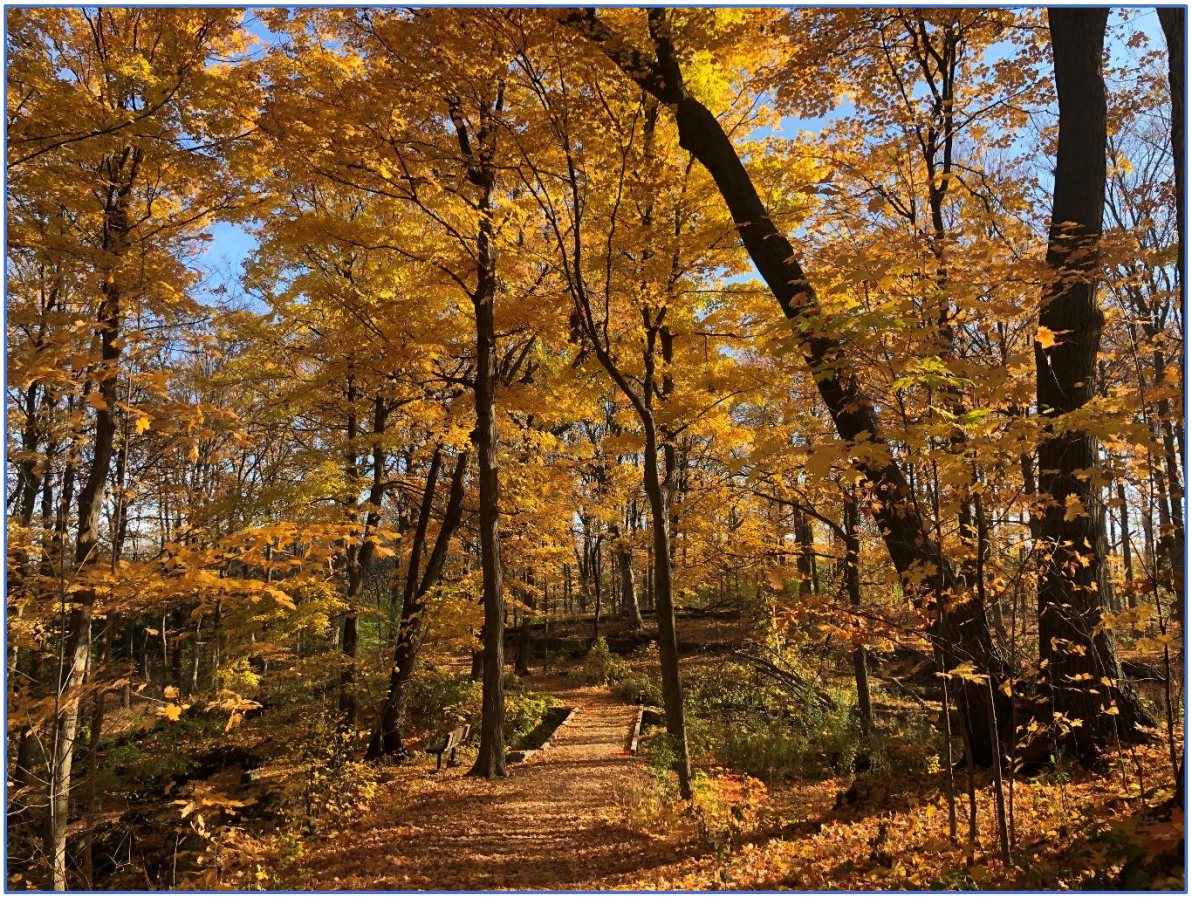
Eramosa Karst Invasive Species Prioritization Plan



Contents

Executive Summary

This prioritization plan outlines actionable tasks for the management of invasive species within Eramosa Karst Conservation Area (EKCA, “the Karst”), and contains background information on a variety of topics relating to the creation of those action items. While the background information is valuable for thoroughly understanding effective and lasting invasive species management, it may be useful to refer directly to the following sections:

- Report Objectives (Section 1.1)
- Treatment/Control Priority List (Section 2.3)
- Prevention (Section 3.0)
- Management by Area (Section 5.0)
- Removal follow-up (Section 7.0)

The HCA’s Prioritization Plans are meant to provide background information, guidance, and action for land managers and conservation areas services (CAS) staff. In reviewing this prioritization plan and its recommendations, the following key points should be considered:

- Invasive species management is based on priority species, areas, and feasibility of success. Each site is unique, and the plans outlined are based on current mapping, best management practices, and an understanding of existing available HCA resources and capacity.
- EKCA has several priority invasive species, including phragmites, common buckthorn, invasive honeysuckle, and garlic mustard, which are invading key areas of biodiversity and significant ecological features.
- To combat invasives, integrated pest management approaches should be undertaken in priority areas, including field ecosystems surrounded by deciduous forests, species at risk habitat in the feeder lands, around karst features, and in the understory of deciduous habitats.
- Initial starting points for CAS and invasive species staff are the removal of invasive shrubs in the central field for native tree plantings, treating small populations of priority species across EKCA, mowing, tilling, and/or plowing fields to enhance SAR habitat and remove herbaceous invasives, and continue volunteer efforts in areas of existing work
- Management does not end at removal, and the best practices for monitoring, disposal, restoration, and timing found in this report to prevent re-establishment must also be considered.

1.0: Introduction and Objectives

The EKCA Prioritization Plan is based on years of field work, data collection and internal policies created by the HCA, including the Invasive Species Strategy and the EKCA Master Plan. This plan first outlines the objectives associated with invasive species prioritization and management, before outlining which species are present and where at EKCA. A brief methodology is also provided for how this prioritization frame operates, with further information expanding on this found later in the document. After outlining the target species and areas, information related to management including prevention techniques, species background, management areas, techniques, and other important action items are provided. The final sections of this report outline more information related to the creation of this document, including mapping methodology, documents and principles used in invasive species control, and appendices with more detailed species profiles and descriptions of significant features at EKCA.

1.1: Objectives

This Prioritization Plan seeks to accomplish three main objectives:

- Objective #1 – Prevent the Introduction of New Invasive Species

  As prevention is the most important method of controlling the spread of invasive species, all prioritization and management must put first the ability to stop the spread of invasive species into new areas. Opportunities to prevent the introduction of invasive species will be implemented, and management techniques that restrict the range of current invasives will be used.

- Objective #2 - Prioritize Management for Species Present

  There are many invasive plant species on HCA land, so prioritization must occur on both a species and property level. This report summarizes the current state of key invasive plant species at EKCA and provides a decision framework for which species and populations should be prioritized for management.

- Objective #3 - Communicate with Conservation Areas for Effective Joint Management

  Internal communication is also a key activity in the Invasive Species Strategy. This plan seeks to provide useful and actionable information to the staff at Hamilton Mountain Conservation Areas (HMCAs), so that both Conservation Area Services (CAS) and Watershed Management Services (WMS) staff can work together to effectively manage invasive species on the property. This report considers feasibility and treatment methods to highlight areas where control efforts could be undertaken by summer contract staff. The creation of this report fulfills the 2024 Strategy directive to implement internal communication about invasive species management activities.

The task of managing invasive species is an HCA wide responsibility. The role of the invasive species technicians is to develop and implement appropriate strategies and management plans related to invasive species, conduct mechanical and chemical removals of target species, and map locations of invasive species on HCA properties. This role takes the invasive species team across the watershed to complete work, and with this in mind, engaging and collaborating with CAS staff, from summer students to superintendents, is vital to the success of these efforts. Prioritization plans provide opportunities, knowledge, and a strategy for superintendents to manage invasive species on their properties through removals and monitoring. Invasive species technicians will work to provide CAS staff with the necessary resources to conduct removals, while prioritizing areas that require support from the invasive species technicians or third-party contractors, such as chemical treatments, mapping emerging species, or coordinating larger scale removals with volunteers or other staff

2.0: Prioritization Framework

To meet the second objective of this plan, prioritization, the invasive plant species identified within EKCA have been organized and ranked according to the methodology below. In general, terrestrial plants are the simplest type of invasive species to manage with the methods HCA has at its disposal. The actionable populations of invasive species outline are terrestrial plants, with considerations for forest pests, pathogens, and aquatic species outlined in later sections of the plan. Methodology for the creation of this framework is also provided later.

2.1: Prioritization Criteria

Invasive species management documents from organizations across Ontario were reviewed in the development of prioritization criteria for this plan. These include *A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario* (Credit Valley Conservation et al., 2016), as well as the City of Mississauga's Invasive Species Management Plan and Implementation Strategy (2021). Both plans provide criteria for deciding control priority of invasive plant populations. The criteria are not standard across publications since each organization's priorities are different, however there are many commonalities. The following have been identified and chosen as key site-level strategies for HCA's approach to prioritizing invasive species population management:

1. Focus removal efforts in areas where invasive species populations are small and are just starting to establish.
2. Protect rare species and ecological community types, as well as ecologically significant areas.
3. Target removals where it is most feasible, and cost of control is lowest.
4. Preferentially remove species which are more likely to spread and permanently dominate an invaded area.
5. Immediately remove species that pose a human health risk, if possible.

These criteria are not objectively weighted, rather, they are used to categorize and understand the different populations of invasive species. These criteria are reflected in the framework created below.

2.2: Assembling the Framework

The creation of a decision framework for treatment of invasive species is one of the central goals for this document. The tables and maps within this section will provide a list of action items for future management of invasive plant species at EKCA. To develop a prioritization framework and categorize each plant species within it, several factors were considered that are both spatial and ecological. Invasive plant populations were examined and divided by population size. Qualitative characteristics were then reviewed regarding each invasive plant species. These characteristics include background information on each species which includes ability to spread, ability to dominate once established, and other factors that dictate treatment type and difficulty. Finally, the priority work areas identified in the Master Plan and the populations that fall within these areas were given higher priority, with different areas ranked to the following classes:

- **Class 1:** Top ranked priority areas containing manageable populations of priority invasives, or areas targeted for restoration the EKCA Master Plan due to Species at Risk concerns and sensitive ecosystems
- **Class 2:** Small populations of other species with low time commitment for removal, show feasibility for eradication, or who's removal builds on existing work areas
- **Class 3**: Rank 2 priority areas containing manageable populations of priority invasives, or areas targeted for restoration the EKCA Master Plan
- **Class 4:** Priority species populations threatening areas of high ecological value and master plan priority areas. Smaller populations are priority but consider large populations where targeted management could have a positive impact. Areas of significance considered within this category are:
    - **A:** Priority areas beyond rank 2 (Feeder lands, karst features)
    - **C:** Significant Woodland
    - **D:** Priority NHS designations (Forest, Meadow, Successional)

The amount of work required for the management of these species and areas should be sufficient for the immediate future, so should work be completed on the classes 1 and 2, maps of the next classes can be provided. Species and areas are given codes on the map for ease of display. Since this plan deals in both target populations and target areas, three maps have been provided; two maps for priority species populations in classes 1 and 2, and one map outlining priority areas, colour coded by class.

When managing individual populations, always begin at the edges of a large population and work in to prevent further spread. Target fruiting plants first in both large and small populations to further prevent spread. If the population is bordering or inside a sensitive or important ecosystem, remove plants in that area first before addressing the rest of the population. If a population crosses multiple boundaries for sensitive ecosystems at EKCA, the population should be addressed in the same fashion as the priority list above. In cases where new invasive species are detected in areas being treated for a larger population, the emerging species should take priority.

2.3: Invasive Plant Priority List

Table 1: Class 1 invasive species populations for EKCA, with location description and treatment recommendations.

Invasive Species	Map Code	Location	Treatment Type	Treatment Timeline
Mixed Herbaceous Invasives	MH1-MH3	Three areas, dividing the field lengthwise, to better prioritize restoration, working around larger populations of single invasives	Mowing, tilling, plowing, replanting	Mowing in 2024, planting beginning 2025, planting order MH-1, MH-2, MH3, mowing for 3 years after
Buckthorn	CB-1 to CB-5	Distinct, dense populations inside the field ecosystem	Pulling, cutting, basal bark and cut stump spray	3-5 years, begin 2025
Tartarian Honeysuckle	TH-1	Small population in the south east corner	Pull	1-2 years, begin 2025
Common Buckthorn	CB-6 and CB-7	Edges of the field, where deciduous forest meets the centre open area	Pull, foliar spray, basal bark spray	5+ years, begin near planting area 2025
Cutleaf Teasel	CT-1 to CT-3	Scattered in field, but several dense patches along east and west side	Seed head cut, spray, timed mowing	Mowing regime for 3 years after planting
Multiflora Rose	MF-1	Fruiting bush south of the main field	Cutting, mowing, cut stump spray	1-2 years, begin 2025

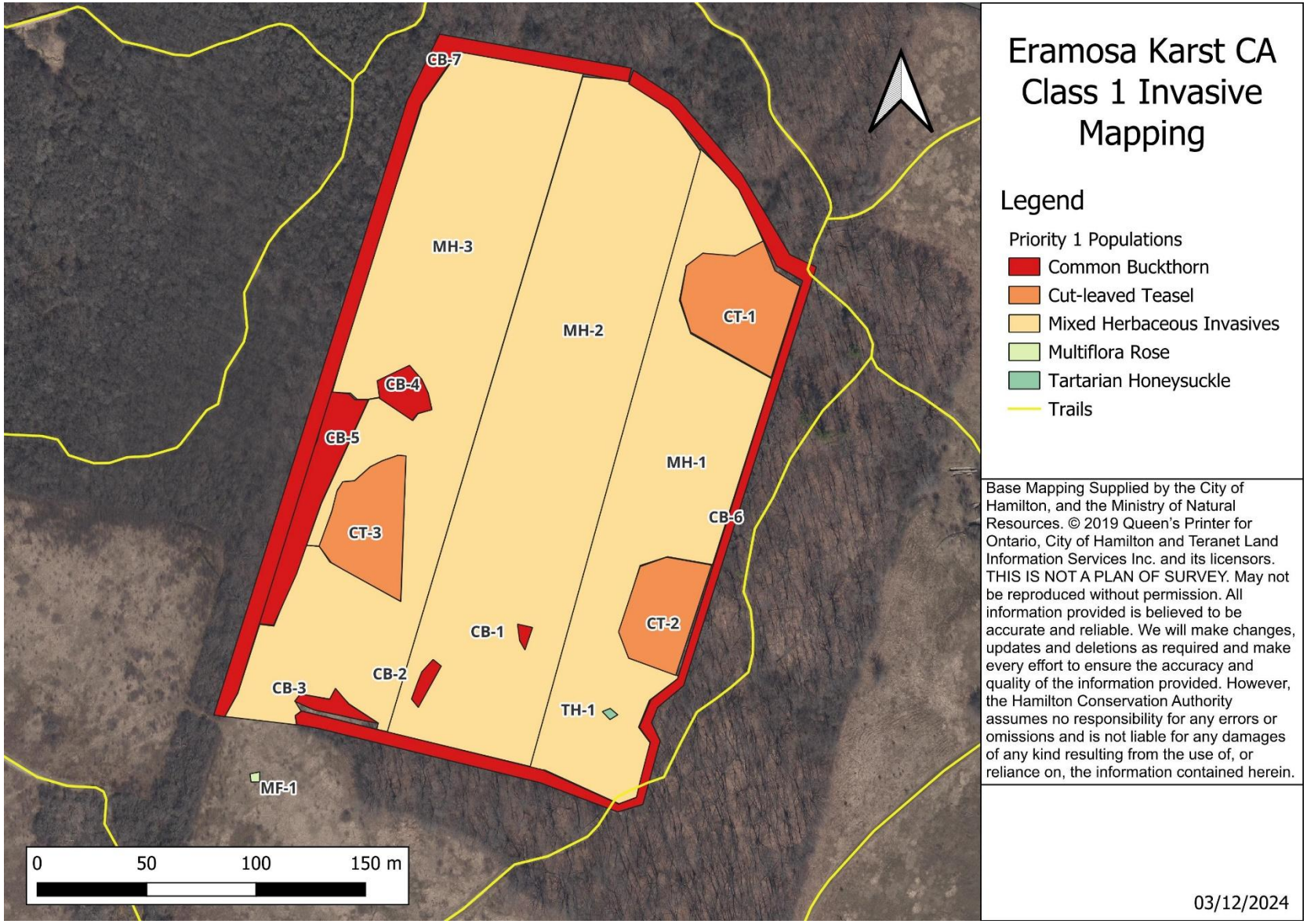


Figure 1: Map of Class 1 Invasive Species at Eramosa Karst Conservation Area

Table 2: Class 2 invasive species populations for EKCA, with location description and treatment recommendations.

Invasive Species	Map Code	Location	Treatment Type	Treatment Timeline
Common Reed (Phragmites)	PH-1 to PH-6	East EKCA, south central feeder lands, mostly along Stewart Creek towards Rymal Road, distinct patches	Foliar spray, brushcut	Continuing work area, 2025 spray priority area
Common Buckthorn	CB-9 to CB-11	West EKCA, along Karst Features Trail before the Amphitheatre, mostly trailside	Pull	Continuing work area, 2025 removal events, ongoing
European Privet	EP-1	EKCA West, trailside near the fork on the Karst Features Trail by the parking lot (EK01)	Manual pull, basal bark	2025, 1-2 years
Holly-leaved Barberry	BB-1	EKCA West, near bridge before the Amphitheatre along Karst Features Trail (EK02)	Pull	2025, 1-2 years
Japanese Hedge-parsley	HP-1	EKCA West, field east of the parking lot near the new pavilion	Pull, foliar spray	2026, after progress in other areas, 2-3 years
Common Reed (Phragmites)	PH-7 to PH-9	EKCA East, southeast corner near Rymal Road, along ephemeral creek bed	Brushcut, spray, not treated in 2024	Continuing work area, 2025 spray priority area
Multiflora Rose	MF-1 & MF-2	EKCA West, north of parking lot and Karst Features Trail (EK20)	Pull, mow, cut stump spray	2026, after progress in other areas
Norway Maple	NM-1 & NM-2	EKCA west, understory and overstory trees, trailside and further into the forest	Pull (saplings), spray, cut (mature trees)	2026, after Buckthorn removals complete in the area

Garlic Mustard	GM-1 & GM-2	Open fields in east EKCA, found near eastern reaches of the Bobolink Trail and Second Road W	Pull	Pull ahead of any mowing/plowing
Common Buckthorn	CB-12	West EKCA, access path/road running along side Karst Features Trail. Area being managed by invasive species staff to test manual treatments and cutting techniques	Critical Period Cutting	Continuing treatment, 1-2 more years

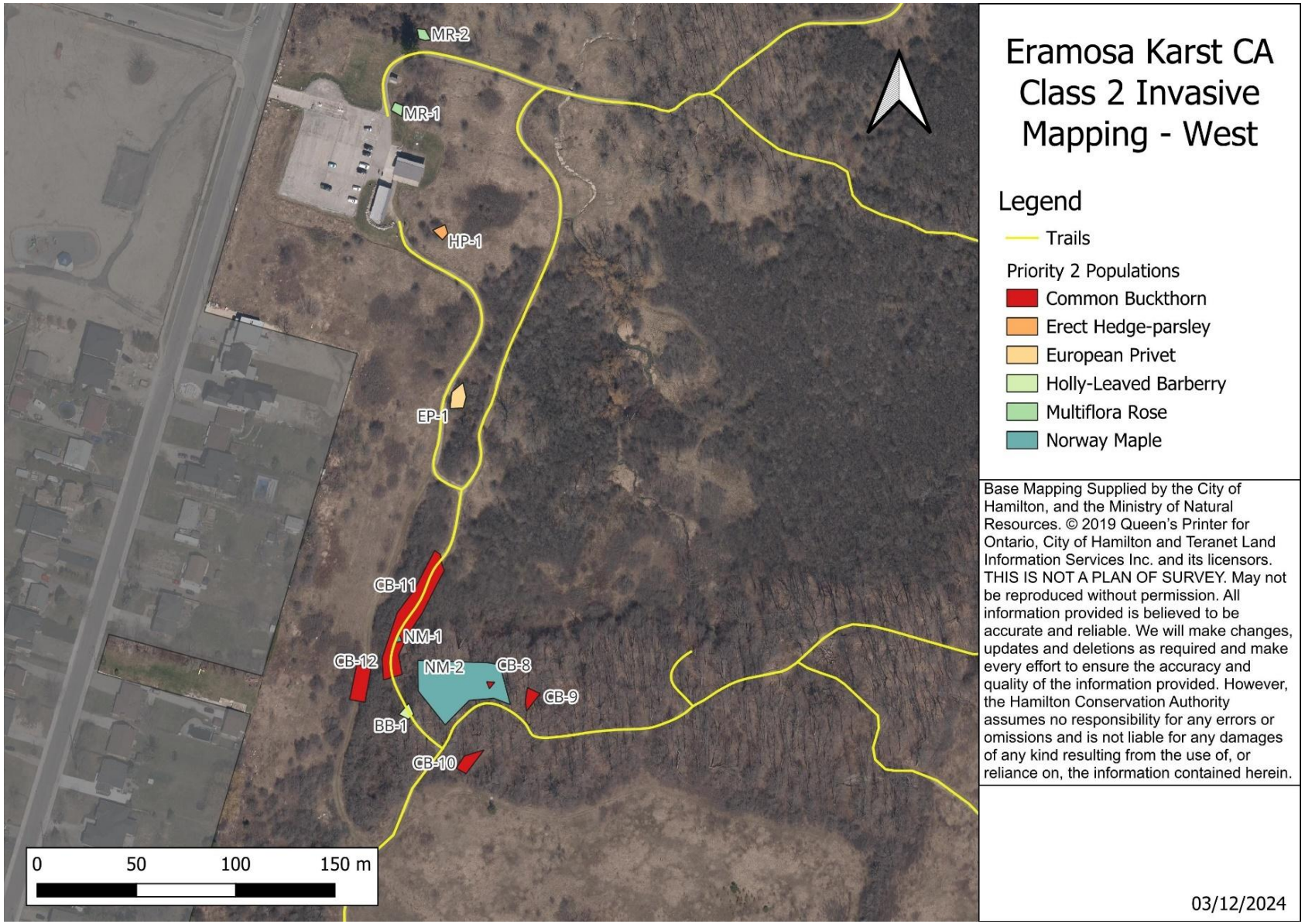


Figure 2: Map of Class 2 Invasive Species at Eramosa Karst Conservation Area, West End

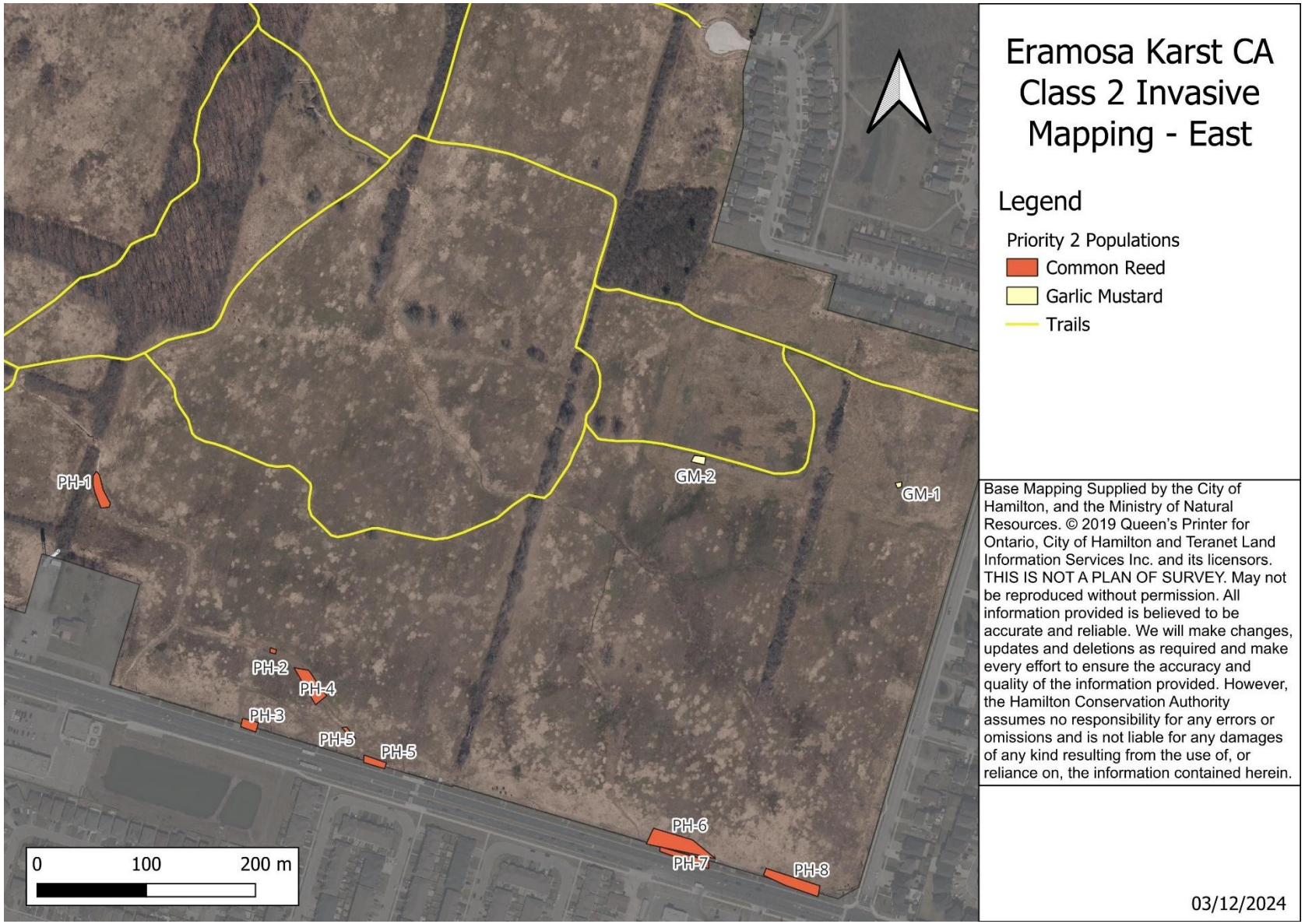


Figure 3: Map of Class 2 Invasive Species at Eramosa Karst Conservation Area, East End

Table 3: Class 3 invasive species populations for EKCA, with location description and treatment recommendations.

Invasive Species	Map Code	Location	Treatment Type	Treatment Timeline
Common Buckthorn	CB-13 -CB-16	Extend work area towards the amphitheatre	Manual Removal	After work areas in Class 2 are complete
Common Buckthorn	CB-17 to CB-20	Field edge around other priority area, understory and trailside in deciduous forest	Manual Removal	After plantings in Class 1 complete, 2026-2027
Canada Thistle	CT-1	Moving in from field, manage spread to prevent becoming prevalent in the understory	Pull	After work areas in Class 2 are complete
Honeysuckle sp.	HS-1 & HS-2	Trailside and forest edges along the Karst Features Trail near the reforested field	Pull	After work areas in Class 2 are complete
Honeysuckle sp.	HS-3	Karst feature, outflow of Potruff Spring	Pull	After work areas in Class 2 are complete
Common Buckthorn	CB-21 to CB-23	Potruff spring outflow and western part of sugar maple deciduous forest	Pull, basal bark or foliar for larger plants	After work areas in Class 2 are complete
Common Buckthorn	CB-24 to CB-26	North of deciduous forest in central EKCA, along trails and towards thickets	Pull, basal bark or foliar for larger plants	After work areas in Class 2 are complete

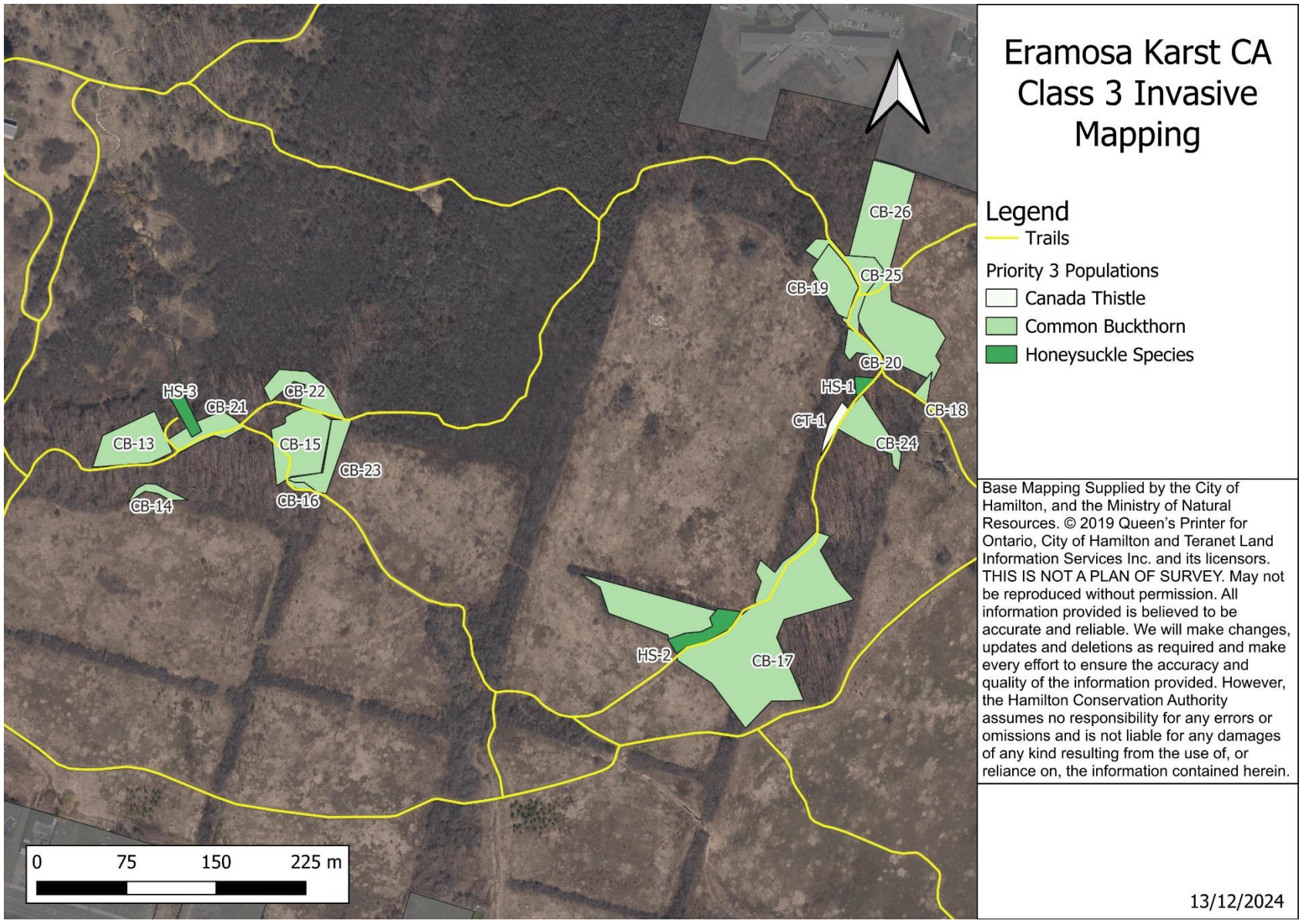


Figure 4: Map of Class 3 Invasive Species at Eramosa Karst Conservation Area

These tables and maps serve as the starting point to any management completed at EKCA, either by invasive species or CAS staff. The invasive terrestrial plants and the specific populations highlighted are, for the most part, feasible to be addressed by staff using manual removal techniques. Several of these populations may already be actively managed by EKCA staff, and in these cases, it is encouraged that this work be continued. Areas highlighted that should be removed by invasive species technicians' areas which will require either an in-water treatment, or an herbicide spray. Additionally, the invasive species team may complete basal bark sprays in the fall and winter months depending on priorities and other demands. Any recommended treatment involved herbicide must be left to a licensed pesticide applicator. Should staff require additional support or wish to collaborate on a removal, invasive species technicians will be available to schedule an event when the schedule allows. For removals that will require a cut stump herbicide treatment, which may occur when cutting down woody invasives such as buckthorn, please notify the invasive species team to arrange a collaborative effort so proper follow-up treatment is completed.

3.0: Prevention

It is important to note that while management of existing invasive plants is critical, prevention is the most important method of controlling the spread of invasive species. Many of the introduced species are hardy species in their native home ranges and thrive in degraded ecosystems. When invasive species are introduced into other landscapes outside of their native range, it is their hardiness and lack of natural predators that makes it relatively easy for them to become established. Once established they are difficult to eradicate. Often, full eradication requires a large amount of time and energy and sometimes is not possible.

Invasive species are introduced through several different pathways. For Conservation Areas and HCA owned properties, the pathways of introduction are mainly along trails, waterways, and road networks. Invasive plant seeds, insects, and pathogen carriers can be introduced and spread along these pathways by hikers, dogs and maintenance equipment. Natural pathways of spread are also key vectors for invasive species, such as migrating birds and wind or rain dispersal.

A few key tasks can be implemented to help prevent the introduction of new invasive species to EKCA. Firstly, a clean equipment protocol should be used for all equipment new to the site that uses the trail or road system. A clean equipment protocol ensures that all equipment coming on to the property is clean of debris and soil before it uses the trails or road network. This includes vehicles and tools used by CAS staff for site maintenance, as well as equipment used by ecology, invasive species, or other departments while conducting work at EKCA. A clean equipment protocol will help prevent unwanted seeds and vegetative material introductions. Since staff working at

EKCA are likely transporting equipment across all East Mountain parks, a clean equipment protocol is very important. If CAS staff are looking to refine or establish a clean equipment protocol, please contact the invasive species staff.

Numerous private properties back onto the Karst which brings the issue of encroachment as invasive species may spread from backyards or through illegal dumping of yard waste into the conservation areas. It is important that issues of encroachment are properly addressed, and that the dumping of yard waste is discouraged as much as possible.

Eramosa Karst sees regular use by hikers, bikers, dog walkers, and casual traffic due to its proximity to suburban areas. With a large trail system throughout the property, it is recommended that boot scraping stations be installed at high traffic areas and trail heads. This will provide a location for hikers to scrape their boots clean of dirt before they enter the trail system and as they leave. Figure 5 shows recommended locations for installation, situated at each trail entrance. Signage should also be introduced to support safe trail practices, including using boot brush stations, staying on trails, and keeping dogs on leash.

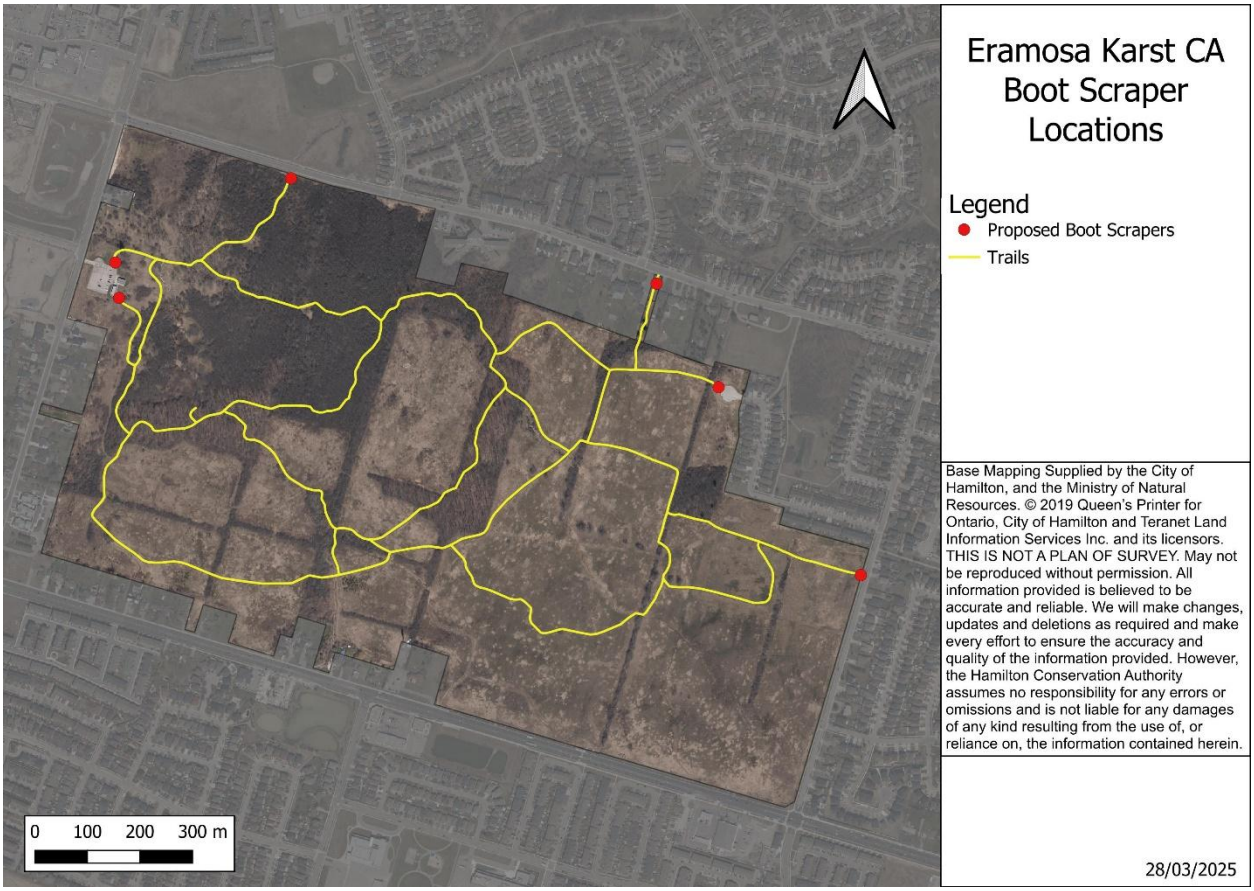


Figure 5: Map of EKCA with proposed locations for boot brush stations

4.0: Invasive species found at EKCA

Invasive species are found throughout the HCA, with three main categories present in different amounts in the watershed; aquatic species, tree pests and pathogens, and plants. EKCA is home to a diverse range of ecosystems, including deciduous forests and thickets, meadows, and shallow marshes. This diversity means the presence of all types of invasives are possible, but there is a documented abundance of those with preference for open fields and forest edges. Through mapping and data collection, high risk species either currently present, or with a strong risk for emergence at EKCA have been highlighted below. It is important to become familiar with these threats, as they may become more prevalent in the years following the publishing of this report, and CAS staff will often be the first to detect their presence. This report will focus on terrestrial plants, forest pests, and pathogens. Although the HCA is home to many aquatic invasives, the lack of significant water features at EKCA means they will not be discussed in this report. Should an aquatic threat be discovered, this report can be amended.

4.1: Aquatic Species

As EKCA lacks significant wetland or watercourse features comparatively to other conservation areas, aquatic invasives are not a priority for this site. However, this does not mean their presence is not possible. Areas of EKCA that do experience occasional flooding, wetland conditions, or are home to semi-aquatic invasive species like Phragmites should continue to be monitored for the emergence or appearance of invasive aquatic species. These areas were not assessed under the updated master plan. Should a potential species be discovered, contact the invasive species team or HCA aquatic ecologist.

4.2: Forest Pests and Diseases

Forest pests and diseases can include insects, fungi and pathogens. They are a risk to individual tree health and therefore the wider forest health of the HCA watershed. EKCA has large areas of NHS designated forest ecosystems, however, many of these are dominated by buckthorn thickets, making the areas of more biodiverse forests even more valuable. Several forest pests and diseases have been detected within the watershed at various levels of severity, depending on their locations. The invasive forest pests currently detected at EKCA are LDD Moth, Beech Bark Disease, and Beech Leaf Disease. Though not yet detected in the watershed, Oak Wilt is currently surveyed for in the mature oak stands at EKCA. The detected forest pests and surveys at EKCA are all most prominent in the mixed deciduous forest ecosystems found in the park (Figure 6 & 7). Profiles on these species and pests can be found in Appendix 1.

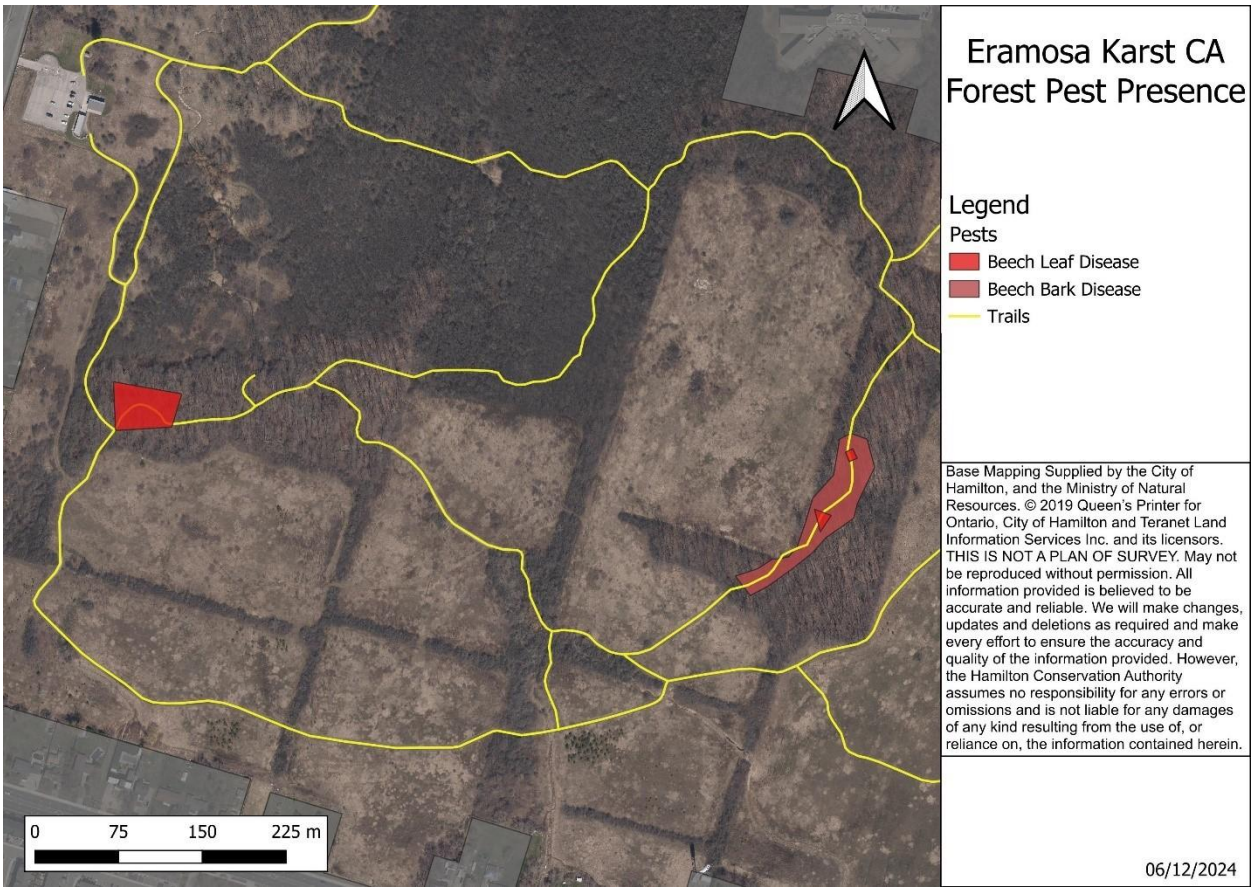


Figure 6: Forest Pests Surveys and Mapped Populations at EKCA

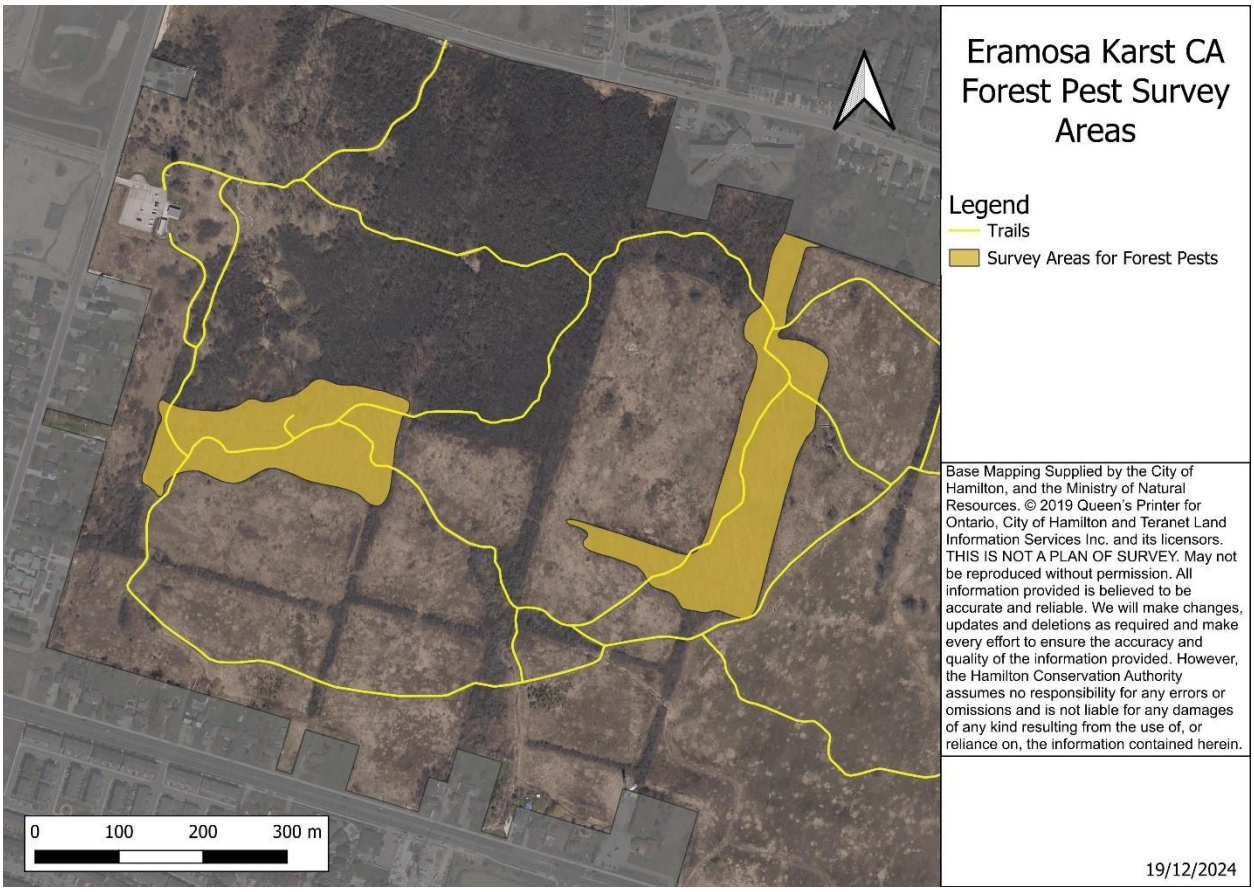


Figure 7: Survey Areas at EKCA for Forest Pests

4.3: Terrestrial Invasive Species

Based on survey data collected between January 2021 and July 2024, there are 27 different invasive plant species that are mapped at EKCA. To prioritize these species, both HCA's top 10 invasive plant species list and the Urban Forest Associates (UFA, 2018) invasive species of southern Ontario list were reviewed. As a result, only species considered invasive and of higher priority are included. The UFA use categories to organize invasive species based on their degree of negative effect to local ecosystems. The following explains their categorization from 1-4.

Category 1 - Aggressive invasive exotic species that can dominate a site to exclude other species and remain dominant on the site indefinitely.
Category 2 - Exotic species that are highly invasive but tend to only dominate certain niches or do not spread rapidly from major concentrations.
Category 3 - Exotic species that are moderately invasive but can become locally dominant when the proper conditions exist.
Category 4 - Exotic species that do not pose a serious threat to natural areas unless they are competing directly with more desirable vegetation.

Table 1 then uses the UFA list and HCA's top 10 invasive plant species list to place the 25 species into a category.

Table 4: Invasive species found at Eramosa Karst Conservation Area

Common Name	Scientific Name	HCA Terrestrial Top 10	HCA Aquatic Top 10	UFA 2018
Common Buckthorn	*Rhamnus cathartica*	X		Category 1
Garlic Mustard	*Alliaria petiolata*	X		Category 1
Honeysuckle species	*Lonicera sp.*	X		Category 1
Morrow's Honeysuckle	*Lonicera Morrowii*	X		Category 1
Phragmites	*Phragmites australis*	X	X	Category 1
Tartarian Honeysuckle	*Lonicera tatarcia*	X		Category 1
Canada Thistle	*Cirsium arvense*			Category 1
Multiflora Rose	*Rosa multiflora*			Category 1
Vetch species	*Vicia sp.*			Category 1/2
Bird's-foot-trefoil	*Lotus corniculatus*			Category 2
Kentucky Bluegrass	*Poa pratensis*			Category 2
Norway Maple	*Acer platanoides*			Category 2
White Sweet Clover	*Melitotus albus*			Category 2
Common Teasel	*Dipsacus fullonum*			Category 3
Cutleaf Teasel	*Dipsacus laciniatus*			Category 3
Hawkweed Oxtongue	*Picris hieracioides*			Category 3
Spotted Knapweed	*Centaurea stoebe ssp. micranthos*			Category 3
Privet	*Ligustrum sp.*			Category 4
Common Canary Grass	*Phalaris canariensis*			Category 5
Callery Pear	*Pyrus calleryana*			N/A
Common Burdock	*Arctium minus*			N/A
Common Milkpea	*Galega officinalis*			N/A
Herb Robert	*Geranium robertianum*			N/A
Japanese Hedge-Parsley	*Torilis japonica*			N/A
Queen Anne's Lace	*Daucus carota*			N/A
Sweet pea	*Lathyrus odoratus*			N/A
Red Clover	*Trifolium pratense*			N/A

EKCA presents some unique challenges compared to other conservation areas due to the nature of invasive species distribution. Although the forests and hedgerows provide easier opportunities for invasive mapping and identification, the field areas often have a complex and scattered invasive makeup. To provide relevant and actionable invasive species management recommendation, this plan offers information on both a by species and by area basis. Species of high priority, or those that are mapped more distinctly have species relevant information in Appendix 2.

5.0: Management by Area

The areas surveyed at EKCA provide a challenge in that many of the areas have multiple invasive species interspersed within the lands in ways not conducive to species-by-species management. To align with the goals and assessments made by the EKCA Master Plan and reflect how invasives are distributed on the landscape, management by area is a viable approach, with priority areas identified in this report (Figure 9)

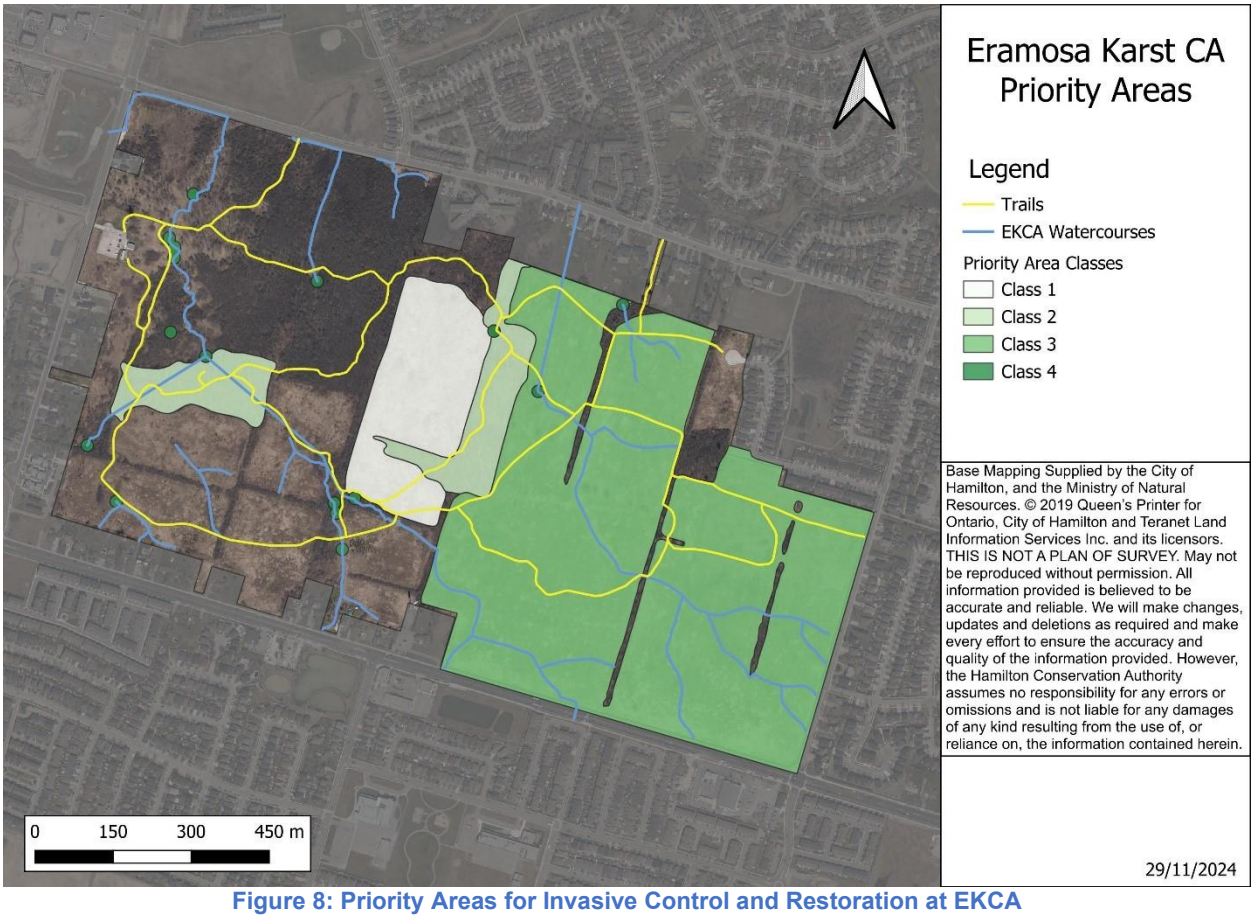


Figure 8: Priority Areas for Invasive Control and Restoration at EKCA

5.1: Priority Area 1: Deciduous Forest Expansion

Many of the areas mapped at EKCA are former agricultural fields that are comprised of a variety of both shrubby and herbaceous invasive species. Based on master plan recommendations and ecological surroundings, restoration of these fields is recommended. The deciduous forests at EKCA, the interior of which are a separate priority area, can see an improvement in their biodiversity, health, and habitat capacity through forestry tree plantings, increasing their footprint. The area chosen for this work is a field almost entirely enclosed by the forest, currently containing common buckthorn, honeysuckle, and field invasives such as canary grass, burdock, teasel, vetch, and other herbaceous plants. It is recommended that removals be undertaken in this area, either through mechanical means or pesticide application, to remove shrubs and trees to free the area for future work, including mowing, plowing, or tilling to combat herbaceous growth and provide opportunity for planting. Detailed plans for this area are contained in Figure 9. This is the year 1-5 priority for EKCA, with management techniques outlined in the following section.

5.2: Priority Area 2: Interior Forest and Continuing Work

Due to the prominence of hawthorn and buckthorn dominated woodland and hedgerow habitats, forested areas containing stands of maple, oak, beech, hickory, and native shrubs are deemed high priority. Two areas have been identified, which have seen ongoing invasive management before the commencement of this plan. Species in this area include common buckthorn, honeysuckle species, garlic mustard, and forest invasives including beech leaf and beech bark disease. For manual removal techniques refer to “Manual Removals” in the Management Techniques section below. The goal in these areas related to invasive species management and restoration is to improve overall biodiversity, remove invasive species, and also provide opportunity for continued collaboration between CAS staff, volunteers, ecology, and invasive species on shrub removals that can be accomplished manually. Manual removal of common buckthorn, honeysuckles and garlic mustard can be completed by CAS, if time allows, with a quick check in with invasive species staff. Refer to the monitoring section (Section 9.0) below to ensure tracking of removal areas is completed and that chemical treatments can be planned as well as restoration.

5.3: Priority Area 3: Field restoration for SAR

The former agricultural lands found at EKCA contain many herbaceous and shrubby invasives described previously, including Canada thistle, white sweet clover, red clover, sweet pea, hawkweed, common and cutleaf teasel, Canada thistle, common burdock, and some early shrub colonists like common buckthorn and Tartarian honeysuckle. Many of these species are managed using the same techniques, with treatment windows inline with each other. The goal of invasive species management in the field ecosystems is to improve ecosystem quality through diversity of species, reduction of

invasives individuals, and the management of quality habitat for key species such as Bobolink, breeding sparrows, migratory birds, and insects. These areas will need a long term, multi-faceted approach to management. For this area reference to tilling and mowing techniques will be required, with tilling recommended in July and September, and mowing recommended in early April, June, and late summer as required. Prescribed burns could also be an option, in accordance with best management practices and information outlined in Section 6.3.

5.4: Priority Area 4: Karst Feature Enhancements

As outlined in the EKCA Master Plan, the karst features contribute to the ANSI designation of this site, offering unique and rare features found few other places in Ontario. In addition to their rarity and hydrological functions, the geomorphology of EKCA has created microclimates and separate ecotypes with specific flora and fauna worthy of preservation and focus. As many of the significant karst features are near trails, these areas can become catchments for invasive species, jeopardizing both biodiversity and the ability of patron's other visitors to enjoy and study these features. Openings and outflows mapped showed occasional densities of woody invasives and herbaceous field invasive encroachment, hindering access, sightlines, and biodiversity. It is recommended that features such as cave openings, springs, and sinks be localized priority areas for removals which could be accomplished by manual removals by CAS staff or volunteers, or localized pesticide applications in buffers around designated features.

6.0: Priority Area Management Techniques

6.1: Mowing

It is recommended the EKCA staff employ and rotating mowing plan for the fields at EKCA. Mowing is effective in managing invasive species, and may not lead to eradication, but can prevent seeding, spread, and size of invasive plant populations. Mowing should be completed in accordance with best practices that do not interfere with breeding birds or species at risk. Mowing may require specialized equipment due to uneven ground, density of groundcovers, plant height, and toughness of stems. Therefore, it is recommended that staff organize a mowing plan in coordination with ecology staff, CAS, CAPSS, and Milgrove staff to decide on a best approach to mowing. In addition to the removal of invasive species, mowing can also help stimulate native seed banks and clear areas for future planting projects for the further introduction of native stock. For any mowing program, understanding the plant makeup of the area is very important, as different species should be mown at different times. Invasive plants mapped in the fields at EKCA flower throughout the year, with species that respond best to mowing often beginning as early as May and as late as August. This is important to

consider as mowing after flowering and during seed production is poor management practice. Beginning mowing in either late fall or early spring (April/May) should be following by further treatment on regrowth in June and August. Generally, it is suggested an early season mow in April, followed by a late season mow in mid-summer lines up with best practices, however, considerations for SAR and breeding birds make this approach complex, and further consultation prior to any mowing should be completed.

6.2: Tilling and Plowing

Tilling and plowing are techniques that are both effective for invasive management, restoration and enable other forms of management to be employed in field environments. Using farming or other equipment to till fields removes first year or established growth of all species present, and can create an open environment that allows for cultivation, seeding, or treatment of emerging species down the line. Plowing and tilling also create land that is more manageable by removing obstacles and flattening the land, making it more easily mowed and worked upon. Tilling has been used for invasive species management previously, including at Fifty Point, where a monoculture of teasel was mown, plowed, tilled, and seeded with a cover crop to encourage seed bank growth and eliminate more individual plants in a single year. Thistle, grasses, teasel, burdock, vetches, and many other herbaceous species are documented to be controlled or managed effectively by repeated tilling. Tilling has been found to be effective for teasel, Queen Anne's Lace, Spotted Knapweed, vetch, Burdock, Common Milkpea, and Canada Thistle, amongst others. Till after emergence but before seeding. For these and other field invasives that may respond to tilling, a till in early July, with follow up tilling or mowing in August and September should eliminate secondary growth and prevent seeding in most cases.

6.3: Prescribed Burning

Fire can be a useful cultural management tool for invasive species removal under the correct circumstances. There is precedent for the HCA using prescribed burning for field and prairie environments in the Dundas Valley. Several species identified as invasive at EKCA can be managed effectively by fire, such as Kentucky Bluegrass and vetch species. Fire combined with cutting, tilling, and replanting can be very effective for removing invasive species and stimulating the growth of native species. There are some species that have been found to become early colonizers after fire, however, which could add challenge to any prescribed burn, such as White Sweet Clover and some shrubs. Also, the status of feeder lands and proximity to urban and suburban areas also may present challenges. Prior to any prescribed burning, a more elaborate plan should be created with ecology and CAS staff, HCA management, and local authorities. If prescribed burning is undertaken, burns should occur in April, or in late fall to be most effective.

6.4: Manual Removal

Many invasive species can be removed using manual techniques, referring to hand pulling, digging, or using other handheld tools such as weed wrenches, shears, secateurs, or loppers. Manual removal techniques are best implemented with multiple workers or volunteers, and are frequently the focus on volunteer events held by invasive species staff since they are more time consuming. When practicing manual removal techniques, focus on species that can be easily identified, can be effectively removed with the use of pesticide, and on populations that can be eliminated or significantly pushed back over time. Species at EKCA including shrubby invasives like honeysuckle and buckthorn, or manageable populations of garlic mustard are a common focus for manual removal. Removed invasives must be disposed of correctly, either by bagging and solarizing, or placed in such a way that will not result in the further spread or re-rooting of the plant. Removals can occur any time of year, though late summer and early fall will often lead to seeds and berries being spread if materials are not disposed of correctly.

6.5: Native Plantings

The importance of replanting, reseeding, or longer-term management of sites through restoration is a priority of invasive species management. At EKCA, many areas of focus could be easily reinvaded by the existing invasive species through vegetation regrowth or through seed backs, or introductions of new species via humans or animals. Therefore, promoting management with plantings and seedings helps ensure competition with invasive species, removes open areas that invasive species can easily colonize, along with increase biodiversity and providing habitat for native species, include SAR such as Bobolink. Native plantings are recommended in the interior field (priority area 1) to expand the forest ecosystem, and could be expanded with native seedings or scattered planting to enhance habitat and increase diversity in the feeder land fields where future management is anticipated. Cover crops should be used if large areas are tilled or mowed to prevent regrowth of invasive species while new plantings establish.

7.0: Disposal of Invasive Plant Parts

Proper disposal of invasive plants helps to prevent them from further spread. All fleshy/herbaceous plants and plant parts (e.g. seed and flower heads, fruits, roots) should be carefully placed into black garbage bags and left in direct sun for a minimum of two weeks to kill all plant parts before sending them to the landfill. Woody stems from honeysuckles, multiflora roses and buckthorn can be left with the dirt removed from the roots and raised off the ground to dry out and then either decompose on their own, be chipped, or burned. If they are to be chipped, remove any seeds or fruit from the plant to ensure they are not spread because seeds can stay viable for years. Any species

chemically treated, particularly woody and tall herbaceous grass, should be left for the season. They can be left to naturally decompose or can be cut and mowed down by staff if necessary.

8.0: Herbicide Treatments

Herbicides applied to invasive species will be overseen by the invasive species team and must be completed by licensed pesticide applicators. Treatments include basal bark, where the herbicide is applied to the outside of the stem near the base; cut stump, applying herbicide to the exposed inner bark after cutting; foliar spray, using a backpack sprayer to apply herbicide to leaves and branches; and injection via an injecting device and herbicide capsules. Common herbicides applied by the invasive species team include Garlon RTU and Glyphosate, depending on the plant being targeted. Herbicide will be applied at times suggested by species specific best management practices, along with consideration for other environmental factors such as breeding birds, risk of indirect application and herbicide drift, and proximity to open water and inhabited areas. All pesticide applications will be properly signed, with signs posted one day before application and left up for one day following application. EKCA staff will also be notified anytime invasive species staff will be on site to spray.

9.0: Monitoring

Successful invasive species management requires follow-up monitoring at all removal sites and continued removal of re-sprouting invasive plants. It takes multiple years to deplete seed banks and completely exhaust root systems. Eradication may be possible for some of these species, but long-term management of more established species will be needed, like common buckthorn. Yearly monitoring of removal locations should be well documented. It is useful to keep track of what areas have been treated, the method of removal, the amount of plant material removed, and with what degree of success the removal saw over the long term. This can be accomplished through notetaking, mapping, photo-monitoring, and collaboration with the invasive species team. This ensures that the energy of CAS staff is best used, and removals are optimized for long-term success. Monitoring of treated areas should occur for five years to ensure no re-introductions occur.

Monitoring is also key for early detection of emerging species. Any new or suspected invasive species detected at EKCA should be communicated to the invasive species team and prioritized accordingly.

10.0: Restoration

Controlling invasive plants helps maintain species diversity and enhances natural areas, but promoting restoration and re-planting is equally important. Prioritizing restoration in key areas is as important as removals for maximizing efficiency and long-term success.

Removals of invasive species with no follow-up often allows for equally invasive and aggressive species to move into cleared areas, creating a new problem to solve for managers and staff. Removals should be followed by a coordinated replanting plan, which could include native trees, plants or shrubs, that will not only prevent re-invasion of invasive species but also provide ecological and human benefits. Examples of this type of work would be planting cover crops following a tillage or controlled burn of an invasive dominated field, to provide a buffer for reseeding and allow for restoration plantings to occur later, which will provide habitat and ecosystem services.

Seeding is another method of restoration. If there is a lack of resources for replanting, seeding the area with a native seed mix can be used as a cover crop until other species can establish. These do not need to be complex; they should be used to cover the area to prevent re-invasion. Collecting and spreading seeds from one location at EKCA to another is a straightforward and cost-effective restoration technique.

Restoration of key ecological areas is outlined in the current draft version of the EKCA Master Plan. For specific recommendations and further information, please consult that document.

11.0: Additional Background and Methodology

In 2024, HCA released an updated Invasive Species Strategy addressing the significant ecological, economical, and societal threat of invasive species. The Strategy outlined six key activities for managing invasive species in the watershed: prevention, communication, prioritization, monitoring and restoration, collaboration, and research. This site-specific plan for EKCA focuses on prevention, prioritization, and communication.

Invasive species are described in EKCA's Master Plan, which is currently under revision with a draft plan released in late 2024. The draft master plan contains information on important ecological features such as natural heritage areas, significant wildlife habitat, and the location of species at risk and locally rare species. This prioritization plan builds on both the new master plan and existing plans, namely the 2007 EKCA Master Plan and 2013 EKCA Feeder Lands Operating Plan. During the master planning process, the ecological land classification (ELC) defined ecosystem types dominated by invasives, as well as cataloguing invasives found throughout the

park. This document has drawn from these findings and priorities, and accomplishing and provides a path to accomplishing the goals of both the Master Plan and Invasive Species Strategy.

11.1: Integrated Pest Management Principles

Integrated Pest Management (IPM) is a list of principles which are built upon economically and ecologically sustainable approaches to controlling invasive plants. IPM is used to increase the efficacy and efficiency of treatment (Sherman, 2015). The following principle of IPM is used for the decision framework outlined later in this document:

"Making control decisions based on knowledge of potential damage, cost of control methods, and the environmental impact of both the invasive plant and the control decision" (Sherman, 2015, p. 11).

IPM principles are found throughout this document, and any additional work done beyond this document should be in consultation with invasive species staff and done according to IPM ideals.

11.2: Significant Ecological Features

Significant ecological features help categorize the landscape to assist in management and prioritization. At EKCA, these features are organized by a variety of factors, including City of Hamilton core areas and ecological species and areas of significance. These areas are described in Appendix 3, and mapped in Figure 10. These natural areas designations help guide prioritization in focusing which parts of EKCA should be deemed most important for invasive removal work and restoration, and were used to determine the priority areas for management found in Section 5.

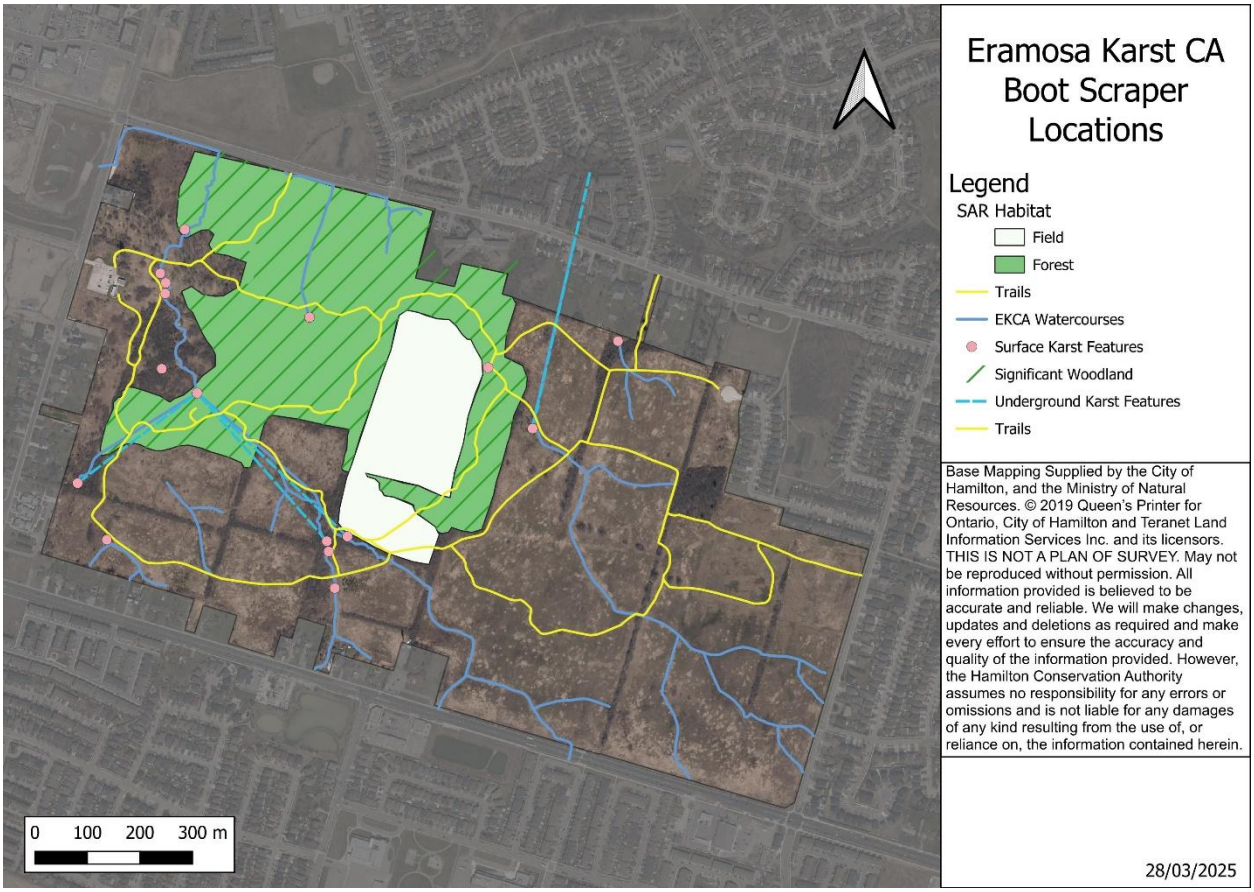


Figure 10: Significant Ecological Features at EKCA

11.3: Mapping

EKCA was mapped over several visits between May and October 2024, with historical data used to provide further context to invasive species diversity and distribution. To continue the innovation of HCA's invasive mapping protocol and streamline the process, EKCA was mapped with a heavier reliance place upon existing species distribution information collected during the master plan mapping process. Invasive species found during ELC mapping were used as a reference for larger, more difficult areas, such as the feeder land fields, where mapping individual species in an ecosystem that often contain 6-10 interspersed invasive or non-native species. This method expedited the process, but still captured known invasives, and allowed for more focus to be paid to areas of higher priority. Since master plan mapping took place in 2023, the data was assumed to have a high level of accuracy based on surveying protocols implemented, and the recency of the surveys. Using this approach also helped to create more collaboration between ecology and invasive species staff, leading to a better understanding of shared priorities and plans for restoration.

12.0: Plan Gaps and Blind Spots

EKCA is a large area, that contains numerous environment types that are dynamic and difficult to map. Since mapping in each area was completed on one visit, some areas may contain additional invasive species that were not flowering, growing, or identifiable upon inspection. Additionally, the uniformity and size of the former agricultural areas made the prospect of granular mapping more difficult. However, since potential treatments for these areas would be very broad, with limited effectiveness of species-specific actions, this gap is minor. Additionally, using ELC data helps overcome this gap, although the plant lists provide an overview of a large area generally, as opposed to the exact location of specific populations.

13.0: Conclusion

The prioritization of invasive species management at EKCA is a multi-year effort. Terrestrial plants are a key threat and can be removed with relative ease with the correct tools and time allotted. Terrestrial pests and diseases are more difficult but need to be considered and monitored going forward. Once Class 1 and 2 populations and areas are under control, or have seen substantial progress in restoration, new populations can be managed. Additionally, monitoring of pests and emerging terrestrial invasives should be a year-round initiative. Removing current invasive plants and preventing new ones from being introduced into the conservation areas will support HCA's Invasive Species Strategy, and by extension, the organization's Strategic Plan.

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Appendix 1: Forest Pest and Diseases Profiles

LDD Moth/Spongy Moth formerly known as the European gypsy moth, is an established species of moth where the larvae feed on the leaves of over 200 tree species. Although the defoliation by spongy moths will not kill trees, co-occurrence with another stressor such as severe drought or fall cankerworm outbreaks may lead to tree decline. Spongy moth population sizes cycle every few years with a sharp increase before collapsing. During a peak year, the open canopy resulting from the severe defoliation can allow invasive plants to become more established in the understory. Manual removal of egg masses or caterpillars on select isolated trees can help mitigate damage. Egg mass removal is done by scraping them off the tree truck between September – and March into a jar of soapy water and destroyed. Then from May – August burlap bands are then placed around the tree trunk and caterpillars are removed daily and placed in buckets of soapy water to kill them. Moths are surveyed for during the winter, where plots are chosen based on tree composition and location, and egg masses are counted to predict the next year's defoliation rates. EKCA has not been a part of HCA's recent photomonitoring program, but should defoliation rates increase, or concerns arise, this is subject to change. Surveying would occur in deciduous forest communities at EKCA, including ELC communities coded FOD5-1 (Sugar Maple deciduous forest) and FOD5-3 (Sugar Maple – Oak deciduous forest).

Beech Leaf Disease (BLD) is a disease that infects American beech trees and has been detected on HCA property. Signs of BLD were first detected in Dundas Valley and the disease has since been found at EKCA and other properties throughout the watershed. This disease is associated with nematodes that were likely transported by humans on contaminated wood. It spreads very quickly and where established it is known to affect nearly 100% of nearby American beech trees. Currently, no effective control or eradication measures have been developed, which places higher importance on preventing spread using boot brushing stations. Symptoms of BLD in the early stages are a striping appearing on the leaves caused by a darkening between the leaf veins. This is best seen from the bottom-side of the leaf and through the summer and winter months. Most mortality occurs in saplings, happening as rapidly as one year. Older trees are slower to be infected, starting in the lower branches and working up. As the disease progresses, the leaves near the branch tips become shrivelled and discoloured and reduced bud and leaf production. BLD symptoms were observed on several small beech trees in the deciduous mixed forest in the centre of the karst, amongst trees also affected by Beech Bark Disease (BBD).

Beech Bark Disease (BBD) refers to the decline and death of beech trees as a response to an infestation of invasive insects, leading to fungal infection. Invasive beech scale insects cause damage to the bark of the trees, allowing for canker fungus to take over. BBD is a staged disease; as disease progresses, large beech trees die and

suckers are sent out which densely cover the undergrowth, pushing out other native vegetation. EKCA has been affected by BBD, like other conservation areas, which mature beech stands seeing removal after tree mortality. As the effects of BBD are ongoing, monitoring for hazard trees, restoration opportunities, and ongoing management are recommended approaches to dealing with the disease.

Oak Wilt is a fungal pathogen that targets all species of oak, however red oaks are more quickly and severely affected. This disease occurs predominantly in the Great Lakes Region of the United States and has moved into Canada with three detections in Ontario in 2023. This fungus has two known pathways of spread: underground by root connections, and by beetles which transfer spores from tree to tree during feeding. Discolouration of the leaves begins in the upper portion of the crown, turning them a bronze colour and causing premature leaf fall, which act as the first sign of infection. The fungus itself is found beneath the bark of the infected trees in the form of a dark mat, referred to as “pressure pads” that gives off a fruity scent. This scent is what attracts the insects to feed and spread spores to non-infected oaks. Bark wounds and freshly cut limbs on healthy oaks allow the fungus-carrying beetles to transmit the disease to non-infected trees. Therefore, pruning oak trees should be avoided between April and November of each year if possible. Oak stands have been surveyed at EKCA in Oak Deciduous forest types (ELC code FOD5-3) in 2024 with no cases found. Surveys will continue to be conducted over the coming years to monitor for this threat.

Jumping Worms are a recently detected invasive species on HCA land, currently only found in the Dundas Valley Conservation Area. These worms can quickly degrade the quality of forests. They consume the top layer of organic material on the forest floor, degrading soil quality and making it difficult for plants to remain rooted. In Canada, the adult worms do not survive the winter, but their eggs do which allows for the life cycle to continue. Jumping worms can be easily distinguished for their fast moving and thrashing bodies and by their clitellum, a collar-like band around their bodies. The clitellum on a jumping worm is a white to light grey that wraps around their entire body. Their presence can also be detected by the changes in soil texture, jumping worm waste resembles coarse coffee grounds which lies on the top layer of soil. Removal of this species once it is established is not possible. Jumping worms are not yet present at EKCA, however, their presence should be monitored for, and implementing control measures such as boot brushes are key in preventing spread.

Appendix 2: Invasive Terrestrial Plant Profiles

Common Buckthorn (*Rhamnus cathartica*) is listed as noxious weed under the Weed Control Act, and presents as a small tree or shrub that was introduced to Ontario from Eurasia. It was widely planted in farm hedgerows and fencerows as a wind break. Birds and small mammals feed on the berries of this plant. Buckthorn can be removed by

hand pulling for smaller plants and by using an extractigator (weed wrench) on medium sized trees. Larger trees can be treated with a basal bark herbicide application in the fall. Re-planting with native trees and shrubs will also be required to shade out emerging common buckthorn. Sustained and continued effort will need to be applied to reduce the overall dominance. Adhering to the priority plan, presented above will be important. In addition, large tree control should focus on fruiting female trees which are a major vector of spread.

Common Reed/Phragmites (*Phragmites australis*) is a high priority invasive for the HCA. This species of common reed from Eurasia is a highly aggressive perennial grass that spreads quickly and out competes other native species in wetland habitats. It forms large monocultures that decrease plant biodiversity and create poor habitat for wildlife. Ecology staff began removal of this plant from the reservoir with contractors in 2020 and was managed by staff in subsequent years. Effective control strategies have included drowning of stems when water levels are high (June-September) or herbicide application in dry periods for these wetland communities (August-October). Continued efforts should result in eradication of phragmites in the target areas through spraying and brushcutting in 3-5 years. Removal of this species, even though it is outside the class 1 area will continue.

Common Teasel & Cutleaf Teasel (*Dipsacus fullonum/laciniatus*) are invasive biennial species that are becoming an increasing focus of the invasive species program at the HCA. Teasel can be managed through many techniques. Cutting can be done in their second year of growth, when the plant bolts and flowers, however, seed heads will continue to grow late into the year, even after repeated cuts. Targeted chemical applications of large first year stands can be effective at limiting second year growth, but multiple years of treatment is required. An integrated approach involving tilling, cutting, and pesticide application is currently being piloted in the HCA, with early indications of success, so it is recommended that the integration of methods be implemented to prevent regrowth and deplete the heavy seed bank.

Garlic Mustard (*Alliaria petiolate*) is a biennial plant that produces seed in its second year. It can grow in a variety of conditions making it a very good invader in diverse habitats. It easily outcompetes other native ground cover and can change the soil environments to favour its growth over others. Hand picking between April and June, before the plant goes to seed is the optimal time for removal. With a dedicated effort over 5 years removal of this species can be achieved, provided no large-scale unintentional introductions occur.

Multiflora Rose (*Rosa multiflora*) is a prolific seed producer and can shade and crowd out native species. It can be difficult to control as seeds have high germination rates and the plant re-sprouts vigorously when from a cut stem or when its roots are

disturbed. Hand-pulling is an effective tool before berries are produced (April – August). Larger plants can be dug out using a combination of an extractigator and a shovel. Foliar application of herbicide works best on multi-stemmed plants or large plants that have been repeatedly cut with no chemical control. Trail side, large multiflora rose could be mown using heavy machinery and followed up with a foliar application. Foliar application works best between July and mid-September, but caution must be taken during breeding bird season when nesting birds maybe found within the branches of multiflora rose. Any of these processes could take one to two years to see success because multiple stemmed specimens generally have a very large root system. Cutting the stems at the base and applying an herbicide is a secondary option for larger specimens outside of the breeding bird season. Cut stump treatment should be applied from September to December.

Norway Maple (*Acer platanoides*) are shade tolerant and prolific seed producers and can grow quickly in the understory and compete with native oaks, maples, and other deciduous canopy trees, and has become a dominant canopy tree in urban and suburban parks, woodlots, and roadsides. Their dense canopy can also shade out understory species like shrubs, grasses, and other herbaceous growth. To control Norway Maple, target seeding trees with either chemical girdling or cutting down with forestry tools. Saplings can be hand pulled or removed using shovels and weed wrenches with ease up to around 2.5 cm in diameter. Larger trees can also be pulled with more effort, or chemically treated either with a foliar spray of girdling technique such as basal bark, cambium spray, or cut stump treatment.

Honeysuckle Species (*Lonicera sp.*) refers to four non-native species of honeysuckle considered invasive, which include Tartarian (*Lonicera tatarica*), Amur *(L. maackii*), Morrow *(L. morrowii*) and Bells (*L* x *bella*) honeysuckles. There are six native species of honeysuckle and 10 non-native species total. Hand pulling small plants can be very effective. An extractigator (weed wrench) can be used on medium sized plants. This is best done in the fall if spring ephemeral flowers (e.g.: Trilliums and Trout Lilies) grow in the area. The entire root system must be removed otherwise new stems will form in the spring. Once pulled, plants can be piled with their roots exposed and off the ground to promote drying and prevent re-rooting. For larger bushes or ones located in sensitive areas, cutting followed by an application of herbicide on the cut stumps is also effective in late summer and early fall.

White Sweet Clover (*Melitotus albus*) is an herbaceous invasive moncarpic species that inhabits a variety of open habitats. White sweet clover grows tall and dense, outcompeting native species in delicate and rare ecosystems such as tall grass prairies and savannahs, as well as former agricultural sites. It can easily be pulled by hand, prior to seeding, usually in in late summer. Depending on population size, an herbicide treatment may be more efficient for large populations where hand pulling would be too

time consuming. Other methods of control such as cutting, burning, and tilling can be used with caution, as white sweet clover is an early colonizer and can re-sprout thicker through seedbanks and vegetative growth.

Appendix 3: Significant Ecological Features

Provincially Significant Earth Science ANSI - Much of this Conservation Area is designated as a provincially significant earth science ANSI. As per the ANSI report (Buck et al 2003) “Eramosa Karst in Stoney Creek contains numerous diverse karstic features, several of which are provincially significant. These include soil pipes, a high concentration of suffusion dolines and sinking streams, overflow sinks, dry valleys and a post-glacial stream cave of significant length. Each of these features is considered the best example of its type in Ontario. This karst type and the various provincially significant features identified at the Eramosa Karst are not currently represented elsewhere in Ontario within protected areas”. A detailed version of ANSI features and areas is available in the draft master plan. ANSI land at EKCA is included in the City of Hamilton core areas.

Significant Woodlands - Significant Woodlands are areas which are ecologically important in terms of features (species composition, age of trees and stand history) and function (contribute to the broader landscape because of their location, size or the amount of forest cover in the area) (City of Hamilton, 2022). The mature woodlot and shrub thicket within the central portion of EKCA is considered by the City of Hamilton to be significant woodland. This area is comprised of a sugar maple and oak deciduous stand in the centre of the property, a sugar maple stand to the west, plus hawthorn and gray dogwood thickets to the north and northwest. The thicket area has been heavily invaded by buckthorn along its perimeter, however.

Species at Risk (SAR) and Locally Rare Species – Species at risk are species of plant or animal that are at risk of disappearing from the wild. Eramosa Karst is home to eight known federally and provincially designated species at risk. Additionally, staff and community science programs have observed nine species of conservation concern, including 2 flowering plants, one species of tree, 6 species of bird, and one species of butterfly. These inhabit the forests and fields at the karst that are under threat from the encroachment of invasive species. Refer to the EKCA Master Plan for specific SAR information.

Significant Wildlife Habitat – Related closely to SAR designations, EKCA is home to several key areas that support both SAR and other species who breed or live in the area. These areas are outlined in the master plan, and include potential reptile hibernaculums in the karst and rock features, open country breeding bird habitat in the open fields, and shrub and successional bird breeding habitat, in the thickets and deciduous forests in the west portion of the conservation area. These areas are protected from new development, but could see work undertaken to remove invasive species, restore biodiversity, and protect existing individuals or breeding populations.