods (UTRCA, 2012).

Eleven invasive terrestrial plant species were surveyed for infestation level (compared to native species presence), and density (in relation to total ground cover of the observation area).

b) Environmentally Significant Areas (ESAs)

The City of London has been consistently implementing ecological restoration projects in City owned ESAs since 2006. With a focus on invasive species management, these restoration projects are essential to protecting the ecological integrity of ESAs. The City is an identified leader among other levels of government and other municipalities in demonstrating a proactive approach to the management and control of invasive species in protected natural areas and the policies, actions, and best management practices implemented by the City are serving as an example for the MNRF as they work to determine how to implement the Ontario Invasive Species Act.

Buckthorn Removal

Habitat protection, restoration and stewardship work is a priority in London's publically owned Environmentally Significant Areas (ESAs) in order to protect and enhance their ecological integrity. This restoration work is consistent with the CMP recommendations for ESAs and Provincial Best Management Practices. The Upper Thames River Conservation Authority (UTRCA) ESA team complete most of the restoration work through capital projects and a contract which is funded and directed by the City. Trained volunteers with the City's Adopt an ESA program also participate in restoration projects demonstrating their commitment to local stewardship.

CMPs have been completed for some ESAs within the City of London. These Council-supported documents outline recommendations that highlight the importance of actively managing the natural features and functions of an ESA, including the management of invasive species, recording and monitoring invasive plant species presence, and recognizing that the removal of aggressive invasive species is a priority. The City retained Dillon Consulting and UTRCA to develop and successfully implement an Invasive Species Management Plan for the Medway Valley Heritage Forest (MVHF) ESA to mitigate invasive species impacts to Species at Risk (SAR) and Conservation Concern species. The City, Dillon Consulting, and UTRCA were all recognized by the Federal Government for innovative invasive species management, habitat protection and contributions to the Federal Recovery Strategy for the False Rue-anemone (*Enemion biternatum*) in Canada (2016).

c) Community Engagement

The City's Adopt-A-Park, Adopt-An-ESA and "Friends of" groups have been donating volunteer time over the past decade to assist in the physical removal and awareness of invasive plant species in parks and ESAs. Community "Buckthorn Busting" events were promoted by the City in ESAs and parks in partnership with the City of London Urban Forestry section and UTRCA until 2015. The City of London protects and enhances more habitat every year by providing opportunities for engagement in planting on public and private property, by protecting natural areas, by reducing mowing, and by planting native species. The City holds annual naturalization planting events in partnership with ReForest London and other community groups, the majority of which are business or volunteer oriented, to promote the growth of native vegetation on public lands.

d) Woodland Management

The City has been treating invasive plants in parks and woodlands across London for years. On average, $50,000 per year has been spent in 13 parks and woodlands treating Buckthorn, Garlic Mustard, Periwinkle, Japanese Knotweed, and Norway Maple across 30 hectares of City-owned land. This work is now coordinated by Urban Forestry staff who have retained a Contractor to protect Parks and Woodlands through an increasing number of invasive species projects.

On average, reactive invasive plant species management is costing $2000 per hectare to treat. This includes spot treatments, patch work, and up to three follow-up visits per site.

e) Parks Operations

Currently, about 11% of the City (inside the Urban Growth Boundary) is publically owned parkland and over 60% of that area or about 1,400 hectares is managed as naturalized, no-mow areas and this area increases every year. Parks Operations staff are trained to identify invasive species in the field and assist in coordinating invasive species control projects.

Invasive Plant Species Management in London's ESAs, Parks & Woodlands

	2006 - 2008	2009	2010	2011	2012	2013	2014	2015	2016
Phragmites australis (Common Reed)*							●	●	●
Japanese Knotweed*						●	●	●	●
Dog Strangling Vine*						●	●	●	●
Common and Glossy Buckthorn*	●	●	●	●	●	●	●	●	●
Giant Hogweed*					●	●	●	●	●
Garlic Mustard		●						●	●
Goutweed							●	●	●
Periwinkle								●	●
Purple Loosestrife		●						●	●
Black Locust								●	●
Scots Pine							●	●	●
Non-Native Honeysuckle								●	●
Russian/Autumn Olive							●	●	●

*denotes priority species

7.0 NEXT STEPS

7.1 Incorporate Invasive Plant Management into Land Use Planning

Municipalities are responsible for land use planning, which ensures that natural heritage features and resources are considered in community development. It also helps to plan for the incorporation of goals such as an increase in urban forests, and a reduction in urban sprawl. There are considerations around development and the spread of invasive plants. The incorporation of invasive plant management strategies into development plans will help to address this issue. It is also important to look at the sources of topsoil/fill brought into and exported from development sites and what they could contain.

The OIPC has created the Grow Me Instead Guide which lists a number of alternative plants to many common garden invaders. This guide is geared towards individual landowners and can be incorporated into new housing developments as information to new homeowners.

Goutweed Management in Medway Valley Heritage Forest ESA

7.2 Promote the use of EDDMapS in Ontario

Preventing invasive plants from arriving and becoming established in Ontario is critical in the fight against this growing threat. EDDMapS is a fast and easy way to map invasive species without requiring any GIS or technical computer experience. By promoting the use of EDDMapS to the public, this can help engage them in learning more about invasive plants. Promoting the web-based and smartphone app will improve tracking across the province, resulting in better species distribution maps. If more people are using the program, there is a higher change that detection of new species will occur, which will enable rapid response.

Although it is important to track the distribution of all invasive plants within the province, the focus within this municipal strategy will be on public tracking of species on the pre-determined Watch list. Tracking Watch List species using EDDMapS increases the likelihood of new invaders being caught quickly.

Goutweed Management Area

Dog Strangling Vine at Fanshawe Lake

7.3 Contaminated Materials and Equipment (Clean Equipment Protocol)

Invasive plants and their seeds can be dispersed by many vectors including wind, water, animals, illegal dumping, vehicles, and contaminated material. It is not feasible to control all of these vectors; however, there are strategies that can be adopted to reduce the spread of invasive plants through those pathways.

One of the most common and preventable pathways through which invasive plants spread into natural areas is the illegal dumping of green waste. Natural areas, parking lots, borders shared by residential neighbourhoods sometimes becomes dumping sites that may lead to new invasions. Education and promotion of proper disposal techniques, including green waste that targets both residents and landscape contractors may help reduce this problem.

Control of potentially contaminated materials (e.g. fill, soil, gravel, excavated materials from construction sites, etc.) at the source also helps to prevent the spread of invasive plants. Raising awareness of the problem among target audiences (e.g. construction, demolition and landscape contractors) is a first step towards addressing this issue. Simple measures such as inspecting and cleaning equipment and vehicles after they come in contact with contaminated materials will reduce the likelihood of spread.

7.4 Staff Training and Education

Municipal staff play an important role in invasive plan prevention and management. With adequate training, staff can assist with tracking and mapping invasive plants, as well as communicating with the public.

Most staff training and education can take place through workshops in partnership with local non-profit organizations that are specialized in invasive plants. Workshops can focus on a number of things including invasive plant identification, using EDDMapS Ontario, Invasive Plant Best Management Practices for control, tips on communicating with the public and the Clean Equipment Protocol. Staff should be updated regularly on new information regarding invasive plants and the strategy through emails, meetings or newsletters. Engage staff through encouraging participation in invasive plant volunteer events.

Buckthorn Busting in Euston Park

7.5 Public Education and Outreach

Engaging landowners and the general public is a key component in the prevention, introduction, spread, and management of invasive plants. Comprehensive outreach and education provides residents with information and tools to take appropriate action against invasive plants on their own property; and can include encouragement to support the work of local stewardship groups and non-profit organizations. Effective communication with residents and the public can be done in a number of ways (e.g. websites, social media, mail-outs, workshops, signage, etc.).

Taking advantage of the City of London's existing corporate communication strategies to educate and inform London residents of the threats and harms of invasive plant species will be an extremely valuable tool to managing the city-wide invasive plant species issue. In future, it would be an added benefit for the City of London to develop a communication plan solely focused on invasive plants.

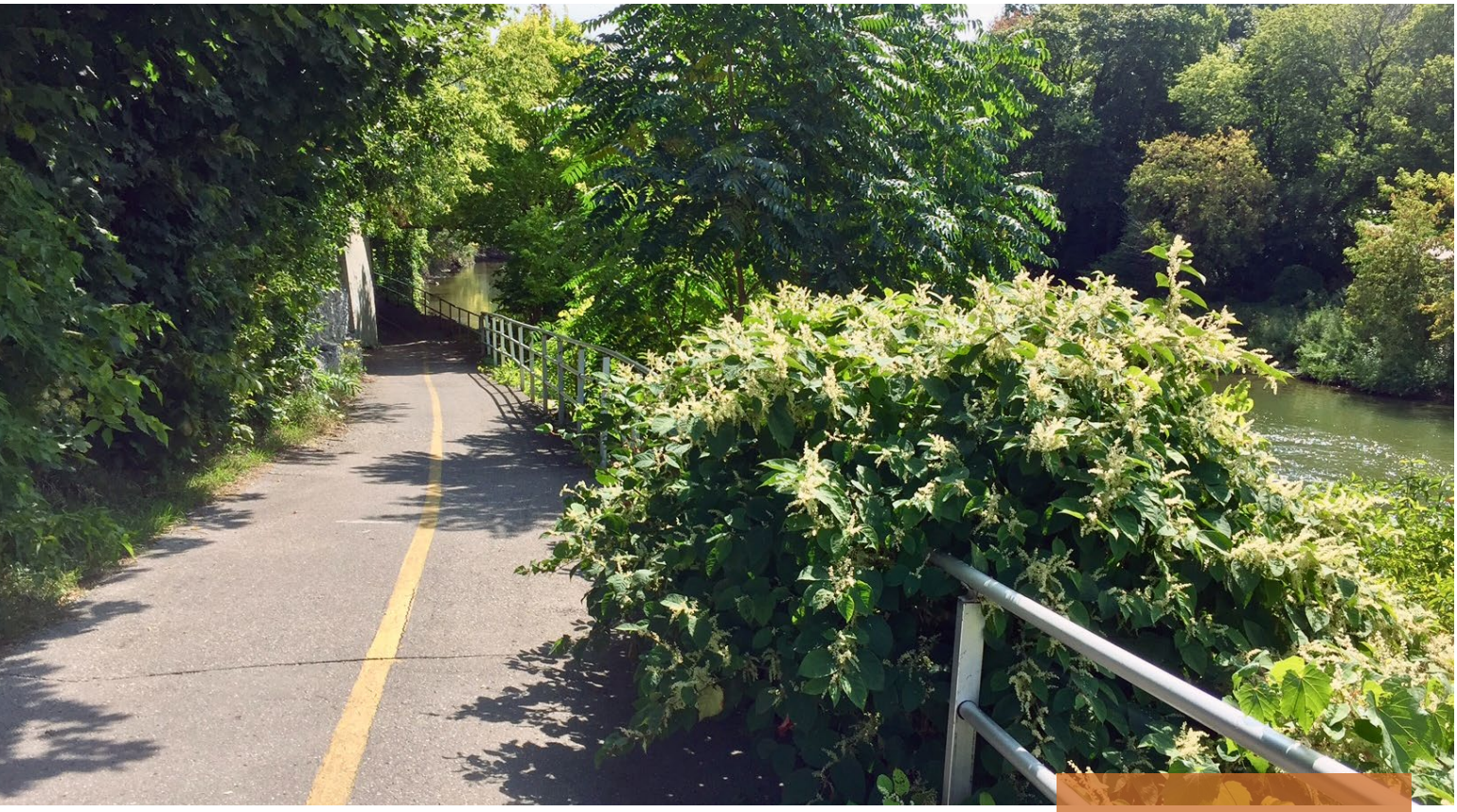
An important component of this public awareness is effectively communicating the "before-and-after" appearance of the landscape in areas undergoing large-scale invasive plant species work. This is a useful method of introducing the concept of replanting native vegetation to the site to prevent colonization of invasive plants in recently disturbed environments.

Using the City's EnviroWorks pamphlets that are currently distributed throughout the year to London residents, updating the City website, utilizing existing social media platforms, and hosting landowner workshops in partnership with local non-profits (like the London Environmental Network) and community groups are all examples of how the City can improve the promotion of invasive species management at a private landowner level.

7.6 Stormwater Management Unit

As part of the LIPMS, it is critical to involve other departments in order to address invasive species from multiple angles and utilize various resources. The Stormwater Management unit will help to conduct invasive species inventories of SWMFs (specifically for the priority species *Phragmites*) and look to implement invasive species control works on SWMFs adjacent to the Natural Heritage system or when conducting maintenance of their facilities.

Dog Strangling Vine



Japanese Knotweed along the Thames Valley Parkway

7.7 Parks Operations

The Parks Operations unit will play a central role in the LIPMS. A new dedicated team is conducting invasive species inventories of natural areas located within the parks and green space system. The next step for this team is to be directly implementing EDRR protocols for priority invasive species. This will greatly improve addressing invasive species invasions within City Parks and adjacent Natural Heritage features by eliminating vectors and promoting native species in naturalized areas.

Parks Operations in conjunction with Environmental and Parks Planning is developing a London *Phragmites* Management Strategy that includes control along roadways and drainage ditches (these areas are maintained by Parks Operations), which is the primary vector for this priority invasive species. It would be beneficial for Parks Operations to have licenced pesticide applicators as part of their team. This would increase the efficiency of this team, the implementation of the EDRR protocols, and allow for increased invasive species control options to effectively implement the LIPMS.

Phragmites growing near a new development site

7.8 Development Services

As part of the LIPMS, developing a process to identify, map, and treat *Phragmites* on future development lands, both City and privately owned, will allow for greater opportunities to control priority invasive species within the City. This process could start as early as pre-consultation, be included as standard recommendations in an EIS to require treatment of *Phragmites* on sites, form part of Draft approvals and drawings, development agreements, and draft a standard condition for Development Services to add to their 'pick list' of standard conditions.

8.0 RECOMMENDATIONS

The LIPMS sets out a detailed vision for controlling multiple invasive species across the entire City. The following recommendations are needed to implement the strategy. Each recommendation will require specific funding to fully and effectively implement. Staff will, upon acceptance of this report, prepare detailed funding and implementation timelines for Council approval.

1) Develop a *Phragmites* control program according the Strategic Process (Section 5.0) outlined in the LIPMS. This is the City's highest priority species, as it poses the biggest threat to the ecological integrity and long term health of the City's Natural Heritage System, and creates potential health and safety concerns. As such, this program is already being developed in conjunction with other City departments outside of Planning Services to make it a city-wide control program. This program will include reaching out to City of London neighbours and provincial partners with the intent of creating a larger regional approach to controlling this species as quickly as possible.

2) Further expand what the City is already implementing in our ESAs. The UTRCA's ESA team funded by the City has been paramount in the City's invasive plant control activities for many years. Further expanding their capability to implement additional control measures following the Strategic Process (Section 5.0) on a regular basis throughout the ESAs will provide a significant net benefit to the City's ESAs over the long-term.

3) Further expand the City's Woodland Management Program to address invasive species City-wide.

4) Implement the Council approved Thames Valley Corridor Plan (TVCP), including the Natural Heritage, stewardship, and protection sections of the TVCP Action Plan regarding invasive species.

5) Over the long-term, develop further control programs for listed priority species over time, once recommendations 1-4 have been implemented and their effectiveness has been tracked, monitored, and verified.

6) Develop a process to include in the LIPMS a trigger to identify, map and control Phragmites on vacant lands and future development lands and to work with the various owners. This process could start as early as pre-consultation, be included as standard recommendations in an EIS, form part of Draft approvals and drawings, development agreements, and draft a standard condition to be used. Further opportunities can include proactively identifying Phragmites on vacant lands and future development lands without an application as a trigger and have permissions in place to control.

APPENDIX A

Phragmites australis (European Common Reed) – Canada's Worst Invasive Plant

Phragmites is an aggressively spreading grass that can reach heights of more than 5 metres (16.4 feet) and densities of over 200 plants per square metre. In 2005 it was recognized as Canada's worst invasive plant by scientists at Agriculture and Agri-food Canada. Since then it has spread throughout Ontario and become a significant threat to London's wetlands and riparian corridors where it has the potential to drastically reduce plant and animal diversity and threaten a high number of Species at Risk (SAR).

The known negative impacts of *Phragmites* include:

- Blocking recreational access and aesthetic enjoyment of riparian corridors and wetlands
- Standing dead biomass is a significant fire hazard to hydro corridors & residential areas
- Blocks sight lines along roads and at intersections
- Damage to asphalt roads from *Phragmites* rhizomes
- Plugging agricultural drainage ditches and tiles, impacting crop yields
- Native plant species cannot effectively compete against *Phragmites*
- *Phragmites* stands are monocultures that effectively become wildlife dead-zones
- Reduces or eliminates habitat for high number of Species at Risk

Recent studies have identified roads, rail lines and the movement of infested heavy equipment as the main vectors for the spread of *Phragmites*. Currently Ontario lacks the coordinated approach required to effectively deal with *Phragmites* and curtail its spread.

Local control programs are underway in many of Ontario's municipalities including London where *Phragmites* is managed in a number of our Environmentally Significant Areas and Parks. While this is an important first step, a *Phragmites* Management Plan should be developed for London while it is still feasible to protect our City and our Natural Heritage System from Canada's worst invasive plant. In 2015 the City of St. Thomas began implementing their *Phragmites* Management Plan to become a "Phragmites Free City by 2020" through an annual budget of $13,000.

The knowledge obtained through these control efforts is summarized in Best Management Practices (BMPs) endorsed by the MNRF and OIPC to provide guidance for the most effective and efficient way to manage *Phragmites*. City of London staff has experience in implementing BMPs and recently contributed to the development of a BMP for Controlling Invasive *Phragmites* in Ontario's Roadside Ditches.

The most important message is that *Phragmites* must not be ignored. Established *Phragmites* cells can expand at an exponential rate and will eventually become problematic. The quicker an infestation is dealt with, the easier and less costly it will be to manage.

APPENDIX B

Case Study – City of St. Thomas "Phrag Free City 2020"

What is the geographic scope of your project?

- All lands located within the incorporated City of St. Thomas, Ontario

What type of project is this?

- Direct management
- Education and Outreach
- Planning

Why is *Phragmites* an issue in your area?

- *Phragmites* growing around lakes, along streams and rivers, along the road, hydro corridors, and at intersections is posing a public safety risk and is also impacting recreation opportunities and ecosystem-health.

What is your organization's approach to invasive *Phragmites* management?

- Mapped *Phragmites* (Fall 2014 and updated Fall 2015 update annually)
- Year 1 – *Phragmites* Management Plan created
- Budget provided by Council
- 5 year Letter of Opinion - MNRF (Pesticide Act & Ontario Regulation 63/09) & Council
- Eradication program implemented
- Eradication along shoreline of lake, meadow and two storm water management ponds
- Severe fire hazard areas eradicated as priority one
- Selected road corridors, ditches sprayed
- Years 2 to 5 - Visual check and re-spray as necessary
- Eradicate identified *Phragmites* cells in the City to limit of budget annually to 2020

Who are your partners in this effort?

- City of St. Thomas and Doug Tarry Homes – year 1
- City of St. Thomas – subsequent years
- Parks and Rec., Roads, Fire and Police Services

What are the funding sources?

- City of St. Thomas and Doug Tarry Homes shared equally – year 1
- City of St. Thomas – subsequent years (13k per year - 5 years)

What are your goals and objectives for the program?

- Phrag Free City by 2020

What type of land does your program target?

- All public and private lands within the city including those held by Conservation Authority

What is the status of the program and are you seeing results?

- Year 1 tremendous success around lakeshore even with no spraying over water
- Year 2 was equally successful in hydro and road corridors based on visual evidence
- Respray of Year 1 area indicates full eradication in those locations

Can you share important lessons learned - both about what worked and what did not work?

- Lobbying Federal Health Ministry to approve a safe over water pesticide for *Phragmites*
- Absolutely imperative to partner with the City Council
- At this time the Phrag Free City plan shows no down side

APPENDIX C

Policy

Council's Strategic Plan (2015-2019)

Strategic Plan for the City of London 2015-2019

The Invasive Species Strategy is consistent with the Strategic Plan, the four areas of focus and directly aligns with many of the implementation strategies.

Strengthening Our Community

- Amazing arts, culture, and recreation experiences
- Healthy, safe, and accessible city
- Help Londoners understand how we provide safe drinking water and protect the Thames River

Building a Sustainable City

- Strong and healthy environment
- Plant more trees and better protect them from deforestation, invasive species, and other threats
- Work together to protect all aspects of our natural environment including woodlands, wetlands, river and watercourses, and air quality as our city grows
- Fund innovative ways to adapt to Climate Change
- Invest in making London's riverfront beautiful and accessible for all Londoners
- Protect and promote London's Thames Heritage River status

Growing our Economy

- Strategic, collaborative partnerships
- Partner with the London Community Foundation on the "Back to the River Project"
- Diverse employment opportunities

Leading in Public Service

- Proactive financial management
- Make sure that financial issues are not created and pushed to the future, creating problems for future generations
- Use innovative and best practices in all organizational and management activities

The London Plan (2016)

The environmental policies of the London Plan, approved by council in 2016, build on the current Official Plan policies. The London Plan has a strong focus on protecting and improving the City's Natural Heritage System. Specifically, the goals of the City with respect to Natural Heritage focus on the following:

1308_ We will plan for our city to ensure that London's Natural Heritage System is protected, conserved, enhanced, and managed for present and for future generations by taking the following actions:

1) 1. Achieve healthy terrestrial and aquatic ecosystems in the city's subwatersheds.

2) Provide for the identification, protection, rehabilitation, and management of natural heritage features and areas and their ecological functions.

3) Protect, maintain, and improve surface and groundwater quality and quantity by protecting wetlands, groundwater recharge areas and headwater streams.

4) Enhance, protect and conserve the Natural Heritage System through well planned built form and community design.

5) Maintain, restore, monitor and improve the diversity and connectivity of natural heritage features and areas and the long-term ecological function and biodiversity of Natural Heritage Systems.

6) Encourage, through education and incentive programs, the cooperation of property owners in the maintenance of, or enhancement to, the naturalization of lands and the sustainable use of our Natural Heritage System.

7) Monitor the potential impacts of climate change to maintain the integrity and resiliency of the Natural Heritage System and adjust management activities accordingly.

8) Provide opportunities for appropriate recreational activities based on the ecological sensitivities of the area.

Furthermore, the London Plan speaks to management, restoration and rehabilitation priorities for the City of London:

1417_ The City will encourage rehabilitation and enhancement measures that protect the ecological function and integrity of the Natural Heritage System. The City of London Subwatershed Plans provide guidance for the types of measures that may be identified through secondary plans, environmental impact studies, the Environmental Assessment process or other environmental studies or programs. Rehabilitation and enhancement measures may be implemented through conservation master plans, woodland management plans, or invasive species management plans on publicly-owned land and through stewardship and conservation programs for privately-owned lands.

On December 28, 2016 the Province approved The London Plan with modifications.

Ontario Invasive Species Strategic Plan, 2012

The Ontario Invasive Species Strategic Plan was designed to outline objectives emphasizing the need to prevent new invasives from arriving and establishing in Ontario, to slow or reverse existing colonies, and reduce the negative impacts of established species.

There is no single piece of federal legislation that comprehensively deals with the control, prevention, and management of invasive species. Ontario is the only jurisdiction in Canada with such focused legislation. The strategic plan addresses the need for an Ontario perspective on invasive species management, and highlights the need for improved communication and coordination between federal, provincial, and municipal levels of government, and the integration of industry and non-government organizations

Ontario Invasive Species Act, 2015

The Ontario Invasive Species Act came into force November 3, 2016. This Act is designed to provide enabling legislative framework to better prevent, detect, respond to and where feasible eradicate invasive species; promote shared accountability for managing invasive species; use risk-based approach that considers the full range of threats, costs and benefits to the environment, society and the economy; and complement the role of the federal government in managing invasive species.

In the future, the Act may introduce regulated areas in Ontario as control areas for invasive species, and will work towards establishing measures to prevent introduction and/or control the spread of existing invasive species. Inspectors may make an order declaring land to be an "Invaded Place" if there is evidence that a regulated invasive species is present and the order is required to:

- Prevent the invasive species from spreading to areas outside of the place, or
- To control, remove, or eradicate the invasive species that is on or in the place

The Ontario Invasive Species Act supports the creation of additional plans, as these will enable enhanced partnerships and actions to support the prevention and control of invasive species across the province. The Act also provides tools for preventing the sale and distribution of invasives. The capability of the Act will be limited to dealing with the species that get listed in the regulations as being either "prohibited" or "restricted". See the Government of Ontario website for the list and additional information: https://www.ontario.ca/page/stop-spread-invasive-species.

Thames Valley Corridor Plan, 2011

The Thames Valley Corridor Plan addresses key land planning and management issues along the Corridor. The TVCP establishes an overall concept plan for the Thames River and associated corridor lands, and relates to the preservation and protection of the Natural Heritage System in the following manner:

- "The City recognizes the Thames Valley Corridor as its most important natural, cultural, recreational and aesthetic resource."
- 3.1 Natural Heritage, Stewardship, and Protection
    - NH-3: Internally, identify potential private land acquisition areas that may facilitate the restoration and/or expansion of forest cover and contiguous natural vegetation along the length of the Thames Valley Corridor. Priority areas for acquisition are those with a high diversity of Carolinian plant species or SAR as identified on the City's Ecological Land Classification (ELC) database, or that support interior forest habitats, or provide natural connections to the larger system.
    - TR-1: Protect and manage areas with unique or rare plant and animal species.
    - TR-2: Develop and implement a comprehensive restoration and management program focused

on existing and new vegetation patches with objectives to protect, maintain and enhance natural areas and habitats.

- TR-3: Target management efforts on vegetation patches with evidence of invasive species presence. Management initiatives should include invasive species removal, litter clean-up, and management of random trail use. The target habitats for invasive species management are those natural areas in good condition that currently have low abundance of invasive/non-native species. Containment of non-native species is more effective and less costly if control can begin at the first detection of invasion. The sites with heavy abundance are lowest priority unless they are associated with rare species or unusual communities or wildlife habitat that is compromised by their presence.
- Table 1: Action Plan
  - » E-4: Produce an informational brochure such as the 'Living With Natural Areas" pamphlet for residents living near the Thames River and its tributary creeks, concerning impacts of household products on water quality, illegal dumping, managing yard waste, use of native species in landscaping, responsible use of natural areas.

Conservation Master Plans for Environmentally Significant Areas (ESA)

Conservation Master Plans (CMP) are completed to emphasize the protection and enhancement of the ecological integrity and ecosystem health of the Environmentally Significant Areas in the City of London. Invasive species management and control is addressed in detail for some of the City's owned and managed ESAs. Recommendations, timelines and potential costs may also be identified in CMPs.

City of London Urban Forest Strategy-Enhancing the Forest City, 2014

The Urban Forest Strategy is a plan designed to outline the steps the City of London must take to protect, enhance, and monitor the urban forest system. The mission of the Strategy is to "Plant More, Protect More and Maintain better". The integration of invasive species management into the management of the urban forest system is a critical step in improving the health of the City's natural environment. Invasive species management supports the following Strategy goals and actions:

Plant More

Strategic Goal 3 - Establish a diverse tree population city-wide as well as at the neighbourhood level.

- 3.3: Manage woodlands to improve opportunities for species diversity

Protect More

Strategic Goal 4 - Preserve and enhance local natural biodiversity.

- 4.2: Manage natural areas to enhance biodiversity (i.e., enrichment plant¬ing, retention of wildlife trees and coarse woody debris, uneven distribu¬tion of plantings, proactive management of invasive species to enhance native species, etc.)

Strategic Goal 6 - Improve urban forest health.

- 6.4: Develop and implement an integrated pest management plan encom¬passing insects, disease, and invasive species. The plan should address prevention, control and restoration within City-owned natural areas, and identify budgets and measurable targets for implementation. The plan should address pests on private property and provide the authority and empower the City to control pests on private property as required to en¬sure the overall health of the urban forest.

Maintain Better

Best management practices for reducing the risk of invasive species establishment in newly naturalized areas are highlighted in Strategic Goal 9:

- 9.4: Reduce the area of turf grass in the City through tree planting, with more selective mowing, to reduce costs. Areas with modified mowing require monitoring and management for invasive plants.

Ecologist Planner: J. MACKAY

Appendix B – RESPONSES TO EEPAC'S COMMENTS

Memo

To: EEPAC

From: Environmental & Parks Planning (E&PP)

Date: July 17, 2017 (Updated September 13, 2017)

RE: City Responses to EEPAC's Comments on the Draft London Invasive Plant Management Strategy – November 2016

E&PP thank EEPAC for their review of the Draft London Invasive Plant Management Strategy (LIPMS) for the City of London.

EEPAC Comments on LIPMS received November 11, 2016 (Circulated October 21, 2016 to EEPAC)

- The document is very detailed about the policies and legislation supporting the control of invasive plant species, and I understand the need to provide a policy context for the development and implementation of an invasive plant management strategy. However, the document spends too much time directly quoting the supporting sections out of these various policies and legislation. Many of the statements supporting the control of invasive species are very similar among the policies and legislation, which makes the "Policy Context" section difficult to read. Perhaps this section can be made more concise by summarizing the main ways in which the existing policy and legislation support the invasive plant management strategy.
    - *Staff Response: Agreed, policy section has been removed and added as an appendix to the LIPMS*

- Incorporate the various departments of the City directly into the "Strategic Process" section of the management strategy instead of talking about the Storm Water Management and Parks Operations departments as separate sections at the end of the document. This will better establish the need to incorporate all relevant departments of the City into the invasive plant management strategy.
    - *Staff Response: The strategic process section is based on the OIPC document "Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities.*

- Why were the four priority invasive plant species selected? It would be helpful to specifically explain why Phragmities, Japanese Knotweed, Dog Strangling Vine, and Giant Hogweed were selected as priority species.
    - *Staff Response: Further clarification has been provided in the LIPMS.*

- In the "Socio-Economic" subsection of "Impacts of Invasive Species" the primary example provided for the economic impacts of invasive species was Emerald Ash Borer. Though I agree this is an important invader, the example is poorly chosen given the section is about the impacts of invasive plants. Perhaps a specific example of the economic impacts of plants would be more effective and illustrative.

- *Staff Response: Agreed, example has been removed.*

- The document could be improved by making a section emphasizing the effectiveness of invasive plant species control programs. The document speaks broadly about how the control of invasive species is important for the health of the natural heritage features and will reduce future control costs. However, do invasive plant species control programs work and on what scale? Are there existing examples of programs that are effectively controlling invasive plant species? St. Thomas was used as a case study, but there is not sufficient evidence provided about this example to support whether invasive plant management is truly effective. Providing evidence to support the viability of invasive plant species control programs will help bolster support from council and the community because there are doubts about whether we can manage such a persistent and widespread threat.
    - *Staff Response: LIPMS sections already address the concerns raised.*

- More detail about the implementation of the strategic process for invasive plant species management would strengthen the document. Currently, the strategic process section is very high level and provides few specific details about the implementation of the strategy. Also, more information regarding “who” will be involved in the various steps of the strategic process will be helpful. For example, who is going to do the inventory/mapping or deal with early detection? Who will be involved with the rapid response to an early detection of an invasive plant? Providing more detail on implementation will make the strategy seem more feasible and realistic.
    - *Staff Response: This document is intended to be a high level document and that section outlines a hierarchical approach that can be applied to all priority species in various situations and locations. The ‘who’ will also vary depending on the location and species. The departments involved include but are not limited to the SWM unit, Parks Operations, Urban Forestry, City Weed Inspector, Environmental and Parks Planning, the UTRCA (City funded ESA team), and members of the public (observation reports).*

- I agree that there is more philosophy than concrete action outlined in the document, and it doesn't offer too many clear directives.
    - *Staff Response: The LIPMS is based on the OIPC document “Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities. Also, please see the Recommendations – Section 8.0.*

- What is the prioritization order for invasive species and sites (e.g. protect SAR first, then riparian corridors)?
    - *Staff Response: Please see Section 4.0 and Sections 5.1 and 5.2.*

- What is the seasonal time course for invasive control (i.e. need to hit invasives before they flower, if applicable)? A generic annual timeline for invasive control would be good to have, and make sure that no funds or time allocated to invasive control goes to waste. Something like this needs to be in this document - it might be something that the city ecologists know, but it is unlikely that anyone else in the civic administration is aware of it.
    - *Staff Response: Please see Section 5.0.*

- I am concerned with whether sufficient funds will be allocated to properly deal with invasives under this strategy. Given how aggressive the approach needs to be, it is something with which Council needs to be on board.
    - *Staff Response: Agreed, sufficient funding is a requirement to successfully implement the LIPMS.*

- Complete and absolute prohibition on the sale and trade of invasives needs to be enacted immediately and enforced with extreme prejudice if any invasive management strategy is to work.
    - *Staff Response: See the Ontario Invasive Species Act (in force 2016), which is identified in Appendix C.*

Staff Comment: Additional uncollated comments were received by E&PP staff from the EEPAC working Group. While these comments were reviewed and addressed through revisions to the LIPMS, individual responses cannot be provided as the comments came in the form of hand written notes and other formats.