Waterdown-Sassafras Woods Heritage Lands Management Plan:

Inventory, Opportunities and Issues Report

Prepared for Cootes to Escarpment EcoPark System

February 2016

Cootes to Escarpment EcoPark System Partners

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Cover Photograph of Grindstone Creek taken by Leah Lefler

Cootes to Escarpment EcoPark System

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1.0 Introduction

1.1 Study Context

Between 2007 and 2009, a group of public agencies and organizations consisting of the Royal Botanical Gardens, Hamilton Conservation Authority, Conservation Halton, City of Hamilton, City of Burlington, Halton Region, Bruce Trail Conservancy, Hamilton Naturalists' Club, McMaster University and Hamilton Harbour Remedial Action Plan, undertook to develop a strategy to protect, connect and restore natural lands and open space between the Niagara Escarpment and Cootes Paradise in Hamilton Harbour. The initiative resulted in the "Cootes to Escarpment Park System Conservation and Land Management Strategy Phase II Report" (October 2009). This report was based on extensive background research, public engagement and stakeholder consultation, and articulates the vision for a new park system in this area. The Phase II report divides the Cootes to Escarpment EcoPark System into six core natural areas referred to as "Heritage Lands", named to reflect the natural and cultural components of each area (Figure 1):

- Borers-Rock Chapel Heritage Lands;
- Burlington Heights Heritage Lands;
- Clappison-Grindstone Heritage Lands;
- Cootes Paradise Heritage Lands;
- Lower Grindstone Heritage Lands; and
- Waterdown-Sassafras Woods Heritage Lands.

The Cootes to Escarpment EcoPark System faces intense pressures from the surrounding urbanized portions of Hamilton and Burlington, including major transportation arteries such as Highways 403 and 6. The effects of urban growth includes stressors such as increased use, additional infrastructure, demand for recreation and educational programs, facilities, and unauthorized use and access. These stressors can be expected to result in damage to sensitive habitats and will jeopardize the long term health of natural features and their functions. In response to this, the Phase II report recommended a number of actions, one of which is the preparation of a management plan for each of the Heritage Lands.

The management plans will contribute to achieving the vision of the Cootes to Escarpment EcoPark System as a "protected, permanent and connected natural lands sanctuary from the Harbour to the Escarpment that promotes ecosystem and human health within Ontario's Greenbelt". Thus, they will provide guidance for the protection and conservation of valuable natural and cultural heritage resources located within the Heritage Lands, and direct future development and management efforts. Because much of the study area is part of the Niagara Escarpment Parks and Open Space System (NEPOSS), the management plans must utilize the NEPOSS land classifications and zones as a basis for recommending future management initiatives. The management plans will provide guidance to the partner agencies such that they can implement their respective mandates while providing consistency throughout the EcoPark System.

Cootes to Escarpment EcoPark System Vision Map

Legend:

- EcoPark Land Boundaries
- Stewardship Lands
- Hydro Corridors
- Water Bodies
- Roads
- Rail Lines
- Hiking Trails

Produced by Michael Karpovage of Mapformation.com. July, 2015

Vision

Our vision for the Cootes to Escarpment EcoPark System is that it will be known internationally as a protected, permanent and connected natural lands sanctuary from the Harbour to the Escarpment that promotes ecosystem and human health within Ontario's Greenbelt.

Cootes to Escarpment naturally connected EcoPark System

cootestoescarpment.ca

The Heritage Lands include both public and privately owned lands. The management plans focus on the publically owned lands which are referred to as "Current EcoPark Lands" in this report. Management plans for the Clappison-Grindstone Heritage Lands and Waterdown-Sassafras Woods Heritage Lands are being completed concurrently as many of the opportunities and issues that pertain to these areas are similar, and it was deemed efficient to undertake them at the same time. This Inventory, Opportunities and Issues report is part of the management plan that addresses the Waterdown-Sassafras Woods Heritage Lands (Figure 1). The Current EcoPark Lands in the Waterdown-Sassafras Woods Heritage Area are owned and managed by four partner agencies: Bruce Trail Conservancy, City of Burlington, Conservation Halton, and Halton Region (Figure 2).

1.2 Purpose and Scope of Work

1.2.1 Purpose of the Management Plan

The overall goal of this project is to develop a comprehensive management plan for the Waterdown-Sassafras Woods Heritage Lands. The management plan will enhance protection of important natural and cultural features and improve sustainable recreation, research and education opportunities through addressing the following elements:

- protection and sustainable use of natural heritage resources;
- protection and sustainable use of cultural heritage resources;
- pressures and issues of concern identified by the four participating landowners, other Cootes to Escarpment EcoPark System partners, stakeholders and the public;
- wildlife corridors, eco-passages and pedestrian linkages;
- infrastructure maintenance, creation and decommissioning;
- recreation, education and research opportunities that are compatible with preserving the natural and cultural heritage of the area; and
- criteria and indicators for evaluation of the implementation and effectiveness of the management plan and an ongoing monitoring program to consistently collect supporting information.

1.2.2 Scope of Work

This overall study contains a number of important milestones:

1. Prepare Project Charter (undertaken by Steering Committee)
2. Prepare a Resource Inventory and Issues Report (September 2015)
3. Prepare draft Land Classifications and Zones (December 2015)
4. Finalize Land Classifications and Zones and Management Policies (May 2016)
5. Prepare draft Management Plan (May 2016)
6. Public Meeting to Present Draft Management Plan (June 2016)
7. Finalize Management Plan (July 2016)

Cootes to Escarpment EcoPark System

Waterdown - Sassafras Woods Heritage Lands

Figure 2: Current EcoPark Lands

Legend

Partner Land Holdings

- Bruce Trail Conservancy
- City of Burlington
- Conservation Halton
- Halton Region
- City of Burlington Managed Lands
- Bruce Trail Conservancy Managed Lands
- Stewardship Lands
- Utility Corridors
- Municipal Boundary
- Study Area
- Waterdown - Sassafras Woods Heritage Lands

Sources of Information:
Conservation Halton
Hamilton Conservation Authority
City of Burlington
City of Hamilton
Bruce Trail Conservancy
Ministry of Natural Resources and Forestry

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Meters

North-South Environmental Inc.
Specialists in Sustainable Landscape Planning

February 4, 2016

City of Hamilton
Mountain Brow Road
McNally
Waterdown Woods
Waterdown Woods
Hughes
Waterdown Woods
King Road
City View Park
Upper Rambo Creek/ Mansfield Park
Kerncliff 1
Kerncliff 1
Kerncliff 1
Kerncliff 2
Waterdown Woods
Tyandaga Golf Course
Tyandaga Golf Course
City of Burlington
Upper Hager Creek
Forestvale Park
Kerns/Westbury Park
Kerns Road
Upper Hager Creek
HWY 407
Waterdown Road
Sassafras Woods
Falcon Creek
Bayview Park/ Indian Creek
Waterdown Road
Sassafras Tributary
HWY 403

This current report constitutes the second milestone and provides a thorough inventory of the natural heritage, recreational and cultural resources of the Current EcoPark Lands, and identifies the management issues and opportunities. Later reports will provide land classification and zoning and present management recommendations.

Although this report focuses on the Current EcoPark Lands, some inventory, opportunities and issues are provided that occur on adjacent lands.

1.3 General Overview

The Waterdown-Sassafras Woods Heritage Lands comprise 800 ha of land located in an area extending generally from Waterdown Road to Brant Street in the City of Burlington and from Highway 403 north to Mountain Brow Road and Dundas Street in the City of Hamilton. Of the 800 ha, 445 ha (or 56%) are currently owned and managed by partner organizations (Figure 2). The majority of the Current EcoPark Lands are owned by the City of Burlington (247 ha), with smaller areas owned by Conservation Halton (157 ha), Halton Region (30 ha), and Bruce Trail Conservancy (11 ha).

The Waterdown-Sassafras Woods Heritage Lands are highly aesthetic and scenic, and are valued by cyclists, hikers, dog walkers, birdwatchers, dog park users, model airplane club members, recreational users of City View Park, and the surrounding community. The area provides spectacular views, especially from City View Park, extending from the City of Toronto in the east, to Hamilton, and including areas south of the escarpment, including west Burlington (Aldershot) and the south shore of Lake Ontario. On a clear day it is possible to see as far south as the Skylon Tower in Niagara Falls.

Some of the Current EcoPark Lands support existing infrastructure. There is an approved management plan for City View Park, and a Master Plan for Kerncliff Park; however, there is no overall coordinating management stategy for the Heritage Lands. While large blocks of protected natural areas are present, there are also significant gaps which include both natural features and habitats, and essential ecological linkages.

Waterdown Woods is generally characterized as a deciduous forest situated on the plains above the Niagara Escarpment and below the escarpment rim on talus. Sassafras Woods is generally characterized as a deciduous forest situated on complex topography which alternates between ravines and dry ridges. The southerly exposure of these Heritage Lands results in a relatively warm, dry microclimate that supports many Carolinian and southern plants, including rare and uncommon species as well as threatened and endangered species. The study area supports a diverse network of trails, including the Bruce Trail and many actively-used footpaths and cycling trails. The forest and escarpment habitats are interspersed with open fields, some of which have been damaged by bike trails and recreational vehicles. Residential areas, agricultural fields, brick quarries, industrial uses and other developments are located adjacent to the study area.

1.4 Study Methodology

1.4.1 Project Governance and Study Team

The Waterdown-Sassafras Woods Heritage Lands Management Plan project is directed by a Steering Committee and will receive input and comment from a Stakeholder Advisory Committee and the public.

The Steering Committee consists of representatives from Conservation Halton, City of Burlington, City of Hamilton, Halton Region, and the Bruce Trail Conservancy, as well as the Cootes to Escarpment EcoPark System Coordinator.

Responsibilities of the Steering Committee are as follows:

- responsible for all substantive decisions concerning preparation of the Waterdown-Sassafras Woods Heritage Lands Management Plan;
- responsible for organizing input, feedback and review by their home organizations at pertinent points through the process of management plan development; and
- provide guidance to Project Team and Cootes to Escarpment EcoPark System Coordinator.

The role of the Stakeholder Advisory Committee is to provide advice and input at various phases of development of the Waterdown-Sassafras Woods Management Plan, as determined by the Steering Committee and Cootes to Escarpment EcoPark System Coordinator. Members include individuals and representatives of organizations that are affected by and/or can provide useful input to the management plan (see Section 1.3.2).

The Project Team is led by North-South Environmental Inc. (project management and natural heritage expertise), and consists of LURA (public engagement expertise), Schollen & Company Inc. (recreation expertise), Unterman, McPhail & Associates (cultural expertise), and Andlyn Ltd (planning expertise). Responsibilities of the Project Team are as follows:

- responsible for undertaking the project and all aspects of management plan development;
- facilitate and record stakeholder and public input;
- communicate with and take direction from the Cootes to Escarpment EcoPark System Coordinator and the Steering Committee; and
- provide regular progress reports as required by the Cootes to Escarpment EcoPark System Coordinator.

1.4.2 Community Engagement

During the Phase 2 Inventory, Opportunities and Issues Phase, the consulting team in collaboration with the Steering Committee developed a combined Community Engagement and Communication program for the Clappison-Grindstone and Waterdown-Sassafras Woods Heritage Lands Management Plans that provides an opportunity for key stakeholder groups, as well as the general public, to participate in the development of the management plans.

We identified a series of engagement strategies and six overarching goals to guide the engagement process. The goals are:

- ensure that all stakeholders (community groups, service clubs, local agencies and institutions, businesses, and municipal staff, etc.) have the opportunity to participate in the development of the management plans, to the extent that they are willing and/or able to do so;
- provide interesting and stimulating discussion forums, which will enable everyone to be engaged in meaningful discussion about the development of the management plans;
- actively engage and inspire key audiences in the creation of the management plans through the use of innovative tools and techniques;
- ensure that participants are informed and kept up to date on the progress of the plans;

- inform the development of the management plans through a collaborative and participatory process; and
- promote and engage a natural resource stewardship ethic among Cootes to Escarpment EcoPark System users.

The engagement and communications program includes seven key components that will be rolled out throughout the next phases of the project (Table 1).

Table 1. Key Engagement Components in Phase 1

Developing a Stakeholder List

A comprehensive stakeholder list that includes over 130 individuals and stakeholder organizations with a potential interest in the management plans was developed and organized under three categories:

- Complete List: includes all potential stakeholders, the intent being that this represents all people who should be notified about the project and receive invitations to the Community Meetings.
- Stakeholders to gather information from: includes a subset of the complete list and represents stakeholders that we expect can provide information on inventory, existing conditions and potential management issues and opportunities. They were invited to Information Gathering Sessions.
- Stakeholder Advisory Committee: includes a smaller subset of the complete list and represents knowledgeable and interested individuals who were invited to review reports and provide guidance to the consultant team.

Stakeholder Advisory Committee

An advisory committee has been established that is comprised of approximately 6-10 representatives from key project stakeholder organizations with a broad geographic interest in the area. This committee will meet three times to discuss the development of the management plans and is comprised of representatives from (*confirmation pending):

- Greenbelt Council/Foundation
- Hamilton Harbour Remedial Action Plan
- Department of Athletics and Recreation, McMaster University
- Bicycle Works (a local, privately-owned bicycle shop)
- Ministry of Natural Resources and Forestry

- Hamilton Naturalists' Club*
- Burlington Green*
- Niagara Escarpment Commission*
- North Aldershot Residents Association*
- Hager Creek Stewardship Group*
- Friends of Kerncliff Park*
- Iroquoia Bruce Trail Club*

Key Informant Information Gathering Sessions

Six stakeholder information gathering sessions were held on April 28th, May 1st and June 19th 2015 to discuss management issues and gather information on natural heritage, cultural and recreation resources. A total of approximately 20 invitees attended. Invitations were extended to external stakeholders representing: aboriginal groups, government and agencies (including local municipalities and the local conservation authority), committees to City of Hamilton and City of Burlington Council, educational institutions, business and development organizations, local utilities and transit, as well as environmental, trails, community, agricultural and heritage groups. Each session began with welcoming remarks and a brief introduction to the project from the Cootes to Escarpment EcoPark System Project Coordinator and consultant team members. Participants then engaged in a facilitated discussion to identify any data gaps and issues and opportunities for management on the sites.

1.4.3 Data Collection and Analysis

In order to organize information and prepare a format for reporting information within the Waterdown-Sassafras Woods Heritage Lands, the partner-owned parcels were subdivided and named based on ownership and habitat similarity (Figure 2). The parcels are referred to throughout this report, and are as follows:

- Bayview Park/Indian Creek
- City View Park
- Falcon Creek
- Forestvale Park
- Hughes Property
- Kerncliff 1
- Kerncliff 2
- Kerns/Westbury Park
- McNally Property
- Sassafras Tributary
- Tyandaga Golf Course
- Upper Hager Creek
- Upper Rambo Creek/Mansfield Park
- Waterdown Road
- Waterdown Woods

Available background information and data were collected from the various partner agencies and a list of available reports, data sets, and maps was compiled (Appendix 1). This list was used to keep track of requested and received information, as well as the source of each Geographic Information System (GIS) layer for metadata purposes.

Fieldwork was prioritized based on data gaps, as well as a desire to visit all partner-owned properties. Fieldwork was undertaken primarily in July 2015, but included initial reconnaissance surveys in late April and some follow-up visits in September (Table 2).

Table 2. Dates of fieldwork completed.

Date	Description
22 April 2015	Reconnaissance tour with study team
10 July 2015	Forestvale Park Kerns/Westbury Park Tyandaga Golf Course Upper Rambo Creek/Mansfield Park
15 July 2015	Waterdown Road Sassafras Tributary Bayview Park/Indian Creek
16 July 2015	Waterdown Woods Falcon Creek Upper Hager Creek
4 August 2015	McNally Property Hughes Property
5 August 2015	City View Park Kerncliff 1 Kerncliff 2

Method for Planning Inventory

To prepare the planning review, the following source documents were referenced:

- Niagara Escarpment Plan
- Niagara Escarpment Development Control Regulation
- Parkway Belt West Plan, as amended
- Parkway Belt Land Use Regulation 482/73
- Greenbelt Plan – Plan of Boundary of Protected Countryside
- Greenbelt Plan Maps
- City of Hamilton Official Plan
- City of Hamilton Zoning Bylaw 05-200
- Halton Region Official Plan
- City of Burlington Official Plan
- City of Burlington Zoning Bylaw 2020

The Parkway Belt Land Use Regulation applies through North Aldershot, except where revoked site specifically. Local knowledge was used to assess implications for the Current EcoPark Lands. For example, there are several locations where revocation is either known or expected to have occurred. Information collected from the planning analysis was incorporated into a Characterization Matrix (Appendix 2) that summarizes the planning, policy and legislative framework for each parcel.

Method for Recreation Inventory

Members of the Steering Committee provided mapping in digital (GIS) and hard copy formats showing existing unsanctioned and official trails and proposed trail and cycling networks within Hamilton and Burlington. Land Stewardship Plans developed by the Bruce Trail Conservancy were also provided and reviewed. The trails from these various reports and maps were compiled and layered in GIS, along with identifying steeply sloped areas, access points and locations where trails extend outside of the Heritage Lands into neighbouring properties.

Representative sections of the partner-owned properties were visited between June and August (Table 2) to identify additional access points, walk trails and identify management issues. Where potential management issues and additional access points were noted, they were recorded by GPS and compiled with the trails data. This provided a composite base plan of all mapped trails and access points. The map will be used to evaluate opportunities and constraints in the context of developing the management recommendations subsequent to this phase of the project. The background review work was augmented with consultations consisting of an interview with a mountain biking enthusiast, and phone conversations and emails with members of the Bruce Trail Conservancy, Conservation Halton, Iroquoia Bruce Trail Club, and Ontario Disc Golf Association.

A Focus Group was held with several representatives with involvement in trails (Appendix 4), and the following additional resources were identified and reviewed as part of the background review:

- Hike Ontario Trails literature;
- International Mountain Biking Trail Design Guidelines;
- Waterdown Road Corridor Class EA, 2012;
- King Road Reconstruction Municipal Class EA, 2014; and
- City of Burlington Draft Community Trails Strategy (current).

During the inventory phase the consultant team was made aware that the City of Burlington is currently developing a Community Trails Strategy that will carry out the City's vision for a linked open space system. The study will build on the City's existing trail system and address the following key objectives:

- engage the public and stakeholders;
- develop design guidelines for future projects;
- develop a plan that will result in a connected network of trails throughout Burlington;
- continue the trail signage program;
- prepare a phased implementation plan;
- identify maintenance standards for trails; and
- establish a strategy to promote Burlington's trails and encourage public use.

The outcomes of the study will be incorporated into the management plan process to ensure alignment with principles and management outcomes. In addition, *Managing Recreational Trail Environments for Mountain Bike User Preferences* (Symmonds et al. 2000) was reviewed as part of the research for this management plan.

Method for Natural Heritage Inventory

A Data Gap Analysis was completed to identify areas where natural heritage data were lacking and to assist in the prioritization of fieldwork (Appendix 3). The Halton Natural Areas Inventory (Dwyer 2006) was the primary source of natural heritage information. Information was also compiled from Conservation Halton's species occurrence data base, and rare species records from the Natural Heritage

Information Centre. Information was also included from the Hamilton Natural Areas Inventory (Schwetz 2014), and Bruce Trail Conservancy Land Stewardship Plans.

Vegetation resources include Ecological Land Classification (ELC) for Southern Ontario (Lee et al. 1998). ELC data were provided by Conservation Halton, Hamilton Conservation Authority, Bruce Trail Conservancy, and North-South Environmental Inc. The ELC units were completed to the Vegetation Type level wherever possible. Community Series level was used for vegetation units that were not well-described in the ELC system (e.g., some cultural vegetation types do not fit well within the First Approximation ELC system). For the most part, vegetation types have been identified for natural communities. Incidental observations of wildlife and any other noteworthy occurrences (e.g., wildlife habitat, seepages, disturbances, etc.) were recorded, and GPS coordinates were taken where appropriate to enable mapping of management issues.

Natural heritage data were entered into a Microsoft Access database. Data were analysed to determine the presence of rare species and species at risk, and to determine the floristic quality of the partner-owned land parcels. Percentages of native and non-native species, Floristic Quality Index (FQI) (Oldham *et al.* 1995), and Native Mean Coefficient of Conservatism (Native Mean C), were calculated for the Current EcoPark Lands. These analyses provide a relative measure of vegetation quality.

Species lists were screened for provincial, regional and local significance. Provincial flora and fauna rarity was based on rankings provided by the Natural Heritage Information Centre (NHIC; identified as S1-S3) or species identified as endangered, threatened or special concern by COSEWIC[1] and/or COSSARO[2]. Halton Regional floral and faunal rarity status has been based on listings provided by the Halton Natural Areas Inventory (Dwyer 2006). Fauna area-sensitivity was based on species reported as area-sensitive in the Ministry of Natural Resources Significant Wildlife Habitat Technical Guide Appendix C (MNR 2000).

Mapping was completed in ArcMap using GIS. ELC maps were compiled based on data sources from Conservation Halton, Bruce Trail Conservancy, and the fieldwork completed by North-South Environmental. Rare species mapping was prepared based on data provided by Conservation Halton, the NHIC and fieldwork records by North-South Environmental. Trails and access point mapping was prepared based on data provided by Conservation Halton and the Bruce Trail Conservancy.

Method for Cultural Inventory

The background examination of cultural heritage resources included a physical windshield and pedestrian survey of the various Current EcoPark Lands within the Heritage Lands. This survey was complemented with background research on area settlement, the identification of cultural heritage resources of cultural heritage significance or interest and consultation with local municipalities. Halton Region and the City of Hamilton both have Archaeological Master Plans in place. The locations of archaeological sites are restricted to in-house use. Archaeological potential is shown in the mapping of the Master Plans, but is rather general in scope and relates mainly to the watercourses. Actual archeological sites are not shown to protect sites from disturbance and potential theft.

[1] Nationally rare species are designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are subject to the Federal Species At Risk Act.

[2] Provincially rare species are designated by the Committee on the Status of Species At Risk in Ontario (COSSARO) and are subject to the Ontario Endangered Species Act.

The inventory of existing cultural heritage resources included the review of the "Imperial Atlas of Wentworth County, 1903, Township of Flamboro, East, the Department of National Defense Topographic Mapping, 30 M/5, 1938 and 30 M/5, 1968 and the Ontario Ministry of Natural Resources aerial photography, dated 1954. The City of Hamilton's Inventory of Buildings of Architectural/or Historical Interest, Volume 2 was completed. Consultation with the City of Hamilton, the City of Burlington, and Ontario Heritage Trust was undertaken to confirm the identification of cultural heritage resources within the study area. The City of Burlington was contacted but no identified sites were listed or designated under the Ontario Heritage Act within the City of Burlington portion of the Heritage Lands.

Method for Management Issue Inventory

Management issues and opportunities were documented during the review of background information, through targeted fieldwork and from discussions held during the stakeholder engagement sessions, Steering Committee meetings and additional meetings with key stakeholders, including Conservation Halton staff. A list of all individuals and/or agencies consulted is included in Appendix 4. Management issues and opportunities were recorded in table format to provide a framework for organizing issues, opportunities, the general location of where a particular issue occurs, as well as possible recommendations. This table remains a work in progress, and will provide a concise summary for the management plan which will be prepared later in the study process. Management issues mapping was prepared, along with a key map of management issue locations which can be used to reference details pertaining to each management issue and photographs.

2.0 Land Use

2.1 Existing Land Uses

Much of the Heritage Lands consist of upland woods and idle and/or abandoned agricultural lands, which are now used for conservation and passive recreation, including the Bruce Trail. Residential development extends along Waterdown Road on the escarpment slopes adjacent to the Heritage Lands to the west. Three hydro rights-of way transect the area. In addition, bike and ATV trails also randomly cross through the area. A radio communication tower is present adjacent to King Road on the escarpment brow. An abandoned quarry is located on the escarpment brow in Kerncliff 1 and has been repurposed and rehabilitated as a City of Burlington park (Figure 2). Existing uses include several City of Burlington parks with active recreational uses (i.e., playgrounds, sports fields), and a golf course.

Above the escarpment, adjacent land use is currently predominantly agricultural, except for suburban residential development on the east side of Waterdown; however, much of this land has been recently approved for residential development. Downslope of Waterdown Woods, several industrial sites are present, including clay and shale quarries, and two closed landfill sites (the former Regional landfill east of Falcon Creek and Bayview Park/Indian Creek on Figure 2). Historically, this area was logged prior to the 1940s and shale extraction undertaken within the area that subsequently was used for landfill. Reportedly, this area was known as the “badlands” of southern Ontario due to the exposed nature of the clay and erosion processes.

Below the escarpment brow, wooded natural areas are also present on the lower escarpment slopes, and in the ravine valleys above Highway 403 (Falcon Creek and Indian Creek ravines). The Tyandaga and Brant Hills suburban residential areas are located below the escarpment either side of Kerns Road. Most

of the land along and below the escarpment falls within the Niagara Escarpment Plan and the Parkway Belt West Plan policy area designated by the provincial government and has been designated as either Natural Area Public Open Space or Complementary Open Space (under the Parkway Belt West Plan) or as Escarpment Natural Area or Protected Countryside.

2.2 Future Planned Uses

The following is a summary of current development applications affecting private and public property in the general vicinity of the Waterdown-Sassafras Woods Heritage Lands. This summary was prepared based on information provided by or available from the City of Burlington and the City of Hamilton.

2.2.1 City of Burlington

- 1775 King Road – Hanson Brick Ltd.

The City of Burlington has advised that Hanson Brick proposes to commence tree clearing within the East Quarry lands of the Aldershot Quarry located west of the Upper Hager Creek parcel (Figure 2). These lands are subject to a Class A Licence under the Aggregate Resources Act.

- Skyview Drive/Forestvale Drive

The City of Burlington has advised that Hydro One will be conducting tree cutting operations along the transmission corridor in the Skyview Drive/Forestvale Drive area in 2015. The work is being undertaken by Hydro One in accordance with the North American Electric Reliability Corporation which requires management of vegetation within transmission corridors to ensure hydro electric supply. It is understood Hydro One is informing landowners along the affected corridors through correspondence and meetings, where required.

- 2100 Brant Street – Roman Catholic Episcopal Corporation of the Diocese of Hamilton

It is reported that the Diocese is selling the 11.06 ha of vacant property which abuts the Tyandaga Golf Course (Figure 2).

2.2.2 City of Hamilton

- 392-526 Dundas Street East – Waterdown Bay Ltd.
  City File 25T-200513

The property known as 392-526 Dundas Street East is comprised of 125 ha of land extending from Mountain Brow Road north to Dundas Street East and extending from Flanders Drive east to the line separating Lots 1 and 2, Concession 3 in the Geographic Township of East Flamborough, now in the City of Hamilton, and within the Waterdown urban area. These lands are located on the north side of Mountain Brow Road opposite Waterdown Woods (Figure 2).

The application is a plan of subdivision which was draft approved by the Ontario Municipal Board on April 14, 2014 together with an implementing Zoning Bylaw amendment to the Town of Flamborough Zoning Bylaw 90-145-Z. The approval permits a total of approximately 2,574 residential units in a variety

of types and tenures together with district commercial, convenience commercial, school, park and other blocks for public purposes, and a system of roads. Included are reservations of open space approximately 11.0 ha in size north of the untraveled Mountain Brow road allowance adjacent to Waterdown Woods.

It is understood that the draft approved plan of subdivision will be implemented in phases as transportation and servicing requirements permit.

It is noteworthy that the draft approved subdivision identifies closure and realignment of Mountain Brow Road east of Flanders Drive as Burke Street extending north to Dundas Street East.

- 562 Dundas Street East – Kerncliff Trust
  City File 25T-200711

The property known as 562 Dundas Street East is comprised of 36.4 ha of land extending north of the Mountain Brow unopened road allowance to Dundas Street East, adjacent to Kerns Road and within the Waterdown urban area. These lands are located on the north side of the Mountain Brow road allowance on the west side of Kern's Road opposite Kerncliff Park and City View Park within the City of Burlington.

The application was submitted in 2007 for approval of a plan of subdivision to permit an adult life style residential community on 16 ha of land comprising several development blocks, together with blocks for open space, various public uses and roads. Approximately 16 ha of land as Block 7 has been identified as environmentally sensitive area and part of the Waterdown Woods ESA.

Currently the application is pending and has not received draft approval at this time.

2.3 Utilities Adjacent to Current EcoPark Lands

Enbridge Pipelines Inc.

Enbridge Pipelines Inc. operates a petroleum pipeline in the east sector of Waterdown-Sassafras Woods Heritage Lands. Above the Niagara Escarpment, the pipeline parallels Kerns Road, turning easterly adjacent to Kerncliff Park to follow the Hydro One Burlington-Richview Transmission Line through the City of Burlington. The affected adjacent Heritage Lands are the Tyandaga Golf Course, Waterdown Woods, Kerncliff 1, and City View Park (Figure 2).

Enbridge Pipelines Inc. has no planned changes to the pipeline physical plant within the easement or on pipeline lands. Enbridge Pipelines intends to exercise the rights of the pipeline easement/agreements which are understood to include vegetation removal on the easement, access for maintenance, etc. No buildings or structures are permitted on the pipeline lands and crossing by roads require Enbridge Pipelines approval.

Trans Canada Pipelines Limited

Trans Canada Pipeline operates a petroleum pipeline which is oriented generally east-west through the Waterdown-Sassafras Woods Heritage Lands. The pipeline is located south of the Hydro One Dundas Burlington Transmission Line except east of Kerns Road, the pipeline follows the Bell Trunk Line,

extending east to Brant Street. The affected Waterdown-Sassafras Woods Heritage Lands are Waterdown Woods, Kerncliff 1, and Upper Rambo Creek/Mansfield Park.

Trans Canada Pipelines advised that there are no known changes to the pipeline physical plant within the easement or on pipeline lands. Trans Canada Pipelines intends to exercise the rights of the easement/agreements which is understood to include operating and maintaining the pipeline, which may include vegetation removal on the easement, access for maintenance, excavation as may be needed, etc.

Hydro One

Hydro One owns and operates high voltage transmission lines extending from the Burlington Transformer Station at the Freeman Interchange (QEW/Hwy 403/Hwy 407) and affecting the Waterdown-Sassafras Woods Heritage Lands. The transmission lines are described as follows:

- Mount Hope Transmission Line (oriented east-west and generally parallel to Highway 403).
- Dundas-Burlington Transmission Line (oriented east-west and defining the southerly extent of the Niagara Escarpment Plan area).
- Burlington-Guelph Transmission Line (oriented northwest-southeast extending from the transformer station through the Waterdown built-up area).
- Burlington-Richview Transmission Line (oriented east-west extending through the Burlington built-up area).

The affected adjacent Waterdown-Sassafras Woods Heritage Lands are Waterdown Woods, Upper Hager Creek, Tyandaga Golf Course, Falcon Creek, Bayview Park/Indian Creek, and Sassafras Tributary (Figure 2).

Hydro One has no known planned changes to the transmission facilities and intends to exercise the rights of any easements/agreements or owned transmission properties where they exist for the purpose of operating and maintaining transmission facilities.

Hydro One conducts a program of vegetation management on transmission corridors to assist with compliance with the North American Electrical Reliability Corporation (NERC) and to meet corporate standards (www.hydroone.com/ourcommitment/pages/vegetation.aspx). Hydro One is planning vegetation removal on transmission corridors at various locations in the City of Burlington, has informed the City and will be informing residents and businesses along the corridors.

Hydro One owns and operates extensive high voltage transmission and low voltage distribution systems throughout Ontario on corridors and rights-of-way owned by Hydro One, the Provincial government, private property owners, railway companies and First Nations communities. Many of the corridors have sufficient space for expansion of transmission facilities and potentially, secondary land uses. The Province has implemented a Provincial Secondary Land Use Program to allow for secondary use of the corridors while recognizing the primary purpose to facilitate electricity transmission and distribution.

Secondary use of corridors and rights-of-way are dealt with on a site specific basis by way of municipal consultation, submission of a proposal by proponent to Hydro One followed by stakeholder review to ensure technical compatibility. If approved and the proponent agrees to terms and conditions of use, an agreement is completed between the proponent and Infrastructure Ontario.

A number of key technical considerations apply to secondary land uses including minimum vertical clearance to transmission lines, access to transmission structures, roads and parking design and location, no permanent buildings, maximum mature height of landscape plantings, grading, drainage and stormwater management requirements (www.hydroone.com/secondarylanduse/pages/default.aspx).

Bell Canada

Bell Canada maintains a cross-country trunk line easement which extends on a north-south orientation from the Bell service building on the northeast quadrant of the intersection of Waterdown Road and the North Service Road to Brant Street, south of its intersection with Beaufort Drive/Cavendish Drive. Based on available information, the Trans Canada Pipeline easement appears to flank the Bell trunk easement in the vicinity of Kerncliff Park. The affected Waterdown-Sassafras Woods Heritage Lands are Sassafras Tributary, Falcon Creek, Waterdown Woods, Kerncliff 1, Kerncliff 2, and Upper Rambo Creek/Mansfield Park (Figure 2).

Bell Canada advises that the former overhead plant on the easement has been removed and there is no buried plant on the easement. Bell Canada also advised that it wishes to maintain its property interest in the easement and exercise the easement and agreement rights.

3.0 Planning Context and Policy Framework

The existing planning policy and regulatory framework in this area is complex due to multiple jurisdictions at the Provincial and municipal levels, and changes between these jurisdictions some of which are in-progress. Further, the boundaries between the municipal and provincial jurisdictions are not the same.

This section provides a summary outline of the planning policy and regulatory framework. Planning documents are by nature living documents and subject to change. Existing available information has been used to establish the jurisdictional limits, including Zoning By-laws and Provincial regulations. At the time of detailed project planning, it is important to obtain updated information and confirm applicable requirements.

3.1 Planning Policy

3.1.1 Greenbelt Plan, 2006

The Greenbelt Plan is complemented by the Provincial Growth Plan, 2006.

The Greenbelt Plan identifies where urban growth will not occur in order to protect the agricultural land base and ecological features and functions of the landscape.

The Niagara Escarpment Plan and the Parkway Belt West Plan both form part of the Greenbelt Plan and continue to apply where they exist. In these areas, the Protected Countryside policies of the Greenbelt Plan do not apply except section 3.3 applies in the case of the Niagara Escarpment Plan area and sections 3.2, and 3.3 apply in the case of the Parkway Belt West Plan Area. The boundary between the Niagara Escarpment Plan and the Parkway Belt West Plan is the Dundas – Burlington Transmission Line and the Bell Trunk Line. Lands east of Kerns Road and south of the Bell Trunk Line are within the Urban Area and unaffected.

The Waterdown Woods – Sassafras Woods Heritage Lands south of the Dundas – Burlington Transmission Line/Bell Trunk Line in the City of Burlington are in part, designated in the Greenbelt Plan as Protected Countryside with a Natural Heritage System overlay designation. This affects the following properties:

- Sassafras Tributary;
- Falcon Creek; and
- Waterdown Woods.

Since these lands are not considered prime agricultural area, the permitted uses in the Protected Countryside include existing uses which can continue and expand, and new non-agricultural uses including recreational uses, all subject to criteria. Key criteria are the appropriateness of the use for the rural setting, the manner of servicing and the natural heritage requirements outlined below.

The overlying Natural System policies require no negative impacts by new development on natural heritage and hydrologic features, and functions. Connectivity between these features shall be maintained and if possible enhanced. Except recreation uses, the disturbed area of any site, and impervious surfaces shall not exceed 25% and 10% of the total developable area respectively.

The Natural Heritage System policies also define key natural heritage and hydrologic features. Development is not permitted within these features except existing uses, forest, fish and wildlife management, conservation and flood control necessary to the public interest, and recreational uses. New development and site alteration within 120 m of any key natural heritage or hydrologic feature requires an environmental evaluation to establish an appropriate vegetation protection zone in natural self-sustaining vegetation. For wetlands, seepage areas, springs, fish habitat, streams, lakes and significant woodlands, a minimum vegetation protection zone of 30 m is required from the feature outside boundary.

These Greenbelt Plan policies are implemented by the Official Plans of the upper and lower tier municipalities.

3.1.2 Parkway Belt West Plan, 1978

The general intent of the Parkway Belt West Plan is to define and separate urban areas, provide linkages between urban areas for transportation, communication and utilities, reserve lands for such linear facilities, open space and unanticipated needs, and preserve prominent features. Amendments 105 and 120 significantly reduced the extent of the Parkway Belt West Plan in the west portion of North Aldershot. In this area, the Plan is limited to a section of the Upper Hager Creek valley and to various utility corridors.

Upper Hager Creek and the adjacent portion of Waterdown Woods are designated as Public Open Space and Buffer Area. The Burlington – Guelph Transmission Line, the Dundas – Burlington Transmission Line and the Mount Hope Transmission Line are designated as Electric Power Facility, and the Bell Trunk Line and an abutting section of the Enbridge Pipeline are designated as Utility.

Adjacent to the Bell Trunk Line extending from the Mount Hope Transmission Line east of Falcon Creek to Brant Street, the Plan identifies an approximate 30m wide allowance for future utilities. The intent of the Plan is public acquisition of an approximate 30m right-of-way in this area for future utility

connections between the Hamilton urban area and Toronto through the Oakville and Mississauga urban areas.

The permitted uses in the Public Open Space and Buffer Area are limited to existing uses, linear facilities for transportation, communication and utilities, public open space and buffers, and related incidental uses, other open space uses provided that they are available to the public and other (unanticipated) public uses. These use permissions are subject to criteria with the intent of protecting natural features, maintaining open space character and minimizing building height, bulk and coverage.

The Greenbelt Plan policies which apply in the Parkway Belt West Plan are the same Natural System policies outlined above and policies for Parkland, Open Space and Trails. These latter policies speak to the municipal role in providing a full range of built and natural settings for public recreation, and considerations for municipal parkland strategies and trail strategies. These policies recognize Conservation Authority and Provincial parklands as important components of the system of parklands.

The Parkway Belt West Plan is implemented by the Official Plans of the upper and lower tier municipalities, and by Parkway Belt Land Use Regulation also known as a Minister's Zoning Order.

3.1.3 Niagara Escarpment Plan, 2005

The purpose of the Niagara Escarpment Plan is to maintain the Niagara Escarpment and land in the vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment.

The Plan sets out seven land use designations which define how land shall be used including permitted uses and lot creation. Development criteria applicable in each designation determine how a proposed land use or development shall be carried out. The Plan also sets out policies for the system of parks and open space within the Plan area.

The Waterdown-Sassafras Woods Heritage Lands north of the Dundas – Burlington Transmission Line and Bell Trunk Line within the City of Burlington and the City of Hamilton are subject to the Niagara Escarpment Plan and variously designated as follows:

- Escarpment Natural Area
    - Waterdown Woods;
    - Kerncliff 1;
    - City View Park;
    - Upper Rambo Creek/Mansfield Park;
    - Hughes Property; and
    - McNally property.

- Escarpment Protection Area
    - McNally property;
    - Waterdown Woods;
    - Kerncliff 1;
    - Kerncliff 2; and
    - City View Park.

Some properties bear more than one land use designation depending on the physical conditions and property context. Generally, Escarpment Natural Areas are wooded slopes or landforms associated with the escarpment, the most significant stream valleys, wetlands and Areas of Natural and Scientific Interest (ANSIs). Escarpment Protection Areas are similar slopes and landforms but where existing land uses have altered the natural environment, areas in close proximity to escarpment slopes, Regionally Significant ANSIs and designated Environmentally Sensitive Areas.

Escarpment Natural Area is the most restrictive designation, followed by Escarpment Protection Area.

Subject to the applicable Development Criteria, a partial list of permitted uses in the Escarpment Natural Area includes existing uses, non-intensive recreation uses such as nature viewing and trail activities excluding motorized vehicles, forestry, fish and wildlife management, essential watershed management, flood and erosion control by public authority or under public supervision, archaeology, essential transportation and utility facilities, accessory buildings and structures, incidental uses, The Bruce Trail and related trail installations, unserviced overnight rest areas, and access points, and uses permitted in park or open space master/management plans not in conflict with the Niagara Escarpment Plan.

Subject to the Development Criteria, a partial list of permitted uses in the Escarpment Protection Area are the same but include agricultural operations and accessory small scale commercial uses in non-agricultural areas, small scale institutional uses and recreation uses which are oriented toward the land which require minimal changes to features (natural, topographic, landscape), and do not require major structures (e.g. picnic sites, day use sites, unserviced camp sites, trail uses).

The Development Criteria set out performance standards to be implemented with all permitted uses. Since the criteria deal with a variety of conditions, all criteria will not apply to every circumstance. The criteria address general matters of site capacity, servicing and design, and specific matters of steep slopes and ravines, water resources, wooded areas, wildlife habitat, forestry, cultural heritage, recreation, ANSIs and the Bruce Trail.

The Niagara Escarpment Plan also sets out a policy framework for the Niagara Escarpment Parks and Open Space System (NEPOSS) including the overall park system concept, park and open space classification, zoning and master/management planning policy. The following Waterdown-Sassafras Woods Heritage Lands within the Niagara Escarpment Plan area are classified within the NEPOSS system:

- Kerncliff Park (Natural Environment)
    - Kerncliff 1

- Burlington City Park (Recreation)
    - City View Park

- Waterdown Woods (Nature Reserve)
    - Waterdown Woods

Nature Reserves represent the most significant and distinctive natural areas and land forms, and serve to protect Areas of Natural and Scientific Interest. Management practices and uses are to protect in perpetuity, the features and values for which the reserve was established. Access and activities in these

areas will be limited, and facilities will be the minimum necessary to support scientific research, nature appreciation and similar uses.

Natural Environment parks are characterized by variety of natural features, historical resources and landscapes, and provide protection for natural and cultural features. Activities range from trail uses to camping and day use in the more developed, and accessible areas.

Recreation parks are some of the best recreational environments on the escarpment. They occur naturally or are capable of development to provide a wide variety of recreational opportunities. In Recreation parks, management and development of resources is appropriate in order to provide the recreational environment and facilities (the City View Park is developed with outdoor sports fields and support facilities and natural areas for passive use).

The Greenbelt Plan policies which apply within the Niagara Escarpment Plan area are the same Parkland, Open Space and Trails policies outlined above for The Parkway Belt West Plan.

3.1.4 Halton Region Official Plan 2009

The Regional Official Plan 2009 incorporates the Sustainable Halton planning exercise (ROPA 38), undertaken by the Region to bring the Official Plan into conformity with Places to Grow, the Greenbelt Plan and the Provincial Policy Statement. By orders of the Ontario Municipal Board dated February 4, 2014, and October 2, 2014, certain policies of the Regional Official Plan 2009 were approved and are now in force, and other policies were held for adjudication, including the Regional Natural Heritage System policies. Notwithstanding, this planning summary considers those policies of the Regional Official Plan 2009, approved or otherwise.

The municipal boundary between Halton Region /City of Burlington and the City of Hamilton differs from the boundary between Provincial plans as noted previously. Commencing at Highway 6 and proceeding east, the municipal boundary follows the Mountain Brow Road extension up to Waterdown Road, then follows the crest of the Niagara Escarpment, turning north at Kerns Road. In consequence, east of Highway 6, both municipalities are within the Niagara Escarpment Plan area but only the Halton/Burlington area is within the Parkway Belt West Plan area.

The Waterdown-Sassafras Woods Heritage Lands north of the Dundas – Burlington Transmission Corridor/Bell Trunk Line (and within the Niagara Escarpment Plan) are designated as Regional Natural Heritage System. The jurisdiction of the Niagara Escarpment Plan is also recognized.

South of the same transmission line/trunk line, the Heritage Lands bear various land use designations given the differing planning context by property location and/or features. The jurisdictions of the Parkway Belt West Plan and the Greenbelt Plan are also recognized. The following outlines the applicable designations:

- Regional Natural Heritage System
    - Waterdown Woods;
    - Kerncliff 1;
    - City View Park;
    - Upper Rambo Creek/Mansfield Park;
    - Upper Hager Creek;

  - Forestvale Park; and
  - Falcon Creek.

- Greenbelt Natural Heritage System Overlay
  - Sassafras Tributary;
  - Falcon Creek; and
  - Waterdown Woods.

- North Aldershot Policy Area
  - Falcon Creek

- North Aldershot Policy Area Eligible for Urban Services
  - Waterdown Road

- Urban Area
  - Kerns/Westbury Park;
  - Upper Hager Creek;
  - Tyandaga Golf Course; and
  - Kerncliff 1.

The Regional Natural Heritage System includes components which are:

- Significant habitat of endangered and threatened species (whether identified in the Official Plan or not).
- Significant wetlands
- Significant woodlands
- Significant valleylands
- Significant wildlife habitat
- Significant areas of natural and scientific interest
- Fish habitat
- Enhancements to these key features
- Linkages
- Buffers
- Watercourses regulated by Conservation Halton or that provide a linkage to a wetland, or significant woodland
- Wetlands other than Significant Wetlands
- Escarpment Natural Areas and Escarpment Protection Areas in the Niagara Escarpment Plan, and
- Floodplains regulated by Conservation Halton

In the Regional Natural Heritage System designation, a partial list of permitted uses includes all types, sizes and intensities of agricultural operations outside of designated Escarpment Natural Areas and Regional Natural Heritage System key features, existing uses, non-intensive recreation but only on public land or The Bruce Trail, forestry, fisheries and wildlife management, archaeology, essential transportation and utility facilities, accessory buildings and structures, incidental uses, essential watershed management and flood and erosion control projects by public authority or approved in a local Official Plan as of December 16, 2009, and uses permitted in approved park or open space master/management plans not in conflict with the Niagara Escarpment Plan.

This list of permitted uses is similar to the provisions for designated Escarpment Natural Areas and Escarpment Protection Areas under the Niagara Escarpment Plan.

The basic goal of the Region's Natural Heritage System is to ensure that biological and ecological functions within the Halton landscape are preserved. Alteration of any component of the Natural Heritage System is generally not permitted unless it has been demonstrated that there will be no negative impacts on the natural features or areas, and their functions. Development and site alteration is not permitted in significant wetlands, significant habitat of endangered or threatened species and fish habitat except in accordance with applicable law. Any development or site alteration, including public works, located inside or within 120m of the Regional Natural Heritage System is required to carry out an Environmental Impact Assessment (EIA) unless:

- The proposal is minor in scale and does not warrant an EIA.
- The use conforms to the local Official Plan and is permitted in the Zoning Bylaw.
- The use requires only a Zoning Bylaw amendment and is exempt from the requirement of an EIA by the local Official Plan, or
- As exempt or modified by the Regional Official Plan policies.

Generally, trail development within the Regional Natural Heritage System is encouraged but with limitations, as follows:

- Only on public lands or part of The Bruce Trail.
- No negative impact on ecologically sensitive areas or resource uses such as agriculture.
- Proper regard for private property trespass and liability in the event of property damage or personal injury, and
- Adjacent landowners potentially affected are consulted.

The Greenbelt Natural Heritage System is a Region-wide overlay designation intended to implement the corresponding Greenbelt Plan policies. In this overlay designation, the same key features for the Regional Natural Heritage System apply together with the following:

- Sand barrens, savannahs and tall grass prairies
- Permanent and intermittent streams
- Lakes
- Seepage areas and springs
- Alvars
- Significant habitat of species of special concern.

While the two Natural Heritage Systems have different policies, they are intended to complement each other. Development within the Greenbelt Natural Heritage System is subject to the Greenbelt Plan policies.

Development is generally prohibited within the key features of the Greenbelt Natural Heritage System except as per the Plan policies. The permitted uses within key features include forestry fisheries and wildlife management (if carried out to maintain or improve these features), conservation and flood or erosion control (if necessary to the public interest after all alternatives are considered), essential

transportation and utility facilities, non-intensive recreation where negative impacts are minimized, and existing uses.

Any development including the public works within the Greenbelt Natural Heritage System or within 120m of a key feature is subject to an EIA which must identify vegetation protection zones of sufficient width to protect the key feature and to achieve natural self-sustaining vegetation. For wetlands, seepage areas, springs, fish habitat, streams, lakes and significant woodlands, the minimum required vegetation protection zone is 30m.

The North Aldershot Policy Area designations implement the 1994 North Aldershot Inter-Agency Review. The intent is to maintain the unique character of the North Aldershot area within the context of the surrounding built-up area and to provide for limited development in certain areas while preserving significant natural areas, and the predominantly rural and open space landscape.

A partial list of permitted uses in the North Aldershot Policy Area designation include existing uses, non-intensive recreation on public lands or The Bruce Trail, recreation uses including golf courses and driving ranges subject to specific conditions related building scale, site design, water use etc., forestry, fisheries and wildlife management, archaeology, transportation and utility facilities, accessory and incidental uses, and uses permitted in local Official Plans and Zoning Bylaws which implement the North Aldershot Inter-agency Review planning framework. All such permitted uses are subject to Regional Natural Heritage System boundary revisions to bring this designation into conformity with the Greenbelt Plan and the heritage systems approach. Upon such revision, the Regional Natural Heritage System and Greenbelt Plan policies will apply based on the revised Natural Heritage System boundaries.

All development in the North Aldershot Policy Area designation is permitted only on the basis of individual well and septic systems and subject to the Region's Guidelines on Hydrogeological Studies.

Within the North Aldershot Policy Area Eligible for Urban Services designation, development on full municipal services is permitted, subject to the Region's Urban Servicing Guidelines. As the affected Sassafras Woods property 1 is a Regional water reservoir, further development appears to be unlikely.

In the Urban Area designation, the range of permitted uses and the creation of new lots will be in accordance with the requirements of the local Official Plan and Zoning Bylaw. All such development must conform to the Regional Plan policies. In the Waterdown Woods – Sassafras Woods Heritage Lands, the affected lands are ravines, municipal parks and a golf course within established residential neighbourhoods.

3.1.5 City of Burlington Official Plan, 2006

The land use designations and policies of the City Official Plan as they affect the Waterdown-Sassafras Woods Heritage Lands implement the North Aldershot Inter-agency Review planning framework, the Regional Official Plan and the Provincial Plans where they apply.

The portions of The Heritage Lands located outside of the North Aldershot Planning Area are within the Urban Planning Area Boundary. This affects lands in the North Service Road prestige industrial area and generally east of Kern's Road, and the Bell Trunk Line.

These Heritage Lands are variously designated in the City Official Plan, as follows:

- Greenlands (Escarpment Plan Area)
  - Waterdown Woods;
  - Kerncliff 1;
  - City View Park;
  - Upper Rambo Creek/Mansfield Park; and
  - Hughes property.

- Escarpment Protection Area
  - Waterdown Woods;
  - Kerncliff 1;
  - Kerncliff 2; and
  - City View Park.

- Parkway Belt West
  - Waterdown Woods

- Environmental Protection
  - Sassafras Tributary;
  - Falcon Creek; and
  - Waterdown Woods.

- Infill Residential
  - Waterdown Road

- Recreation/Open Space (with Former Waste Disposal Site)
  - Falcon Creek; and
  - Bayview Park/Indian Creek.

- Business Corridor
  - Falcon Creek;
  - Bayview Park/Indian Creek; and
  - Upper Hager Creek.

- Residential Low Density
  - Upper Hager Creek;
  - Waterdown Woods;
  - Forestvale Park;
  - Kerns/Westbury Park;
  - Upper Rambo Creek/Mansfield Park; and
  - Kerncliff 1.

- Major Parks and Open Space
  - Tyandaga Golf Course

The following Waterdown-Sassafras Woods Heritage Lands are recognized as within an Environmentally Sensitive Area (ESA):

- Waterdown Woods;
- Sassafras Tributary;
- Falcon Creek; and
- Kerncliff 1.

It is noted that all City Official Plan land use designations within the current Parkway Belt West Plan area are deferred and have no status. For the affected lands in Waterdown Woods 3 and the Upper Hager Creek, the operative City land use designation are those contained in the City Official Plan 1971 which recognizes the jurisdiction of the Parkway Belt West Plan, 1978. As a practical matter, there is no significant difference.

The general intent of the City Official Plan in North Aldershot is to protect significant environmental areas, maintain the general open space setting, ensure that existing roads retain their character and ensure that new development is integrated with existing development, and compatible with existing settlement character.

The Parkway Belt West designation on portions of the Waterdown Woods 3 property and Upper Hager Creek property 11 reflects the intent and requirements of the Parkway Belt West Plan.

The Environmental Protection Area designation includes ESAs, watercourses and valleys including those regulated by Conservation Halton, woodlots, hazard lands, significant wildlife habitat, natural escarpment features, ANSIs, Provincially Significant Wetlands (PSWs), lands below staked top of bank, publicly-owned lands used for open space or conservation purposes, buffers of 7.5m from valleys and 15m from ESAs, and other areas of important natural and landscape interest.

A partial list of permitted uses in the Environmental Protection Area designation includes existing agriculture, existing uses, forestry, fisheries and wildlife management, archaeology, essential transportation and utility facilities, accessory buildings and structures, incidental uses and essential watershed management, and flood control projects by public authority. Non-intensive recreation is permitted only with preservation of natural features to the maximum possible degree, building and structures are minor in scale, and there is no or minimal parking provided. Further, no development is permitted in significant woodlands.

Any development within the Environmental Protection Area designation may require an Environmental Evaluation Report except detached dwellings on existing lots and agricultural uses such as barns, and sheds. Additional policies for the Environmental Protection Area designation reference the context of development and are intended to protect these areas through buffer, land assembly and development setback requirements. Generally, a 15m development setback and buffer is required adjacent to the Grindstone Valley ESA and Sassafras Woods ESA, and a 7.5m setback, and buffer adjacent to all other waterways.

The Recreation and Open Space designation applies to the tableland portions of the two former land fill properties. The permitted uses are parks and open space, low intensity outdoor recreational uses, golf courses subject to specific policies, and associated buildings, and structures. Major natural features are to be preserved and buildings and structures associated with recreational uses shall be minor in scale, and located to secure the open space character of the surrounding area. As these Recreation and Open

Space designated lands are not within areas eligible for urban services in the Regional Official Plan, only private services are permitted in accordance with Regional Guidelines for Hydrogeological Studies.

In the Infill Residential designation, permitted uses are limited to single detached dwellings in associations with existing settlement, subject to lot sizing depending on servicing. As the affected Sassafras Tributary is a Regional water reservoir, further development appears to be unlikely.

The Greenlands (Escarpment Plan Area) designation reflects the intent and purpose of the Niagara Escarpment Plan – Escarpment Natural Area land use designation. A partial list of permitted uses is similar to the Escarpment Natural Area designation; they are existing uses, non-intensive recreation without motorized vehicles, forestry, fisheries and wildlife management, archaeology, essential transportation and utility facilities, accessory uses, incidental uses. The Bruce Trail, essential watershed management and flood control by public authority and uses permitted in parks/open space master/management plans not in conflict with the Niagara Escarpment Plan.

The Escarpment Protection Area designation policies essentially replicate the permitted uses in the same land use designation of the Niagara Escarpment Plan. The policies add that the City will provide comments to the Niagara Escarpment Commission and land owning agencies regarding permitted uses proposed in NEPOSS park and open space master/management plans.

All development in the Greenlands (Escarpment Plan Area) and Escarpment Protection Area designation, unless specifically identified, is to proceed on private self-sustaining services.

The Business Corridor, Residential Low Density and Major Parks and Open Space designations are Urban Planning Area designations. Where the properties take the form of ravines, the Official Plan recognizes the feature schematically by a Watercourse designation.

The general intent of the Business Corridor designation is to provide locations for prestige office and industrial use with good access and high visibility along highways. Permitted uses are wide range of office, industrial, research, utilities and transportation uses, service trades in enclosed buildings, hospitality uses and a limited range of retail, and service commercial uses, subject to criteria. The Business Corridor lands west of King Road including Falcon Creek properties 1 and 2 are subject to site-specific policies which implement the intent of the original Parkway Belt West Plan and the North Aldershot Inter-agency Review for these lands by limiting impervious coverage, maintaining open space character and wooded areas, and hedgerows.

The intent of the Residential Areas designation is to provide for housing and other compatible land uses that are part of the residential environment. In the Residential Low Density designation, the forms of housing are limited to single and semi-detached dwellings, and other ground-oriented housing forms, subject to maximum density limits. The areas flanking Kerns Road and the Tyandaga Golf Course are established stable residential neighbourhoods where change is not anticipated.

In the Business Corridor and Residential designations, the ravines and waterways bear a schematic Watercourse designation. The general intent is to protect life and property and promote fish habitat by reserving these areas from development. Permitted uses are limited to non-intensive outdoor recreation, essential public utilities and services, flood and erosion control facilities, and watershed management. These areas are defined by hazard criteria and are typically regulated by Conservation

Halton Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulations. Typically, these lands are zoned and dedicated to City ownership at the time of development of adjacent lands.

The Major Parks and Open Space designation reflects the City-level parkland function of the Tyandaga Golf Course. Permitted uses in this designation include outdoor recreation uses, golf courses and related facilities and municipal parks, and related community facilities. Connections between parks for pedestrians and cyclists are encouraged as a means to link communities to park facilities and extend the City system of walkways, and bikeways. In all parks, a high priority is to be placed on environmental protection, public safety, public access and visibility from adjacent streets.

All development within these Urban Planning Area designations is to proceed on full municipal services in accordance with Regional Urban Servicing Guidelines.

3.1.6 City of Hamilton Official Plan (Rural March 2012) (Urban August 2013)

The Waterdown-Sassafras Woods Heritage Lands are located within the Rural Planning Area of the City Official Plan. On the Heritage Lands, the intent of the City Official Plan is to implement the requirements of the Niagara Escarpment Plan and the Provincial Policy Statement.

The Heritage Lands are variously designated in the City Official Plan as follows:

- Open Space
  - Waterdown Woods
  - McNally property

- Rural Area
  - McNally property

In addition, these lands are designated within the Natural Heritage System as Core Areas with a small section of linkage on the McNally property.

The Open Space system includes the natural and open space features that form part of the Niagara Escarpment. The predominant use or function of these areas is recreation, conservation and other appropriate open space uses include passive recreation, resource-based tourism and recreation, pedestrian trails, bikeways and walkways, forestry, fishery and wildlife management, hazard lands and limited ancillary uses, subject among other things, to the Natural Heritage System policies.

Lands designated as Open Space and included within the NEPOSS system are required to comply with the policies of the Niagara Escarpment Plan.

Lands within the Rural Area designation are not prime agricultural areas and not natural in state. The permitted uses in the Rural Area designation are limited to agriculture, agriculture-related commercial and industrial uses, on-farm secondary uses, other resource-based rural uses and institutional uses serving the rural community, all subject to specific requirements.

Within the Natural Heritage System policy framework, key natural heritage features are identified, as follows:

- Life Science ANSI
  - Waterdown Woods; and
  - McNally property.

- Significant Woodlands
  - Waterdown Woods; and
  - McNally property.

- Environmentally Significant Area
  - Waterdown Woods; and
  - McNally property.

- Key Hydrologic Feature (Wetlands)
  - Waterdown Woods

- Key Hydrologic Feature (Streams)
  - Waterdown Woods

The Natural Heritage System consists of the Greenbelt Natural Heritage System, the Niagara Escarpment Plan area and Core Areas, and Linkages identified by the City based on the Provincial Policy Statement. The general intent is to protect and enhance these areas, and to provide opportunities for recreation and use where they do not impact natural heritage features. Where two or more natural features of differing significance overlap in the Natural Heritage System, the more restrictive policies pertaining to those features shall apply.

For lands outside of the Greenbelt Natural Heritage System (within the Niagara Escarpment Plan or City Official Plan Urban Area), new development is not permitted within or adjacent to a key natural heritage feature unless evaluated through an EIA and demonstrated that there will be no negative impacts to natural features and ecological functions. New development within or adjacent to any other core area shall also require an EIA with the additional requirements that connectivity between core areas be maintained or enhanced, that removal of other natural features be avoided and that the disturbed area of any site not exceed 25% of the developable area with impervious surfaces not exceeding 10%.

The EIA shall propose vegetation protection zones of sufficient width to protect the core area and achieve natural self-sustaining vegetation. Where vegetation protection zones have not been specified the following minimum zone objectives are to be considered by the EIA:

- Permanent or intermittent stream – 30m, both sides, measured from stable top of bank
- Wetlands – 30m
- Fish habitat – 30m from top of bank or meander belt allowance
- Woodlands – 15m from dripline
- Significant woodlands – 30m from dripline
- ANSI – 30m
- Designated valleylands – 15m from top of bank.

Development adjacent to wetlands, seepage areas, springs, fish habitat, permanent and intermittent streams and significant woodlands shall maintain a 30m vegetation protection zone. Permitted uses in all vegetation protection zones are limited passive recreation uses, conservation, forest, fisheries and wildlife management, existing uses, and infrastructure projects, subject to specific policies.

Linkages are remnant natural features within the landscape that connect core areas. A linkage is shown in the City Official Plan on the southwest portion of the McNally property. The intent is that linkages be protected and enhanced in order to sustain the Natural Heritage System, wherever possible.

Where new development is proposed within an identified linkage, a Linkage Assessment is required. Linkages typically include woodlands, other features such as meadows and streams, and watercourses. The City Official Plan sets out the basic information requirements for Linkage Assessments. The City Council recently adopted new guidelines for EIS and Linkage Assessment Reports.

In addition to linkages, the City Official Plan acknowledges that there are hedgerows that are worthy of protection as they function similar to linkages or represent a feature that contributes to the landscape.

3.2 Planning Regulation

3.2.1 Niagara Escarpment Development Control

Niagara Escarpment Development Control Regulation 828/90 regulates development within the designated Area of Development Control as defined by Regulation 826/90. Within the designated area of development control, all local Zoning Bylaws and Minister's Zoning Orders have no effect. The designated area of development control is not the same as the Niagara Escarpment Plan area. Some sections of the Plan area have been removed from development control, thus allowing local Zoning Bylaws to take effect. Examples are existing subdivided and developed areas within municipal Urban Area boundaries such as the Rockcliffe neighbourhood in Waterdown, adjacent to the Waterdown-Sassafras Woods Heritage Lands.

Current areas of development control are shown schematically on maps available from the NEC. At the time of any proposed development on the Heritage Lands, it is important to confirm whether development control or local zoning applies.

Generally, development control applies in the City of Burlington and the City of Hamilton from the Dundas – Burlington Transmission Line and the Bell Trunk Line north to the urbanized edges of Waterdown. All of the Waterdown-Sassafras Woods Heritage Lands within the Niagara Escarpment Plan Area are subject to development control.

Under the Niagara Escarpment Planning and Development Act, any development in the form of the change of use of land, building or structure requires a development permit prior to the issuance of any other approval unless exempt. Change of use of land includes site alteration.

Under Regulation 828/90, certain classes of development are exempt from the requirement to obtain a development permit if the development is included as a permitted use in the Niagara Escarpment Plan and not in conflict with any development permit issued. There are numerous exemptions, and by way of example include:

1. The maintenance of lands, buildings and structures under the jurisdiction of a conservation authority, the establishment of hiking or cross-country ski trails and the erection of signs for the purposes of property identification or interpretive or recreational information on lands owned by a conservation authority.

2. The maintenance of land, buildings and structures for The Bruce Trail by the Bruce Trail Conservancy and the establishment of The Bruce Trail by the Bruce Trail Conservancy on land owned or managed by agreement with the Bruce Trail Conservancy.

Other exemptions deal with public maintenance matters, forestry, agriculture etc. Any proposed development on the Heritage Lands should be reviewed against the exemption list.

3.2.2 Parkway Belt Land Use Regulation 482/73 (Minister's Zoning Order)

Parkway Belt Land Use Regulation 482/73 was established in 1973 to control development within the Parkway Belt West Planning Area in the City of Burlington pending preparation, approval and implementation of the Parkway Belt West Plan. The regulation applies in the City of Burlington south of the Dundas – Burlington Transmission Line from Highway 6 east generally to the vicinity of Kerns Road, excluding the residential subdivisions in this area. The Parkway Belt West Plan provides that the regulation will be revoked when local Zoning By-laws are brought into conformity with the Plan. Site specifically, the regulation has been amended and revoked numerous times throughout North Aldershot.

Given that the current City of Burlington Official Plan and Zoning By-law 2020 implement the North Aldershot Inter-agency Review, the City has made formal application to the Province to revoke the regulation in its entirety. That application is still in-process. A map showing the areas currently subject to the regulation was not available due to mapping discrepancies between the City and the Ministry of Municipal Affairs and Housing as to the extent of previous revocations.

Parkway Belt Land Use Regulation 482/73 co-exists with the local Zoning Bylaws such that the more restrictive prevails. The current City-proposed revocation is intended to give the underlying local Zoning Bylaw sole jurisdiction and effect.

The regulation recognizes uses that existed lawfully before the regulation came into effect (August 4, 1973) and prohibits all other uses except agricultural uses, and accessory building and structures, including one single detached dwelling, subject to requirements for lot area, lot frontage, yards and dwelling size. Additional requirements address residential additions, residential accessory buildings and structures, and street/highway setbacks.

A key regulation states that the City of Burlington and any Provincial or Federal ministry, department or agency, telephone company, Hydro One, gas company holding franchise in Burlington and Conservation Halton may use land or erect a building or structure for the purpose of providing a service to the public. The phrase "providing a service to the public" is not defined in the regulation. Should the regulation still operate at the time of any development on the Waterdown-Sassafras Woods Heritage Lands, it would be appropriate to consult with the City of Burlington and if necessary, the Ministry of Municipal Affairs and Housing for direction.

3.2.3 City of Hamilton Zoning Bylaw (Flamborough Zoning Bylaw 90-145-Z)

The City of Hamilton is in the process of preparing one comprehensive Zoning Bylaw to implement the City Urban Official Plan and Rural Official Plan by replacing six existing former area municipal Zoning Bylaws. At this time, comprehensive Zoning Bylaw 05-200 includes new downtown, open space and parks, institutional and industrial zones. Currently, the City is finalizing new rural zones. New residential and commercial zones will follow.

Given the above, the former Town of Flamborough Zoning Bylaw 90-145-Z identified zoning on the Waterdown Woods and the McNally property as Parkway Belt Open Space O1 zone where the permitted uses are limited to agriculture, conservation and park. Due to Niagara Escarpment Development Control, this zoning has no effect.

3.2.4 City of Burlington Zoning Bylaw 2020

Zoning Bylaw 2020 recognizes the jurisdiction of Niagara Escarpment Development Control Regulation 828/90 which operates between the Dundas – Burlington Transmission Line and the municipal boundary of the City of Burlington. South of the transmission line, Zoning Bylaw 2020 establishes zones intended to implement the North Aldershot Policy Area provisions of the City Official Plan. Generally east of Kerns Road, Zoning Bylaw 2020 establishes zones which implement the Urban Area provisions of the City Official Plan. Outside of the Niagara Escarpment Development Control, the zoning for Waterdown-Sassafras Woods Heritage Lands is provided in Appendix 2.

The City park and open space zones are hierarchical in nature with the Community Park PC zone being the least restrictive generally intended for City-wide parks and recreational buildings, and Open Space O3 being the most restrictive, generally intended for valley lands and similar natural areas.

Permitted uses in the Community Park PC zone include all forms of City and community parks, recreation facilities, cultural heritage resources etc. Permitted uses in the Neighbourhood Park P zone are generally for recreation of local or community level service and include neighbourhood parks and parkettes, outdoor community and recreation facilities, resource areas etc.

Permitted uses in the Open Space O1 include municipal parks, private and public open space, golf courses with buildings including curling, tennis arena, gymnasium, swimming pools, cemetery, cultural heritage resources, and storm water management facilities. Permitted uses in the Open Space O2 zone include municipal parks and public open spaces, public utilities and services, non-intensive outdoor recreation, storm water management facilities, cultural heritage resources. And permitted uses in the Open Space O3 zone are parks, open space, walking trails, forestry, fisheries and wildlife management, agricultural except within a woodlot, transportation and utilities, archaeology and storm water management and erosion control but not permanent detention or retention ponds.

Permitted uses in the Service S zone are any transportation, communication or utility use and open space and outdoor recreation uses, and parking lot associated with these uses. The Service S zone applies to Kerncliff 2 which is an Enbridge gas line easement.

The Business Corridor BC2 zone is an urban employment zone applicable to the prestige industrial lands along the north side of Highway 403 as Falcon Creek properties 2 and 3 south of the Mount Hope transmission line. The permitted uses are a wide range of industrial, office, hospitality and limited retail, service commercial and recreation uses, subject to restrictions on building coverage to achieve an open

site character, similar to the adjacent industrial and office land uses. The H-holding provision restricts uses pending removal of the holding provision subject to such matters as servicing, land assembly, transportation improvement or other matters such as technical studies.

The North Aldershot Residential RNA1 zone is a restricted residential zone with lot size dependent on the form of servicing. As the affected Sassafras Tributary property 2 is a Regional water reservoir, this zone reflects the context of adjacent land uses and the requirements should the property redevelop which is unlikely.

The Residential R2.3-184 zone and the Residential 2.2 zone on Upper Hager Creek property 7 and Kerns Park property 5 respectively reflect the surrounding subdivisions and the zoning on the adjacent residential lots.

Except for the off-street parking and loading provisions, and general parking provisions, the Zoning Bylaw does not apply to public authority in any zone except the Open Space O2 and O3 zone, and except the uses permitted in all zones. "Public authority" is defined as "federal or provincial bodies, the Region or the City and any commission, board, authority or department established by or for any of them." This provision does not apply since the Waterdown-Sassafras Woods Heritage Lands are zoned Open Space O3.

In addition, Zoning Bylaw 2020 establishes a 15m setback from the O3 zone on the Sassafras Tributary property 1, a 7.5m setback from all other O2 and O3 zones and a 4.5m setback from the top of bank of a creek not within a creek block.

3.2.5 Conservation Halton Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation

On portions of the Waterdown-Sassafras Woods Heritage Lands, Conservation Halton administers Ontario Regulation 162/06, the Development, Interference with Wetlands and Alterations to Shorelines, and Watercourses Regulation made under the Conservation Authorities Act s.28. Generally, the regulation does not permit development or site alteration within a Regional storm floodplain, a wetland or on a valley slope and requires development setbacks as follows:

- 15 m from stable top of bank of the Grindstone Creek and all tributaries, and 7.5 m from stable top of bank of other watercourses;
- 15 m from the floodplain or meander belt of Grindstone Creek and all tributaries, and 7.5 m from floodplain or meander belt of other watercourses;
- 120 m from a PSW or wetlands greater than 2 ha in size; and
- 30 m from a wetland less than 2 ha in size.

The regulation is administered based on guidelines which account for existing uses, additions, accessory structures and public uses. Permits are required for any building, structure or site alteration within the regulated area, unless exempted.

3.3 Additional Natural Heritage Legislation and Policy

3.3.1 Federal Legislation

Migratory Birds Convention Act (1994)

Most species of birds in Canada are protected under the Migratory Birds Convention Act through the Migratory Birds Regulations and the Migratory Birds Sanctuary Guidelines. These policies and regulations ensure the protection of listed migratory bird species, their nests, eggs and offspring.

Species at Risk Act (2002)

Enacted in 2002, the Species at Risk Act (SARA) provides legal protection for federally-listed species at risk (i.e., listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)) on federal lands. The act helps to protect sensitive species from becoming extinct by securing actions for their recovery. Several federal species at risk have been noted within the Waterdown-Sassafras Woods Heritage Lands, including vascular plants, birds, amphibians and reptiles.

3.3.2 Provincial Legislation

Endangered Species Act (2007)

This legislation provides protection for species at risk and their habitat. Legal protection is provided for species that have been identified by the Committee on the Status of Species At Risk in Ontario (COSSARO) as Endangered, Threatened or Special Concern. In addition, significant habitat of those species identified as Endangered or Threatened is protected from development and habitats of provincial Special Concern species are recognized under the Province's Significant Wildlife Habitat categories. A significant number of Endangered, Threatened and Species of Special Concern have been noted in the Waterdown-Sassafras Woods Heritage Lands.

3.3.3 Federal Policy

Great Lakes Water Quality Agreement (1972)

Signed in 1972, this agreement between Canada and the United States committed both nations to restore and enhance water quality in the Great Lakes Ecosystem. This agreement has established ecosystem-based management including the development of ecosystem objectives for the lakes. In 1987, annexes were initiated to develop and implement Remedial Action Plans (RAPs) to restore impaired water uses for significantly degraded areas (Areas of Concern) and Lakewide Management Plans (LaMPs) to address contamination by toxic substances. Hamilton Harbour was designated as an Area of Concern under the Great Lakes Water Quality Agreement (GLWQA). Wastewater treatment plants, industrial activity, and runoff from agriculture and urban development contributed to significant increases in nutrients in Cootes Paradise Marsh and Hamilton Harbour. Under the GLQWA, the RAP was developed to address these environmental problems in Hamilton Harbour (Clayton 2010). With this legislation, toxic substances in the harbour need to be eliminated. Considering that Grindstone Creek is connected to Hamilton Harbour, this legislation pertains to the Grindstone Creek Watershed.

Lake Ontario Bi-national Biodiversity Conservation Agreement (2009)

Canada and Ontario work cooperatively with the United States federal and state governments to protect and restore Lake Ontario's natural diversity under the Lake Ontario Lakewide Management Plan. This

management plan includes conservation of critical lands and waters, reduction of the impact of aquatic invasive species, restoration of natural connections and hydrology, restoration of native fish communities, native species and aquatic ecosystems, the restoration of nearshore waters, and planning and adaptation for climate change. The recovery of habitat within the Clappison-Grindstone Heritage Lands (which is located within the Grindstone Creek watershed) would contribute to these goals.

3.3.4 Provincial Policy

Provincial Policy Statement (2014) and the Natural Heritage Reference Manual (2005)

The Provincial Policy Statement (PPS) is issued under the authority of Section 3 of the Planning Act. Section 3 requires that decisions affecting planning matters "shall be consistent with" policy statements under the Act. Part III of the PPS establishes that the PPS is to be read in its entirety and all relevant policies are to be applied to each situation. In that context, Section 2.1 of the PPS (2014), which is the section that relates specifically to natural heritage, establishes clear direction on the adoption of a systems approach through the implementation of natural heritage systems, and the protection of resources that have been identified as 'significant': wetlands, habitats of endangered or threatened species, fish habitat, woodlands, valleylands, wildlife habitat, and areas of natural and scientific interest.

Natural heritage system is currently defined under the PPS (2014) as follows:

> *"means a system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions, and working landscapes that enable ecological functions to continue. The Province has a recommended approach for identifying natural heritage systems, but municipal approaches that achieve or exceed the same objective may also be used."*

Furthermore, the PPS (2014) states in Section 2.1.3 that:

> *"Natural heritage systems shall be identified in Ecoregions 6E & 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas."*

In March 2010, the Province released the Second Edition of the Natural Heritage Reference Manual (NHRM), which was intended to guide the implementation of the 2005 PPS. The NHRM explicitly recognizes linkages "between and among natural heritage features and areas, surface water features and ground water features, and hydrological functions" which are necessary for the ecological and hydrological integrity of watersheds. The protection of significant ecological and hydrological linkages as well as woodlands, fish habitat, valleylands and wetlands will be relevant for identifying issues and opportunities, as well as setting management zones, in the Waterdown-Sassafras Woods Heritage Lands.

Strategic Plan for Ontario Fisheries

This strategic plan is a policy to guide fisheries management in Ontario based on an ecosystem approach. The objectives for the Strategic Plan are to protect healthy aquatic ecosystems, rehabilitate

degraded aquatic ecosystems and to improve cultural, social and economic benefits from Ontario's fisheries resources. These objectives directly apply to the Clappison-Grindstone Heritage Lands, and the Grindstone Creek watershed in particular.

Ontario Biodiversity Strategy (2005)

This strategy was developed to protect and conserve Ontario's biodiversity. This goal is achieved through a variety of measureable, time-bound targets. Partnership between government, private landowners, academic institutions, non-governmental agencies, industrial sectors, urban and rural communities, and Aboriginal communities is key to the success of the protection and sustainable use of biological assets. To ensure sustainable use, the Ontario Biodiversity Strategy uses the concept of "sustainable use: the use of components of biodiversity in a way and at a rate that does not lead to their long-term decline, thereby maintaining the potential for future generations to meet their needs and aspirations" (OMNR, 2005). Biodiversity of the Waterdown-Sassafras Woods Heritage Lands could be enhanced and better-protected. It may be beneficial to refer to the direction and recommendations of the Ontario Biodiversity Strategy, to guide the management planning process of the Waterdown-Sassafras Woods Heritage Lands.

3.4 Other Studies and Plans

Grindstone Creek Watershed Study, Our Legacy to Value: The Grindstone Creek

The Grindstone Creek Watershed Study, Our Legacy to Value: The Grindstone Creek sets out a vision for the watershed. This report provides a blueprint to care for and regenerate valued components of the watershed and achieve this vision. Surface water, groundwater, nature, community, and agriculture are reviewed in the context of watershed management. Implementation actions and strategies are also provided.

Hamilton Harbour Remedial Action Plan

The Hamilton Harbour Remedial Action Plan is a plan to delist Hamilton Harbour from the list of 43 Areas of Concern (AOC) for environmental degradation in the Great Lakes System. Hamilton Harbour was designated as an AOC in 1987 under the Canada-United States Great Lakes Water Quality Agreement (GLWQA). This agreement promotes bi-national consultation and cooperative action to restore, protect and enhance the water quality of the Great Lakes Basin. Through collaboration, Canada and the United States work towards AOC remediation. The states of the Remedial Action Plan include: (1) environmental conditions and problem definition; (2) goals, options and recommendations; and (3) evaluation of remediation measures and confirmation of restoration of uses.

Hamilton Harbour and Watershed Fisheries Management Plan

The Hamilton Harbour and Watershed Fisheries Management Plan was developed directly as a result of the success of the Hamilton Harbour Remedial Action Plan to restore water quality and fish habitat in Hamilton Harbour and its watershed (Bowlby et al. 2009). The goal of the plan is to "support diverse, well-balanced, and healthy aquatic ecosystems that provide sustainable benefits to meet society's present and future needs". The three objectives of the plan are to protect healthy aquatic ecosystems, rehabilitate degraded aquatic ecosystems, and improve cultural, social and economic benefits from the aquatic resources of Hamilton Harbour and its watershed.

Bruce Trail Conservancy Strategic Plan – 2015 to 2018

The Bruce Trail Conservancy Strategic Plan presents the strategic goals for the organization for 2015 to 2018. Four strategic goals, of equal importance, are included:

1. Secure and steward a permanent conservation corridor along the Niagara Escarpment that contains the Bruce Trail.
2. Have the necessary financial resources in place to carry out the Bruce Trail Conservancy's Mission.
3. Be a dynamic organization which is able to support its aggressive land acquisition and fundraising programs to be able to fulfill the Bruce Trail Conservancy's Mission.
4. Achieve a high public profile so that stakeholders and the general public know about the Bruce Trail Conservancy and the good work being done to protect the Niagara Escarpment.

The Bruce Trail Conservancy's Mission is "The Bruce Trail Conservancy is a charitable organization committed to establishing a conservation corridor containing a public footpath along the Niagara Escarpment, in order to protect its natural ecosystems and to promote environmentally responsible public access to this UNESCO World Biosphere Reserve."

Bruce Trail Conservancy Land Stewardship Plans

The Bruce Trail Conservancy prepares Land Stewardship Plans for the lands they manage. Within these plans, the following topics are covered:

- property description;
- property particulars;
- existing conditions (biophysical conditions, biotic conditions, cultural resources);
- land use restrictions and permitted uses; and
- summary of recommendations.

The following Land Stewardship Plans are available within the Waterdown-Sassafras Woods Heritage Lands, which provide specific management recommendations for Bruce Trail-managed properties:

- McNally Bruce Trail Land Stewardship Plan Report (2010); and
- Burlington Easement Bruce Trail Land Stewardship Plan Report (2012).

City View Park Land Management Plan (2009)

The City View Park Land Management Plan provides a guide for the long term development of the park in keeping with the principles, policies and guidelines for land management in the Niagara Escarpment Parks and Open Space System (NEPOSS) (Landplan et al. 2009). The Plan includes key information from the City View Park Master Plan and supporting Technical Studies that confirm the potential and feasibility of developing a park at the corner of Dundas Street and Kerns Road in the City of Burlington. This Plan has been endorsed by the Niagara Escarpment Commission, and approved by the Ministry of Natural Resources and Forestry.

Kerncliff Park Master Plan

A Master Plan for Kerncliff Park (Kerncliff 1 on Figure 2) was prepared by the City of Burlington in 1998 (City of Burlington 1998). This Master Plan provides a review of background information, identified biophysical and land use constraints, as well as opportunities. A park concept and park zones are laid out, along with the preferred design which provides the basis for detail design and to highlight the park features and issues associated with park operations and management. A majority of the Kerncliff Park Master Plan has been implemented.

Waterdown-Aldershot Transportation Master Plan Study

This Environmental Assessment and Master Plan study was completely jointly by Halton Region and the City of Hamilton in April 2015. This study addresses the expansion of Waterdown Road through Aldershot and south Waterdown.

Environmental Assessments

Several Environmental Assessments have been completed or are in the process of being completed within or adjacent to the Heritage Lands:

- Waterdown Road Class Environmental Assessment;
- King Road Reconstruction Municipal Class Environmental Assessment; and
- several creek erosion Environmental Assessements.

3.5 Planning Inventory Summary

For the area generally west of Kerns Road, the Official Plans of Halton Region, the City of Burlington and the City of Hamilton have been brought into conformity with Provincial Plans and policy. There is a high level of consistency between the Official Plans in terms of policies and permitted uses as applied to The Heritage Lands. Generally, the Heritage Lands west of Kerns Road are physically constrained and lack access to municipal services, or municipal services are not intended. Exceptions are the Falcon Creek properties adjacent to the North Service Road which are within the Urban Area boundary.

The Heritage Lands generally east of Kerns Road are within the Urban Area boundary and within established stable residential neighbourhoods of the City of Burlington. These lands have not changed since zoned and assembled by the City either through the subdivision of land process or by other means of parkland acquisition. The bulk of these lands are creek blocks or neighbourhood parks, except the Tyandaga Golf Course.

Other than the major parks such as City View Park, the Tyandaga Golf Course or neighbourhood parks; the permitted uses on the Heritage Lands are typically limited to non-intensive recreation uses, trail uses and ancillary facilities like parking and access. At select locations west of Kerns Road, existing uses vary from this theme, for example at the Bayview landfill, there is an off-leash dog park, long standing indoor gun range, and an outdoor radio controlled airplane flight park. Otherwise, uses are intended to be small in scale and with least impact on the environment, and landscape.

The distinction between properties lies in the requirements for permitted uses depending on the applicable planning jurisdiction. Generally, west of Kerns Road, individual permitted uses may require environmental impact studies or environmental evaluation depending on the location, the conditions and applicable policy, and regulation. Development in proximity to key natural heritage features may be subject to greater separation distances and vegetation protection zones in order to maintain the integrity of the features.

The formal parks within the urban area boundary east of Kerns Road are not subject to these same requirements, but rather, the applicable requirements of the City of Burlington Official Plan and Zoning Bylaw.

In the area of Niagara Escarpment Development Control, development permits may be required unless the nature of the development, for example, trails, falls under development control exemptions. The Parkway Belt Land Use Regulation exempts buildings, structures and uses which provide a service to the public but this exemption may be short-lived given the application by the City of Burlington to revoke the regulation. In the underlying zoning of the City of Burlington, most of the Heritage Lands are zoned Open Space O2 and O3 which permit parks, related buildings and structures, and accessory facilities. In the few areas not zoned Open Space, the public authority provision of the Zoning Bylaw may apply.

Well in advance of any development, site alteration or activity on the Heritage Lands, it is important to review the applicable policy and regulation in order to determine conformity and any application, and approval requirements or exemptions.

4.0 Recreation Inventory

4.1 Study Area Recreational Resources

4.1.1 Trails

Figure 3 illustrates the existing trail network, access points and parking areas in the Waterdown-Sassafras Woods Heritage Lands. The Bruce Trail is a public footpath running from Niagara to Tobermory. It is entirely built and maintained by volunteers for the purpose of protecting the Niagara Escarpment, the most significant landform in southern Ontario. The Heritage Lands fall within the Bruce Trail Iroquoia section, which extends from Grimsby to Milton. Waterfalls are abundant in this section of the Bruce Trail, including waterfalls at Smokey Hollow (located in the adjacent Clappison-Grindstone Heritage Lands), which is a drawcard for tourists to Waterdown (BTC website).

The main trail route is referred to as the Main Bruce Trail. The Bruce Trail Conservancy has identified the preferred or "Optimum Route" of the Bruce Trail based on a set of criteria identified in the Niagara Escarpment Parks and Open Space System (NEPOSS) manual in Section 5.6 Bruce Trail (MNRF 2012). The Bruce Trail Conservancy seeks to establish a "continuous route for the Bruce Trail" and "works to establish trails on the Optimum Route where possible" (Bruce Trail Conservancy Strategic Plan – 2015 to 2018). The Bruce Trail Conservancy strives to fulfill its primary goal of securing and stewarding a permanent conservation corridor along the Niagara Escarpment that contains the Bruce Trail, with the aim of establishing and maintaining the Bruce Trail along the Optimum Route by fostering positive relationships with private landowners along the Optimum Route (Bruce Trail Conservancy Strategic Plan – 2015-2018). Within the Waterdown-Sassafras Woods Heritage Lands, the Bruce Trail follows the Optimum Route in all but one location. A small segment of trail within Waterdown Woods does not follow the Optimum Route (see Figure 3).

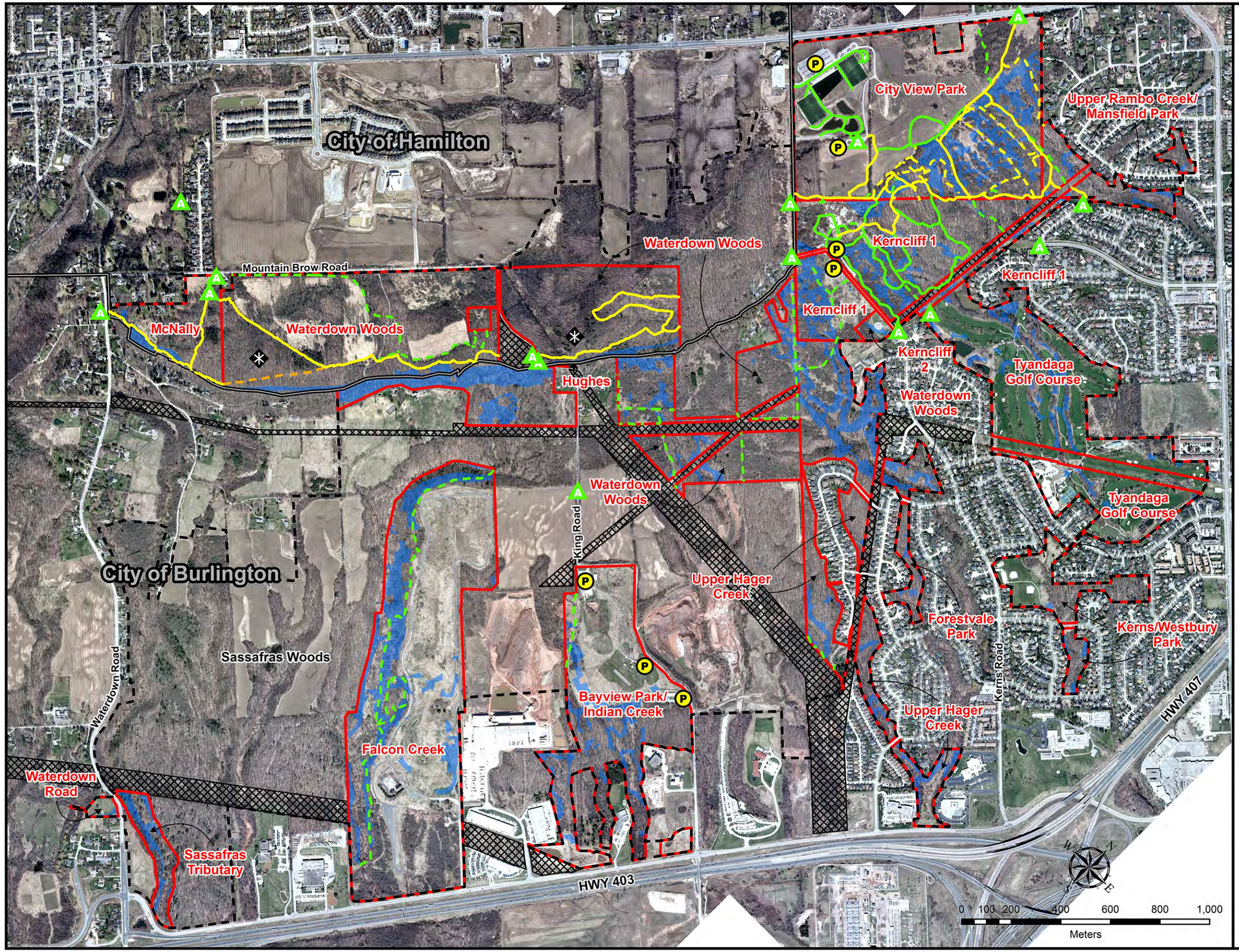
Within the Bruce Trail system, a number of Side Trails provide access to the main Bruce Trail. The Main Bruce Trail and Side Trails are managed by the Bruce Trail Conservancy and Bruce Trail Clubs.

The Main Bruce Trail and Side Trails traverse the Heritage Lands in a predominantly east-west direction. The section of the Bruce Trail located between the Clappison-Grindstone Heritage Lands and City View Park is known as the Offa's Dyke Friendship Trail. Friendship Trails are a mark of friendship and international cooperation between two organizations and Bruce Trail Conservancy continues to open

Cootes to Escarpment EcoPark System

Waterdown - Sassafras Woods Heritage Lands

Figure 3: Trails, Parking and Access Locations



Legend

- Bruce Trail
- Bruce Trail Side Trails
- Bruce Trail Optimum Route
- City of Burlington Trails
- Unsanctioned Trails
- Parking and Access Locations
- Access Locations
- Higher Density of Trails
- Slopes >25%
- Utility Corridors
- Municipal Boundary
- Study Area
- Waterdown - Sassafras Woods Haritage Lands

Note:
Trails have been mapped in the study area.
Additional trails may exist.

Sources of Information:
Conservation Halton
Hamilton Conservation Authority
City of Burlington
City of Hamilton
Bruce Trail Conservancy
Ministry of Natural Resources and Forestry

North-South Environmental Inc.
Specialists in Sustainable Landscape Planning

February 4, 2016

new Friendship Trails with organizations around the world. Approximately 3.8 km of the Main Bruce Trail and 3.6 km of Bruce Trail Side Trails are present within the Heritage Lands. In addition, the City of Burlington manages approximately 4.8 km of trails in City View Park and Kerncliff Park. There are an additional 8.2 km of unsanctioned trails within the Heritage Lands.

Sanctioned Bruce Trail Side Trails, as well as unsanctioned mountain biking trails, intersect with the main Bruce Trail at multiple locations and contribute to the formation of at least two large loops through Waterdown Woods and south portion of City View Park. Associated with these uses are many ad hoc stream crossings structures, rails (i.e., trail edges bordered by logs and sometimes pressure-treated lumber to prevent trail erosion), and boardwalks. In some cases, fallen limbs or tree trunks have been positioned to challenge the technical skills of mountain bikers.

The Bruce Trail enters the Heritage Lands from the west, from the adjacent Clappison-Grindstone Heritage Lands, and extends southeast from Mountain Brow Road, roughly following the edge of the escarpment from which it affords sensational views of Burlington and Hamilton Harbour. The Bruce Trail intersects King Road at a hairpin turn at the top of a steep gradient in the road. The sightlines for motorists and hikers at this location are poor owing to the turn and the road dropping away down the escarpment. The intersection of the Bruce Trail at King Road is a concern in that the trail is utilized by organized hiking groups and casual hikers and there is no signage warning either motorists or pedestrians of the upcoming intersection. Nor are there any safety features at the crossing itself. Exacerbating the potential safety concerns to hikers and motorists is the fact that these roads form part of a popular loop for road cyclists who especially enjoy the speed they pick up on the descent on King Road. Refer to Section 7.0 for recommendations that can enhance safety in this area. Also, for more detail on the specific issues and planned improvements to this area refer to the City of Burlington King Road Class Environmental Assessment.

Within Waterdown Woods the ad hoc trails form a fairly dense pattern and have not been mapped, thus the trail network is not reflected on Figure 3; however, a symbol indicating a higher density of trails has been placed in this area. One well-used bike loop that has been developed within this section of the management area was located using GPS and has been included on the map. The trail traverses flat terrain, is dense and meandering and provides riders a unique experience and challenge as there are many exposed rocks, tree roots and tightly winds between the trees. However, intensive trail use in this area is impacting the native vegetation. Given that the nearby Bruce Trail provides a similar experience, terrain and challenge to hikers, this trail should be evaluated for potential closure. In addition, there are several single-track mountain bike trails, which for the most part form looped trails branching from the main Bruce Trail, and are situated outside of the forested areas. Such loops occur approximately 400 m west of King Road and approximately 500 m east of King Road, within Waterdown Woods (Figure 3). The trails in this section of the Heritage Lands exhibited limited erosion in late summer and fall, but as they are situated on karst, which becomes inundated in the spring with standing and flowing water, it is presumed that there is considerably more potential for muddy sections of trail and bike ruts to occur in this area. An existing 3 m wide groomed granular access road crosses the Bruce Trail south of Mountain Brow Road west of King Road. This is driveway is owned by Conservation Halton under agreement with a private landowner. There may be an opportunity to approach the landowner to enable public access via the driveway in future as a key access and linkage to the Bruce Trail from the adjacent development area.

A relatively well-used, narrow single-track bike trail marked by blue ribbons has been field verified and mapped along the east valley slopes of Falcon Creek (Figure 3). The trail is within Halton Region property and bike use is unauthorized. The surrounding habitat is sensitive, and includes habitat for species at risk.

Anecdotal evidence confirms that this unsanctioned trail is a popular mountain bike circuit appealing to bikers of different skill levels and ages. There are a number of potential safety/trail condition issues in this area including potential for flooding of the trail as it meanders near, and crosses the creek. This occurs in the north section of the trail as it bends eastward north of the former landfill (Figure 3). The trail also crosses Falcon Creek in the south section near the North Service Road, and a formalized crossing structure is needed. The bike community is proactive in ensuring the safety of its users and posts "red day" notices online to alert users when flow levels are high in the creeks and to discourage use during wet spring rainfalls. It is unclear how well this protocol is being respected, although anecdotal evidence among the local mountain biking community suggests that is is. Nevertheless, the management plan should reinforce this message.

There are a number of locations in the northern portion of the Falcon Creek valley where the trail crosses deeply cut watercourses. These crossings mostly consist of informal plank crossings. In one particular location where the channel is braided, four such crossings have been erected in short succession. The plank crossing and compaction from trail use seems to be contributing to bank erosion. There are a number of locations where tires and metal debris have been discarded along the north section of this trail system including at the entry point visible from King Road. At the south end, cyclists access the trail by trespassing through the adjacent private lands owned by Ippolito Transportation Inc., despite there being a no trespassing sign right at the property boundary where the trail exits public land. The hydro corridor to the east of the property could provide access (refer to opportunities listed in Section 7.0).

The northern portion of the former Regional landfill's west boundary is marked with a tall chain link fence; however, the southern section is not marked by a fence. Therefore, it is unclear whether the trail observed in the south section remains within the Regional landfill site. The unsanctioned trail crosses the hydro corridor which runs east-west across the creek toward the west to Sassafras Woods.

In other areas of the Heritage Lands, there is a proliferation of unsanctioned trails intersecting the Bruce Trail and it may be difficult for trail users to be certain of the alignment of the main Bruce Trail. Bruce Trail signage trail blazes are placed far apart and signage is provided only at some confluences of the Bruce Trail system and at some of the intersections of unsanctioned trails. To compound the issue the local mountain biking community has been adding its own blazes (red arrows). This can lead to confusion and disorientation to the user.

There is also a proliferation of unsanctioned trails within the woodland below the escarpment brow within City View and Kerncliff Parks (Figure 3). Some of the trails have been surfaced with woodchips by local volunteers. The trails in this area contain some structured stream crossings, steps and fire pits. A sectional (non-continuous) steel pipe safety barrier occurs at the cliff side trail overlooking Kerncliff Park at City View Park. This steel pipe rail was installed as part of the Kerncliff Park Master Plan.

Apart from some Bruce Trail signage to direct hikers and restrict mountain biking, there is no other signage on the Bruce Trail within the Waterdown-Sassafras Woods Heritage Lands. There are arrows

marked as part of the Kerncliff Trail Marking System, which also includes a trail map at the entrance to Kerncliff Park. Unsanctioned trails been not been marked in a consistent manner.

4.1.2 Trail Uses

Trail use within the Heritage Lands primarily consists of hiking (ranging from casual outings by local residents to more serious hikers on the Bruce Trail), single-track mountain bike use and dog walking. No All Terrain Vehicle (ATVs) trails were noted in the Current EcoPark Lands; however, ATV use may occur within the Heritage Lands in the Hanson quarry east of King Road. Motorized vehicle use is not permitted on Current EcoPark Lands. An existing trail, located on a granular access road, extends from the south end of the quarry at King Road, east across hydro lands and links to an existing asphalt parking lot at 891 North Service Road (Figure 3). There is also likely cross-country skiing and snow-shoeing that occurs in the Heritage Lands on some trails and in suitable locations (e.g., Tyandaga Golfcourse, Bayview Park, Bruce Trail when there is sufficient snow cover, etc.).

What is probably the largest issue is the anticipated increase in the use of the trails by hikers, dog walkers and mountain bikers as the area is promoted and urban development and new access points are established. In particular, the completion of development above the escarpment brow between Kerns Road and Waterdown, consisting of approximately 3,200 new units, can be expected to increase use substantially in Waterdown Woods. There will also be intensification of use as the final phases of City View Park are implemented, including additional parking (100 spaces) for park users, including Bruce Trail users. This is expected to increase pressure on the natural and existing recreational resources in the area and will necessitate monitoring and an increased commitment to management to prevent and/or mitigate impacts.

The main trail uses are described in more detail below.

Hiking

Regular hiking activities are focussed on the Bruce Trail, which sees several weekly-organized hiking groups convene to walk various portions of the trail. On weekends the known entry points to the trail are busy with parked cars. During the weekdays these same points regularly contain 1-3 vehicles at any given time. This attests to the current popularity of the Bruce Trail and side trails in this area of the Cootes to Escarpment EcoPark System. In addition, there are many local residents who use the trails for casual walking and this happens through the weekdays as well as weekends. These local casual users include residents who walk their dogs in the Heritage Lands, both on and off-leash. Incidents of conflict between dogs and cyclists have been reported to us.

There are some risks associated with hiking on the trails through natural areas. Some trails follow along the escarpment brow, and through rocky talus and edges of creeks. The City of Burlington website provides safety tips to Bruce Trail users and alerts users of these potential safety concerns.

Dog Walking

Dog walking occurs frequently in the Heritage Lands, and may represent the largest single user group in terms of numbers of visits per year. Many dogs are walked off leash through the Current EcoPark Lands. Identified impacts of off-leash dogs on natural areas can include:

- soil nutrient enrichment due to urination and defecation, which can ultimately affect the type of vegetation and wildlife supported in the area and would change the composition of the natural area in this regard;
- risk of spread of disease from domestic dogs to wildlife or vice versa;
- trampling, denuding and altering vegetation structure can result in damage to low-growing plants, resulting in a change of structural diversity of the natural area;
- near-surface tree roots are also often damaged resulting in tree die-back and death;
- introduction of non-native seeds carried into natural areas on dog fur;
- wildlife disturbed due to hunting, chasing and scent impacts by dogs.

Off-leash dogs may also impact the experience of other visitors by charging or jumping up on hikers, mountain bikers, or other dogs. Other issues include the lack of proper disposal of dog feces (e.g., either not picked up and left on or beside the trail, or picked up in a bag and left along the trail or at an access point). Both on- and off-leash dog walking activities will likely increase with the anticipated increase in urban development.

There is an off-leash dog park located at Bayview Park, within the Waterdown-Sassafras Woods Heritage Lands. This dog park appears to be well-used by the public in the morning and in the late afternoon/early evening. Given that dog owners often need to drive a fair distance from residential areas to this dog park, many dog owners utiltize existing EcoPark System trails that are located closer to their homes to provide unsanctioned off-leash opportunities for their dogs.

Mountain Biking

The escarpment offers diverse and challenging routes and environments to explore and enjoy as a mountain bike rider. However, it should be noted that many of the trails utilized by mountain bike riders were constructed without authorization from the agency or municipality that manages the lands (Figure 3). Notwithstanding, there are a number of easily accessed points into the Clappison-Grindstone Heritage Lands from the surrounding street network and residential areas that attract those that enjoy this pastime. The density and also level of challenge offered by the myriad of trails observed results in a large number of riders.

There is some level of commitment to education and skills training in the biking community. Weekly evening riding groups are organized by the local bike shop in Waterdown throughout the summer. Members of riding groups contribute voluntarily to the development of new mountain biking trails with input from the larger biking community, but without input from the landowner (e.g., Conservation Halton or municipality). There are mountain bikers with a broad range of skill levels accessing the Heritage Lands, and a broad range of environmental awareness and commitment to environmental stewardship. The mountain bike user group includes a subset of thrill seekers who are looking to construct elaborate pump tracks and jumps. This type of activity is discouraged, and carries significant liability to the managing agencies, and requires education about safety and the environmental impacts of the use. It also requires vigilance in managing the removal of structures and unsanctioned trails.

It is also important to note that unsanctioned trail development is prohibited on Heritage Lands and, therefore, all trail development is encouraged to be done in consultation with Conservation Halton, City of Burlington, or other land owner. Moreover, many of the trails extend beyond the Current EcoPark Lands onto neighbouring private property, which essentially amounts to trespassing (e.g., Hanson Quarry properties).

Biking is permitted in Kerncliff Park. It is not permitted within the City View Park/Bruce Trail Conservancy easement area, and is signed for no biking. Biking is, however, permitted in all other areas of City View Park. The issue of whether or not biking is a permitted use in a particular area or not creates confusion to users, who may be unaware of where biking is permitted and where single-use hiking only is permitted. This same issue extends to Conservation Halton lands, where biking is permitted, including on the Bruce Trail (although not promoted), whereas at the McNally Property, single-use hiking only is permitted. This creates 'islands' of uses.

There is a wide range of bicycle use in the Heritage Lands ranging from casual, family-oriented excursions, through disciplined, highly technical mountain bike riding, to thrill seekers who construct jumps and other structures to challenge themselves. This last group frequently include extremely dangerous activities that have no place in a public space, and should only be undertaken in a very controlled and well-supervised environment. Unfortunately, all users of mountain bikes often get lumped into one category, and this is unfair to the many cyclists who are competent, responsible riders that often contribute their time and resources to sound trail construction.

Observations from fieldwork revealed that in many cases mountain biking activity identified in the Waterdown-Sassafras Woods Heritage Lands was confined to defined trails with limited areas of impact resulting from trampling and soil erosion. In most cases the trails were observed to be single track bike trails which are narrow (width of the bike), most of which require a relatively high level of technical proficiency on the part of the rider, and include trails that were criss-crossed with exposed roots, rock outcrops and natural uncut or placed logs. In a few locations, noticeable impacts to understory vegetation and soil conditions were noted, particularly within Waterdown Woods and Kerncliff Park (Figure 3).

Generally, with the current level of use, mountain biking in the Heritage Lands appears to be having a limited impact on the surrounding natural system. However, there are some locations in Waterdown Woods and Kerncliff Park where trail density is high and there is an unacceptable amount of bare soil, root exposure, erosion, etc. These areas would benefit from trail closures with commensurate restoration, and management to address existing impacts. In addition, the bike jumps and other structures created and used by thrill-seeking individuals need to be identified and removed, with subsequent monitoring and education on sanctioned uses, as features are likely to be re-built. Alternatively, individuals interested in this type of activity are encouraged to participate in discussions with agencies. For example, interested individuals could collaborate with agencies to develop a plan to locate, sign, monitor and maintain mountain biking features that provide a mid-level challenge (e.g., such as at Kelso Conservation Area). This opportunity will be further discussed in the management plan.

Safety Issues

There are several off-trail hikes that offer long views to the harbour and are popular gathering points. There is limited signage warning hikers to stay back from the edges of the escarpment. Visitors must also take care when walking below the brow of the escarpment due to the chance of falling rocks, or slips and falls on wet or moss-covered rocks. Visitors should stay on marked trails at all times, not only for their own safety, but also to prevent impacts to ground flora including the many rare and sensitive plants in the area.

Improved safety signage, consistent blazes and measures to assess and close redundant or unsafe trails, should be considered to improve safety. It is also important that safety messages are offered consistently across all the partner agency websites. It may be beneficial to produce a leaflet or information guide that all partners vet and adopt and then promote to their respective constituencies to add to the consistency and effectiveness of getting this message out to the public. This will be addressed in future management recommendations.

Unsanctioned Party Spots/Fire Pits

Although confined to a small number of locations, several unsanctioned after-hour gatherings ("party spots") were noted. These have generated garbage, debris from fire pits and contributed to soil compaction and erosion. Picnic tables, a rope swing and log seats have been identified at some of the sites. People visit these locations to enjoy the surrounding natural setting, socialize and recreate. Issues associated with unsanctioned party spots/fire pits largely involve safety concerns and vandalism. Unsafe behavior can be associated with this type of use, including the setting of fires, influence of alcohol/drugs on good judgement, thrill-seeking acts, etc. Vandalism of surrounding trees, spreading of garbage and disturbance to understory vegetation and soils can result. This type of unsanctioned use can also cause other trail users to feel unsafe. There is a management opportunity to restore these areas and mitigate impacts associated with this unsanctioned use. An additional management opportunity includes identifying appropropriate locations for benches and/or picnic tables to facilitate small social gatherings.

IMBA's Trail Principles of Sustainable Trail Design and Construction

Given the role of the International Mountain Biking Association (IMBA), their stated intent to work with other trail users and their commitment to environmentally responsible trail use and design, it is worth discussing their potential role in the Heritage Lands. The IMBA trail design and use standards could be used in the future design and management of cycling trails in the Heritage Lands. The IMBA's website indicates that the organization "strives for the following goals in designing and building trails: 1) limit environmental impacts; 2) keep maintenance requirements to a minimum; and 3) avoid user conflicts". These goals are generally consistent with the use of the Heritage Lands.

In order to build sustainable trails, the IMBA have offered the following guiding principles to trail builders on their website: "A contour trail is a path that gently traverses a hill or sideslope. It's characterized by a gentle grade, undulations called grade reversals, and a tread that usually tilts or outslopes slightly toward the outer edge. These features minimize tread erosion by allowing water to drain in a gentle, non-erosive manner called sheet flow. When water drains in thin, dispersed sheets, dirt stays where it belongs - on the trail." The IMBA guidelines go on to note that sustainable contour trail development should:

1. Do everything you can to keep the water off the tread, and users on it.
2. Build on the contour and use frequent grade reversals - surf the hillside.
3. Follow the half-rule: A trail's grade shouldn't exceed half the grade of the sideslope.
4. Maximum grade should be 15 percent (except for natural or built rock structures).
5. Average grade should stay under 10 percent (with grade reversals).
6. Route trails to positive control points (viewpoints, water, other attractions).
7. Use bench-cut construction, and excavate soil from the hillside.
8. For reroutes, reclaim old trail thoroughly - the visual corridor as well as the trail tread.
9. For highly technical trails where grade will sometimes exceed 15 percent, use natural rock, rock armoring or other rock features to add challenge and improve sustainability.

Not all of the principles noted above may apply in all circumstances. It is best to first assess the terrain and particular natural environmental features and constraints that may exist when developing a sustainable trail plan. Only after the existing natural resources have been evaluated should it be determined if a trail of any kind is appropriate and secondly what the appropriate type of construction ought to be. For example, the use of switchbacks on slopes alluded to in point number 2 could lead to soil erosion where shallow rooted vegetation and/or sandy erosive soils are present. The recommendation to excavate soils on slopes similarly could lead to erosion and further disruption to the environment by dumping the excavated soils in the surrounding environment. It should also be noted that necessary permits may also be required to construct trails. Despite this, what is evident from the IMBA literature is that at least most of the trail and user issues identified in the Waterdown-Sassafras Woods Heritage Lands would also be of concern to IMBA, and thus they will likely be a useful partner in the future management of trails within the Heritage Lands.

Recent collaboration with IMBA to develop mountain biking trails at Kelso Conservation Area and Christie Lake Conservation Area has been deemed a success by both the Ontario Cycling Community and partners who worked to develop the trails (e.g., Conservation Halton). A similar collaborative approach should be considered in the planning, design and development of potential mountain biking trails within the Heritage Lands where, or if, deemed an appropriate use in a given area.

4.1.3 Existing Infrastructure

The natural settings in this area predominantly support passive recreational pursuits including hiking trails, nature appreciation and some locations suitable for mountain biking. Active and passive recreational infrastructure within the Waterdown-Sassafrass Woods Heritage Lands is focussed in three parks: Bayview Park, Kerncliff Park and City View Park as well as mixed passive and active recreational trail uses. Over the last several years more substantial recreational facilities have been planned, designed and implemented within Kerncliff Park and City View Park.

Bayview Park

Bayview Park is located off King Road north of Hwy 403, and along with City View Park, is considered a main centre for access to the EcoPark System. The park is situated on the former Bayview landfill and, therefore, has little natural vegetation. The park is situated outside of the Niagara Escarpment Plan Area. Its position on the escarpment slope affords views over the tree canopy, providing exceptional views south to Lake Ontario and north to the escarpment. It offers visitors one of only three enclosed leash-free dog parks in Burlington (also known as W.A.G park - where dogs gather) which is funded solely by private donations from individuals and local businesses. The City of Burlington regulates the park and its bylaw levies fines for owners who contravene the rules of the dog park. Fines are applied if you lose control of your dog or if you do not pick up after your dog.

The park includes a sheltered picnic pavilion (provided by the Lions Club) and parking for 300 cars. The Rotary club maintain a second shelter in the park adjacent the gravel parking area. A 10x30 m area at the entry sign to the park is under construction as a pollinator meadow. A community planting event is planned for the meadow in September 2015.

The Burlington Radio Control Modellers is a group of approximately 160 members who share a common interest in flying model aircraft and utilize and maintain a portion of the Bayview Park grounds for this pursuit. The City of Burlington has an agreement with the Burlington Radio Control Modelers that

allows members to use a portion of this park for flying radio controlled aircraft. Only members and registered guests (with insurance) are allowed to fly at the park. Memberships and identification are checked upon arrival by other members. Modest bleachers encourage the public to come watch the planes being flown. According to the website for the club, members gather to fly model planes on "any day when the weather is relatively nice". The field is most active from 10:00 am to 11:30 am, and again in the evening from 6:00 pm until sunset. The club hosts numerous events throughout the year that include competitive skills flying events. Users drive up to the sheltered bleachers to offload their model aircraft and park in the nearby gravel parking lot, or in the large parking lot offered to the off-leash dog park users at the Bayview Park entry (Figure 3).

The Burlington Rifle and Revolver Club operate next to Bayview Park within a 45 m long building. The club is an indoor recreational and competitive rifle and revolver club with 1,600 members whose aim is to promote the safe handling of firearms. Its members range from 10 years and older and meet daily. A small asphalt parking lot services this use.

City View Park

The Master Plan for City View Park has been approved with the Land Management Plan through the NEPOSS process. Since the approval of the master plan for City View Park (New City Park Preferred Master Plan in 2010) phased implementation has occurred in the park resulting in completion to date of:

- three artificial turf fields;
- creative playground;
- internal roadways and parking facilities (500 cars and 10 buses);
- stormwater management pond/wetland & boardwalks;
- trails;
- extensive natural restoration; and
- park maintenance facility.

The work-to-date has occurred with development permites from the NEC applied for and approved. The majority of the restoration plantings and natural restoration occurred in the first phase of implementation.

In summer 2015, City View Park was a practice venue for the 2015 Pan Am Games. A pavilion is scheduled to be constructed at City View Park in 2019, subject to Capital Budget approval. Future phases of the planned park improvements include implementation of the open space areas for passive recreation and associated restoration and buffer plantings. Additional trails are proposed including links to the Bruce Trail (with additional 100 parking spots for park users, including Bruce Trail users).

The Bruce Trail easement and all of the Bruce Trail with the exception of a Side Trail from the Kerncliff Park parking lot, is located in City View Park. The main Bruce Trail extends eastmard to the intersection of the Ian Reid Side Trail (so named by the Iroquoia Bruce Trail Club to honour Ian Reid as a long-time member of the Bruce Trail Conservancy since the 1960s). The side trail continues through a mature forest. Passing a connection to the Kerncliff Park trail system, the side trail crosses several small creeks with newly constructed pedestrian bridges and ascends from the valley to rejoin the main trail.

Kerncliff Park

Kerncliff Park is the site of the old Nelson Quarry which is also an Area of Natural and Scientific Interest. The quarry has been rehabilitated and is comprised of wetlands, formalized gravel paths, mulch trails

and a boardwalk. A trail map greets visitors at the entry to the park and provides access to a network of gravel, mulch and natural surface trails. A number of informal creek crossings have been upgraded with well-constructed timber bridges in recent years. The Iroquoia Bruce Trail Club organizes several hikes a year through the wooded portion of the park. Council approved the Master Plan for Kerncliff Park in 1999, and NEC adopted and endorsed the Plan. Extensive interpretive displays have been placed, replaced and removed due to vandalism.

The *Cootes to Escarpment Park System Conservation and Land Management Strategy* Phase II report (Wong 2009) indicates the potential future direction of this park to include "moderate activity" offering "interpretation of geology and natural restoration of disturbed landscapes."

The park is situated next to City View Park and extends southward from the top of the cliff created by the former working face of the quarry. The blue blazed side trail of the Bruce Trail extends along the edge the quarry, into the adjacent woodland and up the slope to the main Bruce Trail along the escarpment brow (marked with white blazes). The Bruce Trail provides hikers access along the cliff edge. The escarpment outlook provides a spectacular view extending from Toronto in the east, across Burlington, to Hamilton and the west end of Lake Ontario. On a clear day the Skylon Tower in Niagara Falls can be seen; City View Park lives up to its namesake.

Within Kerncliff Park, there is a looped system of trails managed by the City of Burlington, interpretive signs, and a boardwalk through a wetland located on the quarry floor. The aggregate producers contributed funding for Phase 1 of the project, which awarded the park a Bronze designation. Canada Trust Friends of the Environment provided funding for tree planting, which was carried out by school children. Through a grant provided by Enbridge Pipeline, a prairie species planting demonstration area was installed. Unfortunately, controlled burning of the area has not been permitted based on Fire Department rules and regulations and the area has been overrun by invasive species.

Friends of Kerncliff Park are a small volunteer group of 15-30 people who are committed to being stewards of the park. The Friends have been active for over 5 years leading clean-up efforts contributing to the stewardship of the park. Friends of Kerncliff Park earned Burlington's Environmental Award in 2011.

4.1.4 Access Points

A number of informal and semi-formalized entry points provide access to the current trail system (Figure 3). A majority of the access points to the main and side Bruce Trails are marked simply by a single piece of armourstone and Bruce Trail sign. Access to the Bruce Side Trail at the end of Havendale Boulevard does not provide demarcation of the trail (only a sign to Mansfield Park).

Apart from the formalized entry points to the three large City parks in the Heritage Lands, there are no provisions for formal parking at any of the other entry points to the Bruce Trail system or informal trail system. 3-5 cars are parked at any one time on the roadside edges of King Road where it meets the Bruce Trail. An informal pull off area provides space for up to 3 cars at this location and has been seen littered with garbage much of the time. There is a safety issue at the King Road access as previously mentioned. The City of Burlington permitted the establishment of the Bruce Trail Side Trail in Kerncliff Park and City View Park so that safe parking lots could be used instead of roadside parking. A parking lot at Kerns/Westbury Park provides parking for the baseball diamonds and access to the trail system through the area.

There may be a safety issue where the Bruce Trail crosses Dundas Road (Hwy 5), near the easternmost access point to City View Park. This is a four lane highway with an 80 kph limit and, when busy, currently presents a formidable and dangerous crossing. As the use of the Bruce Trail increases in the Heritage Lands, there will be a greater urgency to establish a safe crossing at this location. Currently it is a use "at your own risk" crossing. Halton Region undertook an Environmental Assessment for work on Dundas. As a result, the preferred crossing for the Bruce Trail is now down the south side of Dundas to Brant Street/Cedar Springs Road where Bruce Trail users can cross safely.

Within the Tyandaga residential area located east of the Heritage Lands, some private landowners that back onto the ravines have fenced their properties and placed gates to access an unsanctioned, self-made and maintained trail network into the public open space system (e.g., Forestvale Park, Upper Hager Creek, Kerns/Westbury Park). The gates are unauthorized.

Access to Waterdown Woods will likely change as the subdivision to the north is developed. Unsanctioned access points are currently being used, including roadside parking which is unsafe and should therefore not be used. In general, unsanctioned access points should not be used. Although there are no user survey data to confirm how often or when the unsanctioned access points are being used, it is probably an issue at existing use levels and it will only be exacerbated by the anticipated increased desire to use these sites. Addressing safe access will be a significant issue to be addressed in the management recommendations. Access to other areas (e.g., City View Park, Kerncliff 1, Bayview Park, Tyandaga Golf Course) is currently adequate. There is very limited access to the various segments of Hager and Rambo Creeks, but these lands are generally not suitable for public use.

The formalized entry points at City View, Kerncliff and Bayview Parks offer many amenities. The entry point at Kerncliff Park includes shelters, benches, bike parking areas, bins, entry unit paving, armourstone, signage, lighting, wire fencing, manicured lawn and native plantings. There are two parking lots associated with Kerncliff Park. The main, east, Kerncliff Park entrance is asphalt and provides 40 parking spots. The parking area on the west side of Kerns Road is gravel and provides another 20 spaces for park users, including Bruce Trail users. There is direct access to the trail system from Kerns Road for hikers and cyclists.

Formalized mulch trails provide access to the Bruce Trail directly from the south parking lot of City View Park. A future trails map is proposed at this access point for the trail system as identified in the *Cootes to Escarpment Park System Conservation and Land Management Strategy* Phase II report (Wong 2009). The mulch trail parallels the Bruce Trail which follows the brow of the escarpment. The internal park trail in City View Park is intended for cyclists, and to promote active transportation.

4.1.5 Existing Programming

There are active sports facilities offered within the Waterdown-Sassafras Woods Heritage Lands at City View Park (soccer fields and baseball diamonds), and at Kerns/Westbury Park (baseball diamonds). There are also playparks at Kerns/Westbury Park and Forestvale Park. Overall, the natural setting predominantly supports passive recreational pursuits including hiking trails, nature appreciation and some locations suitable for mountain biking.

Geocaching is also a popular sport with limited usership. Conservation Halton post links on their website for geocaching referring to the rules of the Ontario Geocaching Association for guidelines,

permissions and applications required to participate in the sport. The City of Burlington website boasts geocaching as "a great opportunity to get out and explore new areas or find hidden treasures in your own community and to spend a few hours to find one of many hidden geocaches in the Halton Region." However, the Bruce Trail Conservancy has a "No Physical Geocaches on BTC Managed Land" policy. Coordination of partner agency efforts may be beneficial to the user group; furthermore, geocaching can potentially be a great interpretive tool.

The City of Burlington is undertaking the re-writing of the Parks By-law in 2016. This will likely have implications for the issues and opportunities identified in the forthcoming management plan, and also the preliminary issues and opportunities identified in this report.

4.2 Adjacent Recreational Resources

4.2.1 Trails

A number of unsanctioned trails extend beyond the Heritage Lands boundary and connect to adjacent private properties and farms. In several cases portions of the trail system rely on accessing the public lands across easements or through private lands (e.g., Bruce Trail crosses a farm and private driveway in Waterdown Woods). The private driveway in Waterdown Woods is not a public access point. The Bruce Trail has handled private land access appropriately with good signage, fencing and climbable structures (turnstiles) making it obvious to the trail user that they are entering private lands and that a particular set of rules apply to the user.

A large network of unsanctioned trails occurs outside the Current EcoPark Lands (e.g., in Sassafras Woods, Hanson Quarry property east of King Road). These trail systems are accessed off of the North Service Road, and King Road. These access points are also unsanctioned. Currently, anyone using these unsanctioned trail networks is trespassing. These areas provide habitat for species at risk and many have very steep ravines. Any future trails would need to avoid these sensitive features.

There have been instances where bike tours have utilized unsanctioned trails on private lands, resulting in conflicts, physical altercations and frustration on the part of private landowners.

4.2.2 Uses

Motorized vehicle (e.g., ATV or snowmobile) trails are apparent along the utility corridors in the Heritage Lands. Brush is cleared out of utility corridors on a routine basis, which enables motorized vehicles to access these areas. ATV use is, however, an unsanctioned use and is viewed as trespassing. A new study by the province to assess and potentially promote native restoration plantings in all utility corridors could change the management and maintenance of utility corridors in the future. However, the appropriateness of ATV or snowmobile use on the utility corridors is dependent on the authorization of the landowners, and is generally considered an unsanctioned use.

The development of multi-use trails on roadside shoulders, in rights-of-way or utilizing the utility corridors to make some east-west linkages is currently lacking across the Heritage Lands, and is an opportunity that should be explored in more detail as part of this management process. It should be noted, however, that east-west linkages may not be feasible in all desired locations due to the presence of significant species and steep valleys. Considerations should also be given for future planned road works such as potential re-alignment, widening or geometric improvements within the surrounding road system.

A granular access road suspected of being used by ATVs and mountain bikes was observed in the Hanson quarry east of King Road (Figure 3).

The development of multi-use trails on roadside shoulders, in rights-of-way or utilizing the utility corridors to make some east-west linkages is currently lacking across the Heritage Lands, and is an opportunity that should be explored in more detail as part of this management process. It should be noted, however, that east-west linkages may not be feasible in all desired locations due to the presence of significant species, species at risk, and steep valleys. Consideration should also be given for future planned road works such as potential re-alignment, widening or geometric improvements within the surrounding road system.

4.2.3 Existing Uses within Utility Corridors

The surrounding road pattern is actively used by on-road cyclists and includes a mapped 15 km loop (posted on-line) which utilizes Main Street South, Mountain Brow Road, King Road, North Service Road, Brant Street, Plains Road East, Lakeshore Boulevard, then Plains Road West and Snake Road to close the loop. The speed at which cyclists descend the steep roads should be addressed as a safety concern, and may result in potential conflicts with hikers and motorists.

Abandoned logging routes and access ways may provide other opportunities for linkage or re-alignment within the Current EcoPark Lands.

4.2.4 Access Points

There are a number of locations where new access points into the Heritage Lands may be developed from surrounding areas that are not part of the Heritage Lands. For example, as urban development occurs on adjacent lands, opportunities for additional access points external to the Heritage Lands may be identified and implemented. Any new proposed access points or trail linkages should be reviewed in the context of the management plan and any Trails Master Plan documents in order to identify enhancements to trail linkages or to suggest alternate access points.

5.0 Natural Heritage Inventory

5.1 Physiography and Surface Geology

The Waterdown-Sassafras Woods Heritage Lands contain an extensive escarpment plain and a 3 km stretch of south-facing escarpment slopes. The escarpment slopes and plain support a high number of plant communities, including large areas of mature deciduous forest and escarpment habitat interspersed with open field and other successional vegetation communities. Waterdown Woods is dominated by the vertical bedrock exposures of the Niagara Escarpment. Along the escarpment face are cliffs up to 8 m high, capped by dolostones of the Lockport Formation, the top unit of the Niagara Escarpment. Below the cliffs, steep talus slopes grade into gradual shale slopes of the Queenston Formation, the basal unit of the escarpment (Varga 1995). The shale slopes are best displayed along Falcon Creek and extend south into Sassafras Woods for 3 km, constituting one of the most extensive shale slopes on the Niagara Escarpment (Riley et al. 1996). Sassafras Woods is one of the few remaining sizeable woodlots typical of the dry deciduous forests that once covered most of Halton Region south of

the Niagara Escarpment. Five small valley systems extend into the area along a north-south axis producing a profile of plateaus alternating with shallow depressions. Soils are deep, red clay. Together, Waterdown Woods and Sassafras Woods include a very complete cross-section of the natural biotic communities associated with the Niagara Escarpment (Schwetz 2014). The natural physiography of the Heritage Lands has been altered by landfills and shale quarries.

Within the Waterdown-Sassafras Woods Heritage Lands, the escarpment is comprised of limestone pavement along the escarpment rim, a steep rock cliff, and a forested talus slope. The elevation of the rim ranges from 230 to 240 m within the Heritage Lands. The toe of the escarpment is not distinct; the south-facing escarpment slope transitions with the broad south slope of the Trafalgar Moraine to the northeast (part of the South Slope physiographic region) (Chapman and Putnam 1984). Falcon, Indian, Hager, and Rambo Creeks and tributaries of Grindstone Creek, which arise along the escarpment face in the Heritage Lands, have eroded narrow ravines into the till and shale of the lower slopes. The Heritage Lands are located in two watersheds. The tributaries at Sassafras Woods and the western half of Waterdown flow within the Grindstone Creek watershed. Falcon, Indian, Hager and Rambo Creeks are part of the Indian Creek watershed. Both the Grindstone Creek and Indian Creek watersheds drain into Hamilton Harbour in Lake Ontario.

Ordovician red shales of the Queenston Formation are locally exposed along the lower ravines. Sandstone, shale, limestone and dolostone of the Silurian Cataract and Clinton Groups underlie the escarpment slopes, but are generally not exposed. The dolostone bedrock layer is at or close to the surface on the plateau above the escarpment. Locally it forms an exposed “limestone pavement”, an unusual landform created where karstic weathering processes have widened the steep joints and fractures in the exposed bedrock surface (Dwyer 2006).

Overburden both above and below the escarpment consists of the clayey Halton Till. Above the escarpment, this till has been deposited as a group of small moraines known as the Waterdown Moraines that parallel the escarpment brow. The moraine deposits are less than 5 m thick throughout the study area, and form a hummocky surface. Halton Till also forms a till sheet covering the lower escarpment slopes. In much of this area, soil development is limited due to the shallow overburden and the steep, unstable slopes along the escarpment and stream ravines. Farmington loam has developed on the shallow soils along the escarpment rim. Poorly-drained Jeddo loam and imperfectly-drained Chinguacousy loam occur on the uneven terrain of the Waterdown Moraines. Oneida loam and clay loam are present on well-drained till on the escarpment slopes.

Groundwater flow is generally southeasterly into Hamilton Harbour, except along the northern site boundary where flow appears to be northwesterly into the Grindstone Creek valley above the escarpment. The Lockport-Amabel bedrock aquifer above the escarpment discharges as seeps along the escarpment face, giving rise to several surface streams. The moraines and limestone pavements above the escarpment appear to function as a local recharge zone.

There are significant karst formations at Waterdown Woods, McNally and City View Park. The Grindstone Creek watershed contains numerous locations of karst topography, which within the watershed, is typified by sinking streams and re-appearing springs, trenches in the bedrock (grykes), and soil piping. Karst is typically found where sedimentary bedrock lies exposed at the surface oris overlain by only shallow permeable soil layers such as along the Niagara Escarmpment. Overtime, karst features may develop into caves and sinkholdes (where are also known as dolines). These features develop

underground where it is difficult to monitor their rate of growth, and can result in sudden collapse where the sinkholde develops close to the Earth's surface (Conservation Halton, Draft Grindstone Creek Watershed Study 2015).

5.2 Surface Water

Surface water features in the Heritage Lands include several small tributaries of Grindstone Creek (Sassafras Tributaries), and Falcon Creek, Indian Creek, Hager Creek, and Rambo Creek. Portions of these watercourses are intermittent. Due to the highly erodible nature of the soils in this area, these creek systems flow through deeply incised valleys, which provide a unique landscape characteristic. Other surface water features present within the study area include stormwater management ponds located at City View Park, Tyandaga Golf Course, and Bayview Park/Indian Creek.

5.3 Vegetation

5.3.1 Inventory

Figure 4 illustrates the vegetation community coverage of the study area. Table 3 summarizes the number of polygons, area and percentage of the study area that each ELC vegetation community comprises within the study area. Table 4 summarizes the ELC composition of each parcel. Some polygons were too small to map (i.e., small slivers often located at the very edge of the Current EcoPark Lands); therefore, the number of polygons, size and percentage of study area reported in Table 3 may not appear to match what is illustrated in Figure 4.

Bluff, Talus and Cliff

Open Bluffs have less than 25% tree cover and less than 25% shrub cover. Tree invasion is generally restricted by erosion-related disturbances. They are typically found on active, steep to near-vertical exposures of unconsolidated mineral material, and are subject to active erosional processes restricted to lacustrine or riverine shorelines (Lee et al. 1998). An Open Bluff (BLO) community has been documented along Upper Hager Creek in Waterdown Woods (Figure 4 and Tables 3 and 4).

Treed Talus vegetation communities have between 25-60% tree cover, varying from patchy and barren to more closed in nature (i.e., savannah or woodland) depending on the availability of substrate accumulated between rocks (Lee et al. 1998). Fresh-Moist Sugar Maple Carbonate Treed Talus Type (TAT1-4) has been documented below the escarpment rim in City View Park and Kerncliff 1; Fresh-Moist Basswood-White Ash Carbonate Treed Talus Type (TAT1-5) has been documented below the escarpment rim in Kerncliff 1 and Waterdown Woods (Figure 4 and Tables 3 and 4). The talus slopes in the Waterdown-Sassafras Woods Heritage Lands have rich Sugar Maple (*Acer saccharum*) forests and semi-open Basswood (*Tilia americana*) and White Ash (*Fraxinus americana*) groves.

Open Cliff vegetation communities have less than 25% tree cover and less than 25% shrub cover, and are typically found on vertical or near-vertical bare bedrock faces (Lee et al. 1998). **Treed Cliff** vegetation communities have between 25-60% tree cover, are typically restricted to the narrow cliff rim, and are dependent on how broken and fractured the cliff rim and face are (Lee et al. 1998). Although not mapped due to their small size, Open Cliff and Treed Cliff vegetation communities are found at the McNally Property and at Waterdown Woods, within the Heritage Lands.

Cultural Communities

Regenerating cultural communities are scattered through the shale slopes in Waterdown-Sassafras Woods. They sustain old fields, thickets and Grey Dogwood (*Cornus racemosa*), Staghorn Sumac (*Rhus typhina*) and hawthorn (*Crataegus* sp.) as well as successional groves of White Ash, Large-tooted Aspen (*Populus grandidentata*), Trembling Aspen (*P. tremuloides*) and White Elm (*Ulmus americana*). Cultural vegetation communities are located throughout the Heritage Lands (Figure 4 and Tables 3 and 4).

Cultural Meadows represent a very early stage of natural succession. They have less than 25% tree cover and less than 25% shrub cover, and often have a large proportion of non-native plant species (Lee et al. 1998). They lack woody species and are dominated primarily by opportunistic forbs and grasses. Cultural meadows generally result from or are maintained by cultural or anthropogenic-based disturbances. Depending on soil moisture regimes, these communities can vary from dry pasture grass-dominated areas to the aster and goldenrod assemblages on fresh to moist substrates. Mineral Dry-Moist Old Field Meadow Type (CUM1-1) and other cultural meadow communities (i.e., CUM, CUM1, and CUM2) have been documented throughout the study area (Figure 4 and Tables 3 and 4), with the largest areas of cultural meadow occurring within City View Park and Falcon Creek.

Cultural Meadow has been mapped in several locations that have undergone restoration plantings, such as the ecological restoration area in City View Park. The restoration area is in the early stages of restoration, and although that are many trees and shrubs planted in the area, they are not large enough to achieve the canopy cover required to be considered a forest or plantation. In addition, some of the Cultural Meadows at Waterdown Woods have recently been planted as restoration fields with 50% conifer and 50% deciduous tree species. Some planting has also occurred on the Regional Landfill (Falcon Creek), but many of these plantings have failed.

Cultural Thickets include areas in a somewhat later stage of succession than cultural meadows. They have less than 25% tree cover and greater than 25% shrub cover, and often have a large proportion of non-native plant species (Lee et al. 1998). Cultural thicket communities are dominated by woody shrubs and often have an understory of forbs and grasses. Like cultural meadows, cultural thickets generally result from, or are maintained by cultural or anthropogenic-based disturbances. Cultural thickets have been documented through the study area (Figure 4 and Tables 3 and 4), with the largest areas of cultural thicket occurring within Waterdown Woods and City View Park. The following cultural thicket vegetation types/ecosites have been documented within the study area (Figure 4 and Tables 3 and 4):

- Gray Dogwood Cultural Thicket Type (CUT1-4); and
- Raspberry Cultural Thicket Type (CUT1-5).

Cultural Savannahs have between 25% and 35% tree cover, and often have a large proportion of non-native plant species resulting from cultural or anthropogenic disturbances (Lee et al. 1998). They are generally open in character, with scattered trees and shrubs and an understory dominated by forbs and grasses. Hawthorn Cultural Savannah Type (CUS1-1) has been documented in Waterdown Woods (Figure 4 and Tables 3 and 4).

Cultural Woodlands are treed areas that have between 35% and 60% tree cover, and often have a large proportion of non-native plant species resulting from cultural or anthropogenic disturbances (Lee et al. 1998). Cultural Woodland (CUW) or Mineral Cultural Woodland Ecosite (CUW1) have been documented in Bayview Park/Indian Creek, Upper Hager Creek, Waterdown Road, and Falcon Creek (Figure 4 and Tables 3 and 4).

Table 3. Vegetation communities of partner-owned Waterdown-Sassafras Woods Heritage Lands

ELC Community Series	# of Polygons	Hectares	% Study Area
BLO - Open Bluff	1	0.01	0.00
TAT - Treed Talus	2	1.63	0.37
CUM - Cultural Meadow	46	77.95	17.50
CUS - Cultural Savannah	2	0.93	0.21
CUT - Cultural Thicket	35	57.52	12.92
CUM/CUT – Cultural Meadow/Thicket	1	3.57	0.80
CUW - Cultural Woodland	5	5.88	1.32
CUP - Cultural Plantation	6	2.63	0.59
FOD - Deciduous Forest	54	197.27	44.30
FOM - Mixed Forest	2	2.50	0.56
FOC - Coniferous Forest	1	0.31	0.07
SWD - Deciduous Swamp	4	7.81	1.75
SWT - Thicket Swamp	1	0.58	0.13
MAM - Meadow Marsh	3	1.05	0.24
MAS -Shallow Marsh	1	1.27	0.29
OAO - Open Aquatic	2	0.69	0.16
UNC - Unclassified	7	13.99	3.14
ANT - Anthropogenic	2	12.60	2.83
Totals:	**175**	**388.19**	**87.17**

Table 4. Vegetation communities of Current EcoPark Lands, broken down by parcel

Parcel Name	Vegetation Communities (ha)																
	BLO	TAT	CUM	CUT	CUS	CUM/CUT	CUW	CUP	FOC	FOD	FOM	SWD	SWT	MAM	MAS	OAO	ANT
Bayview Park/Indian Creek			13.08	1.07			0.09	0.09		15.83						0.23	0.97
City View Park		0.83	10.19	11.99		3.57		0.90		16.82							11.63
Falcon Creek			36.56	8.59			5.5			17.84							
Forestvale Park										2.39							
Hughes										0.05							
Kerncliff 1		0.07	2.62	8.51						21.51	0.61				1.27		
Kerncliff 2				0.47													
Kerns/Westbury Park			1.39							5.36							
McNally			1.12	1.02				0.45	0.31	7.35							
Sassafras Tributary										4.58							
Tyandaga Golf Course			0.06	0.02						7.19						0.46	
Upper Hager Creek			0.64	0.38			0.22			12.52				0.97			
Upper Rambo Creek/Mansfield Park										7.55							
Waterdown Road							0.07										
Waterdown Woods	0.01	0.74	12.28	25.47	0.93			1.18		78.28	1.89	7.81	0.58	0.09			
Totals (ha):	**0.01**	**1.64**	**77.94**	**57.52**	**0.93**	**3.57**	**5.88**	**2.62**	**0.31**	**197.27**	**2.50**	**7.81**	**0.58**	**1.06**	**1.27**	**0.69**	**12.60**

Cootes to Escarpment EcoPark System

Waterdown - Sassafras Woods Heritage Lands

Figure 4: Vegetation Communities

Legend

Ecological Land Classification

ANT - Anthropogenic
BLO - Open Bluff
CUM1 - Mineral Cultural Meadow Ecosite
CUM1-1 - Dry-Moist Old Field Meadow Type
CUM2 - Bedrock Cultural Meadow Ecosite
CUP - Cultural Plantation
CUP1 - Deciduous Plantation
CUP3 - Coniferous Plantation
CUS1-1 - Hawthorn Cultural Savannah Type
CUT1 - Mineral Cultural Thicket Ecosite
CUT1-4 - Gray Dogwood Cultural Thicket Type
CUT1-5 - Raspberry Cultural Thicket Type
CUW1 - Mineral Cultural Woodland Ecosite
FOC3 - Fresh-Moist Hemlock Coniferous Forest Ecosite
FOD - Deciduous Forest
FOD1-1 - Dry-Fresh Red Oak Deciduous Forest Type
FOD1-4 - Dry-Fresh Mixed Oak Deciduous Forest Type
FOD2-2 - Dry-Fresh Oak-Hickory Deciduous Forest Type
FOD2-3 - Dry-Fresh Hickory Deciduous Forest Type
FOD2-4 - Dry-Fresh Oak-Hardwood Deciduous Forest Type
FOD3-1 - Dry-Fresh Poplar Deciduous Forest Type
FOD4-2 - Dry-Fresh White Ash Deciduous Forest Type
FOD4-11 - Dry-Fresh Black Locust Deciduous Forest Type
FOD5-1 - Dry-Fresh Sugar Maple Deciduous Forest Type
FOD5-3 - Dry-Fresh Sugar Maple-Oak Deciduous Forest Type
FOD6-5 - Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type
FOD7-2 - Fresh-Moist Ash Lowland Deciduous Forest Type
FOD7-4 - Dry-Fresh Black Walnut Lowland Deciduous Forest Type
FOD9-4 - Fresh-Moist Shagbark Hickory Deciduous Forest Type
FOM2-2 - Dry-Fresh White Pine-Sugar Maple Mixed Forest Type
FOM7-1 - Fresh-Moist White Cedar-Sugar Maple Mixed Forest Type
MAM1-3 - Forb Bedrock Meadow Marsh Type
MAM2-5 - Narrow-leaved Sedge Mineral Meadow Marsh Type
MAS2-1 - Cattail Mineral Shallow Marsh Type
OAO - Open Aquatic
SWD2-1 - Black Ash Mineral Decuous Swamp Type
SWD2-2 - Green Ash Mineral Deciduous Swamp Type
SWD3-2 - Silver Maple Mineral Deciduous Swamp Type
SWT2-5 - Red-osier Mineral Thicket Swamp Type
TAT1-4 - Fresh-Moist Sugar Maple Carbonate Treed Talus Type
TAT1-5 - Fresh-Moist Basswood - White Ash Carbonate Treed Talus Type
UNC - Unclassified

Utility Corridors

Municipal Boundary

Study Area

Waterdown - Sassafras Woods Heritage Lands

Sources of Information:
Conservation Halton
Hamilton Conservation Authority
City of Burlington
City of Hamilton
Bruce Trail Conservancy
Ministry of Natural Resources and Forestry

North-South Environmental Inc.
Specialists in Sustainable Landscape Planning

February 4, 2016

0 100 200 400 600 800 1,000
Meters

Cultural Plantations have greater than 60% tree cover and consist of deciduous and/or coniferous trees that have primarily been planted (Lee et al. 1998). Cultural Plantations, including Cultural Plantation (CUP) and Coniferous Plantation (CUP3) have been documented in Bayview Park/Indian Creek, Waterdown Woods, and McNally (Figure 4 and Tables 3 and 4).

Forested Communities

Forested communities have greater than 60% tree cover, and can be dominated by deciduous and/or coniferous trees. Forested communities are characterized based on the species that dominate the canopy layer. For example, a forest that is dominated by Sugar Maple would be classified as a deciduous forest dominated by Sugar Maple. The Heritage Lands contain **Coniferous Forest**, **Deciduous Forest** and **Mixed Forest**. Coniferous forests have greater than 75% canopy cover of coniferous tree species, deciduous forests have greater than 75% canopy cover of deciduous tree species, and mixed forests have greater than 25% canopy cover of coniferous tree species and greater than 25% canopy cover of deciduous tree species (Lee et al. 1998).

Forested communities are found throughout the study area, along the Niagara Escarpment and creek ravines (Figure 4 and Tables 3 and 4). Within the study area, forested communities are primarily dominated by deciduous forest (197.27 ha), with a small proportion of mixed forest (2.50 ha) and coniferous forest (0.31 ha). The escarpment slopes in Waterdown Woods support deciduous forests dominated by Sugar Maple, White Oak (*Quercus alba*) and Red Oak (*Q. rubra*), with Shagbark Hickory (*Carya ovata*) as a common secondary species. Below the escarpment, the complex series of uplands and ravines supports drier forests of Red Oak and White Oak, with Sugar Maple, Red Maple (*A. rubrum*) and Shagbark Hickory as important secondary species and occasionally as co-dominants. Scattered upland seeps sustain Shagbark Hickory and White Ash wet mesic forests. The ravine slopes vary from dry White Oak-Red Oak and dry mesic Red Oak forests. The ravine slopes vary from dry White Oak-Red Oak and dry mesic Red Oak forests on southern aspects to mesic Sugar Maple forests and an Eastern Hemlock (*Tsuga canadensis*) grove (FOC3) on northern aspects. The bottomlands have rich Sugar Maple – White Ash forests. Mixed forests consist of Sugar Maple-White Pine (FOM2-2), or Sugar Maple-White Cedar (FOM7-1).

The following forested communities have been documented within the study area:

- Dry-Fresh Red Oak Deciduous Forest Type (FOD1-1);
- Dry-Fresh Mixed Oak Deciduous Forest Type (FOD1-4);
- Dry Fresh Oak-Hickory Deciduous Forest Type (FOD2-2);
- Dry-Fresh Hickory Deciduous Forest Type (FOD2-3);
- Dry-Fresh Oak-Hardwood Deciduous Forest Type (FOD2-4);
- Dry-Fresh Poplar Deciduous Forest Type (FOD3-1);
- Dry Fresh Black Locust Deciduous Forest Type (FOD4-11);
- Dry-Fresh White Ash Deciduous Forest Type (FOD4-2);
- Dry-Fresh Sugar Maple Deciduous Forest Type (FOD5-1);
- Dry-Fresh Sugar Maple-Oak Deciduous Forest Type (FOD5-3);
- Fresh-Moist Sugar Maple – Hardwood Deciduous Forest Type (FOD6-5);
- Fresh-Moist Ash Lowland Deciduous Forest Type (FOD7-2);
- Fresh-Moist Black Walnut Lowland Deciduous Forest Type (FOD7-4);
- Fresh-Moist Shagbark Hickory Deciduous Forest Type (FOD9-4);
- Dry-Fresh White Pine-Sugar Maple Mixed Forest Type (FOM2-2);

- Fresh-Moist White Cedar-Sugar Maple Mixed Forest Type (FOM7-1); and
- Fresh-Moist Hemlock Coniferous Forest (FOC3).

Oak Woodlands

Oak woodland communities are one of the most significant ecosystems in the study area. Oak woodlands are not itemized or described in the 1998 ELC System (Lee et al. 1998), and are thus included under oak dominated deciduous forest types, such as Dry-Fresh Red Oak Deciduous Forest Type (FOD1-1) and Dry-Fresh White Oak Deciduous Forest Type (FOD1-2). Many of the rare and uncommon species present within the Heritage Lands are located within these open oak woodland communities.

The draft 2008 update of ELC codes includes vegetation types for oak woodlands under the Ecosite "Deciduous Woodland", where deciduous trees dominate and cover >75%. The following Deciduous Woodland communities have been noted within the Heritage Lands, but have not been fully mapped and are not shown on Figure 4:

- Dry Red Oak Woodland Type (WODM3-1); and
- Dry White Oak Woodland Type (WODM3-3).

Wetland Communities

In general, wetland communities are scarce within the Current EcoPark Lands, comprising just 2.4% of the study area. This is due to the physiography, soils and terrain which all promote rapid drainage through the escarpment and creek valleys. **Deciduous Swamp** vegetation communities have greater than 25% tree cover by trees that are greater than 5 m in height. The canopy layer must have greater than 75% cover by deciduous tree species (Lee et al. 1998). **Thicket Swamp** vegetation communities have less than 25% tree cover and greater than 25% shrub cover (Lee et al. 1998). These swamp vegetation community types are dominated by hydrophytic shrub and tree species that are compatible with variable flooding regimes. The deciduous swamp communities located in Waterdown Woods are part of the Falcon Creek Provincially Significant Wetland Complex.

Meadow Marsh vegetation communities have less than 25% tree and shrub cover and are characterized by emergent hydrophytic macrophytes and tend to be dominated by species that are less tolerant of prolonged flooding (Lee et al. 1998). Areas of meadow marsh tend to receive seasonal flooding, where soils are flooded in the spring but become moist to dry by summer. This vegetation community represents the interface between wetland and terrestrial ecosystems. **Shallow Marsh** vegetation communities have less than 25% tree and shrub cover and are usually dominated by grasses, sedges and rushes (Lee et al. 1998). They can have water up to 2 m deep, with standing or flowing water for much or all of the growing season.

Within the study area, the following wetland vegetation communities have been documented within Waterdown Woods (Figure 4 and Tables 3 and 4):

- Black Ash Mineral Deciduous Swamp Type (SWD2-1);
- Green Ash Mineral Deciduous Swamp Type (SWD2-2);
- Silver Maple Mineral Deciduous Swamp Type (SWD3-2); and
- Red-osier Mineral Thicket Swamp Type (SWT2-5).

Aquatic Communities

Open Aquatic communities have water greater than 2 m in depth with no macrophyte vegetation and no tree or shrub cover, and tend to be dominated by plankton (Lee et al. 1998). Open Aquatic (OAO)

communities are present within stormwater management ponds at Bayview Park/Indian Creek and Tyandaga Golf Course (Figure 4 and Tables 3 and 4).

Anthropogenic

Several anthropogenic (ANT) areas are present within the Current EcoPark Lands (Figure 4 and Tables 3 and 4). These lands contain land uses that are not easily classified using the ELC for southern Ontario. For example, small slivers of manicured areas are often present along the study area boundaries, portions of anthropogenic use such as parking lots are also present.

5.3.2 Significant Vegetation Communities

There are two provincially significant vegetation communities within the Waterdown-Sassafras Woods Heritage Lands (Figure 4):

- Fresh-Moist Sugar Maple Carbonate Treed Talus Type (TAT1-4) – S3; and
- Fresh-Moist Basswood-White Ash Carbonate Treed Talus Type (TAT1-5) – S3.

In addition, the following oak woodland vegetation communities are also considered to be provincially significant, but are not currently mapped under the 1998 ELC system (Lee et al. 1998), and are thus not mapped on Figure 4:

- Dry Red Oak Woodland Type (WODM3-1); and
- Dry White Oak Woodland Type (WODM3-3).

Historical records indicate that prairie and oak savannah were associated with well-drained, sandy sites south of the Escarpment. "A mosaic of prairie, savannah and open oak-hickory woodlands developed over well-drained sandy soils in present-day Aldershot and on thinly-mantled south-facing slopes below the Escarpment" (Goodban et al. 1999). Only a handful of tiny prairie-savannah remnants remain within the dry oak/hickory forests that are located south of the Niagara Escarpment within the study area. Adjacent dry, open ridges within utility corridors support clusters of prairie plant species (Halton Region Conservation Authority 1998). Far less than 1% of the pre-settlement prairie and savannah remains in southern Ontario. The remnant prairie/savannah features represent the rarest and most threatened community type within the Waterdown-Sassafras Woods Heritage Lands.

The Niagara Escarpment, Falcon Creek valley, Indian Creek valleys, Upper Hager Creek valleys, and Upper Rambo Creek valley are covered in older forests of Red Oak, White Oak, Sugar Maple with trees in excess of 100 years old in some locations. By some definitions, these forests would qualify as old growth. The stunted White Cedars along the cliff-rim ecotone in Waterdown Woods may be old-growth stands, with trees in excess of several hundred years old.

According to the Halton Natural Areas Inventory, Waterdown Woods and Sassafras Woods contain forest interior habitat, which is defined as forested areas that are greater than 100 m away from a forest edge. Forest interior habitat provides important refuges for area-sensitive wildlife species, particularly some bird species.

Much of the forest within the study area would qualify as significant woodland using Halton Region's significant woodlands criteria (ROPA 38, November 28, 2014).

A small portion of PSW (i.e., Falcon Creek Provincially Significant Wetland complex) occurs within Waterdown Woods in the Waterdown-Sassafras Woods Heritage Lands.

Several Grindstone Creek tributary valleys, Falcon Creek valley, Indian Creek valleys, Upper Hager Creek valleys, and Upper Rambo Creek valleys may qualify as significant valleyland, based on the 2014 Provincial Policy Statement definition which states that significant valleylands are "ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system".

Some of the vegetation communities found within the study area may qualify as significant wildlife habitat, which includes rare vegetation communities or specialized habitat for wildlife including bluffs, cliffs and talus slopes, old growth forest, other rare vegetation communities, and seeps and springs (MNRF 2015). Seeps and springs are typical of headwater areas and are often at the source of coldwater streams.

5.4 Flora

5.4.1 Inventory

A total of 720 floral species have been documented in the Waterdown-Sassafras Woods Heritage Lands. See Appendix 5 for the complete listing of floral species documented within each of the Current EcoPark Lands, and within the Waterdown-Sassafras Woods Heritage Lands as a whole. Off these 720 species, 509 (71%) are native species.

A total of 21 Carolinian indicator species (*sensu* Riley et al. 1989) and 25 plant species with prairie – savannah affinities (*sensu* Riley et al. 1989) have been noted (Appendix 6).

Table 5 provides the number of native floral species, Floristic Quality Index (FQI), and Native Mean C for each Current EcoPark Land. FQI, a measure of both habitat conservatism and species richness and thus an indicator of vegetation quality, is the average Coefficient of Conservatism (CC) divided by the square root of the number of plant species in the community (Oldham et al. 1995). CC is a measure of a plant's specificity of habitat requirements, with a coefficient of 0 indicating a plant tolerant of a wide range of conditions and 10 indicating a plant that has the most specific habitat requirements. Mean CC is thus a measure of the habitat requirements of a plant community.

The Native FQI of the Waterdown-Sassafras Woods Heritage Lands as a whole is an extremely high value at 118.38. In southern Ontario, most natural areas within urban or urbanizing landscapes have Native FQI values of around 70-80. Remnant patches of natural habitat in urban areas of Ontario typically have FQIs in the 15-30 range. FQIs of 40-45 are fairly high for agricultural landscapes. A mean C under 4 indicates that the site is primarily vegetated with adaptable species that can withstand a variety of habitat changes. Areas with high coefficients (higher than 4) are likely to be more sensitive to disturbance, for example a change in hydrology, influx of non-native species, or change in canopy cover.

Table 5. Floristic Quality of the Waterdown-Sassafras Woods Heritage Lands

Site Name	# Native Flora Species	Native FQI	Native Mean C
Bayview Park/Indian Creek	293	88.20	5.15
City View Park	355	91.82	4.87
Falcon Creek	339	92.34	5.02
Forestvale Park	43	24.59	3.75
Hughes	323	88.48	4.92
Kerncliff 1	358	94.27	4.98
Kerncliff 2	358	94.27	4.98
Kerns Westbury Park	52	25.90	3.59
McNally	312	85.29	4.83
Sassafras Tributary	325	89.68	4.97
Tyandaga Golf Course	314	84.59	4.77
Upper Hager Creek	105	51.54	5.03
Upper Rambo Creek/Mansfield Park	351	91.89	4.90
Waterdown Road	5	6.71	3.00
Waterdown Woods	360	94.59	4.99
Waterdown-Sassafras Woods Heritage Lands	**509**	**118.38**	**5.25**

Invasive species have been identified as one of the greatest threats to the integrity of the ecosystems of the Waterdown-Sassafras Woods Heritage Lands. Table 6 below lists the major invasive species and provides an indication of whether they are dominant in their respective habitats. This list has been compiled based on several background reports, data sets and fieldwork completed by North-South Environmental Inc. Expert knowledge of the characteristics of invasive species was applied to identify the major invasive plant species that are considered high priorities for management.

Table 6. Major invasive plant species found within Waterdown-Sassafras Heritage Lands

Common Name	Scientific Name	Locally Dominant
Herbaceous Plants		
Garlic Mustard	*Alliaria petiolata*	x
Dog-strangling Vine	*Cynanchum rossicum*	x
English Ivy	*Hedera helix*	
Periwinkle	*Vinca minor*	
Himalayan Balsam	*Impatiens glandulifera*	
Japanese Knotweed	*Polygonum cuspidatum*	
Phragmites	*Phragmites australis*	
Purple Loosestrife	*Lythrum salicaria*	
Shrubs		
White Mulberry	*Morus alba*	
Common Buckthorn	*Rhamnus cathartica*	x
Non-native Honeysuckles	e.g., *Lonicera tatarica*	x
Multiflora Rose	*Rosa multiflora*	x
Japanese Barberry	*Berberis thunbergii*	
Trees		
Norway Maple	*Acer platanoides*	
Manitoba Maple	*Acer negundo*	x
Black Locust	*Robinia pseudoacacia*	x

5.4.2 Significant Flora

A total of 87 significant floral species have been identified within the study area (Table 7), including four nationally and provincially Endangered species, 12 provincially rare species (ranked S1-S3), 64 regionally rare species (based on Halton Region), and 58 regionally rare species in the City of Hamilton. Figure 5 illustrates the distribution of significant flora (and fauna) within the Waterdown-Sassafras Woods Heritage Lands, where known. Table 7 lists species and risk and provincially rare floral species in the Waterdown-Sassafras Woods Heritage Lands.

Table 7. Species at risk and provincially rare floral species in Waterdown-Sassafras Woods Heritage Lands

Scientific Name	Common Name	S Rank	SAR	Historic Record
Aureolaria flava L. Farw.	Smooth Yellow False Foxglove	S2?		
Carex mesochorea Mack.	Midland Sedge	S1		
Carya glabra (Miller) Sweet	Pignut Hickory	S3		
Cornus florida L.	Eastern Flowering Dogwood	S2?	END	
Crataegus brainerdii Sarg.	Brainerd's Hawthorn	S2		Yes
Frasera caroliniensis Walter	American Columbo	S2	END	
Hybanthus concolor (T.F. Forst.) Spreng.	Eastern Green Violet	S2		
Juglans cinerea L.	Butternut	S3?	END	
Morus rubra L.	Red Mulberry	S2	END	
Sphenopholis nitida (Biehler) Scribn.	Shiny Wedge Grass	S1		
Thalictrum thalictroides L. A.J. Eames & B. Boivin	Rue-anemone	S3		
Uvularia perfoliata L.	Perfoliate Bellwort	S1		

Historic Records are >20 years old.

Figure 5. Distribution of rare flora and fauna in Current EcoPark Lands

[This figure contains sensitive information and has been intentionally left out.]

5.5 Fauna

Fauna data were mostly obtained from existing inventories of natural features, and the boundaries of the Current EcoPark Lands are not coincident with ESA, ANSI and other natural area designations. Because of this, some of the species reported below may actually be located on Stewardship Lands within the Heritage Lands, or on lands adjacent to the Heritage Lands. However, because the habitats adjacent to Current EcoPark Lands are usually identical, it is reasonable to assume for the purpose of this management plan that all species reported occur within the Current EcoPark Lands. The complete listing of faunal species documented within the Waterdown-Sassafras Wood Heritage Lands can be found in Appendix 7. Figure 5 illustrates the distribution of significant faunal species within the Waterdown-Sassafras Woods Heritage Lands. Table 8 summarizes significant faunal species found within the Heritage Lands. In this report, significant is meant to mean any species that has been identified as Endangered, Threatened, or Special Concern, ranked S1-S3, or listed as regionally rare by Dwyer (2006).

5.5.1 Inventory

Butterflies and Moths (Lepidoptera)

A total of 51 species of butterfly or moth have been recorded within the Waterdown-Sassafras Woods Heritage Lands. All but one of these species are native. Two provincially significant species, three regionally rare and three regionally uncommon species have been noted (Appendix 7 and Table 8). The provincially significant species noted are:

- Monarch (*Danaus plexippus*) – S4, Special Concern (COSEWIC and COSSARO); and
- Mottled Duskywing (*Erynnis martialis*) – S2, Endangered (COSEWIC and COSSARO).

Dragonflies and Damselflies (Odonata)

A total of 34 species of dragonfly or damselfly have been identified within the Waterdown-Sassafras Woods Heritage Lands, all of which are native. A total of eight regionally rare and seven regionally uncommon (*sensu* Dwyer 2006), as well as two provincially rare species have been noted (Appendix 7 and Table 8).

- Arrowhead Spiketail (*Cordulegaster obliqua*) – S2; and
- Painted Skimmer (*Libellula semifasciata*) –S2.

Fish

Several creek systems arise along the escarpment slopes with the Waterdown-Sassafras Wood Heritage Lands, including tributaries of Grindstone Creek, Falcon Creek, Indian Creek, Upper Hager Creek, and Upper Rambo Creek. These tributaries flow through steep ravines; flows are intermittent with numerous barriers (artificial and natural). A total of four fish species have been recorded within the study area, including one introduced species (Appendix 7). One regionally uncommon fish species has been noted within the Waterdown-Sassafras Woods Heritage Lands (*sensu* Dwyer 2006): Blacknose Dace (*Rhinichthys atratulus*).

Amphibians and Reptiles (Herpetofauna)

A total of 19 species of amphibians or reptiles have been recorded in the Heritage Lands, all of which are considered native species. A total of three provincially rare, two Endangered species, one Threatened, and one species of Special Concern, have been noted. In addition, two regionally rare and three

regionally uncommon species have been noted (*sensu* Dwyer 2006) (Appendix 7 and Table 8). Provincially significant species include:

- Jefferson Salamander (*Ambystoma jeffersonianum*) – S2, Endangered (COSEWIC and COSSARO);
- Jefferson/Blue-spotted Salamander Complex – Jefferson dominated polyploids are considered S2, Endangered (COSEWIC and COSSARO);
- Western Chorus Frog (Great Lakes/St. Lawrence population) (*Pseudacris triseriata*) – S4, Threatened (COSEWIC and COSSARO); and
- Milksnake (*Lampropeltis triangulum*) – S3, Special Concern (COSEWIC and COSSARO).

Birds

A total of 117 bird species have been noted within the Waterdown-Sassafras Woods Heritage Lands, including four non-native species. Of these, 96 are considered to possibly breed within the Current EcoPark Lands, eight are considered to possibly breed within the Stewardship Lands, and the remaining 13 bird species are considered to migrate through the Heritage Lands or casually visit the Heritage Lands (i.e., these species do not likely breed within the Heritage Lands).

In addition, of the species that are thought to breed within the Heritage Lands, 12 are rare in Halton Region and 17 are rare in the City of Hamilton, 32 are uncommon in Halton Region and 40 are uncommon in the City of Hamilton. A total of 26 area-sensitive species have been noted within the Current EcoPark Lands, three area-sensitive species have been noted within the Stewardship Lands, and one area-sensitive migrant has been noted (Appendix 7). A total of 13 provincially rare and/or significant bird species have been documented within the Heritage Lands (*indicates a species associated with the Stewardship Lands; ^ indicates a migrant/casual visitor):

- Canada Warbler (*Cardellina canadensis*) – S4B, Threatened (COSEWIC), Special Concern (COSSARO);
- Cerulean Warbler (*Setophaga cerulea*) – S3B, Endangered (COSEWIC), Threatened (COSSARO);
- Eastern Whip-poor-will (*Caprimulgus vociferous*) – S4B, Threatened (COSEWIC and COSSARO);
- Eastern Wood-pewee (*Contopus virens*) – S4B, Special Concern (COSEWIC and COSSARO);
- Hooded Warbler (*Steophaga citrina*) – S4B, Threatened (SARA);
- Red-headed Woodpecker (*Melanerpes erythrocephalus*) – S3B, Threatened (COSEWIC and COSSARO);
- Wood Thrush (*Hylocichla mustelina*) – S4B, Threatened (COSEWIC), Special Concern (COSSARO);
- *Barn Swallow (*Hirundo rustica*) – S4B, Threatened (COSEWIC and COSSARO);
- *Bobolink (*Dolichonyx oryzivorus*) – S4B, Threatened (COSEWIC and COSSARO);
- *Eastern Meadowlark (*Sturnella magna*) – S4B, Threatened (COSEWIC and COSSARO);
- *Grasshopper Sparrow (*Ammodramus savannarum*) – S4B, Special Concern (COSEWIC and COSSARO);
- ^Chimney Swift (*Chaetura pelagica*) – S4B, S4N, Threatened (COSEWIC and COSSARO); and
- ^Olive-sided Flycatcher (*Contopus cooperi*) – S4B, Threatened (COSEWIC), Special Concern (COSSARO).

Mammals

A total of 20 mammals have been recorded within the Heritage Lands, including Little Brown Bat (*Myotis lucifugus*), a national and provincial Endangered species (Appendix 7 and Table 8). Bat surveys have not been completed and there are likely bat species at risk present in the Heritage Lands given the diversity of habitats and escarpment cliff crevices present.

Table 8. Nationally/Provincially significant faunal species

Common Name	G Rank	S Rank	SARA	COSEWIC	ESA
Butterflies and Moths					
Monarch	G5	S2N,S4B	SC	SC	SC
Mottled Duskywing	G3	S2	NS	END	END
Dragonflies and Damselflies					
Arrowhead Spiketail	G4	S2			
Painted Skimmer	G5	S2			
Amphibians and Reptiles					
Jefferson salamander	G4	S2	THR	END	END
Jefferson/blue-spotted salamander complex	GNA	S2			
Milksnake	G5	S3	SC	SC	SC
Western Chorus Frog (Great Lakes/ St. Lawrence population)	G5TNR	S4	THR	THR	NAR
Birds					
Canada Warbler	G5	S4B	THR	THR	SC
Cerulean Warbler	G4	S3B	SC	END	THR
Eastern Whip-poor-will	G5	S4B	THR	THR	THR
Eastern Wood-pewee	G5	S4B	NS	SC	SC
Hooded Warbler	G5	S4B	THR	NAR	NAR
Red-headed Woodpecker	G5	S4B	THR	THR	SC
Wood Thrush	G5	S4B	NS	THR	SC
*Barn Swallow	G5	S4B	NS	THR	THR
*Bobolink	G5	S4B	NS	THR	THR
*Eastern Meadowlark	G5	S4B	NS	THR	THR
*Grasshopper Sparrow	G5	S4B	NS	SC	SC
^Chimney Swift	G5	S4B,S4N	THR	THR	THR
^Olive-sided Flycatcher	G4	S4B	THR	THR	SC
Mammal Species					
Little Brown Bat	G5	S4	END	END	END

*=species associated with Stewardship Lands; ^=species is a migrant or casual visitor to Current EcoPark Lands

5.5.2 Significant Wildlife Habitat

Based on a preliminary assessment of the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, January 2015), the Waterdown-Sassafras Woods Heritage Lands may provide the following forms of significant wildlife habitat:

1. Seasonal Concentration Areas of Animals
    - Raptor Wintering Area
    - Bat Hibernacula
    - Bat Maternity Colonies
    - Migratory Butterfly Stopover Areas
    - Deer Winter Congregation Areas
2. Rare Vegetation Communities
    - Cliffs and Talus Slopes
    - Old Growth Forest
    - Other Rare Vegetation Communities
3. Specialized Habitat for Wildlife
    - Woodland Raptor Nesting Habitat
    - Seeps and Springs
    - Amphibian Breeding Habitat (Woodland)
    - Woodland Area-sensitive Breeding Bird Habitat
4. Habitat for Species of Conservation Concern
    - Special Concern and Rare Wildlife Species
5. Animal Movement Corridors

A thorough analysis of the extent of Significant Wildlife Habitat is not possible at this scale of study; however we are confident that substantial areas of the Current EcoPark Lands would qualify as Significant Wildlife Habitat.

5.6 Other Natural Heritage Designations

The following designations apply to lands found within the Waterdown-Sassafras Heritage Lands:

Sassafras-Waterdown Woods Provincial Life Science ANSI (Varga 1995)

The combined Sassafras Woods and Waterdown Escarpment Woods site provides the best representation in the biophysical section of bedrock plain, escarpment rim, talus and shale slope on a south-facing escarpment feature (Varga 1995). The Waterdown Escarpment Woods is dominated by the vertical bedrock exposures of the Niagara Escarpment. The largely wooded escarpment feature contains several very high quality mature plant communities and a good diversity of habitats. Areas of mature deciduous forest and escarpment habitat are interspersed with open field environments.

Old Nelson Quarry Provincial Earth Science ANSI (OMNR 1994)

Old Nelson Quarry is located in Kerncliff Park 1 (Figure 2). It is a provincial Earth Science ANSI on the basis of excellent exposures of Amabel, Rochester, Irondequoit, Reynales and Thorold Formations (OMNR 1994).

Waterdown Moraines Regionally Significant Earth Science ANSI (Karrow 1987)
The Waterdown Moraine (Pleistocene) lies immediately above the escarpment. This end moraine marks the furthest extent of the ice front following the re-advance which deposited the Halton Till (Karrow 1987).

Environmentally Sensitive/Signficant Areas (ESAs)
The Halton Regional Official Plan no longer uses Environmentally Sensitive Areas (ESAs) as a basis for protecting natural heritage as they have been replaced, and incorporated into a Regional Natural Heritage System. However, ESAs were the basis for inventory and reporting on the Region's natural heritage for 37 years and still provide a useful framework for reporting and describing natural heritage features. The City of Hamilton does, however, still include Environmentally Significant Areas (ESAs) in their Official Plan.

The following ESAs are found within the Waterdown-Sassafras Woods Heritage Lands:

- Halton Region ESA: Sassafras Woods (NAI-4);
- Halton Region ESA: Waterdown Escarpment Woods and Extension (NAI-5 and NAI-5A);
- City of Hamilton ESA: Waterdown Escarpment Woods (FLAM-51).

The Niagara Escarpment, including the Waterdown-Sassafras Woods Heritage Lands, are designated as a UNESCO MAB Reserve (United Nations Educational, Scientific and Cultural Organization Man and Biosphere Reserve).

Sassafras Woods has been designated a Carolinian Canada site.

5.7 Natural Heritage Connections and Linkages

Natural Heritage connections and linkages occur at various scales: (1) large-scale, provincial, connections through natural areas located along the Niagara Escarpment; (2) connections and linkages among the Heritage Lands; and (3) connections and linkages within individual Heritage Lands. The Heritage Lands and their linkage function are captured within the Region of Halton and City of Hamilton's Natural Heritage Systems.

The Waterdown-Sassafras Woods Heritage Lands are part of a significant corridor that stretches the entire length of the Niagara Escarpment, which provides an important corridor for wildlife movement. The Heritage Lands are connected with several breaks to other forested lands along the Niagara Escarpment, part of a significant corridor extending for 23 km from Spencer Gorge to Mount Nemo. Strip development along Waterdown Road threatens the linkage between the Waterdown-Sassafras Woods Heritage Lands and the Clappison-Grindstone Heritage Lands located to the southwest. Waterdown Woods is not directly connected to any natural areas beyond the escarpment. The natural vegetation along Falcon Creek is connected to the escarpment shale slope forests of Sassafras Woods, and the Grindstone Creek tributaries link to the escarpment slopes. The Heritage Lands provide a natural corridor for species moving between natural areas through the highly urbanized City of Burlington, from Lake Ontario to the Niagara Escarpment. The Heritage Lands and their linkage function are captured within Halton Region's Natural Heritage System.

In terms of inter-Heritage Land connections, the adjacent escarpment natural areas (e.g., Clappison Woods) converge at the upper end of the Grindstone Creek valley, immediately south of Waterdown.

The Grindstone Creek system provides a natural corridor for species moving between natural areas through the highly urbanized City of Burlington, from Lake Ontario to the Niagara Escarpment. Thus, inter-Heritage Land connections are achieved between the Waterdown-Sassafras Woods and Clappison-Grindstone Heritage Lands. To the east, connections are made to other escarpment lands, outside the Cootes to Escarpment EcoPark System.

Within the Waterdown-Sassafras Woods Heritage Lands, Current EcoPark Lands and natural area units are quite fragmented. The escarpment-based parcels are quite separate from the Falcon Creek, Bayview Park/Indian Creek and Sassafras Tributary/Waterdown Road parcels, and the urban ravines also seem disconnected from the Heritage Lands unit.

5.8 Natural Heritage Inventory Summary

The following table includes some natural heritage-related policy categories such as ESA, significant woodland and significant wildlife habitat, as well as strictly natural heritage inventory summary information.

Table 9. Summary of natural heritage inventory findings.

Features	Designation	Study Area
Environmentally Sensitive Area (ESA)	• Halton Region Environmentally Sensitive Area • City of Hamilton Environmentally Significant Area	• Halton Region ESA: Sassafras Woods (NAI-4) • Halton Region ESA: Waterdown Escarpment Woods and Extension (NAI-5 and NAI-5A) • City of Hamilton ESA: Waterdown Escarpment Woods (FLAM-51)
Area of Natural and Scientific Interest (ANSI)	As designated and mapped by MNRF: • Provincially Significant Life Science ANSI • Provincially Significant Earth Science ANSI • Regionally Significant Earth Science ANSI	• Sassafras-Waterdown Woods Provincial Life Science ANSI • Old Nelson Quarry Provincial Earth Science ANSI • Waterdown Moraines Regionally Significant Earth Science ANSI
Provincially Significant Wetland (PSW)	Evaluated as a PSW as defined and mapped by MNRF.	• Small portion of Falcon Creek Provincially Significant Wetland Complex located in Waterdown Woods
Significant Woodland	• Significant Woodlands as identified by criteria in Halton Region's Official Plan (effective 2014)	• Deciduous, mixed and coniferous forests and cultural woodlands in Waterdown-Sassafras Woods Heritage Lands

Features	Designation	Study Area
Significant Valleyland	As defined and mapped by Conservation Halton: • Regulatory floodplain • Rivers and associated valleylands to top of bank	• Regulated lands of the Grindstone Creek, Falcon Creek, Indian Creek, Upper Hager Creek, and Upper Rambo Creek systems
Species at Risk	• Habitat for Endangered Species and Threatened Species • Provincially designated in Ontario's Endangered Species Act • Records considered historical (i.e., more than 20 years old) have not been included in the analysis	• 4 endangered floral species • 10 endangered or threatened bird species • 3 endangered or threatened amphibian species • 1 endangered butterfly species
Significant Wildlife Habitat	• Provincially significant vegetation types; ELC vegetation types ranked as S1, S2, S3 or S3S4 by NHIC • Habitat for globally, nationally and provincially significant species; includes species designated as Endangered or Threatened by COSEWIC, Special Concern by COSEWIC or COSSARO, or identified as S1, S2, S3, or S3S4 by NHIC • Seeps and Springs • Amphibian woodland breeding ponds • Woodland raptor nesting habitat • Woodland area-sensitive bird breeding habitat • Migratory stopover area • Site potentially linked to an animal movement corridor	*Examples of Significant Wildlife Habitat within the study area include:* • Waterdown-Sassafras Woods Heritage Lands are an important breeding area for 104 species of birds, including 29 area-sensitive species. • The area supports 4 species of special concern, rarely found elsewhere in Ontario and Canada (per the ESA). • The area supports several areas of woodland breeding habitat for amphibians. • The area supports seeps and springs, a form of specialized habitat for wildlife.
Surface water and fisheries resources	• Permanent and intermittent streams (including ponds) • Cold-water fish habitat	• Grindstone Creek tributaries within the Heritage Lands are intermittent.

Features	Designation	Study Area
Flora	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 720 flora species; 509 native flora species • 21 Carolinian indicators • 25 Prairie-Savannah indicators • 118.38 FQI; 5.25 Native Mean C • 4 END species • 22 S1-S3 species • 87 regionally rare species
Butterflies and Moths	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 51 species; 50 native species • 1 END species; 1 SC species • 1 S1-S3 species • 3 regionally rare species
Dragonflies and Damselflies	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 34 native species • 2 S1-S3 species • 8 regionally rare species
Fish	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 4 species; 3 native species
Amphibians and Reptiles	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 19 native species • 2 END species; 1 THR species; 1 SC species • 3 S1-S3 species • 2 regionally rare species
Birds	• COSEWIC and COSSARO • NHIC • Dwyer 2006 • SWTGH (MNR 2000)	• 117 species (96 breeding); 113 native species • Current EcoPark Lands: 1 END species; 5 THR species; 1 SC species • Stewardship Lands: 3 THR species • 2 S1-S3 species • 22 regionally rare species • 29 area-sensitive species
Mammals	• COSEWIC and COSSARO • NHIC • Dwyer 2006	• 20 native species • 1 END species

6.0 Cultural Heritage Inventory

6.1 History, Identification and Existing Conditions

Within the Waterdown-Sassafras Woods study area, the primary existing cultural heritage resources relate to quarrying activities. The escarpment geological formation plays a significant role in the location of quarrying activities. This strong physical element has influenced the local area settlement pattern contributing to the historical, social and industrial development of this part of East Flamborough Township, County of Wentworth and Nelson Township in the County of Halton (present day City of Hamilton and City of Burlington).

Review of topographic maps and the historical atlas shows the early agricultural context of the area. Nelson Township was the first area to be settled around 1800 in the County of Halton.

The cultural heritage resource survey identified three principal sites. The first is the former quarrying extraction site located in the Old Nelson Quarry identified in Kerncliff 1, below City View Park (Figure 2). Dolomite was the primary resource selected for extraction. City View Park overlooks the small quarry with a viewscape stretching beyond to Burlington Bay and Lake Ontario. The second site, Kerncliff 1 also contains the site of a remnant concrete structure associated with the processing plant located in Kerncliff Park and is accessed from Kerns Road. It is assumed to relate to the operation of the Old Nelson Quarry business. Built of concrete, it is believed to be a post First World War structure. The third site includes the Falcon Creek lands. Extraction of clays from this area is profiled in the “Report of the Bureau of Mines, Vol. XV. Part II. 1906, Clay and the Clay Industry of Ontario”, M.B. Barker. In 1904, eleven yards (sites) in this area were manufacturing red brick principally for use in Hamilton, Ontario. A number of yards had electricity supplied from Decew Falls in Niagara. This greatly improved production. Decew, commissioned in 1898, was one of the first hydro-electric power plants in Ontario. Four and one-half million brick units were produced from the clay formation in 1904.

The last site is known as Woodhill Farm, the property was originally settled by the Honourable Adam Fergusson. The house was built for Adam Fergusson, born in Scotland in 1783, who immigrated to Upper Canada in 1833, two years after an initial visit in 1831, the basis of his book, "Practical Notes Made during a Tour in Canada and a Portion of the United States in MDCCCXXX", published by William Blackwood in 1833. "Woodhill" was named after Fergusson’s home in Scotland. A large house was required to accommodate his family, which included his new wife, Jessie Tower, six of the seven sons from his first marriage, servants, and a tutor for his sons. In Scotland Fergusson had been a lawyer, magistrate and director of an agricultural society. After settling in Woodhill, he helped to found the Agriculture Association of Upper Canada, whose first exhibition in 1847 was the forerunner of the Canadian National Exhibition. He promoted the founding of the Ontario Veterinary College, later the University of Guelph. He was one of the founders of the Canada Life Assurance Company and a co-founder of the village of Fergus, Ontario. He was active in politics as a moderate Reformer and a member of the Legislative Council. His childrens’ tutor, the Reverend Patrick Bell, invented a reaping machine. One of his sons, Adam Fergusson-Blair, was President of the first Privy Council of the Dominion of Canada in 1867. The Hon. Adam Fergusson died in 1862 (his monument is in St Luke’s Church yard) and his sons inherited Woodhill. In 1871 George & Robert Ferguson sold it to William Spence. In 1947 it was bought by John McColl, who made renovations to the house.
(http://images.halinet.on.ca/8829/data?n=25)

Until his death in 2007, Woodhill was owned by Robert and Lyla Elstone. Robert (Bob) Elstone was an active member of the Burlington, Ontario community and former Citizen of the Year.

Photograph 1. Remnant concrete quarry structure located in Kerncliff 1 (Photograph by Richard Unterman)

6.2 Built Heritage and Cultural Heritage Landscape Conservation Guidelines

Natural heritage and built heritage conservation disciplines have long-viewed landscape conservation as common ground. It is useful to view conservation as a tool to enhance life in a community or area. In Ontario, the *Ontario Heritage Act* (OHA) provides local municipalities with the tools to protect cultural heritage properties of regional and local heritage significance or interest under Part IV and Part V of the Act. It also enables the Ontario Heritage Trust to act through ownership and the implementation of heritage conservation easements to better protect and manage cultural and natural heritage resources of provincial and local significance.

The conservation of cultural heritage within the Waterdown-Sassafras Woods Heritage Lands can best be positioned to conserve cultural heritage resources by providing access to information, the tools and best practices to guide the stewardship, those opportunities to develop co-operative action, and eligibility for specific programs and maintenance designed to support the protection and presentation of the historic sites. The most effective conservation and protection will come from integrating the cultural heritage resources into the larger comprehensive planning for the management of the Waterdown-Sassafras Woods Heritage Lands.

6.3 Cultural Heritage Commemoration and Recognition

There is an opportunity within the study area to present a better commemorative plan based on local history and the recognition of community values. These efforts can be associated within a cultural heritage tourism plan or within the trail network or driving tour plan. Commemorative interpretation of The Old Nelson Quarry can be developed to illustrate importance of quarrying and the industrial history associated with the site. This approach can be used for the Falcon Creek lands illustrating the cultural heritage values related to the importance of clay extraction and brick making. The use of a digital story telling web-based application can be implemented to relate the history of the sites through smartphone technology. New storyboard panels discussing various themes represented in Kerncliff 1 merit consideration.

Photograph 2. 'Badland' formation following clay extraction for brick making, adjacent to Falcon Creek (Photograph taken by Nigel Finney, Conservation Halton).

Most of the area shown in Photograph 2 will be excavated per the current ARA for Hanson Quarry. Therefore, this cultural history element will be lost shortly.

7.0 Management Opportunities and Issues

This section provides a summary of the identified management opportunities and issues, with a focus on highlighting overlap between and among recreational resources, natural heritage resources and cultural heritage resources to assist in identifying integrated options and solutions. These items are set out below, and will guide the development of recommendations in the management plan. This section also identifies preliminary management opportunities. Although this is not a required component of the inventory, opportunities and issues report, initial ideas and solutions that have been identified by the study team are presented for preliminary discussion and feedback.

The current types and intensity of use is most likely degrading the natural features and functions of the Heritage Lands. Impacts have been noted within the existing extent of use, and considerably greater use of the Heritage Lands is anticipated. Lands must be planned and managed wisely to prevent further impacts.

The management plan is being developed predicated on the expectation that use is going to increase in these areas based on recently approved development applications in close proximity to the Heritage Lands (southeast Waterdown), and the possibility of additional approvals in the future. The study team is of the opinion that the Waterdown-Sassafras Woods Heritage Lands are at a critical juncture and that if management is not implemented, current and anticipated increases in impacts will result in substantial degradation of the natural, recreational and cultural value of the area. Thus, prioritizing management of these lands is extremely important and timely. Although the management plan will focus on Current EcoPark Lands within the Waterdown-Sassafras Woods Heritage Lands, there are also pressures being placed on Stewardship Lands within and adjacent to the Heritage Lands. In some instances, management issues on these lands affect the Current EcoPark Lands, and will influence the efficacy of management initiatives. Thus, communication, education and stewardship with adjacent landowners will be a key consideration in future management. Where appropriate, consideration of these adjacent pressures is provided.

Appendix 8 provides a detailed summary of the management issues and preliminary opportunities that have been identified within the Waterdown-Sassafras Woods Heritage Lands. This table organizes the identified management issues under the following headings:

- overarching C2E management issues;
- uses on adjacent lands;
- trails;
- hiking;
- bicycle use;
- motorized vehicle use;
- other recreational uses;
- invasive species;
- ecological management issues;
- encroachment from adjacent lands;
- safety issues;
- infrastructure issues;
- other activities; and
- other management issues.

Many of these issues are inter-related and in many cases management issues cannot be addressed individually. For example, over-use of trails from hiking and/or cycling has in places resulted in erosion issues, which can lead to ecological management issues. The organization of issues in the headings provided above provides a framework for the development of management recommendations to be provided in the management plan.

A description of the management issues and/or opportunities is provided. Appendix 8 currently focuses only on identification of issues although some management recommendations are currently provided. Appendix 8 is a work in progress and will be refined as the management process continues.

Figure 6 illustrates known locations for management issues within the Waterdown-Sassafras Woods Heritage Lands. It does not provide an exhaustive inventory of where all of the management issues are occurring. It provides documented examples of where issues have been identified to date. Photographs of representative examples of management issues are provided in Appendix 9 and in the sections that follow.

7.1 Overarching Cootes to Escarpment EcoPark System Management Issues

7.1.1 Description

Several management issues are not constrained just to the Waterdown-Sassafras Woods Heritage Lands and span the entire Cootes to Escarpment EcoPark System. Although strictly beyond the mandate of this management plan (which is restricted to the Current EcoPark Lands in the Waterdown-Sassafras Woods Heritage Lands), it was deemed important to bring them forward for consideration. These issues are mainly related to the recognition and identification of the EcoPark System, both in terms of boundary identification and the public perception or knowledge of the EcoPark System. These issues are elaborated on in Section 7.1.2.

7.1.2 Issues

Consistent Branding of Cootes to Escarpment EcoPark System

The Cootes to Escarpment EcoPark System is a relatively recent initiative. Some signage has been posted along roadways to identify the boundaries of the system and more signage will be installed in the future; however, at present the signage is scattered and it is very difficult to determine when one is in the EcoPark System and when one is leaving it. Without signage and general public knowledge of where and what the EcoPark System is, there is little opportunity to engage the public in stewardship, educate EcoPark System users about the importance of managing use, and garner support for the management plan. A number of individuals that were interviewed, who clearly visit lands in the EcoPark System for recreation, were unaware they were using it.

The placement of signage can be challenging, especially because there are so many access points into the Cootes to Escarpment EcoPark System. Considerations for the future placement of signage include: locations of other signage, density of brush, proximity to intersections, etc.

Cootes to Escarpment EcoPark System

Waterdown - Sassafras Woods Heritage Lands

Figure 6: Management Issues

Legend

Management Issues

- Unsanctioned Trail Management
- Unsanctioned Creek Crossing
- Encroachment
- Garbage/Dumping
- Gully Erosion
- High Density of Trails
- Invasive Species
- Mountain Bike Structures
- Picnic Area/Fire Pit
- Stormwater Impacts
- Stream Erosion
- Trail Erosion
- Vegetation Clearing
- Utility Corridors
- Municipal Boundary
- Study Area
- Waterdown - Sassafras Woods Heritage Lands

Note:
Not all management issues have been mapped.

Sources of Information:
Conservation Halton
Hamilton Conservation Authority
City of Burlington
City of Hamilton
Bruce Trail Conservancy
Ministry of Natural Resources and Forestry

North-South Environmental Inc.
Specialists in Sustainable Landscape Planning

Geospheres Infomatic Services

February 5, 2016

0 100 200 400 600 800 1,000
Meters

City of Hamilton
City of Burlington
Sassafras Woods
Mountain Brow Road
McNally
Waterdown Woods
Hughes
King Road
Upper Hager Creek
Bayview Park/ Indian Creek
Falcon Creek
Waterdown Road
Sassafras Tributary
HWY 403
City View Park
Upper Rambo Creek/ Mansfield Park
Kerncliff 1
Kerncliff 2
Tyandaga Golf Course
Forestvale Park
Kerns Road
Kerns/Westbury Park
HWY 407

Need for Better Identification of Property Boundaries to Reduce Trespass and Encroachment Issues

When you are within the EcoPark System there is no way of knowing when you are within a Current EcoPark Land and when you are on private lands. The natural areas that compose the majority of the Heritage Lands extend well beyond individual property owners, and a single natural area unit may be owned by multiple landowners. This makes it literally impossible to enforce policies regarding park use and encroachment in areas around the periphery of Current EcoPark Lands. It could create issues for both adjacent land owners (e.g., EcoPark System users inadvertently trespassing, privacy issues if users are walking/cycling along property boundaries), and park management as adjacent owners unintentionally manicure areas within the park, erect structures, etc. (see section 7.4 below).

Lack of Uniform Set of Rules for EcoPark System

There is a lack of a uniform set of rules for the EcoPark System, and each partner agency has their own set of policies and rules. For example, the Bruce Trail Conservancy allows only pedestrian traffic on the Bruce Trail; however, bicyle use occurs throughout the Heritage Lands, including the Bruce Trail and Bruce Trail Side Trails. Not only would this be confusing to EcoPark System users, but users are generally not aware of the relevant rules and regulations of use within the EcoPark System. Different rules and permitted uses may continue to apply to different properties, depending on who owns the land and the properties' sensitivities. However, communication of partner agency rules and policies could be improved.

Implementation

As noted in the discussion of recreation resources, the study team feels that a major management issue is the anticipated increase in use that will result from future development adjacent to the Heritage Lands. The major development proposed on the east side of Grindstone Creek is one current example (see section 2.2.1). Future development on lands adjacent to the Heritage Lands has the potential to degrade their natural, recreational and cultural resources unless mitigation in the way of increased management initiatives is implemented. It is also worth noting that these developments will be desirable communities to live in partly because of the proximity of the aesthetic beauty and recreational opportunities provided by the Heritage Lands. It is thus fitting that the impacts on nearby Heritage Lands resulting from development and the increased cost of management needs should be mitigated, by the developer where appropriate.

At present, there are no policies that would directly facilitate the implementation of relevant management recommendations in the management plans through development approvals. However, where geographic-specific park or public land management plans exist, the Greenbelt Plan 2005 indicates that municipalities, agencies, and other levels of government must consider them when making decisions on land use or infrastructure proposals. As the Cootes to Escarpment EcoPark System represents such a park it would be incumbent on planning authorities to consider increased use pressures and likely environmental impacts in their assessment of development applications.

Several planning policies require proponents of development applications to consider impacts on adjacent natural features and areas resulting from their development proposals, and to mitigate them accordingly. It is especially important that the impacts associated with future developments adjacent to the Heritage Lands be clearly identified and assessed in Environmental Impact Assessments (or similar studies) in the context of the role the Heritage Lands play in the overall Cootes to Escarpment EcoPark System. In other words, the value and significance of the natural features captured in the Heritage Lands is greater because they are part of the EcoPark System, and because they have an ecological

function that goes beyond the feature itself. In determining impact mitigation for future development, this higher value should be considered when determining the limits of the developable area, buffer widths, management needs such as design and provision of trails within the Heritage Lands, etc. Owing to the multi-agency agreement to implement the EcoPark System, and the public resources that have already been spent on the acquisition and management of the Heritage Lands, potential impacts from development should be mitigated through conditions of the approval process. The management issues identified for the Waterdown-Sassafras Woods Heritage Lands, and the subsequent recommendations in the management plan, provide information on current impacts (over-use of trails, unsanctioned trails, trampling, invasive species, etc.) that could be exacerbated by future adjacent development. The recommendations in the management plan may assist in the determination of appropriate mitigation that could be implemented through the development process.

More generally, the partner agencies that are directly involved in the development approval process (in the case of the Waterdown-Sassafras Woods Heritage Lands these are the City of Hamilton, City of Burlington, Halton Region and Conservation Halton), should consider and incorporate the significance of the Heritage Lands in their reviews and the subsequent conditions they impose on development applications. This is viewed as part of their commitment to implementing the Vision of the Cootes to Escarpment EcoPark System.

Partner agencies that are not directly involved in the development approval process would be encouraged to comment as landowners on development applications that may impact their lands. Where a public or private development proposal may exacerbate existing management issues and/or create new ones, adjacent landowners should make such concerns known so they may be addressed accordingly through the development approval process. The recommendations in the management plan may assist adjacent landowners in identifying proximity-related concerns and in advocating for implementation of appropriate mitigation options to resolve them.

Funding

There are differences in approach to open space and park management by the partner agencies. These differences should not expose or penalize EcoPark System users. This means that the partner agencies may need to come to a consensus and understanding of how the Current EcoPark Lands are to be accessed by users and on what terms (e.g., pay for use). In addition, capital and revenue costs associated with any future development proposed in the Current EcoPark Lands (e.g., parking lot) will be high. Funding for the management of Current EcoPark Lands has not currently been identified in detail. It is important to identify funding as a management issue so that realistic expectations are perpetuated from the outset, and to identify the issue to the partner agencies.

Fragmentation

Some of the natural areas within the EcoPark System are relatively isolated and/or fragmented in the landscape. Often there are few opportunities for making ecological connections due to adjacent urban land uses, including traffic/transportation corridors. Not only is the isolation physical (e.g., roads), some of the Current EcoPark Lands are isolated within the Heritage Lands through ownership. For example, portions of Waterdown Woods and Upper Hager Creek are surrounded by privately-owned lands. In many cases, this has led to EcoPark System users trespassing on privately-owned lands in order to access publicly-owned lands.

High Run-off and Peak Flows

There is an overarching issue of high run-off and peak flows associated with the increase in impervious surfaces associated with development (e.g., buildings and asphalt restrict the ability of precipitation to infiltrate in the ground). High run-off and peak flows can accelerate erosion rates and decrease groundwater infiltration. Any steps possible to limit run-off would be beneficial to the watersheds and the Hamilton Harbour.

The total suspended solid loading of Hamilton Harbour is a major watershed concern related to delisting of the Area of Concern. The escarpment tributaries present in the Heritage Lands had natural erosion rates which slowly increased the incised nature of the valleys, but changes to the landscape has accelerated the rate of erosion considerably on some areas. Any planned impervious areas within the EcoPark System should provide demonstrations of Low-Impact Development methods.

7.1.3 Opportunities

Preliminary management opportunities to be explored include the following:

- Establish the Cootes to Escarpment EcoPark System, and Heritage Lands names as the primary branding, with partner ownership becoming the second priority. Signage, promotional material, advertising, educational material, etc. should emphasize and headline the Cootes to Escarpment EcoPark System and Heritage Lands first, and then provide the partner ownership. This will raise the EcoPark System profile, contribute to name-recognition and promote the EcoPark System as a collaborative initiative among the partner agencies.
- Consistently post signage to indicate when users are entering and leaving the Cootes to Escarpment EcoPark System.
- Develop and implement a consistent system to locate and mark boundaries of Current EcoPark Lands within the Cootes to Escarpment EcoPark System.
- Establish a list of appropriate uses that apply to all Current EcoPark Lands with agreement from all partners, recognizing that some areas may have specific uses as a result of zoning (to be provided in future reporting). Appropriate uses do not have to be consistent throughout all properties or areas, and should be established based on the sensitivity of the area and the mandate of the landowning agency.
- When reviewing development applications within the EcoPark System, partners should require the evaluation of potential impacts in the context of the entire Cootes to Escarpment EcoPark System, and encourage mitigation measures that are consistent with the recommendations in the management plans.
- Continue to purchase or receive donations of lands within the Waterdown-Sassafras Woods Heritage Lands and Cootes to Escarpment EcoPark System, as they become available through the Land Securement Strategy, with a priority placed on “joining” Current EcoPark Lands.
- There is currently no policy basis for agencies to insist on implementation of management plan recommendations. Consideration should be given to creating such a policy in the agency’s Official Plans as part of the next round of Official Plan reviews.
- Any planned impervious surfaces as part of the future park infrastructure should provide demonstrations of low impact development methods.

7.2 Infrastructure

7.2.1 Description

Parking and access is limited at the Waterdown-Sassafras Woods Heritage Lands. Figure 3 illustrates the locations of existing parking areas, and known access locations. Some of these parking and access points are sanctioned and some are not. In terms of parking, there are a few parking areas available (e.g., City View Park, Kerncliff Park, King Road access to Waterdown Woods, Bayview Park parking area). Utility corridors are also frequently used to access the Heritage Lands.

7.2.2 Issues

Lack of Adequate and Safe Parking

There is a general lack of adequate and safe parking to provide access to the Heritage Lands. In particular, the informal roadside parking areas, especially the shoulder pull-off on King Road, which is located at the top of the Niagara Escarpment and on a curve, are potentially dangerous owing to the 60 kph speed limit coupled with poor sightlines. This represents an issue associated with a trail/road crossing. Bruce Trail parking areas are frequently over capacity even during the week as parking is very limited in the western portion of the Waterdown-Sassafras Woods Heritage Lands (Figure 3). Parking areas at City View Park and Kerncliff 1 provide abundant parking, including some wheelchair access. Wheelchair accessibility of Bayview Park, including the off-leash dog park, is limited.

Relative Isolation of some Current EcoPark Lands

As mentioned above, some of the Current EcoPark Lands are isolated in the landscape, and are not directly connected to other Current EcoPark Lands. For example, portions of Waterdown Woods and Upper Hager Creek are not easily accessed and are not connected to other Current EcoPark Lands. Also, there are no connections between Bayview Park/Indian Creek, Falcon Creek, Sassafras Tributary and other Current EcoPark Lands (Figures 2 and 3). Additional opportunities for land securement and protection of the Stewardship Lands could be sought.

Trespassing

Due to the relative isolation of some of the Current EcoPark Lands, and the general lack of access, trespassing on privately and publicly owned lands within the Heritage Lands is an issue. Many “No Trespassing” signs have been posted by adjacent landowners as a result, and conflicts between landowners and park users have been noted. For example, mountain bikers, and possibly hikers, that use the trail on the east slope of Falcon Creek, access the trail from the North Service Road via the manicured grass on the Ippolito Transportation Inc. property, despite it being specifically signed no trespassing. Access to Falcon Creek and the landfill site property is also trespassing on public lands, as access is currently not permitted by Halton Region.

This issue ties into the lack of access, as well as the need to identify and mark boundaries of the Current EcoPark Lands. Trespassing also includes unauthorized trail construction on Current EcoPark Lands and encroachment from adjacent private properties; however, these topics are covered in section 7.3 Trails and 7.4 Encroachments. This issue ties into the lack of access, as well as the need to identify and mark boundaries of the Current EcoPark Lands.

7.2.3 Opportunities

Preliminary management opportunities to be explored include:

- using utility corridors and/or unopened road allowances as additional access points;
- consider securement of additional lands that would enable creation of access zones;
- look for locations for additional parking;
- complete trail connections throughout the Heritage Lands and beyond through a comprehensive Trail Plan;
- work with adjacent landowners to establish agreements for access where there are no other alternatives; and
- continue to purchase lands within the Waterdown-Sassafras Woods Heritage Lands and Cootes to Escarpment EcoPark System, as they become available through the Land Securement Strategy, with a priority placed on "joining" Current EcoPark Lands.

7.3 Trails

7.3.1 Description

The existing trail system through the Heritage Lands is extensive, and consists of sanctioned and unsanctioned trails (Figure 3). The Bruce Trail traverses Waterdown Woods, City View Park and Kerncliff 1 and additional trails are maintained by the City of Burlington in City View Park and Kerncliff Park. In addition to these trails, a large network of unsanctioned mountain biking trails and footpaths has been constructed. Some of these are maintained by cyclists and the local community. In some areas the trails are no longer being used and are naturally regenerating. The following uses have currently been documented on trails in the study area:

- hiking;
- on- and off-leash dog use;
- cycling on trails, ranging from casual trail riding to very aggressive mountain biking, in all seasons; and
- motorized vehicle use.

Associated trail uses or activities include unsanctioned trail improvements such as the construction of boardwalks or erosion control measures, cycling structures (e.g., jumps and ramps) and trail modifications (e.g., berms, banked corners).

7.3.2 Issues

Duplication and Density of Trails

As illustrated by Figure 3, some portions of the study area currently support a very high density of trails. In many cases, this network could be simplified to avoid duplication and reduce impact to the natural environment. One of the highest priorities for management of the Waterdown-Sassafras Woods Heritage Lands is trail closure, in conjunction with trail rationalization and formalization.

Overuse of Trails

Some portions of the trail system show signs of overuse, including exposure of tree roots, impacts to ground flora, soil compaction, and widening of trails. Trail overuse has resulted in soil erosion in places. According to the Halton NAI summary of Waterdown Escarpment Woods, areas below the escarpment

brow were damaged by recreational vehicles in the past, which reduced the ground cover significantly (Dwyer 2006).

Erosion on Trails

Unacceptable erosion on trails was noted under a number of circumstances related to overuse, improper trail construction, and/or drainage issues. In a few locations, water ponding on trails was noted, which has led to trail widening or braiding to avoid wet patches on trails. It should be noted that some erosion, compaction, water ponding, etc., is inevitable on footpaths with natural features and as long as it is sustainable (i.e., not expanding) and not impacting significant species, habitats or hydrologic functions, it is considered to be acceptable and part of the trail experience in such areas. However, this would need to be assessed to determine the acceptability of the impact in each location.

Single Track Mountain Bike Trails

These trails were developed by relatively few individuals without consultation or authorization, and are being used by the wider technical mountain biking community. Most of the existing trails are respectful of natural terrain, drainage features and trees. In many cases logs have been placed over the trail to prevent impacts to tree roots. The single track paths are narrow, most as narrow as 0.5 m (bike width) so the impact to surrounding vegetation is limited and soil compaction is confined. However, the relative intensity of the use has resulted in tire rutting in moist areas and down-cutting of soils in many areas. Where the trails traverse steep sections of slope, erosion is prevalent.

The Bruce Trail Conservancy manages its trails and does not permit cycling on them. However, bike use inevitably and unavoidably continues along the Bruce Trail. Improved signage could partially resolve the use issue as some users are unaware of where cycling is permitted.

"Islands" of Permited Bike Use

Biking is currently permitted in Kerncliff Park. It is not permitted in within the Bruce Trail Conservancy easement in City View Park, and is signed for no biking. Biking is permitted in all other areas of City View Park. This is an issue that is confusing to users, who may not know or may have difficulty interpreting where biking is permitted and where it is not. This same issue extends to Conservation Halton Lands, where biking is permitted, including on the Bruce Trail (although not promoted), and on the McNally property where only hiking is permitted. This creates "islands" of uses within the Heritage Lands. This issue will be explored further in the management plan.

User Conflicts

Potential conflicts between different trail user groups include:

- hiker – cyclist;
- off-leash dog – hiker;
- off-leash dog – cyclist; and
- off-leash dog – off- or on-leash dog.

These conflicts can impact the safety of park users, and can also decrease the enjoyment of park users.

Off-leash Dogs

If additional off-leash dog parks are contemplated within the Heritage Lands, it is recommended that off-leash dog parks are located away from environmentally sensitive areas. This recreational use offers potential impacts to these areas such as erosion, soil compaction, water quality impacts, and effects on wildlife. Several municipalities required that an Environmental Impact Study/Environmental Impact

Assessment be developed when off-leash parks are cited adjacent to natural areas in order to assess impacts and mitigate the effects, given that they could be significant. Due to these impacts, it is recommended that off-leash dog parks be cited away from significant natural areas.

Additional off-leash dog parks, located in close proximity to residential areas, would provide an opportunity for these users to focus this recreational use outside sensitive natural areas. Traditionally, municipalities offer the services of dog parks as part of their tax-supported Parks and Recreational programs and facilities.

Interpretation

There is very little signage or interpretation of the EcoPark System within the Waterdown-Sassafras Woods Heritage Lands. There is signage posted within Kerncliff 1 about the old limestone quarry structures located there, and within the old quarry. However, there are many more opportunities for interpretation and education within the park system, which are discussed in part below.

7.3.3 Opportunities

Preliminary management opportunities to be explored include:

- one of the highest priorities for management of the Waterdown-Sassafras Woods Heritage Lands is trail closure, in conjunction with trail rationalization and formalization:
    - limit access to physically and ecologically sensitive habitats, including riverbanks and seepage areas as trail location should be placed in a manner which creates the least disturbance to habitat and wildlife;
    - ensure appropriate routing of trails and trail activities that minimize the potential for harm, minimize the potential for damage to wildlife habitat and avoid impact to the habitat of species at risk and other significant and/or rare species and ecological communitites;
    - consider adopting the approach of ‘preferred’ trail use rather than promoting single-use trails;
    - as an alternative to permanent trail closure, consider seasonal trail closure to keep users out of seasonally wet parts of the trail system;
    - improve signage, trail marking (e.g., blazes) and implement measures to assess and close redundant trails;
    - construct bridges and boardwalks to address erosion and wet trail conditions where they are resulting in unacceptable impacts (e.g., create a raised pathway on the portion of the trail over which the ephemeral stream crosses in the Johnson Easement);
    - investigate alternative trail surfaces that are commensurate with the trail use and location;
    - consider retrofitting remnant logging roads/old cart trails and incorporating them into the trail system where they may complete logical connections; and
    - prepare a protocol for active trail closure to address closure of trails, re-routing of trails, etc..
- complete a survey to determine how the area is currently being used, what the desires of the park users are, etc.;
- provide consistent signage that clearly explain permitted uses (e.g., cycling permitted, off-leash dog area), or conversely, uses that are prohibited (e.g., dogs must be on-leash, no cycling);

- monitor for bicycle activity and take appropriate action such as closing unauthorized trails and, to the extent possible, enforcing use violations;
- securement tends to focus on highly sensitive lands; however, consideration could be given to purchasing lands that are less ecologically sensitive that could provide opportunities and would be more suitable for dog walking, mountain biking or other forms of more intensive recreation;
- identify and connect with individuals and/or groups undertaking unsanctioned stewardship initiatives to formalize good working relationships through providing guidance, support and recognition of their efforts;
- look for suitable locations for intensive off-leash dog activities to occur, preferably within disturbed open space areas with low natural heritage value;
- continue to monitor for trail erosion and implement appropriate trail construction and remediation measures on steeper slopes where warranted;
- engage mountain bike riders in the ongoing monitoring and management of the trail system, in collaboration with and with approval from the landowner; and
- identify and implement commemorative and interpretive opportunities (e.g., in Kerncliff 1 at the old Nelson Quarry where representative examples of bedrock lithology have been identified);
- re-instate the interpretive signage program at Kerncliff Park using a sign format that identifies the park in the Cootes to Escarpment EcoPark System.
- where desired and feasible complete trail connections throughout the Heritage Lands and beyond through a comprehensive Trail Plan.

7.4 Encroachments and Adjacent Impacts

7.4.1 Description

Adjacent land uses can create issues for natural areas. The Waterdown-Sassafras Woods Heritage Lands are surrounded by various land uses, including residential and industrial uses (refer to Section 2.1). Impacts associated within different land uses can encroach onto the partner-owned portions of the Heritage Lands. For example, encroachment from residences abutting Upper Hager Creek, Forestvale Park, Kerns/Westbury Park, Upper Rambo Creek/Mansfield Park, and Waterdown Woods (Figure 2).

7.4.2 Issues

Cats/Domestic Pets

Domestic pets, in particular cats, which inevitably roam freely within natural areas, have a significant impact on native wildlife populations. Cats are very proficient predators and are responsible for killing millions of birds, small mammals, reptiles and amphibians each year (Marks and Duncan 2009).

Dumping

Yard waste, such as grass clippings and trimmed branches, is often thrown inside the edge of natural areas from adjacent residences. Yard waste dumping can be a vector for the spread of non-native invasive species. It also smothers existing vegetation and degrades the aesthetic and floristic quality of an area. Garbage, and other refuse (e.g., old stoves, tires) are also found within natural areas, which can impact the quality of the natural area.

Structures and "Yard Extension"

Structures such as small sheds, and household objects such as lounge chairs and composters were noted within the Current EcoPark Lands, adjacent to residential properties. Also, yards are occasionally extended by mowing, and by the placement of flowerbeds within the natural area boundary. This has an impact on edge vegetation and reduces the overall size of the natural area.

Personal Trails

Personal trails are occasionally created from private residences to connect into the adjacent natural area's trail system. Gates are installed into rear lot fencing in some cases to facilitate access. This speaks to the frequency of use that these trails experience. When combined, this can have an impact of the quality of the natural area and can also impact wildlife through the increased level of disturbance.

Vegetation Removal

Removal of vegetation occasionally occurs along the edges of natural areas. For example, tree cutting of both dead and living trees occurs, as well as clearing of brush, and tree topping to maintain views. These activities reduce the quality of natural areas by reducing or degrading the structure of edge vegetation, and removing snags which have high wildlife value (e.g., for cavity nesting birds).

Drainage and Erosion

Drainage and resulting erosion can encroach into natural areas from adjacent land uses. This has resulted in erosion and contributes to turbidity and siltation of the various creeks that pass through the study area. For example, the stormwater management ponds on the Hanson Brick property discharge into Indian Creek in the Bayview Park/Indian Creek parcel (Figure 2 and Figure 4). When designed and maintained appropriately, such facilities can have a relatively small impact on natural areas. However, if designed and maintained poorly, these facilities can have a very large and negative impact. Stormwater has and continues to cause some erosion on the banks along tributaries of Sassafras Tributary to Grindstone Creek, Upper Hager Creek, Indian Creek, and Upper Rambo Creek. Creek erosion issues have also been noted along the Tyandaga areas of Upper Hager Creek, and are related to high runoff issues due to impervious surfaces and area contours. Swimming pool drainage from private residences can also lead to severe erosion and the formation of gullies over time, especially on highly erodible soils such as the shales that occur within the Heritage Lands.

Impacts from drainage and erosion can significantly damage vegetation. Throughout the Current EcoPark Lands, bank erosion has exposed tree roots and has resulted in deadfall. Some fallen trees have blocked creeks, which in turn impacts the hydrology and fluvial geomorphology of the watercourse. Habitat for herbaceous plants is also impacted. In some places where creek banks had naturally sloped gently toward the creek, soil has been washed away until the banks have become almost vertical (through a process called under-cutting). This impacts the establishment of riparian vegetation with subsequent impacts and further erosion and bank stability. Also, sediment accumulation in areas of slower moving water has resulted in impairment of habitat for aquatic vegetation and likely aquatic invertebrates as well. Reduction of light penetration from increased turbidity also impacts the aquatic life living in the creek system. Undercut banks also pose a concern for the safety of trail users.

Issues associated with impaired water quality have also been noted in the Heritage Lands. Elevated levels of phosphorus have been documented downstream of the Hanson Brickyard (West) in Indian Creek (Conservation Halton, Indian Creek Water Quality Report 2014). The Sassafras Tributary has been noted to have exceptionally high values of *E. coli* with recent water quality monitoring sampling

completed by Conservation Halton in 2015. Also, recent water quality monitoring sampling has identified high chloride levels noted to be originating from the City View Park parking lots. In response to this, the City of Burlington has changed their salting practices to reduce this impact. Additional water quality impacts may result from the South Waterdown development, located to the north of Waterdown Woods.

Salt

As the lands north of Waterdown Woods develop into residential subdivisions, the transportation network (i.e., roads, parking lots, driveways and trails) will require salting in the winter for safety reasons. The dissolved salt will enter the stormwater management facilities before being released into the surrounding environment. Recognizing the impact that salt can have on the natural heritage system, mitigation measures have been developed to reduce this impact, such as using a combination of sand and salt on City of Hamilton roads and directing these flows away from sensitive areas during critical seasons. This impact unfortunately cannot be fully mitigated due to road safety requirements and the limitations of existing technology. The City of Burlington has already significantly reduced inputs to the system by reducing salt application at City View Park. As South Waterdown becomes urbanized, the City of Hamilton will play an increasingly important role in managing salt impacts on the natural heritage system through winter maintenance practices applied to City streets. Private landowner education and outreach regarding safe and alternative salting practices would be beneficial.

Hydrological Changes

With the conversion of agricultural areas to residential north of Waterdown Woods, the way that water once reached the adjacent natural heritage system will be altered. Whether it is from a lack of infiltration due to an increase in imperviousness, a change in flow pattern or a more continual amount of water released, there are anticipated impacts. In order to reduce these impacts, mitigation measures were developed including flow splitting, releasing water to existing discharge locations, and maintaining the hydrologic function of features. It is recognized that the change in land use cannot be fully mitigated, therefore, it is expected that there will be a period of change where the natural heritage system will have to adapt to the new hydrologic regime. Required monitoring of the hydrological changes in the EcoPark System is ongoing to identify potential impacts and mitigate these as they occur. Supporting a treatment train approach to stormwater on private land could be utilized to increase lot level infiltration and reduce runoff.

7.4.3 Opportunities

Preliminary management opportunities to be explored include:

- establish a program to educate adjacent residential landowners by providing information on the impacts of free-ranging cats, disposing yard waste, garbage and other forms of encroachments in natural areas;
- review and evaluate the effectiveness of existing by-laws[3] and identify gaps in by-laws to facilitate the enforcement of use policies, including a cat control by-law;
- post signage to educate the public about the impacts associated with encroachment;
- remove garbage and dumped refuse from the Current EcoPark Lands;

[3] Many by-laws exist; however, due to the lack of staffing resources, municipalities are unable to enforce them and are thus unable to address encroachment issues through this approach.

- encourage implementation of low impact development techniques through the development and re-development process (e.g., underground storage tanks or super pipes, green rooftops) to reduce peak flow volumes to stormwater infrastructure receiving watercourses;
- any future development in the escarpment plateau area in the City of Hamilton should continue to evaluate the potential impact of such development on downstream environments, particularly the cumulative hydrological and hydrogeological effects, and incorporate any lessons learned from the ongoing monitoring associated with existing development approvals;
- remove excessive fallen tree limbs and branches from within the watercourse in Kerns/Westbury Park (Figure 6), which appear to be the result of and exacerbated by human impacts;
- maintain standing vegetation within creek blocks to maintain natural heritage value, and to protect against erosion;
- mitigate erosion issue at southwest corner of the Bayview Park parking lot;
- reach out to residences adjacent to the Kerns/Westbury Park parcel to reduce encroachment such as dumping of yard waste, spread of invasive species, cutting of vegetation, etc.;
- improve water quality and quantity discharging from the stormwater management ponds adjacent to Bayview Park/Indian Creek, Hager Creek, and in City View Park;
- minimize and mitigate impacts associated with road salt to the extent feasible;
- educate private landowners on safe and alternative salting practices that minimize impacts to the natural heritage system;
- support stormwater management options that increase infiltration and reduce runoff.

7.5 Other Uses

7.5.1 Description

Other uses identified within the Heritage Lands through inventory and fieldwork include picnicking, party spots (identified by the presence of fire pits and rope swings, etc.), rock climbing, geocaching/orienteering, bow hunting, and historic uses such as agriculture (identified by the presence of old cart trails and paige wire fencing within natural areas). In addition, students of the Burlington Christian Academy may access the Bayview Park/Indian Creek parcel on occasion through unsanctioned access. A tire rope swing, a network of ropes tied into a web, and an area of compacted soils was noted next to Indian Creek west of the school (Appendix 9 for photograph). The Tyandaga Golf Course, owned by the City of Burlington, is also located in the Heritage Lands.

7.5.2 Issues

Natural Area Degradation

Many of the other uses identified above are relatively benign and do not have a significant negative impact on the natural environment within the study area. Certain activities, such as partying, have localized impacts which can include disposal of garbage and can degrade the quality of natural areas by removing or trampling vegetation, contributing to creation of enlarged soil compaction areas that can become prone to erosion, damaging or vandalizing trees, and can lead to the introduction and spread of invasive species. Since parties are sometimes at night, and may be near the escarpment brow, there are also potential safety concerns.

Safety Concerns

There are safety concerns associated with some of the other uses noted within the study area, such as partying, rope swings, rock climbing and bow hunting. Partying and use of rope swings to jump into the creek(s) can often lead to dangerous behaviours that can result in injury. Rock climbing is inherently dangerous, and requires a great deal of knowledge and skill to be undertaken safely. Bow hunting has been reported from Waterdown Woods and Kerncliff Park. Some of these uses are incompatible with recreational uses in the EcoPark System due to the potential for injury and/or death.

Disc Golf

Disc golf, also referred to as Ultimate Frisbee Golf, is organized by the Professional Disc Golf Association of Ontario and is comprised of 217 current members and runs 17 tour events in southern Ontario every year. It is a relatively new, unknown, but growing sport. The registered members only represent a small fraction of the number of people that play disc golf casually in the province; in the Hamilton/Burlington area there are nearly 1,000 people that play disc golf. The sport is accessible to all ages and includes members into their 70s that play regularly at Christie Lake.

An advocate for the sport had contacted the study team to discuss potential opportunities within this study to integrate a 9-hole course in available open space. For disc golf, the requirement for open space is unlike traditional golf, requiring approximately an acre per hole for a moderate level course. The space used for disc golf does not need to be exclusive, meaning the course could co-exist with other uses such as trails and leashed or unleashed dog walking in times when there is no play. The operation of a 9-hole disc golf course requires minimal capital cost, infrastructure and maintenance. The integration of such a course would represent an opportunity to introduce the sport to the general public, not only as a competitive sport, but as a form of healthy outdoor recreation that is accessible to all age groups. Bayview Park may provide an opportunity for such a use as the terrain is open and mown and only intermittently used by the model flying club.

Polluting Spills

Due to the presence of roadways, pipelines and railway lines within the Heritage Lands, there is a potential for polluting spills to occur. Improve spill prevention and response by ensuring that spill prevention plans, contingency plans and emergency response plans are updated for the prupose of protecting natural features along roads, railway lines and pipelines.

7.5.3 Opportunities

Preliminary management opportunities to be explored include:

- educate users about unsanctioned uses and the impacts associated with unsanctioned uses, and dangers associated with unsafe uses, such as after-hours use and partying, bow hunting, etc.;
- post signage indicating permitted uses and impacts associated with unsanctioned uses stating fines for illicit uses;
- ensure local ordinances and bylaw policies are updated to include prohibition of unsanctioned uses in natural areas;
- identify locations of dumped garbage and yard waste and facilitate clean up;
- remove old paige wire fencing from natural areas;
- engage the Burlington Christian Academy and Fernhill School in the Cootes to Escarpment EcoPark System and look for potential stewardship and local restoration opportunities;
- encourage Tyandaga Golf Course to complete an evaluation for substainable golf courses, such as the Audubon International Certification of Golf Courses;

- close and restore unsanctioned party spots;
- look for appropriate locations for additional benches and picnic tables to facilitate small social gatherings in desired locations;
- report illegal activities to law enforcement, if encountered; and
- improve spill prevention and response by ensuring that spill prevention plans, contingency plans and emergency response plans are updated for the purpose of protecting natural features along roads, railway lines and pipelines.

7.6 Ecosystem Management

7.6.1 Description

Management issues and opportunities related to ecosystem management are aimed at conserving major ecological services and restoring natural resources while meeting the recreational needs of the study area. The principal objective of ecosystem management is the preservation and restoration of natural ecosystems, including protection of significant species, as well as efficient maintenance and ethical use of natural resources.

7.6.2 Issues

Forest Health Decline

Several factors are currently impacting the health of forests in the study area and beyond. Oak decline, Beech Bark Disease, Emerald Ash Borer, Gypsy Moth, Chestnut Blight, Dogwood Anthracnose, Butternut Canker and other diseases are impacting the health of trees and forests overall. Asian Long-horn Beetle has not yet been noted in the area, but is a potential threat. Non-native earthworms also appear to be contributing to the decline of forest health, particularly impacting the diversity of the ground flora and soil microinvertebrate communities (with subsequent issues higher up the food chain). Earthworms are keystone detritivores that can act as “ecosystem engineers” and have the potential to change fundamental soil properties, with cascading effects on ecosystem functioning and biodiversity. Earthworms are suspected of being a particular problem in the woodlands below the escarpment brow in Kerncliff 1 and City View Park. Tree blowdowns associated with the death of trees and slope erosion can also impact the health of forests by creating large gaps in forest canopy. If within the natural range in terms of extent and intensity, tree death, natural slope erosion and lightening strikes are part of providing habitat heterogeneity within an ecosystem and may not be an issue. Many of the forests pests, such as Emerald Ash Borer, are causing significant death and dieback of trees which creates hazard tree and safety issues. Gaining access to and managing the dead trees creates a secondary management issue. Proper removal/disposal of infected trees is also a concern in areas of poor access.

Loss of Open Woodland Habitat

There is significant literature noting the vast open oak woodland and grassland understory within and around the study area due to several centuries of indigenous peoples periodic burning to maintain hunting areas, tree seed and fruit production (e.g., Goodban et al. 1997). Due to the indicators of prairie species in the area, it is likely that pre-contact vegetation communities would have been comprised of a great area and coverage of open oak woodland. Where possible, open oak woodland should be incorporated into restoration targets as a reference ecosystem type.

Over time, open woodland habitat has been lost or diminished within the study area due to the loss of disturbances, probably including fire, which may have maintained a more open forest character. Over

time, forest canopies have closed, reducing the amount of light that is able to penetrate to the forest floor. This has had an impact on the flora in the area, including a reduction of the abundance of prairie, savannah and open woodland-dependent species. The decline of Eastern Flowering Dogwood (an Endangered species) in the Sassafras Tributaries of Grindstone Creek has been attributed to canopy closure. Some habitat for these species remains within the study area, and is supported in places by habitat provided on dry south-facing forested slopes and in utility corridors that are maintained as open habitat based on the needs of the utility infrastructure.

More detail on management directions for restoring open woodland habitat in the Waterdown-Sassafras Woods Heritage Lands will be provided in the management plan.

Conservation and Recovery of Species at Risk

The conservation and recovery of species at risk in the Waterdown-Sassafras Woods Heritage Lands is largely associated with conserving and restoring open woodland habitat. The vast majority of species at risk and rare species in the study area require open woodlands to persist. Management of conditions surrounding known locations of species at risk (e.g., maintaining open woodland characteristics) may be necessary, as the natural disturbance regime of the ecosystem type many species at risk rely upon has been halted (i.e., open oak woodlands historically maintained their open character due to disturbance cuase by fire). In addition, recreational uses that have become established in many locations may not be compatible with the conservation and recovery of species at risk and rare species. This issue will be explored in greater detail in the management plan.

Hydrological Functions

Water quantity impacts have been noted downstream of the stormwater management facility located adjacent to Bayview Park/Indian Creek, the stormwater management facilities located adjacent to Upper Hager Creek, and the stormwater management facilities located within City View Park. Erosion and undercutting has been noted downstream of some of these watercourses. This has an impact on the hydrological function of the watercourse (Figure 6). Furthermore, as more of the surrounding area becomes developed, increased impacts to hydrological functions are anticipated, as an increase in impervious cover results in decreased infiltration and increased runoff. This puts an even greater strain on existing stormwater management facilty infrastructure, and increases the likelihood of impacts to water quantity and quality. Water quality impacts associated with phosphorus, chloride and *E. coli* have also been noted with the Heritage Lands.

Karst

Karst is known to occur throughout Conservation Halton's jurisdiction, particularly immediately upstream of the brow of the Niagara Escarpment, where soils are more permeable and tend to be shallower. Karst features need to be protected, not only due to their status as hazardous lands, but also as potential pathways for groundwater contamination. As karst topography allows a direct pathway for the mixing of surface and groundwater flows, careful planning of landuse and development adjacent to karst areas is a key management strategy for protecting groundwater quality. A Karst Contingency Study and Spills Response Plan should be prepared prior to any adjacent development, to identify groundwater threats and appropriate mitigation strategies (Conservation Halton draft Grindstone Creek Subwatershed Study 2015).

There is also the potential for blockage of karst conduits to result in downstream flooding. Karst conduits that transfer surface stream flows to groundwater seeps may be small and numerous. The

conduits may easily become blocked by aggradation within watercourses, and may cycle between being active, open conduits, and closed blocked conduits, as stream processes change over time. Karst Contingency Studies could also provide clear direction on the importance of erosion prevention. Should there be a decrease in subsurface flow conveyance as a result of a blockage of a significant portion of karst conduits, overland flow will increase, resulting in potential for flooding along historic surface flow paths. Protection of karst features yields environmental and socio-economic benefits (Conservation Halton draft Grindstone Creek Subwatershed Study 2015).

Invasive Species

Several invasive species have been noted within the study area including: Garlic Mustard, Dog-strangling Vine, English Ivy, Periwinkle, Himalayan Balsam, Japanese Knotweed, Phragmites, Purple Loosestrife, White Mulberry, Common Buckthorn, non-native honeysuckles, Multiflora Rose, Japanese Barberry, Norway Maple, Manitoba Maple, and Black Locust. Table 6 (see Section 5.3.1) summaries the major invasive species noted within the Current EcoPark Lands. Invasive species tend to spread aggressively and out-compete native species. Dog-strangling Vine is particularly prevalent within hydro-corridors. Invasive insect species noted within the study area include, Gypsy Moth, and Emerald Ash Borer. Dog-strangling Vine is particularly prevalent within hydro-corridors.

Noxious Plants

Poison ivy and other noxious plants pose health and safety issues for park users. Poison ivy is found throughout the Current EcoPark Lands in various concentrations. Giant Hogweed has not yet been noted within the study area, but has the potential to colonize floodplain valleys (Appendix 5).

Wildlife Crossing

Wildlife crossing has been identified as an issue of concern within the study area. There is a large population of White-tailed Deer within the Grindstone Creek Valley system (part of the Clappison-Grindstone Heritage Lands to the west), and deer frequently cross roads within the Waterdown-Sassafras Woods Heritage Lands such as Waterdown, Kerns and King Roads . Crossing of urban and rural roads by White-tailed Deer poses issues for wildlife and for the safety of the public. Furthermore, road mortality is a large contributor to declines in amphibian and reptile populations. King Road is closed annually in the early spring to accommodate the movement of salamanders from their overwintering habitat to breeding ponds. Due to the fragmented nature of the natural areas that compose the Waterdown-Sassafras Woods Heritage Lands (e.g., highways and roads, hydro-corridors, and railways), it is inevitable that wildlife will need to cross roads, hydro-corridors and railways.

The City of Hamilton is establishing a wildlife corridors committee to examine road kill locations as they related to the City of Hamilton's Natural Heritage Plan.

On-line Ponds

There are five on-line ponds located along the Upper Rambo Creek watercourses at the Tyandaga Golf Course. These ponds could be retrofitted with by-pass channels or managed in a more environmentally condusive manner. In addition, many sections of Upper Rambo Creek in this area are piped underground or do not have adequate riparian buffers.

7.6.3 Opportunities

Preliminary management opportunities to be explored include:

Ecosystem Rehabilitation, Restoration, and Naturalization

- develop a plan for identifying ecosystem targets for the Heritage Lands, based on historical and current composition:
    - include guidelines for local grassland restoration, including target amount, patch size, and best management practices;
    - include recommendations for the use of prescribed burns, which are considered the best means of managing prairie, savannah and open woodland habitats;
- improve condition of rare and uncommon ecosystems such as open oak woodlands
- refer to "Oak Shelterwood: A Technicque to Improve Oak Regeneration" (Stringer, University of Kentucky, undated) for insights into the ecological restoration approach for oak decline, instead of the approach of cutting large canopy gaps by taking out canopy trees;
- restoration of degraded woodlands and plantations;
- research into the ecological disturbances that maintained the original forest ecosystems, including the feasibility of re-introducing or emulating such disturbances;
- continue to monitor and maintain the restoration of native woodland along the escarpment brow in City View Park;
- reforestation and naturalization of depauperate lands (e.g., restoration of old landfill site);
- allow treed sections to develop naturally, allowing existing snags, den trees and downed logs to be left for wildlife value;
- encourage and support the Hager Creek Stewards group to continue stewardship efforts in the Hager Creek watershed, and consider extending this type of grassroots effort to other areas of the Waterdown-Sassafras Woods Heritage Lands;
- investigate the possibility of restoring portions of the existing meadow area at Bayview Park/Indian Creek and Falcon Creek into native meadow or prairie;
- maintain communication with Hanson Brick regarding longterm rehabilitation and parkland dedication opportunities;
- investigate any new approaches for restoring native vegetation, such as native tall-grass prairie, on closed landfills for implementation on the former Regional landfill adjacent to Falcon Creek; wherever possible, retain mature trees and snags for cavity nesting birds, and fallen logs for salamander and other wildlife habitat; and
- wherever possible, tableland restoration should aim to achieve pre-settlement run-off conditions to reduce peak flows to watercourses (e.g., kettle and palustrine tableland wetland pockets could be included in restoration plans to reduce run-off).

Management of Species at Risk Habitat and Habitat of Rare Species

- ecosystem restoration and enhancement, where feasible, are required to sustain and recover species at risk and rare species, as the majority of species at risk and rare species are associated with open oak woodlands, savannas and prairies which require ongoing management;
- restoration should follow an ecosystem-based approach to species at risk restoration, and not species specific restoration;
- continue ongoing monitoring of the populations of significant plants found in the area (e.g., American Columbo, Eastern Flowering Dogwood, Jefferson Salamander);
- develop and implement rare species recovery strategies applicable to the study area

- watch for the presence of species at risk and rare species, and report locations to Conservation Halton and the Natural Heritage Information Centre;
- ensure that trails and recreational uses are not impacting species at risk and rare species habitat; and
- look into management options for reducing existing recreational impacts on species at risk and species at risk habitat (e.g., alternatives to pruning Eastern Flowering Dogwood cited near trails).

Karst

- carefully plan landuses and development adjacent to karst areas to protect groundwater quality; and
- recommend that a Karst Contingency Study and Spills Response Plan be prepared prior to any adjacent development, to identify groundwater threats and appropriate mitigation strategies.

Invasive Species Management

- develop a control strategy for the removal of priority invasive plant species throughout the Cootes to Escarpment EcoPark System;
- continue to document and map the locations of major aggressive invasive species; and
- monitor and, to the extent possible, control the spread of invasive plant species.

Management of Noxious Plants

- post educational signage noting the identification and toxic properties of Poison Ivy in a few key trailhead locations within the Current EcoPark Lands.

Wildlife Crossing

- maintain and protect the continuity and integrity of the Niagara Escarpment and natural greenspace corridors through the Waterdown-Sassafras Woods Heritage Lands, particularly across King Road, as well as the adjacent Waterdown Road;
- continue annual road closure of King Road for salamander crossing;
- investigate the need for and feasibility of implementing wildlife corridors and ecopassages;
- develop a strategy to prioritize and upgrade existing crossing structures (e.g., road culverts); and
- contribute to long-term monitoring opportunities by continuing to monitor wildlife crossing and road mortality.

8.0 Next Steps

Following the completion of this Inventory, Opportunities and Issues Report, work will continue on the preparation of the management plan for the Waterdown-Sassafras Woods Heritage Lands. A number of issues and preliminary opportunities have been identified through the preparation of this report. These will be discussed in greater detail, with recommendations refined as the project moves forward.

Preparation of the management plan includes preparing a land classification system based on the Niagara Escarpment Parks and Open Space System (NEPOSS) zones, followed by the development of the management plan that will guide future management activities. Further public consultation will occur through the development of the NEPOSS zones and the management plan, and public meetings will be held to gain and incorporate feedback.

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Appendix 1: Data Sources

Appendix 1. Data sources referenced to prepare the Inventory, Opportunities and Issues report for Waterdown-Sassafras Woods Heritage Lands.

NAME OF RECEIVED GIS LAYER	SUB-LAYER	SOURCE
2013 orthophotography		Halton Region
Roads		Halton Region
SewerMain		Halton Region
ESA		Halton Region
Parcels_MPAC		Halton Region
ParkwayBeltWestPlan_Designations		Halton Region
ROPA38_LandUse	agricultural area	Halton Region
	mineral resource extraction area	Halton Region
	north aldershot policy area	Halton Region
	regional NHS	Halton Region
	urban area	Halton Region
Map1G_EnhancementAreas		Halton Region
Map1G_NHS_Key_Features		Halton Region
Map1G_NHS_Key_RegLimit_Streams		Halton Region
Map1G_NHS_KeyShoreline_Lake_Ontario		Halton Region
roads		LIO
ANSIs		LIO
NEC		LIO
Greenbelt		LIO
soils		LIO
wetlands		LIO
woodlands		LIO
creeks		LIO
waterbodies		LIO
contours		LIO
quarries and pits		LIO
rare species/vegetation communities (1km squares)		NHIC
EOs_SAR_C2E_sites_20150303		NHIC
Obs_SAR_C2E_sites_20150303		NHIC

NAME OF RECEIVED GIS LAYER	SUB-LAYER	SOURCE
COB_Bridges_January_2015		City of Burlington
COB_Building_Polygons_January_2015		City of Burlington
COB_Road_Segments_January_2015		City of Burlington
COB_Storm_Line_January_2015		City of Burlington
COB_Storm_Point_January_2015		City of Burlington
COB_Topo_Building_Fences		City of Burlington
COB_Zn2020_January_2015 (zoning)		City of Burlington
COB_LandImprov_Line		City of Burlington
COB_ParksBoundaries		City of Burlington
PipelinesUpdatesInprgress		City of Burlington
fields and courts (excel spreadsheet)		City of Burlington
BTC_ELC_Codes		Bruce Trail
BTC_Invasive_Species_Data		Bruce Trail
BTC_Management_Concerns		Bruce Trail
BTC_Rogue_Trails		Bruce Trail
BTC_SAR		Bruce Trail
C2E_ComplimentaryLands		Conservation Halton
C2E_HeritageSystemBoundary		Conservation Halton
C2E_Parking_Access		Conservation Halton
C2E_PartnerLandHoldings		Conservation Halton
C2E_PotentialParkLands		Conservation Halton
CH_Approx_Reg_Limit		Conservation Halton
CH_ARL_Floodplain		Conservation Halton
CH_ARL_MeanderBelt		Conservation Halton
CH_ARL_Ponds		Conservation Halton
CH_ARL_StableTopofBank		Conservation Halton
CH_ARL_Watercourse	stream order	Conservation Halton
CH_ELC		Conservation Halton
CH_EMAN		Conservation Halton
CH_FBMP		Conservation Halton
CH_FishOccurrence		Conservation Halton
CH_ForestryPlanting		Conservation Halton

NAME OF RECEIVED GIS LAYER	SUB-LAYER	SOURCE
CH_InvasiveSpecies		Conservation Halton
CH_InvasiveSpeciesPoly		Conservation Halton
CH_Landcover		Conservation Halton
CH_MMP		Conservation Halton
CH_RoadEcologySurvey		Conservation Halton
CH_SalamanderBoards		Conservation Halton
CH_SpeciesOccurrence		Conservation Halton
CH_SpeciesOccurrencePoly		Conservation Halton
CH_SubwatershedBoundary		Conservation Halton
CH_Trails		Conservation Halton
CH_VernalPool		Conservation Halton
CH_Wetlands		Conservation Halton
SubjectBoundary		Conservation Halton
NAISpeciesQuery (excel spreadsheet)		Conservation Halton
Terrestrial Monitoring info for C2E (Word file)		Conservation Halton
elc_areas		Hamilton Conservation Authority
ALLLIFE with SPECIES STATUS_FLAM51_2015 (excel spreadsheet)		Hamilton Conservation Authority
ALLLIFE with SPECIES STATUS_FLAM-48_2015 (excel spreadsheet)		Hamilton Conservation Authority
ALLLIFE with SPECIES STATUS_FLAM-50_2015 (excel spreadsheet)		Hamilton Conservation Authority
BIKEWAYS		City of Hamilton
BUILDINGS		City of Hamilton
CAMPGROUNDS		City of Hamilton
CITY_BOUNDARY		City of Hamilton
CITY_WATERFALLS		City of Hamilton
ESA_BOUNDARIES		City of Hamilton
ESCARPMENT		City of Hamilton
GOLF_COURSES		City of Hamilton
LAKES		City of Hamilton
PARKING_LOTS		City of Hamilton
PARK_AMENITIES		City of Hamilton
PARKS		City of Hamilton
RAILWAYS		City of Hamilton

NAME OF RECEIVED GIS LAYER	SUB-LAYER	SOURCE
REC_COMM_CENTRES		City of Hamilton
RIVERS		City of Hamilton
ROADS		City of Hamilton
TOURISM_LISTINGS		City of Hamilton
PED_LANDUSE_PRIMARY	Land use designations	City of Hamilton
C2E_HamHC_District		City of Hamilton
C2E_HamSigWood		City of Hamilton
C2EHamSportsFields		City of Hamilton
C2E_HamTrails		City of Hamilton
C2EHamZoningAtt		City of Hamilton
C2EHamAirphotoTiles		City of Hamilton
Air Photos		City of Hamilton
SchE1_LandUseDes_Urban_UpdateDec2014_GeoTiff		City of Hamilton
NAI_Study_Areas		Conservation Halton

REPORTS	SOURCE/REFERENCE	FORMAT	RECEIVED
A Biological Inventory of Halton Region Conservation Authority Properties (1979)	CH	paper	x
A Biological Inventory of Halton Region Conservation Authority Properties (1980)	CH	paper	x
A Biophysical Inventory of the Niagara Escarpment and Grindstone Creek Public Open Space Areas: the Parkway Belt West Plan volume 1 (1989)	CH	paper	x
A Biophysical Inventory of the Niagara Escarpment and Grindstone Creek Public Open Space Areas: the Parkway Belt West Plan volume 2 (1989)	CH	paper	x
Biological Inventory and Evaluation of the Sassafras Woods ANSI (1992)	MNRF	paper	x
Bonta Property Management Plan	BTC	digital copy	x
BTC Invasive Species Strategy - October 2012	BTC	digital copy	x
Burlington Easement Management Plan Bruce Trail Report	BTC	digital copy	x
Burlington Heights Heritage Lands Management Plan: Inventory and Issues Report (June 2013)	MHBC	paper	x
Cootes to Escarpment Conservation and Land Management Strategy, Phase 1 Background Report (December 2007)	C2E	paper	x

REPORTS	SOURCE/REFERENCE	FORMAT	RECEIVED
Cootes to Escarpment EcoPark System: A Plan for the Burlington Heights Heritage Lands (August 2014)	MHBC/C2E	paper	x
Cootes to Escarpment Park System Conservation and Land Management Strategy, Phase II Report (October 2009)	C2E	paper	x
Cootes to Escarpment Park System: Land Securement Strategy (2011)	Orland Conservation/C2E	paper	x
Ecological Survey of the Niagara Escarpment Biosphere Reserve, volume 1 and 2 (1996)	MNR	paper	x
Fenco Reports GO-ALRT Burlington Project: Technical Paper, Burlington Project	Fenco Lavalin/MTO	paper	x
Grindstone Creek Subwatershed Study	CH	paper	x
Grindstone Creek Valley ANSI report	MNR	paper	x
Grindstone Creek Watershed Study (1977)	MNR	paper	x
Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring Long Term Environmental Monitoring Program (2011)	CH	digital copy	x
Halton Natural Areas Inventory (2006) volumes 1 and 2	CH	paper	x
Halton Region Environmentally Sensitive Areas Consolidation Report (April 2005)	NSE/Halton Region	paper	x
Halton Region Environmentally Sensitive Areas Update Study (2002)	Mirek Sharp/Halton Region	paper	x
Hamilton Harbour and Watershed Fisheries Management Plan (2009)	CH	digital copy	x
Johnson Easement Management Plan Bruce Trail Report	BTC	digital copy	x
Kerncliff Park Biophysical Inventory (1998)	CH	paper	x
Kerncliff Park Revised Master Plan (1998)	Burlington	paper	x
Land Steward Invasive Monitoring Protocol Bruce Trail Report	BTC	digital copy	x
Life Science ANSI in Site District 7-3 Outside the NEPA (MNR 1989)	MNR	digital copy	x
McNally Property Management Plan Bruce Trail Report	BTC	digital copy	x
Mount Nemo CA Management Plan Stage 1 and 3 Reports	CH	digital copy	x
National Sewer Pipe Limited Environmental Appraisal, Sanitary Landfill Proposal, Burlington, Ontario	Proctor & Redfern	paper	x
NEPOSS Planning Manual	NEC	digital copy	x

REPORTS	SOURCE/REFERENCE	FORMAT	RECEIVED
Niagara Escarpment Commission Strategic Plan 2012-2016	NEC	paper	x
North Shore Subwatershed Study 2006	CH	digital copy	x
Regional Municipality of Halton Environmentally Sensitive Area Study (1995)	Geomatics/Halton Region	paper	x
Results of Hydrogeology, Hydrology and Rock Stability Work Programs, Kerncliff Park, Ontario	Golder/Burlington	paper	x
Smokey Hollow Management Plan Bruce Trail Report	BTC	digital copy	x
South Waterdown SWS Stage 1 Final Report	NSE	digital copy	x
The Historical and Present Extent and Floristic Composition of Prairie and Savanna Vegetation in the Vicinity of Hamilton, Ontairo (Goodban et al. 1997)	CH/MNR	digital copy	x
North Aldershot Inter-Agency Review Final Report May 1994	Hemson Consulting Ltd.	digital copy	x
Waterdown/Aldershot Transportation Master Plan - City of Hamilton Public Works	City of Hamilton	digital copy	x
Hamilton's Cycling Master Plan Shifting Gears 2009	City of Hamilton	digital copy	x

MAPS	SOURCE	RECEIVED
BTC Invasive Species Maps	BTC	x
Burlington Easement Rogue Trails to be Closed	BTC	x
Grindstone Creek Subwatershed Named - Figure1_OverviewMap	CH	x
Draft Regulated Habitat Red - Burlington South	MNRF	x

Appendix 2: Characterization Matrix

Appendix 2. Waterdown-Sassafras Woods Heritage Lands Characterization Matrix

PROPERTY NAME	OWNERSHIP	MANAGED BY	CURRENT LANDUSE	AREA (ha)	Conservation Authority	PROVINCIAL				REGIONAL		LOCAL		
					REGULATED AREA	PARKWAY BELT WEST	PARKWAY BELT REG	NEP/GREENBELT	NEC DEV CONTROL REG	PLAN	LANDUSE DESIGNATION	PLAN	LANDUSE DESIGNATION	ZONING
Bayview Park/Indian Creek	City of Burlington	City of Burlington	dirt, field,forest, park, former landfill, building block	38.04	partial (75%)	no	partial yes	no	no	Halton OP	North Aldershot Policy Area, Regional Natural Heritage System, Urban Area	Burlington OP	Business Corridor, Watercourse, Recreation/Open Space, Former Waste Disposal Site, Business Corridor	BC2, O2, PC
Falcon Creek	Halton Region	Halton Region	field, forest, building block, dirt, grass, transportation, former landfill, agricultural	72.81	partial (50%)	partial yes (Electric Power Facility, Utility)	yes	In part, Greenbelt (Protected Countryside, NHS)	no	Halton OP	North Aldershot Policy Area, Greenbelt Natural Heritage System, Regional Natural Heritage System (Urban Area)	Burlington OP	Business Corridor, Parkway Belt West, Environmental Protection Area, Recreation/Open Space, Former Waste Disposal Site	H-BC2, S, PC, O3-196
Forestvale Park	City of Burlington	City of Burlington	forest, urban residential creek block	2.60	partial (60%)	no	no	no	no	Halton OP	Regional Natural Heritage System, Urban Area	Burlington OP	Residential - Low Density	P
Hughes	Bruce Trail Conservancy	Bruce Trail Conservancy	forest	0.05	full	no	no	NEC (Escarpment Natural Area)	yes	Halton OP	Regional Natural Heritage System	Burlington OP	Greenlands (Escarpment Plan Area)	NEC DEV CONTROL AREA
Kerncliff 1	Conservation Halton	City of Burlington; Conservation Halton	field, forest, former quarry, park, pipeline block	37.32	partial (75%)	no	no	NEC (Escarpment Natural Area, Escarpment Protection Area)	partial yes	Halton OP	Regional Natural Heritage System, Urban Area	Burlington OP	Escarpment Protection Area, Greenlands (Escarpment Plan Area), Residential - Low Density	NEC DEV CONTROL AREA, S
Kerncliff 2	Halton Region	Halton Region	field, forest, utility	1.15	no	no	no	NEC (Escarpment Protection Area)	yes	Halton OP	Regional Natural Heritage System	Burlington OP	Escarpment Protection Area	NEC DEV CONTROL AREA
Kerns/Westbury Park	City of Burlington	City of Burlington	forest, urban residential creek block, urban residential walkway block, field, park	10.39	partial (80%)	no	no	no	no	Halton OP	Urban Area	Burlington OP	Watercourse, Residential - Low Density	O2, P, R2.2
McNally	Bruce Trail Conservancy	Bruce Trail Conservancy	field, forest, rural residential	11.06	partial (10%)	no	no	NEC (Escarpment Natural Area, Escarpment Protection Area)	yes	Hamilton OP	N/A	Hamilton OP	Open Space, Rural Area	NEC DEV CONTROL AREA
Sassafras Tributary	City of Burlington	City of Burlington	field, forest	4.58	full	no	yes	Greenbelt (Protected Countryside, NHS)	no	Halton OP	Greenbelt Natural Heritage System	Burlington OP	Environmental Protection Area	O3-196
Tyandaga Golf Course	City of Burlington	City of Burlington	building block, field, forest, golf course	44.47	partial (50%)	no	no	no	no	Halton OP	Urban Area	Burlington OP	Major Park, Open Space	O1

PROPERTY NAME	OWNERSHIP	MANAGED BY	CURRENT LANDUSE	AREA (ha)	Conservation Authority	PROVINCIAL				REGIONAL		LOCAL		
					REGULATED AREA	PARKWAY BELT WEST	PARKWAY BELT REG	NEP/GREENBELT	NEC DEV CONTROL REG	PLAN	LANDUSE DESIGNATION	PLAN	LANDUSE DESIGNATION	ZONING
Upper Hager Creek	City of Burlington	City of Burlington	forest, natural area, urban residential creek block, field, urban residential stormwater management block, urban residential walkway block	15.61	partial (75%)	no	no	no	no	Halton OP	Regional Natural Heritage System, Urban Area	Burlington OP	Watercourse, Residential - Low Density	O2, R2.3-184
Upper Rambo Creek/Mansfield Park	City of Burlington	City of Burlington	forest, urban residential creek block	8.13	partial (80%)	no	no	no; NEC (Escarpment Natural Area)	partial yes	Halton OP	Regional Natural Heritage System	Burlington OP	Watercourse, Greenlands (Escarpment Plan Area)	O2, P, NEC DEV CONTROL AREA
Waterdown Road	Halton Region	Halton Region	forest, thicket/woodland, utility	0.88	partial (10%)	no	yes	no	no	Halton OP	North Aldershot Policy Area, Eligible for Urban Services	Burlington OP	Infill Residential	RNA1
Waterdown Woods	City of Burlington; Conservation Halton	City of Burlington; Conservation Halton	forest, urban residential block, urban residential creek block, field, dirt, agricultural, rural residential, transportation	198.72	partial (75%)	partial yes (Public Open Space + Buffer, Utilities)	partial yes	Greenbelt (Protected Countryside, NHS), NEC (Escarpment Natural Area, Escarpment Protection Area)	partial yes	Halton OP; Hamilton OP	Regional Natural Heritage System, Greenbelt Natural Heritage System, Urban, Open Space	Burlington OP, Hamilton OP	Residential - Low Density, Parkway Belt West, Environmental Protection Area, Escarpment Protection Area, Greenlands (Escarpment Plan Area); Open Space	NEC DEV CONTROL AREA, O2, O3-196

Appendix 3: Data Gap Analysis

Appendix 3. Waterdown-Sassafras Woods Heritage Lands Data Gap Analysis

PROPERTY NAMES	ANSI	ESA	Wetland	Landcover	ELC	Plants	Birds	Amphibians	Reptiles	Mammals	Fish	Surface Water
Bayview Park/Indian Creek	no	no	no	dirt, field, forest, park, former landfill, building block	partial (CH)	partial (Halton NAI-55); woodland at SE corner without much inventory	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2002)
City View Park	Old Nelson Quarry Provincial Earth Science ANSI	Waterdown Escarpment Woods	no	sportsfields, field, thicket, forest	complete (CH, BTC, NSE)	partial (Halton NAI-5, Halton NAI-5A, Hamilton FLAM-51, BTC Management Plan, New City Park NSE EIA); specialized habitats (talus) require additional inventory	yes (Halton NAI-5 2004, Halton NAI-5A 2004, Hamilton FLAM-51, BTC Management Plan, NSE New City Park EIA)	yes (Halton NAI-5 2004, Halton NAI-5A 2004, Hamilton FLAM-51, BTC Management Plan, NSE New City Park EIA)	yes (Halton NAI-5 2004, Halton NAI-5A 2004, Hamilton FLAM-51, BTC Management Plan, NSE New City Park EIA)	yes (Halton NAI-5 2004, Halton NAI-5A 2004, Hamilton FLAM-51, BTC Management Plan, NSE New City Park EIA)	yes (Halton NAI-5 , Halton NAI-5A, Hamilton FLAM-51, NSE New City Park EIA); no habitat	yes (Halton NAI-5 2003, Halton NAI-5A 2003, Hamilton FLAM-51 1993, NSE New City Park EIA)
Falcon Creek	Sassafras-Waterdown Woods Provincial Life Science ANSI	Sassafras Woods	unevaluated wetland (CH, LIO)	field, forest, building block, dirt, grass, transportation, former landfill, agriculture	complete (CH)	yes (Halton NAI-4, Halton NAI-55)	yes (Halton NAI-4 2004, Halton NAI-55 2004)	yes (Halton NAI-4 2004, Halton NAI-55 2004)	yes (Halton NAI-4 2004, Halton NAI-55 2004)	yes (Halton NAI-4 2004, Halton NAI-55 2004)	yes (Halton NAI-4 2004, Halton NAI-55 2004)	yes (Halton NAI-4 1996, Halton NAI-55 2002)
Forestvale Park	no	no	no	forest, urban residential creek block	complete (CH)	no	no	no	no	no	no	no
Hughes	Sassafras-Waterdown Woods Provincial Life Science ANSI	Waterdown Escarpment Woods	no	forest	complete (CH)	yes (Halton NAI-5, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Hamilton FLAM-51)	yes (Halton NAI-5, Hamilton FLAM-51); no habitat	yes (Halton NAI-5 2003, Hamilton FLAM-51 1993)
Kerncliff 1	Old Nelson Quarry Provincial Earth Science ANSI	Waterdown Escarpment Woods	no	field, forest, former quarry, park, pipeline block	complete (CH)	yes (Halton NAI-5, Halton NAI-55, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2003, Halton NAI-55 2002, Hamilton FLAM-51 1993)
Kerncliff 2	no	Waterdown Escarpment Woods	no	field, forest, utility	complete (CH)	yes (Halton NAI-55, Hamilton FLAM-51)	yes (Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-55 2004, Hamilton FLAM-51); no habitat	yes (Halton NAI-55 2002, Hamilton FLAM-51 1993)
Kerns/Westbury Park	no	no	no	forest, urban residential creek block, urban residential walkway block, field, park	complete (CH)	no	no	no	no	no	no	no

PROPERTY NAMES	ANSI	ESA	Wetland	Landcover	ELC	Plants	Birds	Amphibians	Reptiles	Mammals	Fish	Surface Water
McNally	Sassafras-Waterdown Woods Provincial Life Science ANSI	no	no	field, forest, rural residential	complete (CH, BTC)	yes (Halton NAI-5, Hamilton FLAM-51, BTC Management Plan)	yes (Halton NAI-5 2004, Hamilton FLAM-51, BTC Management Plan)	yes (Halton NAI-5 2004, Hamilton FLAM-51, BTC Management Plan)	yes (Halton NAI-5 2004, Hamilton FLAM-51, BTC Management Plan)	yes (Halton NAI-5 2004, Hamilton FLAM-51, BTC Management Plan)	yes (Halton NAI-5, Hamilton FLAM-51); no habitat	yes (Halton NAI-5 2003, Hamilton FLAM-51 1993, BTC Management Plan)
Sassafras Tributary	Sassafras-Waterdown Woods Provincial Life Science ANSI	Sassafras Woods	no	field, forest	complete (CH)	yes (Halton NAI-4)	yes (Halton NAI-4 2004)	yes (Halton NAI-4 2004)	yes (Halton NAI-4 2004)	yes (Halton NAI-4 2004)	yes (Halton NAI-4 2004)	yes (Halton NAI-4 1996)
Tyandaga Golf Course	no	no	no	building block, field, forest, golf course	partial (CH)	no	no	no	no	no	no	no
Upper Hager Creek	no	no	no	forest, natural area, urban residential creek block, field, urban residential stormwater management block, urban residential walkway block	complete (CH)	partial (Halton NAI-55)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2004)	partial (Halton NAI-55 2002)
Upper Rambo Creek/Mansfield Park	no	Waterdown Escarpment Woods	no	forest, urban residential creek block	complete (CH)	yes (Halton NAI-5A, Hamilton FLAM-51)	yes (Halton NAI-5A 2004, Hamilton FLAM-51)	yes (Halton NAI-5A 2004, Hamilton FLAM-51)	yes (Halton NAI-5A 2004, Hamilton FLAM-51)	yes (Halton NAI-5A 2004, Hamilton FLAM-51)	yes (Halton NAI-5A, Hamilton FLAM-51)	yes (Halton NAI-5A 2003, Hamilton FLAM-51 1993)
Waterdown Road	no	no	no	forest, thicket/woodland, utility	manicured	no	no	no	no	no	no	no
Waterdown Woods	Sassafras-Waterdown Woods Provincial Life Science ANSI	Waterdown Escarpment Woods	swamp, Falcon Creek Provincially Significant Wetland Complex (CH, LIO); open water, unevaluated wetland (CH, LIO)	forest, urban residential block, urban residential creek block, field, dirt, agricultural, rural residential, transportation	complete (CH)	yes (Halton NAI-5, Halton NAI-55, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2004, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5, Halton NAI-55 2004, Hamilton FLAM-51)	yes (Halton NAI-5 2003, Halton NAI-55 2002, Hamilton FLAM-51 1993)

Appendix 4: List of Individuals and/or Agencies Consulted

Appendix 4. List of individuals and/or agencies consulted to gather information for the Waterdown-Sassafras Woods Heritage Lands Inventory, Opportunities and Issues Report

Information Gathering Sessions

1. Group A: Hamilton and Conservation Halton Staff – 28 April 2015, 9:00am – 11:00am
    - Kent Rundle, Conservation Halton
    - Nigel Finney, Conservation Halton
    - Andrea Dunn, Conservation Halton
    - Brenda Axon, Conservation Halton
    - Adrienne Kupchanko, City of Hamiton

2. Group B: Burlington and Hamilton Staff + Cultural/Historical Representatives – 28 April 2015, 12:30pm – 2:30pm
    - Brenda VanRyswyk, Conservation Halton
    - Sonia Mrva, City of Hamilton
    - John Hall, Hamilton RAP
    - Cathy McMaster, Hamilton-Wentworth Federation of Agriculture
    - Jim Thurston, Burlington Senior's Advisory Committee
    - Jim Frohlick, Burlington Senior's Advisory Committee

3. Group C: Six Nations of the Grand River – 28 April 2015, 3:00pm – 5:00pm
    - Paul General, Six Nations of the Grand River

4. Group D: Community Groups, Citizen Advisory Committees + Evening Alternate Option – 28 April 2015, 7:30pm – 9:00pm
    - Robert Patrick, CONE
    - Linda Axford, Aldershot resident
    - Cam Levack, Tyandaga Residents Association and Hager Creek Stewardship Group

5. Group E: Niagara Escarpment Commission – 1 May 2015, 9:00am – 11:00am
    - Anne Marie Laurence, Niagara Escarpment Commission

6. Group F: Additional Information Gathering Session – 19 June 2015, 9:00am - 11:00am
    - Bob Zawislak, Halton Region
    - Niall Lobley, Conservation Halton
    - Ingrid Vanderbrug, City of Burlington
    - Vito Tolone, City of Burlington
    - Leah Smith, City of Burlington
    - Rosalind Minaji, City of Burlington
    - Cathy Plosz, City of Hamilton
    - Jessica Hale, City of Hamilton
    - Paul Toffoletti, Bruce Trail
    - Wayne Terryberry, McMaster University and Chair of the Hamilton Burlington Trails Council

Focus Group on Trails held at Royal Botanical Gardens

- Ingrid Vanderbrug, City of Burlington
- Niall Lobley, Conservation Halton
- Wayne Terryberry, McMaster University and Chair of the Hamilton Burlington Trails Council
- Peter Kelly, Cootes to Escarpment EcoPark System
- Markus Hillar, Schollen & Company

Meetings with Conservation Halton and Study Team

- 17 February 2015, 10:00am – 12:00pm
- 11 August 2015, 10:00am – 2:00pm

Additional Meetings/Conversations

Cultural Heritage

- Alissa Golden, Heritage Planner, City of Hamilton – 9 September 2015
- Michael Sawchuck, Manager, Acquisition and Conservation Services, Ontario Heritage Trust – 9 September 2015

Planning and Utilities

- Paul Lane, Property and Construction Technologist, Sun Canadian Pipelines – 26 May 2015
- Kelly Hollman, ROW Coordinator/Community Awareness Officer, Imperial Oil Ltd. – 1 June 2015
- Gretchen Gordon, Regional Community Liaison, Trans Canada Pipelines – 29 May 2015
- Lana Kejel, Senior Real Estate Coordinator, Halton Area, Hydro One – 28 May 2015
- Jim Oriotis, Senior Real Estate Coordinator, Hamilton Area, Hydro One – 28 May 2915

Recreation

- Adam Brylowski, Bruce Trail Conservancy – 8 April, 2015
- Paul Schnepf, Owner of Bicycle Works – 4 August 2015
- Dustin Fournier, Disc Golf Enthusiast – 4 and 5 September 2015

Appendix 5: Flora

Appendix 5. Floral species at Waterdown-Sassafras Woods Heritage Lands. * indicates a non-native species

BP/IC = Bayview Park/Indian Creek; CP = City View Park; FC = Falcon Creek; FP = Forestvale Park; K1 = Kerncliff 1; K2 = Kerncliff 2; K/WP = Kerns/Westbury Park; ST = Sassafras Tributary; TGC = Tyandaga Golf Course; UHC = Upper Hager Creek; URC/MP = Upper Rambo Creek/Mansfield Park; WR = Waterdown Road; WW = Waterdown Woods

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Orthotrichaceae																						
	Zygodon viridissimus (Dicks.) Brid.	A Moss	G5	S2					x	x				x	x		x		x		x	x	
	Equisetaceae																						
	Equisetum arvense L.	Field Horsetail	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Equisetum fluviatile L.	Water Horsetail	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
	Equisetum laevigatum A. Braun	Smooth Scouring-rush	G5	S4			H	HR			x							x					
	Equisetum scirpoides Michx.	Dwarf Scouring-rush	G5	S5			h	HU		x			x	x	x						x	x	
	Equisetum variegatum Schleich. ex Fried., Weber & Mohr ssp. variegatum	Variegated Horsetail	G5	S5				HU		x			x	x	x		x		x		x	x	
	Ophioglossaceae																						
	Botrypus virginianus L. Michaux	Rattlesnake Fern	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Osmundaceae																						
	Osmunda claytoniana L.	Interrupted Fern	G5	S5				HU			x							x					
	Pteridaceae																						
	Pellaea atropurpurea L. Link	Purple-stemmed Cliffbrake	G5	S3						x			x	x	x						x	x	
	Pellaea glabella Mett. ex Kuhn	Smooth Cliffbrake	G5	S4			H			x			x	x	x		x		x		x	x	
	Dennstaedtiaceae																						
	Pteridium aquilinum L. Kuhn var. latiusculum (Desv.) L. Underw. ex A. Heller	Bracken Fern	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Aspleniaceae																						
	Asplenium rhizophyllum L.	Walking-Fern	G5	S4			h			x			x	x	x		x		x		x	x	
	Asplenium trichomanes L.	Maidenhair Spleenwort	G5	S5						x				x	x		x		x		x	x	
	Asplenium viride Hudson	Green Spleenwort	G4	S4				HR		x			x	x	x						x	x	
	Dryopteridaceae																						
	Athyrium filix-femina L. Roth ex Mert. var. angustum (Willd.) G. Lawson	Northeastern Lady Fern	G5T5	S5						x				x	x		x		x		x	x	
	Athyrium filix-femina L. Roth ex Mert. var. cyclosorum Rupr.	Northwestern Lady Fern	G5T5	SH						x	x		x	x	x			x			x	x	
	Cystopteris bulbifera L. Bernh.	Bulblet Bladder Fern	G5	S5					x	x			x	x	x		x		x		x	x	
	Cystopteris fragilis L. Bernh.	Fragile Fern	G5	S5						x			x	x	x						x	x	
	Cystopteris tenuis (Michx.) Desv.	Mackay's Brittle Fern	G5	S5					x	x			x	x	x		x		x		x	x	
	Dryopteris carthusiana (Vill.) H.P. Fuchs	Spinulose Wood Fern	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Dryopteris clintoniana (D.C. Eaton) Dowell	Clinton's Wood Fern	G5	S4						x											x		
	Dryopteris cristata L. A. Gray	Crested Wood Fern	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Dryopteris intermedia (Muhlenb. ex Willd.) A. Gray	Evergreen Wood Fern	G5	S5					x	x	x		x	x	x		x	x	x		x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Dryopteris marginalis L. A. Gray	Marginal Wood Fern	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Dryopteris x triploidea Wherry	Hybrid Wood Fern	GNA	SNA							x							x					
	Matteuccia struthiopteris var. pensylvanica (Willd.) C.V. Morton	Ostrich Fern	G5	S5					x	x		x	x	x	x						x	x	
	Onoclea sensibilis L.	Sensitive Fern	G5	S5					x	x	x	x	x	x	x		x	x	x		x	x	
	Polystichum acrostichoides (Michx.) Schott	Christmas Fern	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Polypodiaceae																						
	Polypodium virginianum L.	Rock Polypody	G5	S5			h		x	x	x		x	x	x		x	x	x		x	x	
	Pinaceae																						
*	Picea abies L. Karsten	Norway Spruce	G5	SNA			I		x	x	x	x	x	x	x		x	x	x		x	x	x
	Picea glauca (Moench) Voss	White Spruce	G5	S5			I/N	HU	x	x	x		x	x	x		x	x	x		x	x	
*	Pinus nigra Arnold	Black Pine	GNR	SNA			I									x							
	Pinus strobus L.	White Pine	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
*	Pinus sylvestris L.	Scots Pine	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Tsuga canadensis L. Carrière	Eastern Hemlock	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Cupressaceae																						
	Juniperus communis L.	Common Juniper	G5	S5			H	HR	x														
	Juniperus virginiana L.	Eastern Red Cedar	G5	S5				HU		x	x		x	x	x		x	x	x	x	x	x	
	Thuja occidentalis L.	Eastern White Cedar	G5	S5					x	x	x	x	x	x	x		x	x	x		x	x	x
	Lauraceae																						
	Lindera benzoin L. Blume	Spicebush	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Sassafras albidum (Nutt.) Nees	Sassafras	G5	S4				HU	x	x	x		x	x	x		x	x	x		x	x	
	Aristolochiaceae																						
	Asarum canadense L.	Canada Wild Ginger	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Ceratophyllaceae																						
	Ceratophyllum demersum L.	Common Hornwort	G5	S5			h	HU	x														
	Ranunculaceae																						
	Actaea pachypoda Elliott	White Baneberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Actaea rubra (Aiton) Willd.	Red Baneberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Anemone acutiloba (DC.) G. Lawson	Sharp-lobed Hepatica	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Anemone americana (DC.) H. Hara	Round-lobed Hepatica	G5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Anemone canadensis L.	Canada Anemone	G5	S5					x														
	Anemone cylindrica A. Gray	Long-headed Anemone	G5	S4			h	HU			x							x					
	Anemone quinquefolia L.	Wood Anemone	G5	S5					x	x	x			x	x		x	x	x	x	x	x	
	Anemone virginiana L. var virginiana	Tall Anemone	G5	S5					x	x				x	x		x		x		x	x	
	Anemone virginiana L. var. cylindroidea B. Boivin	Cylindrical Anemone	G5T4T5	SU						x	x		x	x	x			x			x	x	
	Aquilegia canadensis L.	Wild Columbine	G5	S5					x	x			x	x	x		x		x		x	x	
	Clematis occidentalis (Hornem.) DC.	Purple Clematis	G5	S4S5			h	HR		x			x	x	x		x		x		x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
*	Clematis orientalis L.	Oriental Virgin's-bower	G4	SNA					x														
	Clematis virginiana L.	Virginia Virgin's-bower	G5	S5						x			x	x	x		x		x		x	x	
	Ranunculus abortivus L.	Kidney-leaved Buttercup	G5	S5					x	x	x		x	x	x	x	x	x	x		x	x	
*	Ranunculus acris L.	Tall Buttercup	G5	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
	Ranunculus fascicularis Muhlenb. ex Bigelow	Early Buttercup	G5	S4			H		x	x				x	x		x		x		x	x	
	Ranunculus pensylvanicus L. f.	Pennsylvania Buttercup	G5	S5				HU	x														
	Ranunculus recurvatus Poir.	Hooked Buttercup	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Ranunculus sceleratus L. var. sceleratus	Cursed Buttercup	G5T5	SNA							x							x	x		x		
	Thalictrum dioicum L.	Early Meadow-rue	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
	Thalictrum pubescens Pursh	Tall Meadow-rue	G5	S5					x														
	Thalictrum thalictroides L. A.J. Eames & B. Boivin	Rue-anemone	G5	S3			H	HR		x	x		x	x	x		x	x	x	x	x	x	
	Berberidaceae																						
*	Berberis thunbergii DC.	Japanese Barberry	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Berberis vulgaris L.	European Barberry	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
	Caulophyllum giganteum (Farw.) Leconte & Blackwell	Giant Blue Cohosh	G4G5Q	S4?				H?													x		
	Caulophyllum thalictroides L. Michx.	Blue Cohosh	G4G5	S5				H?	x	x	x		x	x	x		x	x	x		x	x	
	Jeffersonia diphylla L. Pers.	Twinleaf	G5	S4			h	HU	x														
	Podophyllum peltatum L.	May-apple	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Menispermaceae																						
	Menispermum canadense L.	Canada Moonseed	G5	S4					x	x	x		x	x	x		x	x	x		x	x	
	Papaveraceae																						
*	Chelidonium majus L.	Greater Celadine	GNR	SNA			I		x	x			x	x	x		x		x		x	x	
	Sanguinaria canadensis L.	Bloodroot	G5	S5					x	x	x	x	x	x	x		x	x	x		x	x	
	Hamamelidaceae																						
	Hamamelis virginiana L.	American Witch-hazel	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Ulmaceae																						
	Celtis occidentalis L.	Common Hackberry	G5	S4			h	HR		x			x	x	x		x		x		x	x	
	Ulmus americana L.	American Elm	G5?	S5					x	x	x		x	x	x	x	x	x	x		x	x	
*	Ulmus pumila L.	Siberian Elm	GNR	SNA			I									x							
	Ulmus rubra Muhlenb.	Slippery Elm	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Moraceae																						
*	Morus alba L.	White Mulberry	GNR	SNA			I		x	x	x	x		x	x		x	x	x		x	x	
	Morus rubra L.	Red Mulberry	G5	S2	END	END	H	HR	x	x			x	x	x		x		x		x	x	
	Urticaceae																						
	Boehmeria cylindrica L. Sw.	False Nettle	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Laportea canadensis L. Wedd.	Wood Nettle	G5	S5					x		x							x				x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Parietaria pensylvanica Muhlenb. ex Willd.	Pennsylvania Pellitory	G5	S4			H	HR		x			x	x	x		x		x		x	x	
	Pilea pumila L. A. Gray	Canada Clearweed	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Urtica dioica L. ssp. dioica	European Stinging Nettle	G5T5?	SNA			I			x	x		x	x	x			x			x	x	
	Urtica dioica L. ssp. gracilis (Aiton) Selander	Slender Stinging Nettle	G5T5	S5						x				x	x		x		x		x	x	
	Juglandaceae																						
	Carya cordiformis (Wangenh.) K. Koch	Bitternut Hickory	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Carya glabra (Miller) Sweet	Pignut Hickory	G5	S3			H	HR		x	x		x	x	x		x	x	x		x	x	
	Carya ovata (Miller) K. Koch	Shagbark Hickory	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
	Juglans cinerea L.	Butternut	G4	S3?	END	END			x	x	x		x	x	x		x	x	x		x	x	
	Juglans nigra L.	Black Walnut	G5	S4					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Fagaceae																						
	Fagus grandifolia Ehrh.	American Beech	G5	S4					x	x	x	x	x	x	x		x	x	x	x	x	x	
	Quercus alba L.	White Oak	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Quercus macrocarpa Michx.	Bur Oak	G5	S5					x	x			x	x	x		x		x		x	x	x
	Quercus rubra L.	Northern Red Oak	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Quercus velutina Lam.	Black Oak	G5	S4				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Betulaceae																						
*	Alnus glutinosa L. Gaertn.	European Alder	GNR	SNA			I		x		x							x					
	Betula alleghaniensis Britton	Yellow Birch	G5	S5					x		x							x					
	Betula papyrifera Marshall	Paper Birch	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Carpinus caroliniana Walter ssp. virginiana (Marshall) Furlow	Blue-beech	G5	S5			H		x	x	x		x	x	x		x	x	x		x	x	
	Corylus cornuta Marshall	Beaked Hazel	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Ostrya virginiana (Miller) K. Koch	Eastern Hop-hornbeam	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Chenopodiaceae																						
	Atriplex patula L.	Spear Saltbush	G5	S5			h				x							x					
	Chenopodiastrum simplex (Torrey) S. Fuentes, Uotila & Borsch	Maple-leaved Goosefoot	G5	S5			h	HU		x			x	x	x		x		x		x	x	
*	Chenopodium album L.	Common Lamb's Quarters	G5	SNA			I									x					x		
	Amaranthaceae																						
*	Amaranthus hybridus L.	Smooth Amaranth	G5?TNR	SNA			I		x														
*	Amaranthus retroflexus L.	Redroot Amaranth	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Portulacaceae																						
	Claytonia virginica L.	Narrow-leaved Spring Beauty	G5	S5				HU	x		x			x	x					x		x	
	Caryophyllaceae																						
*	Cerastium fontanum Baumg.	Common Mouse-ear Chickweed	GNR	SNA			I		x		x							x					

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
*	Dianthus armeria L.	Deptford Pink	GNR	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
*	Saponaria officinalis L.	Bouncing-bet	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Silene latifolia Poir.	White Campion	GNR	SNA			I		x														
*	Silene noctiflora L.	Night-flowering Catchfly	GNR	SNA			I		x	x				x	x		x		x		x	x	
*	Silene vulgaris (Moench) Garcke	Bladder Campion	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Stellaria graminea L.	Grass-leaved Starwort	GNR	SNA			I		x	x			x	x	x						x	x	
*	Vaccaria hispanica (Miller) Rauschert	Cowcockle	GNR	SNA											x								
	Polygonaceae																						
*	Fallopia japonica (Houttuyun) Ronse-Decraene	Japanese Knotweed	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Persicaria hydropiper (L.) Delarbre	Marshpepper Smartweed	GNR	SNA			I				x							x					
*	Persicaria maculosa Gray	Spotted Lady's Thumb	G3G5	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Persicaria punctata (Elliott) Small	Dotted Smartweed	G5	S5				HU		x			x	x	x		x		x		x	x	
	Persicaria virginiana (L.) Gaertner	Virginia Knotweed	G5	S4				HU			x							x					
	Polygonum articulatum L.	Coast Jointweed	G5	S4						x			x	x	x						x	x	
*	Polygonum aviculare ssp. depressum (meisner) Arcangeli	Oval-leaf Knotweed	G5?	SNA			I				x							x					
	Polygonum sp.	Knotweed	GNR	S?					x														
*	Rumex acetosella L.	Sheep Sorrel	GNR	SNA			I				x							x					
*	Rumex crispus L.	Curly Dock	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
*	Rumex obtusifolius L.	Bitter Dock	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Guttiferae																						
*	Hypericum perforatum L.	Common St. John's-wort	GNR	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
	Hypericum punctatum Lam.	Common St. John's-wort	G5	S5				HU			x							x					
	Tiliaceae																						
	Tilia americana L.	American Basswood	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
*	Tilia cordata Miller	Little-leaf Linden	GNR	SNA			I					x				x							
	Cistaceae																						
	Lechea intermedia Legg.	Large-pod Pinweed	G5	S4			H	HR		x			x	x	x		x		x		x	x	
	Violaceae																						
	Hybanthus concolor (T.F. Forst.) Spreng.	Eastern Green Violet	G5	S2			h	HU		x			x	x	x		x		x		x	x	
	Viola canadensis L.	Canada Violet	GNR	S5						x			x	x	x		x		x		x	x	
	Viola cucullata Aiton	Marsh Blue Violet	G4G5	S5				HU	x		x							x					
	Viola labradorica Schrank	Labrador Violet	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Viola pubescens Aiton	Downy Yellow Violet	G5T5	S5					x	x	x		x	x	x	x	x	x	x		x	x	
	Viola rostrata Pursh	Long-spur Violet	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Viola sagittata Aiton var. sagittata	Arrow-leaved Violet	G5T5	S4					x		x							x					
	Viola sororia Willd.	Woolly Blue Violet	G5	S5			H	HU	x	x	x	x	x	x	x		x	x	x		x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Cucurbitaceae																						
	Echinocystis lobata (Michx.) Torr. & A. Gray	Wild Mock-cucumber	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Sicyos angulatus L.	One-seed Bur-cucumber	G5	S5			h	HR	x														
	Salicaceae																						
*	Populus alba L.	White Poplar	G5	SNA			I				x			x	x					x		x	
	Populus balsamifera L.	Balsam Poplar	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Populus deltoides Bartram ex Marshall ssp. deltoides	Eastern Cottonwood	G5T5	S5						x	x		x	x	x		x		x	x	x	x	
	Populus deltoides Bartram ex Marshall ssp. monilifera (Aiton) Eckenwalder	Plains Cottonwood	G5T5	S2?						x	x		x	x	x			x			x	x	
	Populus grandidentata Michx.	Large-tooth Aspen	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Populus tremuloides Michx.	Trembling Aspen	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
*	Salix alba L.	White Willow	G5	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Salix amygdaloides Anderss.	Peach-leaved Willow	G5	S5						x	x		x	x	x			x			x	x	
	Salix bebbiana Sarg.	Bebb's Willow	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Salix discolor Muhlenb.	Pussy Willow	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Salix eriocephala Michx.	Heart-leaved Willow	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Salix exigua Nutt.	Sandbar Willow	G5	S5					x	x			x	x	x						x	x	
	Salix humilis Marshall	Prairie Willow	G5	S5			H	HR	x														
	Salix lucida Muhlenb.	Shining Willow	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
	Salix nigra Marshall	Black Willow	G5	S4?				HU	x	x	x		x	x	x		x	x	x		x	x	
*	Salix pentandra L.	Laurel Willow	GNR	SNA			I				x			x	x					x		x	
	Salix petiolaris Sm.	Meadow Willow	G5	S5							x							x					
*	Salix purpurea L.	Basket Willow	G5	SNA			I		x														
	Salix sp.	Willow	GNR	S?					x	x				x	x		x		x		x	x	
*	Salix x fragilis L.	Hybrid White Willow	GNA	SNA			I			x	x	x	x	x	x		x	x	x		x	x	
	Brassicaceae																						
*	Alliaria petiolata (M. Bieb.) Cavara & Grande	Garlic Mustard	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Arabis pycnocarpa M. Hopkins var. pycnocarpa	Cream-flowered Rockcress	GNRTNR	S5			H	HR		x				x	x		x		x		x	x	
*	Barbarea vulgaris R. Br.	Bitter Wintercress	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Berteroa incana L. DC.	Hoary False-alyssum	GNR	SNA			I				x			x	x					x		x	
	Borodinia canadensis L. P.J. Alexander & Windham	Sicklepod Rockcress	G5	SU			h	HU	x	x	x		x	x	x		x	x	x	x	x	x	
*	Capsella bursa-pastoris L. Medik.	Common Shepherd's Purse	GNR	SNA							x							x					
	Cardamine bulbosa (Schreb. ex Muhlenb.) B.S.P.	Bulbous Bitter-cress	G5	S4				HU	x														
	Cardamine concatenata (Michx.) Schwein.	Cut-leaved Toothwort	G5	S5					x														
	Cardamine diphylla (Michx.) Alph. Wood	Two-leaved Toothwort	G5	S5					x	x			x	x	x		x		x		x	x	
	Cardamine pensylvanica Muhlenb. ex Willd.	Pensylvania Bittercress	G5	S5				HU	x		x							x					

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*	Hesperis matronalis L.	Dame's Rocket	G4G5	SNA			I		x	x	x	x	x	x	x	x	x	x	x		x	x	
*	Lepidium campestre L. R. Br.	Field Peppergrass	GNR	SNA			I		x	x	x		x	x	x			x			x	x	
*	Nasturtium microphyllum (Boenn.) Reichb.	Small-leaved Watercress	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Thlaspi arvense L.	Field Penny-cress	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Ericaceae																						
	Gaultheria hispidula L. Muhlenb. ex Bigelow	Creeping Snowberry	G5	S5			H	HU			x							x					
	Gaultheria procumbens L.	Eastern Teaberry	G5	S5				HU	x	x	x		x	x	x		x	x	x		x	x	
	Gaylussacia baccata (Wangenh.) K. Koch	Black Huckleberry	G5	S4			h	HU			x							x					
	Vaccinium angustifolium Aiton	Late Lowbush Blueberry	G5	S5				HU	x	x	x		x	x	x		x	x	x		x	x	
	Vaccinium pallidum Aiton	Early Lowbush Blueberry	G5	S4				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Pyrolaceae																						
	Pyrola americana Sweet	Round-leaved Pyrola	G5	S4?				HR			x							x					
	Pyrola elliptica Nutt.	Shinleaf	G5	S5							x							x					
	Pyrola grandiflora Radius	Arctic Pyrola	G5	S4							x							x					
	Monotropaceae																						
	Hypopitys monotropa Crantz	American Pinesap	G5	S4				HU			x							x					
	Monotropa uniflora L.	Indian Pipe	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Primulaceae																						
*	Anagallis arvensis L.	Scarlet Pimpernel	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Lysimachia ciliata L.	Fringed Loosestrife	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Lysimachia nummularia L.	Creeping Jennie	GNR	SNA			I		x	x													
	Lysimachia quadrifolia L.	Whorled Loosestrife	G5	S4			H	HR	x														
	Lysimachia thyrsiflora L.	Water Loosestrife	G5	S5					x														
	Trientalis borealis Raf. ssp. borealis	Northern Starflower	G5	S5							x							x					
	Hydrangeaceae																						
*	Philadelphus coronarius L.	Sweet Mock Orange	GNR	SNA			I		x														
	Grossulariaceae																						
	Ribes americanum Miller	Wild Black Currant	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Ribes cynosbati L.	Prickly Gooseberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Ribes glandulosum Grauer	Skunk Currant	G5	S5			H	HR		x			x	x	x		x		x		x	x	
	Ribes hirtellum Michx.	Smooth Gooseberry	G5	S5			h	HR	x	x				x	x		x		x		x	x	
*	Ribes rubrum L.	Northern Red Currant	G4G5	SNA			I				x					x		x			x		
	Ribes sp.	Gooseberry	GNR	S?					x														
	Ribes triste Pall.	Swamp Red Currant	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Crassulaceae																						
*	Hylotelephium telephioides (Michx.) H. Ohba	Allegheny Stonecrop	G4	SNA						x			x	x	x						x	x	
*	Sedum acre L.	Mossy Stonecrop	GNR	SNA			I			x			x	x	x						x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
*	Sedum sarmentosum Bunge	Stringy Stonecrop	GNR	SNA			I			x			x	x	x						x	x	
	Saxifragaceae																						
	Micranthes virginiensis (Michx) Small	Early Saxifrage	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
	Mitella diphylla L.	Two-leaf Bishop's-cap	G5	S5							x							x					
	Penthorum sedoides L.	Ditch-stonecrop	G5	S5				HU			x							x					
	Tiarella cordifolia L.	Heart-leaved Foam-flower	G5	S5					x	x			x	x	x		x		x		x	x	
	Rosaceae																						
	Agrimonia gryposepala Wallr.	Hooked Agrimony	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Amelanchier alnifolia (Nutt.) Nutt. ex R. Roem.	Saskatoon	G5	S4?			H	HR	x														
	Amelanchier arborea (Michx. f.) Fern.	Downy Serviceberry	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Amelanchier laevis Wiegand	Smooth Serviceberry	G4G5Q	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Amelanchier sanguinea (Pursh) DC.	Round-leaved Serviceberry	G5	S5?			h	HU	x		x							x					
	Amelanchier sp.	Serviceberry	GNR	S?					x	x				x	x		x		x		x	x	
	Amelanchier spicata (Lam.) K. Koch	Running Serviceberry	G5	S4?			H	HU	x														
	Crataegus brainerdii Sarg.	Brainerd's Hawthorn	G5	S2			H	HR		x													
	Crataegus calpodendron (Ehrh.) Medik.	Pear Hawthorn	G5	S4S5			h	HU	x														
	Crataegus coccinea L. var. coccinea	Scarlet Hawthorn	GNR	S4			H				x							x					
	Crataegus coccinea var. pringlei (Sargent) J.A. Macklin & J.B. Phipps	Pringle's Hawthorn	G5	S5			h			x			x	x	x		x		x		x	x	
	Crataegus holmesiana Ashe	Holmes' Hawthorn	G5	S4S5			h	HU		x			x	x	x		x		x		x	x	
	Crataegus macrosperma Ashe	Big-fruit Hawthorn	G5	S5				HU	x														
	Crataegus mollis (Torr. & A. Gray) Scheele	Downy Hawthorn	G5	S5			h			x													
*	Crataegus monogyna Jacq.	English Hawthorn	G5	SNA			I				x						x	x					
	Crataegus punctata Jacq.	Dotted Hawthorn	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Crataegus sp.	Hawthorn	GNR	S?					x	x			x	x	x	x	x		x		x	x	
	Crataegus succulenta Schrad. ex Link	Fleshy Hawthorn	G4G5	S5				HU			x							x					
	Dryas integrifolia M. Vahl ssp. integrifolia	Entire-leaved Mountain Avens	G5	S5																		x	
	Fragaria vesca L.	Woodland Strawberry	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Fragaria virginiana Miller	Wild Strawberry	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Geum aleppicum Jacq.	Yellow Avens	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	
	Geum canadense Jacq.	White Avens	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	x
	Geum fragarioides (Michx.) Smedmark	Barren Strawberry	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Geum laciniatum Murray	Rough Avens	G5	S4					x														
	Geum sp.	Geum	GNR	S?					x														
	Malus coronaria L. Miller	Sweet Crabapple	G5	S4				HU		x			x	x	x		x		x		x	x	
*	Malus pumila Miller	Common Apple	G5	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Physocarpus opulifolius L. Maxim.	Eastern Ninebark	GNR	S5				HR	x														
	Potentilla norvegica L.	Rough Cinquefoil	G5	S5			I		x	x	x							x					

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*	Potentilla recta L.	Sulphur Cinquefoil	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Potentilla simplex Michaux	Old-field Cinquefoil	G5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
*	Prunus avium L. L.	Sweet Cherry	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
*	Prunus cerasus L.	Sour Cherry	GNR	SNA			I			x			x	x	x						x	x	
*	Prunus mahaleb L.	Perfumed Cherry	G5	SNA			I			x			x	x	x						x	x	
	Prunus pensylvanica L. f.	Pin Cherry	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
	Prunus pumila L. var. pumila	Sand Cherry	G5T4	S3												x							
	Prunus serotina Ehrh.	Black Cherry	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Prunus virginiana L.	Choke Cherry	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
*	Pyrus communis L.	Common Pear	G5	SNA			I		x	x	x		x	x	x		x	x		x	x	x	
	Rosa blanda Aiton	Smooth Rose	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
*	Rosa canina L.	Dog Rose	GNR	SNA			I			x	x		x	x	x			x			x	x	
	Rosa carolina L.	Carolina Rose	GNR	S4						x	x		x	x	x			x		x	x	x	
*	Rosa multiflora Thunb. ex Murray	Multiflora Rose	GNR	SNA			I		x	x		x	x	x	x	x	x		x	x	x	x	
	Rosa palustris Marshall	Swamp Rose	G5	S5				HU	x														
*	Rosa rubiginosa L.	Sweetbrier Rose	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Rubus allegheniensis Porter	Allegheny Blackberry	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	
	Rubus flagellaris Willd.	Northern Dewberry	G5	S4			h	HU			x							x					
*	Rubus idaeus L. ssp. idaeus	Common Red Raspberry	G5T5	SNA			I			x	x			x	x					x		x	
	Rubus idaeus L. ssp. strigosus (Michx.) Focke	Wild Red Raspberry	G5T5	S5						x	x	x	x	x	x	x	x	x	x		x	x	
	Rubus occidentalis L.	Black Raspberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Rubus odoratus L.	Purple-flowering Raspberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Rubus pubescens Raf.	Dwarf Raspberry	G5	S5							x							x					
*	Sorbus aucuparia L.	European Mountain-ash	G5	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Fabaceae																						
	Amphicarpaea bracteata L. Fern.	American Hog-peanut	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Desmodium canadense L. DC.	Showy Tick-trefoil	G5	S4				HU			x							x					
	Desmodium paniculatum (L.) de Candolle	Narrow-leaved Tick-trefoil	G5	S4			H	HR		x	x		x	x	x		x	x	x		x	x	
	Hylodesmum glutinosum (Muhlenb. Ex Willdenow) H. Ohashi & R.R. Mill	Large Tick-trefoil	G5	S4						x	x		x	x	x		x	x	x		x	x	
	Hylodesmum nudiflorum (L.) H. Ohashi & R.R. Mill	Bare-stemmed Tick-trefoil	G5	S4			H	HU			x							x					
	Lespedeza capitata Michx.	Round-head Bush-clover	G5	S4				HR	x														
	Lespedeza hirta L. Hornem.	Hairy Bush-clover	G5	S4			h	HR		x	x		x	x	x		x	x	x		x	x	
	Lespedeza violacea L. Pers.	Violet Bush-clover	G5	S4			H			x	x		x	x	x		x	x	x		x	x	
*	Lotus corniculatus L.	Garden Birds-foot Trefoil	GNR	SNA			I			x			x	x	x	x	x		x	x	x	x	

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*	Medicago lupulina L.	Black Medic	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
*	Medicago sativa L.	Alfalfa	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Melilotus albus Medik.	White Sweet-clover	G5	SNA			I			x	x		x	x	x		x	x	x	x	x	x	
*	Melilotus officinalis L. Pall.	Yellow Sweet Clover	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Robinia pseudoacacia L.	Black Locust	G5	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Securigera varia (L.) Lassen	Purple Crown-vetch	GNR	SNA			I		x							x							
*	Trifolium aureum Pollich	Yellow Clover	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Trifolium campestre Schreb.	Low Hop Clover	GNR	SNA			I		x														
*	Trifolium hybridum L.	Alsike Clover	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Trifolium pratense L.	Red Clover	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
*	Trifolium repens L.	White Clover	GNR	SNA			I		x	x	x							x					
*	Vicia cracca L.	Tufted Vetch	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Vicia tetrasperma L. Schreb.	Slender Vetch	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Elaeagnaceae																						
*	Elaeagnus angustifolia L.	Russian Olive	GNR	SNA			I		x	x			x	x	x						x	x	
*	Elaeagnus umbellata Thunb.	Autum Olive	GNR	SNA			I									x							
	Shepherdia canadensis L. Nutt.	Canada Buffalo-berry	G5	S5			H	HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Lythraceae																						
	Decodon verticillatus L. Elliott	Hairy Swamp Loosestrife	G5	S5			H	HR	x														
*	Lythrum salicaria L.	Purple Loosestrife	G5	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
	Thymelaeaceae																						
	Dirca palustris L.	Eastern Leatherwood	G4	S4?			h				x							x					
	Onagraceae																						
	Circaea canadensis (L.) Hill	Broad-leaved Enchanter's Nightshade	G5T5	S5						x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Epilobium ciliatum Raf.	Northern Willowherb	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Epilobium hirsutum L.	Hairy Willowherb	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Epilobium parviflorum Schreb.	Small-flowered Willowherb	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Oenothera parviflora L.	Small-flowered Evening Primrose	G4?	S5						x			x	x	x		x		x		x	x	
	Cornaceae																						
	Cornus alternifolia L. f.	Alternate-leaf Dogwood	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Cornus amomum Miller ssp. obliqua (Raf.) J.S. Wilson	Silky Dogwood	G5	S5							x							x					
	Cornus florida L.	Eastern Flowering Dogwood	G5	S2?	END	END	h	HU	x	x	x		x	x	x		x	x	x		x	x	
	Cornus racemosa Lamarck	Grey Dogwood	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
	Cornus rugosa Lam.	Round-leaved	G5	S5					x	x	x		x	x	x		x	x	x		x	x	

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		Dogwood																					
	Cornus stolonifera Michx.	Red-osier Dogwood	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Santalaceae																						
	Comandra umbellata L. Nutt.	Umbellate Bastard Toad-flax	G5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Celastraceae																						
	Celastrus scandens L.	Climbing Bittersweet	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Euonymus europaea L.	European Euonymus	GNR	SNA								x				x							
*	Euonymus fortunei (Turcz.) Hand.-Mazz.	Climbing Euonymus	GNR	SNA			I									x							
	Euonymus obovata Nutt.	Running Strawberry Bush	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Euphorbiaceae																						
	Acalypha rhomboidea Raf.	Common Three-seed Mercury	G5	S5						x	x		x	x	x		x	x	x		x	x	
*	Euphorbia cyparissias L.	Cypress Spurge	G5	SNA			I			x			x	x	x						x	x	
*	Euphorbia esula L.	Leafy Spurge	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Euphorbia maculata L.	Spotted Spurge	G5?	SNA			I												x				
	Rhamnaceae																						
	Ceanothus americanus L.	New Jersey Tea	G5	S4			h		x	x	x		x	x	x		x	x	x	x	x	x	
*	Rhamnus cathartica L.	European Buckthorn	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Vitaceae																						
	Parthenocissus quinquefolia (L.) Planchon ex de Candolle	Virginia Creeper	G5	S4?				H?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Vitis aestivalis Michx.	Summer Grape	G5	S4				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Vitis riparia Michx.	Riverbank Grape	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Polygalaceae																						
	Polygala senega L.	Seneca Snakeroot	G4G5	S4			h		x		x			x	x			x		x		x	
	Polygala verticillata L.	Whorled Milkwort	G5	S4			H	HR			x			x	x			x		x		x	
	Hippocastanaceae																						
*	Aesculus hippocastanum L.	Horse Chestnut	GNR	SNA			I		x														
	Aceraceae																						
	Acer negundo L.	Manitoba Maple	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
	Acer nigrum F. Michaux	Black Maple	G5T5	S4?					x														
*	Acer platanoides L.	Norway Maple	GNR	SNA			I		x	x		x				x			x	x			
	Acer rubrum L.	Red Maple	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Acer saccharinum L.	Silver Maple	G5	S5					x	x	x	x	x	x	x		x		x	x	x	x	
	Acer saccharum Marshall	Sugar Maple	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Acer spicatum Lam.	Mountain Maple	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Acer x freemanii E. Murr.	Freeman's Maple	GNA	SNA						x			x	x	x						x	x	
	Anacardiaceae																						
*	Cotinus coggygria Scop.	European Smoketree	GNR	SNA			I			x													

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	Rhus aromatica Aiton	Fragrant Sumac	G5	S5			H	HR	x	x	x		x	x	x		x	x	x	x	x	x	
	Rhus typhina L.	Staghorn Sumac	G5	S5					x	x	x	x	x	x	x		x	x	x	x	x	x	
	Toxicodendron radicans L. Kuntze var. radicans	Eastern Poison-ivy	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Toxicodendron radicans L. Kuntze var. rydbergii (Small ex Rydberg) A. Love & D. Love	Western Poison-ivy	G5	S5						x		x		x	x	x	x		x	x	x	x	
	Rutaceae																						
	Zanthoxylum americanum Miller	Northern Prickly Ash	G5	S5						x			x	x	x		x		x		x	x	
	Oxalidaceae																						
	Oxalis dillenii Jacq.	Slender Yellow Wood-sorrel	G5	S5?					x	x				x	x		x		x		x	x	
	Oxalis stricta L.	European Wood-sorrel	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Geraniaceae																						
	Geranium maculatum L.	Spotted Geranium	G5	S5					x	x	x		x	x	x	x	x	x	x	x	x	x	
*	Geranium robertianum L.	Herb-Robert	G5	S5			I		x	x	x		x	x	x	x	x	x	x	x	x	x	
	Balsaminaceae																						
	Impatiens capensis Meerb.	Spotted Jewel-weed	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
*	Impatiens glandulifera Royle	Purple Jewelweed	GNR	SNA			I		x														
	Impatiens pallida Nutt.	Pale Jewelweed	G5	S5						x	x							x					
	Araliaceae																						
	Aralia nudicaulis L.	Wild Sarsaparilla	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Aralia racemosa L.	American Spikenard	G4G5	S5						x	x		x	x	x		x	x	x		x	x	
*	Hedera helix L.	English Ivy	GNR	SNA			I					x				x					x		
	Apiaceae																						
*	Aegopodium podagraria L.	Goutweed	GNR	SNA			I		x														
	Cicuta maculata L. var. maculata	Spotted Water-hemlock	G5T5	S5					x														
	Cryptotaenia canadensis L. DC.	Canada Honewort	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Daucus carota L.	Wild Carrot	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x	x	x	x	
*	Foeniculum vulgare Miller	Sweet Fennel	GNR	SNA						x			x	x	x						x	x	
	Osmorhiza claytonii (Michx.) C.B. Clarke	Hairy Sweet Cicely	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Sanicula canadensis L. var. canadensis	Short-styled Canada Sanicle	G5T5	S4				HR	x														
	Sanicula marilandica L.	Maryland Sanicle	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Sanicula odorata (Raf.) Pryer & Phillippe	Clustered Sanicle	G5	S5			h	HR	x														
	Taenidia integerrima L. Drude	Yellow Pimpernell	G5	S4			h	HU	x		x			x	x			x		x		x	
	Gentianaceae																						
	Frasera caroliniensis Walter	American Columbo	G5	S2	END	END	H	HR	x		x			x	x			x		x		x	
	Apocynaceae																						
	Apocynum androsaemifolium L.	Spreading Dogbane	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Apocynum cannabinum L. var. hypericifolium A. Gray	Clasping-leaved Indian Hemp	G5?	SU					x		x							x					

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	Apocynum x floribundum Greene	Hybrid Dogbane	GNA	SNA							x							x					
*	Vinca minor L.	Periwinkle	GNR	SNA			I		x	x	x	x	x	x	x		x	x	x		x	x	
	Asclepiadaceae																						
	Asclepias exaltata L.	Poke Milkweed	G5	S4				HU	x	x	x		x	x	x		x	x	x		x	x	
	Asclepias incarnata L.	Swamp Milkweed	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Asclepias syriaca L.	Common Milkweed	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Asclepias tuberosa L.	Butterfly Milkweed	G5?	S4			h	HU	x		x			x	x					x		x	
*	Cynanchum rossicum (Kleopov) Borhidi	European Swallowwort	GNR	SNA			I		x	x	x	x	x	x	x		x	x	x		x	x	
	Solanaceae																						
*	Solanum dulcamara L.	Climbing Nightshade	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x	x	x	x	x
*	Solanum nigrum L.	Black Nightshade	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Convolvulaceae																						
*	Convolvulus arvensis L.	Field Bindweed	GNR	SNA			I				x							x					
	Cuscuta gronovii Willd. ex Schultz	Swamp Dodder	G5T5	S5?				HU	x														
	Polemoniaceae																						
	Phlox divaricata L.	Wild Blue Phlox	G5	S4				HU	x														
	Hydrophyllaceae																						
	Hydrophyllum virginianum L.	Virginia Waterleaf	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Boraginaceae																						
*	Cynoglossum officinale L.	Common Hound's-tongue	GNR	SNA			I			x			x	x	x						x	x	
*	Echium vulgare L.	Common Viper's-bugloss	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Hackelia deflexa (Wahlenb.) Opiz	Northern Stickseed	G5	S5			H	HU		x			x	x	x		x		x		x	x	
	Hackelia virginiana L. I.M. Johnston	Virginia Stickseed	G5	S5				HU	x	x			x	x	x		x		x		x	x	
*	Lithospermum officinale L.	European Gromwell	GNR	SNA			I			x													
	Myosotis laxa Lehm.	Small Forget-me-not	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Myosotis scorpioides L.	True Forget-me-not	G5	SNA			I		x														
	Myosotis sp.	Forget-me-not	GNR	S?					x														
	Myosotis verna Nutt.	Spring Forget-me-not	G5	S4?			H	HR	x														
*	Symphytum officinale L. ssp. officinale	Common Comfrey	GNR	SNA			I			x											x		
	Phrymaceae																						
	Phryma leptostachya L.	Lopseed	G5	S4S5						x	x		x	x	x		x		x	x	x	x	
	Verbenaceae																						
	Verbena hastata L.	Blue Vervain	G5	S5					x		x							x					
	Verbena urticifolia L.	White Vervain	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Lamiaceae																						
*	Clinopodium acinos L. Kuntze	Spring Savory	G5	SNA			I			x			x	x	x		x		x		x	x	
	Clinopodium vulgare L.	Field Basil	G5	S5						x			x	x	x		x		x		x	x	

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	Collinsonia canadensis L.	Canada Horse-balm	G5	S4				HU	x	x	x		x	x	x		x	x	x		x	x	
*	Glechoma hederacea L.	Ground Ivy	GNR	SNA			I		x	x			x	x	x		x		x		x	x	
	Hedeoma pulegioides L. Pers.	American Pennyroyal	G5	S4				HU			x							x					
*	Lamium maculatum L.	Spotted Dead-nettle	GNR	SNA												x							
*	Leonurus cardiaca L.	Common Motherwort	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x		x	x	x
	Lycopus americanus Muhlenb. ex Bartram	American Water-horehound	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Lycopus europaeus L.	European Water-horehound	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Lycopus uniflorus Michx.	Northern Water-horehound	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Mentha arvensis L.	Field Mint	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Mentha sp.	Mint	GNR	S?					x														
*	Mentha spicata L.	Spearmint	GNR	SNA			I			x													
*	Mentha x piperita L.	Pepper Mint	GNA	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Monarda fistulosa L.	Wild Bergamot	G5T5?	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Nepeta cataria L.	Catnip	GNR	SNA			I		x	x			x	x	x		x		x		x	x	
	Physostegia virginiana L. Benth. Ssp. virginiana	Virginia False Dragonhead	G5	S4			H	H?		x			x	x	x						x	x	
	Prunella vulgaris L. ssp. lanceolata (W.C. Barton) Hultén	Lance-leaved Self-heal	G5T5	S5					x	x						x			x		x		
*	Prunella vulgaris L. ssp. vulgaris	Common Self-heal	G5TU	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	x
	Scutellaria lateriflora L.	Mad Dog Skullcap	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Plantaginaceae																						
*	Plantago lanceolata L.	English Plantain	G5	SNA			I		x	x			x	x	x		x		x		x	x	
*	Plantago major L.	Common Plantain	G5	SNA			I		x	x	x		x	x	x	x	x	x	x		x	x	
	Plantago rugelii Decne.	Rugel's Plantain	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Oleaceae																						
	Fraxinus americana L.	White Ash	G5	S4					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Fraxinus nigra Marshall	Black Ash	G5	S4					x		x							x					
	Fraxinus pennsylvanica Marshall	Green Ash	G5	S4					x	x		x		x	x		x		x	x	x	x	
*	Ligustrum vulgare L.	European Privet	GNR	SNA			I		x	x	x		x	x	x		x		x	x	x	x	
*	Syringa vulgaris L.	Common Lilac	GNR	SNA			I		x	x	x	x	x	x	x		x	x	x		x	x	
	Scrophulariaceae																						
	Aureolaria flava L. Farw.	Smooth Yellow False Foxglove	G5	S2?			H	HR	x	x			x	x	x		x		x		x	x	
	Chelone glabra L.	White Turtlehead	G5	S5					x	x			x	x	x		x		x		x	x	
*	Linaria vulgaris Miller	Butter-and-eggs	GNR	SNA			I			x	x		x	x	x		x	x			x	x	
	Mimulus ringens L.	Square-stemmed Monkeyflower	G5	S5				HU	x														
	Pedicularis canadensis L.	Canada Lousewort	G5	S5			h	HU	x	x	x		x	x	x		x	x	x		x	x	
	Penstemon hirsutus L. Willd.	Hairy Beardtongue	G4	S4						x			x	x	x		x		x		x	x	

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*	Verbascum thapsus L.	Great Mullein	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Veronica americana (Raf.) Schwein. ex Benth.	American Speedwell	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
*	Veronica anagallis-aquatica L.	Water Speedwell	G5	SNA			I		x														
*	Veronica officinalis L.	Common Speedwell	G5	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
*	Veronica serpyllifolia L. ssp. serpyllifolia	Thyme-leaved Speedwell	G5TNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Orobanchaceae																						
	Conopholis americana L. Wallr.	Squaw-root	G5	S4?			H	HU			x							x					
	Epifagus virginiana L. Barton	Beechdrops	G5	S5					x	x	x			x	x		x	x	x		x	x	
	Orobanche uniflora L.	One-flowered Broomrape	G5	S4			H	HR	x														
	Bignoniaceae																						
	Campsis radicans L. Seem. ex Bureau	Trumpet Creeper	G5	S2?						x													
*	Catalpa speciosa Warder ex Engelm.	Northern Catalpa	G4?	SNA			I			x													
	Campanulaceae																						
	Campanula americana L.	Tall Bellflower	G5	S4			h	HR	x														
*	Campanula rapunculoides L.	Creeping Bellflower	GNR	SNA			I		x														
	Campanula rotundifolia L.	Harebell	GNR	SNA			h	HR	x	x			x	x	x		x		x		x	x	
	Lobelia inflata L.	Indian-tobacco	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Lobelia siphilitica L.	Great Blue Lobelia	G5	S5					x		x							x					
	Rubiaceae																						
	Galium aparine L.	Cleavers	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Galium asprellum Michx.	Rough Bedstraw	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Galium boreale L.	Northern Bedstraw	G5	S5				HU		x	x		x	x	x		x	x	x		x	x	
	Galium circaezans Michx.	Wild Licorice	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Galium lanceolatum Torr.	Lanceleaf Wild Licorice	G5	S5			h	HU		x	x		x	x	x		x	x	x		x	x	
*	Galium mollugo L.	Smooth Bedstraw	GNR	SNA			I			x													
	Galium palustre L.	Marsh Bedstraw	G5	S5					x	x				x	x		x		x		x	x	
	Galium sp.	Bedstraw	GNR	S?					x	x				x	x		x		x		x	x	
	Galium tinctorium L.	Stiff Marsh Bedstraw	G5	S5				HU	x														
	Galium triflorum Michx.	Three-flowered Bedstraw	G5	S5					x	x	x		x	x	x			x			x	x	
	Mitchella repens L.	Partridge-berry	G5	S5																	x		
	Caprifoliaceae																						
	Diervilla lonicera Miller	Northern Bush-honeysuckle	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Lonicera canadensis Bartram	Canada Fly-honeysuckle	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Lonicera dioica L.	Limber Honeysuckle	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
*	Lonicera morrowii A. Gray	Morrow Honeysuckle	GNR	SNA			I		x	x	x			x	x		x	x	x		x	x	
	Lonicera sp.	Honeysuckle	GNR	S?					x														

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*	Lonicera tatarica L.	Tartarian Honeysuckle	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
*	Lonicera x bella Zabel	Hybrid Honeysuckle	GNA	SNA			I				x							x					
	Sambucus canadensis L.	Common Elderberry	G5T5	S5					x	x	x		x	x	x	x	x	x	x		x	x	
	Sambucus racemosa L. (Michx.)	Red Elderberry	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Symphoricarpos albus L. S.F. Blake	Snowberry	G5T5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Triosteum aurantiacum E.P. Bicknell	Orange-fruited Horse-gentian	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Viburnum acerifolium L.	Maple-leaved Viburnum	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
*	Viburnum lantana L.	Wayfaring Tree	GNR	SNA			I		x		x							x		x			
	Viburnum lentago L.	Nannyberry	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Viburnum opulus L. ssp. opulus	Cranberry Viburnum	GNR	SNA			I			x	x							x			x		
	Viburnum opulus ssp. trilobum	Highbush Cranberry	GNR	S5					x	x			x	x	x		x		x		x	x	
	Viburnum rafinesquianum Schult.	Downy Arrowwood	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Viburnum recognitum Fern	Southern Arrowwood	G4G5	S4				HR	x														
	Dipsacaceae																						
*	Dipsacus fullonum L.	Common Teasel	GNR	SNA			I			x	x	x	x	x	x	x	x	x	x	x	x	x	
	Asteraceae																						
*	Achillea millefolium L.	Common Yarrow	G5	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
	Ageratina altissima L. R.M. King & H. Robinson	White Snakeroot	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Ambrosia artemisiifolia L.	Annual Ragweed	G5	S5					x	x	x		x	x	x	x	x	x	x		x	x	
	Ambrosia trifida L.	Great Ragweed	G5	S5			h	HU	x														
	Anaphalis margaritacea L. Benth. & Hook. f. ex C.B. Clarke	Pearly Everlasting	G5	S5			H	HU									x						
	Antennaria neglecta Greene	Field Pussytoes	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Antennaria parlinii Fern. ssp. fallax (E. Greene) R.J. Bayer & Stebb.	Deceitful Pussytoes	G5T4T5	S5							x			x	x			x		x		x	
	Antennaria parlinii Fern. ssp. parlinii	Parlin's Pussytoes	G5T5?	SU					x														
*	Arctium lappa L.	Greater Burdock	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Arctium minus (Hill) Bernh.	Common Burdock	GNR	SNA			I			x	x	x	x	x	x	x	x	x	x		x	x	
*	Artemisia vulgaris L.	Common Wormwood	GU	SNA			I		x														
	Bidens cernua L.	Nodding Beggarticks	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Bidens frondosa L.	Devil's Beggarticks	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Bidens tripartita L.	Three-parted Beggarticks	GNR	S5						x			x	x	x		x		x		x	x	
	Bidens vulgata Greene	Tall Beggarticks	G5	S5				HU	x	x	x		x	x	x		x	x	x		x	x	
*	Carduus nutans L. ssp. nutans	Nodding Thistle	GNRTNR	SNA			I			x			x	x	x		x		x		x	x	
*	Centaurea jacea L.	Brown Knapweed	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Centaurea nigra L.	Black Knapweed	GNR	SNA			I			x													
*	Centaurea stoebe subsp. micranthos (S. G. Gmelin ex Gugler) Hayek	Spotted Knapweed	GNR	SNA			I			x	x		x	x	x			x		x	x	x	

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*	Cichorium intybus L.	Chicory	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Cirsium arvense L. Scop.	Canada Thistle	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x		x	x	x
	Cirsium muticum Michx.	Swamp Thistle	G5	S5			H		x														
	Cirsium sp.	Thistle	GNR	S?						x				x	x		x		x		x	x	
*	Cirsium vulgare (Savi) Ten.	Bull Thistle	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Crepis tectorum L.	Narrow-leaf Hawksbeard	GNR	SNA			I			x			x	x	x		x		x		x	x	
	Erechtites hieracifolia L. Raf. ex DC.	Eastern Burnweed	G5	S5			h	HU	x		x							x					
	Erigeron annuus L. Pers.	Annual Fleabane	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Erigeron canadensis L.	Canada Horseweed	G5	S5						x			x	x	x		x		x		x	x	
	Erigeron hyssopifolius Michx.	Daisy Fleabane	G5	S5													x						
	Erigeron philadelphicus L.	Philadelphia Fleabane	G5	S5						x	x		x	x	x	x	x	x	x	x	x	x	
	Erigeron pulchellus Michx.	Robin's Plantain	G5	S5				HU		x	x		x	x	x			x			x	x	
	Erigeron strigosus Muhlenb. ex Willd.	Rough Fleabane	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Eupatorium perfoliatum L.	Common Boneset	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Eurybia macrophylla L. Cass in Cuvier	Large-leaved Aster	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Eurybia schreberi (Nees) Nees	Schreber's Aster	G4	S2S3			H	HR									x						
	Euthamia graminifolia L. Nutt.	Grass-leaved Goldenrod	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Eutrochium maculatum L. E.E. Lammont var. maculatum	Spotted Joe Pye Weed	G5T5	S5						x	x		x	x	x		x	x	x		x	x	
	Helianthus decapetalus L.	Thin-leaved Sunflower	G5	S5			H	HR		x			x	x	x						x	x	
	Helianthus divaricatus L.	Woodland Sunflower	G5	S5			h	HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Helianthus strumosus L.	Pale-leaf Sunflower	G5	S5			h	HR	x		x			x	x					x		x	
	Helianthus tuberosus L.	Jerusalem Artichoke	G5	SU			I			x													
	Hieracium scabrum Michx.	Rough Hawkweed	G5	S4				HR	x														
*	Hieracium x floribundum Wimm. & Grab.	King Devil Hawkweed	GNA	SNA			I		x	x			x	x	x		x		x		x	x	
*	Inula helenium L.	Elecampane	GNR	SNA			I		x		x							x					
*	Lactuca serriola L.	Prickly Lettuce	GNR	SNA			I		x	x													
*	Lapsana communis L.	Common Nipplewort	GNR	SNA			I		x	x	x		x	x	x		x	x	x		x	x	
*	Leucanthemum vulgare Lamarck	Oxeye Daisy	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Nabalus albus (L.) Hooker	White Rattlesnakeroot	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Nabalus altissimus (L.) Hooker	Tall Rattlesnakeroot	G5?	S5						x	x		x	x	x		x	x	x		x	x	
*	Picris hieracioides L. ssp. hieracioides	Hawkweed Oxtongue	G5	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Pilosella aurantiaca (L.) F.W. Shultz & Schultz Bipontinus	Orange Hawkweed	GNR	SNA			I			x			x	x	x				x		x	x	
*	Pilosella caespitosa (Dumortier) P.D. Sell & C. West	Meadow Hawkweed	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
*	Pilosella piloselloides (Villars) Soják ssp. Piloselloides	Tall Hawkweed	GNR	SNA			I			x	x			x	x		x	x	x		x	x	
*	Pilosella piloselloides ssp. praealta (Gochnat) S. Bräutigam & Greuter	King Devil Hawkweed	GNR	SNA			I			x			x	x	x						x	x	

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	Polymnia canadensis L.	White-flower Leafcup	G5	S4			h	HU		x			x	x	x		x		x		x	x	
	Ratibida pinnata (Vent.) Barnhart	Gray-headed Coneflower	G5	S3							x			x	x					x		x	
	Rudbeckia hirta L.	Black-eyed Susan	G5	S5						x			x	x	x		x		x		x	x	
	Rudbeckia laciniata L.	Cut-leaved Coneflower	G5	S5			h	HU	x														
	Solidago altissima L. var. altissima	Tall Goldenrod	G5T5	S5						x				x	x		x		x		x	x	
	Solidago altissima L. var. gilvocanescens (Rydb.) Semple	Great Plains Late Goldenrod	G5T5	S1						x	x		x	x	x			x		x	x	x	
	Solidago arguta Aiton var. arguta	Cut-leaved Goldenrod	G5	S4			H	HR			x							x					
	Solidago bicolor L.	White Goldenrod	G5	S4?			h	HU	x	x	x		x	x	x		x	x	x		x	x	
	Solidago caesia L.	Blue-stemmed Goldenrod	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Solidago canadensis L. var. canadensis	Canada Goldenrod	G5T5	S5						x		x				x					x		
	Solidago canadensis var. hargeri Fernald	Harger's Goldenrod	G5T4T5	S4?					x	x	x		x	x	x		x	x	x		x	x	
	Solidago flexicaulis L.	Zigzag Goldenrod	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	
	Solidago gigantea Aiton	Smooth Goldenrod	G5	S5				HU	x		x							x			x		
	Solidago juncea Aiton	Early Goldenrod	G5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Solidago nemoralis Aiton ssp. decemflora (DC.) Brammall	Gray-stemmed Goldenrod	G5T5	S1S2					x														
	Solidago nemoralis Aiton ssp. nemoralis	Gray-stemmed Goldenrod	G5T5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Solidago rugosa Miller ssp. rugosa	Northern Rough-leaved Goldenrod	G5T5	S5						x				x	x		x		x		x	x	
	Solidago rugosa ssp. aspera Miller	Southern Rough-leaved Goldenrod	G5TNR	SU						x	x		x	x	x			x			x	x	
	Solidago sp.	Goldenrod	GNR	S?					x	x				x	x		x		x		x	x	
	Solidago squarrosa Muhlenb. ex Nutt.	Squarrose Goldenrod	G4?	S4			H	HU	x														
*	Sonchus arvensis L. ssp. arvensis	Field Sow-thistle	GNRTNR	SNA			I												x				
*	Sonchus arvensis L. ssp. uliginosus (M. Bieb.) Nyman	Smooth Sow-thistle	GNRTNR	SNA			I				x							x					
*	Sonchus asper L. Hill ssp. asper	Prickly Sow-thistle	GNR	SNA			I				x							x					
	Symphyotrichum cordifolium L. Nesom	Heart-leaved Aster	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Symphyotrichum ericoides L. Nesom var. ericoides	White Heath Aster	G5T5	S5						x	x		x	x	x		x	x	x		x	x	
	Symphyotrichum laeve L. Löve & Löve var. laeve	Smooth Aster	G5T5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Symphyotrichum lanceolatum (Willd.) G.L. Nesom	White Panicled Aster	G5T5	S5						x	x		x	x	x		x	x	x		x	x	
	Symphyotrichum lateriflorum (L.) Löve & Löve	Calico Aster	G5	S5						x	x	x	x	x	x	x	x	x	x	x	x	x	
	Symphyotrichum novae-angliae L. Nesom	New England Aster	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Symphyotrichum oolentangiense (Riddell) Nesom	Sky-blue Aster	G5	S4				HR			x							x					
	Symphyotrichum pilosum (Willd.) Nesom var. pilosum	Old Field Aster	G5T5	S5				HU		x	x		x	x	x		x	x	x		x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Symphyotrichum urophyllum (Lindl. in DC.) Nesom	Arrow-leaved Aster	G4G5	S4				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Symphyotrichum x amethystinum (Nutt.) Nesom	Amethyst Aster	GNA	SNA						x			x	x	x		x		x		x	x	
*	Tanacetum vulgare L.	Common Tansy	GNR	SNA			I			x													
*	Taraxacum erythrospermum Andrz. ex Besser	Red-seeded Dandelion	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Taraxacum officinale G. Weber	Common Dandelion	G5	SNA					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
*	Tragopogon dubius Scop.	Meadow Goat's-beard	GNR	SNA			I			x			x	x	x		x		x		x	x	
*	Tragopogon pratensis L.	Meadow Goat's-beard	GNR	SNA			I			x	x		x	x	x		x	x			x	x	
*	Tussilago farfara L.	Colt's-foot	GNR	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
	Xanthium strumarium L.	Rough Cocklebur	G5	S5					x		x							x					
	Alismataceae																						
	Alisma plantago-aquatica L.	European Water-plantain	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Sagittaria latifolia Willd.	Broad-leaved Arrowhead	G5	S5					x														
	Hydrocharitaceae																						
	Elodea canadensis Rich. ex Michx.	Broad Waterweed	G5	S5				HR	x														
	Potamogetonaceae																						
*	Potamogeton crispus L.	Curly-leaved Pondweed	G5	SNA			I		x														
	Potamogeton nodosus Poir.	Long-leaved Pondweed	G5	S5			H	HR	x														
	Potamogeton zosteriformis Fern.	Flatstem Pondweed	G5	S5			H	HR	x														
	Zannichelliaceae																						
	Zannichellia palustris L.	Horned Pondweed	G5	S4			H	HR	x														
	Araceae																						
*	Acorus calamus L.	European Sweetflag	G4?	SNA					x														
	Arisaema triphyllum L. Schott	Jack-in-the-pulpit	G5	S5						x	x	x	x	x	x	x	x	x	x		x	x	
	Symplocarpus foetidus L. Salisb. ex Nutt.	Skunk Cabbage	G5	S5				HU	x														
	Lemnaceae																						
	Lemna minor L.	Lesser Duckweed	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Juncaceae																						
	Juncus articulatus L.	Jointed Rush	G5	S5				HU	x	x			x	x	x						x	x	
	Juncus dudleyi Wiegelb	Dudley's Rush	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Juncus effusus L.	Soft Rush	G5	S5				H?			x							x						
	Juncus tenuis Willd.	Path Rush	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	
	Juncus torreyi Coville	Torrey's Rush	G5	S5				HU		x	x		x	x	x					x	x	x	
	Luzula acuminata Raf.	Hairy Woodrush	G5	S5				HU	x	x	x		x	x	x		x	x	x		x	x	
	Luzula multiflora (Retz.) Lej. ssp. multiflora	Many-flowered Woodrush	G5T5	S5				HU		x	x		x	x	x		x	x	x	x	x	x	
	Cyperaceae																						

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Carex albursina E. Sheld.	White Bear Sedge	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Carex alopecoidea Tuckerm.	Foxtail Sedge	G5	S5			h				x			x	x			x		x		x	
	Carex arctata Boott	Drooping Woodland Sedge	G5	S5							x							x					
	Carex atherodes Spreng.	Wheat Sedge	G5	S4S5			H	HR	x														
	Carex aurea Nutt.	Golden Sedge	G5	S5							x							x					
	Carex bebbii (L.H. Bailey) Olney ex Fern.	Bebb's Sedge	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Carex blanda Dewey	Woodland Sedge	G5?	S5						x	x			x	x			x		x		x	
	Carex brevior (Dewey) Mack. ex Lunell	Short-beaked Sedge	G5?	S4S5				HR	x														
	Carex cephalophora Muhlenb. ex Willd.	Oval-headed Sedge	G5	S5						x	x		x	x	x		x	x	x	x	x	x	
	Carex communis L.H. Bailey	Fibrous-root Sedge	G5	S5							x							x					
	Carex crinita Lam.	Fringed Sedge	G5	S5				HU		x	x							x					
	Carex cristatella Britton	Crested Sedge	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Carex cryptolepis Mack.	Northeastern Sedge	G4	S4			H	HR	x														
	Carex digitalis Willd.	Slender Wood Sedge	G5	S4S5				HU			x							x					
	Carex eburnea Boott	Bristle-leaved Sedge	G5	S5					x														
	Carex gracilescens Steud.	Slender Loose-flowered Sedge	G5?	S4			H	HU		x	x		x	x	x		x		x	x	x	x	
	Carex gracillima Schwein.	Graceful Sedge	G5	S5						x	x	x	x	x	x		x	x	x	x	x	x	
	Carex granularis Muhlenb. ex Willd.	Limestone Meadow Sedge	G5	S5					x	x	x		x	x	x	x	x		x	x	x	x	
	Carex grayi Carey	Gray's Sedge	G4	S4			h	HU	x	x			x	x	x		x		x		x	x	
	Carex grisea Wahlenb.	Grey Sedge	G5?	S4			h	HU	x														
	Carex hystericina Muhlenb. ex Willd.	Porcupine Sedge	G5	S5						x			x	x	x		x		x		x	x	
	Carex intumescens Rudge	Bladder Sedge	G5	S5					x														
	Carex laevivaginata (Kükenth.) Mack.	Smooth-sheath Sedge	G5	S4			h	HU	x														
	Carex laxiculmis Schwein.	Spreading Sedge	G5T3T5	S4?				HU		x			x	x	x						x	x	
	Carex laxiflora Lam.	Loose-flowered Sedge	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Carex lupulina Muhlenb. ex Willd.	Hop Sedge	G5	S5						x			x	x	x		x		x		x	x	
	Carex mesochorea Mack.	Midland Sedge	G4G5	S1					x		x			x	x					x		x	
	Carex molesta Mack.	Troublesome Sedge	G4	S4?				HU		x			x	x	x		x		x		x	x	
	Carex normalis Mack.	Larger Straw Sedge	G5	S4			h	HR	x	x			x	x	x		x		x		x	x	
	Carex pedunculata Muhlenb. ex Willd.	Long-stalk Sedge	G5	S5							x							x					
	Carex pensylvanica Lam.	Pennsylvania Sedge	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Carex plantaginea Lam.	Plantain-leaved Sedge	G5	S5					x		x					x		x					
	Carex platyphylla J. Carey	Broad-leaved Sedge	G5	S5					x	x	x		x	x	x		x	x	x	x	x	x	
	Carex prasina Wahlenb.	Drooping Sedge	G4	S4			h	HU		x	x		x	x	x		x	x	x	x	x	x	
	Carex pseudocyperus L.	Cyperus-like Sedge	G5	S5						x			x	x	x		x		x		x	x	
	Carex radiata (Wahlenb.) Small	Eastern Star Sedge	G4	S4						x	x		x	x	x			x			x	x	
	Carex rosea Schkuhr ex Willd.	Rosy Sedge	G5	S5					x	x	x			x	x	x	x	x	x		x	x	

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	Carex scoparia Schkuhr ex Willd.	Pointed Broom Sedge	G5	S5			h	HR	x														
	Carex sp.	Sedge	GNR	S?					x														
	Carex sparganioides Muhlenb. ex Willd.	Burreed Sedge	G5	S5						x			x	x	x		x		x		x	x	
	Carex stipata Muhlenb. ex Willd.	Awl-fruited Sedge	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Carex tenera Dewey	Tender Sedge	G5	S5						x			x	x	x						x	x	
	Carex tonsa (Fern.) Bicknell var. rugosperma (Mack.) Crins	Rough-fruited Deep-green Sedge	G5T5	S5			H	HR		x	x		x	x	x		x	x	x		x	x	
	Carex tonsa (Fern.) Bicknell var. tonsa	Deep-green Sedge	G5T5	S5							x							x					
	Carex tuckermanii Dewey	Tuckerman's Sedge	G4	S4			h	HU		x			x	x	x		x		x		x	x	
	Carex utriculata Boott	Northern Beaked Sedge	G5	S5			h	HU		x			x	x	x						x	x	
	Carex vulpinoidea Michx.	Fox Sedge	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Cyperus strigosus L.	Straw-colored Flatsedge	G5	S5			h	HR	x														
	Eleocharis erythropoda Steud.	Red-stemmed Spike-rush	G5	S5						x			x	x	x				x		x	x	
	Eleocharis obtusa (Willd.) Schult.	Blunt Spike-rush	G5	S5				HU		x			x	x	x		x		x		x	x	
	Eleocharis palustris (L.) Roemer & Schultes	Creeping Spike-rush	G5?	S5			H	HU			x							x					
	Eleocharis quinqueflora (Hartman) O. Schwarz	Few-flowered Spike-rush	G5	S5				HR		x			x	x	x						x	x	
	Schoenoplectus acutus (Muhl. Ex Bigelow) A.& D. Love	Hard-stemmed Bulrush	G5	S5			H	HR	x														
	Schoenoplectus tabernaemontani (C.C. Gmelin) Pall.	Soft-stemmed Bulrush	G5	S5						x			x	x	x						x	x	
	Schoenoplectus torreyi (Olney) Palla	Torrey's Bulrush	G5?	S4						x			x	x	x						x	x	
	Scirpus atrovirens Willd.	Dark-green Bulrush	G5?	S5					x	x	x		x	x	x		x	x	x		x	x	
	Scirpus cyperinus L. Kunth	Cottongrass Bulrush	G5	S5						x	x		x	x	x		x	x	x		x	x	
	Scirpus pendulus Muhlenb. ex Willd.	Rufous Bulrush	G5	S5				HU			x							x					
	Poaceae																						
*	Agrostis capillaris L.	Colonial Bentgrass	GNR	SNA							x							x					
*	Agrostis gigantea Roth	Redtop	G4G5	SNA			I		x		x							x					
	Agrostis perennans (Walter) Tuckerm.	Upland Bentgrass	G5	S5				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Agrostis stolonifera L.	Creeping Bentgrass	G5	SNA						x			x	x	x		x		x		x	x	
*	Alopecurus pratensis L.	Field Foxtail	GNR	SNA			I				x			x	x					x		x	
	Andropogon gerardii Vitman	Big Bluestem	G5	S4			h	HU	x		x							x					
*	Arrhenatherum elatius L. P. Beauv. ex Presl	Tall Oatgrass	GNR	SNA			I				x			x	x			x		x		x	
*	Avena fatua L.	Common Wild Oat	GNR	SNA						x			x	x	x						x	x	
*	Avena sativa L.	Cultivated Oat	GNR	SNA			I				x			x	x					x		x	
	Brachyelytrum erectum (Schreb.) P. Beauv.	Bearded Shorthusk	G5T4T5	S4?			h	HU	x		x							x					
	Bromus ciliatus L.	Fringed Brome	G5	S5			h	HU			x							x					
*	Bromus commutatus Schrad.	Hairy Brome	GNR	SNA			I				x			x	x					x		x	
*	Bromus inermis Leyss.	Smooth Brome	G5TNR	SNA			I			x	x		x	x	x		x	x	x		x	x	

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*	Bromus japonicus Thunb. ex Murray	Japanese Brome	GNR	SNA			I			x	x		x	x	x					x	x	x	
	Bromus kalmii A. Gray	Kalm's Brome	G5	S4			H	HR	x														
	Bromus pubescens Muhl. ex Willd.	Hairy Woodland Brome	G5	S4			h		x	x	x		x	x	x		x	x	x	x	x	x	
*	Bromus tectorum L.	Downy Brome	GNR	SNA			I			x			x	x	x						x	x	
	Calamagrostis canadensis (Michx.) Beauv.	Bluejoint Reedgrass	G5	S5							x							x					
	Cinna arundinacea L.	Stout Wood Reedgrass	G5	S4						x			x	x	x		x		x		x	x	
*	Dactylis glomerata L.	Orchard Grass	GNR	SNA			I		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Danthonia spicata L. P. Beauv. ex Roem. & Schult.	Poverty Oatgrass	G5	S5							x			x	x			x		x		x	
	Dichanthelium latifolium (Linnaeus) Harvill	Broad-leaf Panicgrass	G5	S4			H	HU			x							x					
	Dichanthelium linearifolium (Scribner) Gould	Linear-leaved Panicgrass	GNR	S5			h	HR			x							x					
	Dichanthelium xanthophysum (A. Gray) Freckmann	Pale Panicgrass	G5	S4				HR			x							x					
*	Digitaria ischaemum (Schreb. ex Schwein.) Schreb. ex Muhlenb.	Smooth Crabgrass	GNR	SNA							x			x	x					x		x	
	Echinochloa muricata var. microstachya Wiegand	Western Barnyard Grass	G5T5	S5			h	HU	x	x	x		x	x	x			x			x	x	
	Elymus hystrix L.	Bottlebrush Grass	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Elymus repens L. Gould	Creeping Wildrye	GNR	SNA			I			x	x		x	x	x	x	x	x	x	x	x	x	
	Elymus riparius Wiegand	Eastern Riverbank Wildrye	G5	S4?			h	HR	x														
	Elymus virginicus L.	Virginia Wildrye	G5T5	S5						x			x	x	x		x		x		x	x	
	Festuca subverticillata (Pers.) Alexeev	Nodding Fescue	G5	S4			h				x							x					
	Glyceria striata (Lam.) A. Hitchc.	Fowl Mannagrass	G5	S5					x	x	x	x	x	x	x	x	x	x	x		x	x	
	Leersia oryzoides L. Sw.	Rice Cutgrass	G5	S5							x							x	x				
	Leersia virginica Willd.	Virginia Cutgrass	G5	S4					x	x	x		x	x	x		x	x	x		x	x	
*	Lolium perenne L.	Perennial Ryegrass	GNR	SNA			I			x													
*	Lolium pratense (Hudson) Darbyshire	Meadow Ryegrass	G5	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Muhlenbergia mexicana L. Trin var. mexicana	Mexican Muhly	G5	S5						x			x	x	x	x					x	x	
	Muhlenbergia mexicana L. Trin. var. filiformis (Willd.) Scribn.	Slim-stemmed Mexican Muhly	G5	S4			H	HR		x				x	x		x		x		x	x	
	Oryzopsis asperifolia Michx.	White-grained Mountain-ricegrass	G5	S5					x	x	x		x	x	x		x		x	x	x	x	
	Panicum capillare L.	Common Panicgrass	G5	S5						x			x	x	x		x		x		x	x	
	Patis racemosa (Smith) Romaschenko, P.M. Peterson & Soreng	Black-seeded Ricegrass	G5	S4			h			x			x	x	x		x		x		x	x	
	Phalaris arundinacea L.	Reed Canary Grass	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Phleum pratense L.	Common Timothy	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x	x	x	x	
	Phragmites australis (Cav.) Trin. ex Steud. ssp. australis	European Reed	G5T5	SNA			I		x	x									x				
	Poa alsodes A. Gray	Grove Meadow Grass	G4G5	S4			h	HU	x														

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*	Poa annua L.	Annual Bluegrass	GNR	SNA			I		x														
*	Poa compressa L.	Canada Bluegrass	GNR	SNA					x	x	x		x	x	x		x	x	x	x	x	x	
*	Poa nemoralis L.	Woods Bluegrass	G5	SNA			I			x	x			x	x			x		x		x	
	Poa pratensis L. ssp. pratensis	Kentucky Bluegrass	G5T5	S5			I			x				x	x	x	x		x		x	x	x
	Poa pratensis ssp. alpigena (Lindman) Hiitonen	Alpine Meadow Bluegrass	G5T5	S4S5						x	x		x	x	x			x		x	x	x	
*	Puccinellia distans (Jacq.) Parl.	Spreading Alkaligrass	G5	SNA			I			x			x	x	x						x	x	
	Schizachne purpurascens (Torr.) Swallen ssp. purpurascens	Purple False Melic	G5	S5							x							x					
*	Setaria pumila (Poir.) Schult.	Yellow Foxtail	GNR	SNA			I			x	x		x	x	x		x	x	x		x	x	
	Sphenopholis intermedia (Rydb.) Rydb.	Slender Wedge Grass	G5	S4S5						x	x		x	x	x		x	x	x	x	x	x	
	Sphenopholis nitida (Biehler) Scribn.	Shiny Wedge Grass	G5	S1			H	HR	x		x			x	x					x		x	
	Sporobolus cryptandrus (Torr.) A. Gray	Sand Dropseed	G5	S4			H	HU			x			x	x					x		x	
	Trisetum melicoides (Michx.) Vasey ex Scribn.	Purple False Oats	G4	S4			H	HR	x														
	Sparganiaceae																						
	Sparganium eurycarpum Engelm. ex A. Gray	Broad-fruited Burreed	G5	S5				HU	x														
	Typhaceae																						
*	Typha angustifolia L.	Narrow-leaved Cattail	G5	SNA						x	x		x	x	x		x	x	x		x	x	
	Typha latifolia L.	Broad-leaved Cattail	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
*	Typha x glauca Godron	Blue Cattail	GNA	SNA					x														
	Liliaceae																						
	Allium tricoccum var. burdickii Hanes	Narrow-leaved Wild Leek	G5T4T5	S1?			H		x														
*	Asparagus officinalis L.	Garden Asparagus	G5?	SNA			I		x	x	x		x	x	x		x	x	x	x	x	x	
	Clintonia borealis (Aiton) Raf.	Blue Bead-lily	G5	S5						x			x	x	x		x		x		x	x	
*	Convallaria majalis L.	European Lily-of-the-valley	G5	SNA			I		x														
	Erythronium americanum Ker Gawl.	Yellow Trout-lily	G5	S5						x	x		x	x	x		x	x	x		x	x	
*	Hemerocallis fulva L. L.	Orange Daylily	GNA	SNA			I			x													
	Lilium michiganense Farw.	Michigan Lily	G5	S5					x		x							x					
	Lilium philadelphicum L.	Wood Lily	G5	S5			H	HR			x							x					
	Maianthemum canadense Desf.	Wild-lily-of-the-valley	G5	S5					x	x	x	x	x	x	x		x	x	x		x	x	
	Maianthemum racemosum L. Link	False Solomon's Seal	G5	S5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Maianthemum stellatum L. Link	Star-flower False Solomon's-seal	G5	S5					x	x			x	x	x		x		x		x	x	
	Polygonatum biflorum (Walter) Ell.	Giant Solomon's Seal	G5T5	S4			H	HR	x														
*	Polygonatum multiflorum L. All.	Eurasian Soloman's Seal	GNR	SNA			I			x													
	Polygonatum pubescens (Willd.) Pursh	Downy Solomon's Seal	G5	S5					x	x	x		x	x	x	x	x	x	x		x	x	
	Prosartes lanuginosa (Michaux) D. Don	Yellow Mandarin	G5	S4				HU	x	x	x		x	x	x		x	x	x	x	x	x	
	Streptopus lanceolatus (Aiton) Reveal var. lanceolatus	Eastern Rose Twisted-stalk	G5	S5						x	x		x	x	x		x	x	x		x	x	

	Scientific Name	Common Name	GRank	SRank	COSEWIC	ESA	Hamilton NAI	Halton NAI	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Trillium erectum L.	Red Trillium	G5	S5					x		x							x			x		
	Trillium grandiflorum (Michx.) Salisb.	White Trillium	G5	S5					x	x	x	x	x	x	x		x	x	x		x	x	
	Uvularia grandiflora Sm.	Large-flowered Bellwort	G5	S5					x	x	x		x	x	x		x	x	x		x	x	
	Uvularia perfoliata L.	Perfoliate Bellwort	G5	S1			H	HR			x							x					
	Iridaceae																						
	Iris versicolor L.	Harlequin Blue Flag	G5	S5					x														
	Sisyrinchium montanum Greene	Strict Blue-eyed-grass	G5T4T5	S5						x			x	x	x						x	x	
	Smilacaceae																						
	Smilax herbacea L.	Herbaceous Carrionflower	G5	S4					x	x	x		x	x	x		x	x	x		x	x	
	Smilax tamnoides L.	Hispid Greenbrier	G5	S4						x	x		x	x	x		x	x	x		x	x	
	Orchidaceae																						
	Corallorhiza maculata (Raf.) Raf. var. occidentalis	Western Spotted Coralroot	G5T3T5	S4?				HR			x							x					
	Cypripedium parviflorum var. makasin (Farwell) Sheviak	Small Yellow Lady's Slipper	G5T4T5	S4S5						x				x	x		x		x		x	x	
	Cypripedium parviflorum var. pubescens (Willdenow) Knight	Large Yellow Lady's Slipper	G5T5	S5			H			x	x		x	x	x			x			x	x	
*	Epipactis helleborine L. Crantz	Eastern Helleborine	GNR	SNA			I		x	x	x		x	x	x	x	x	x	x	x	x	x	

Appendix 6: Carolinian, Prairie and Savannah Indicators

Appendix 6. Carolinian, Prairie and Savannah Indicator species at Waterdown-Sassafras Woods Heritage Lands.

Scientific Name	Common Name	SRank	Carolinian Zone	Prairie Savannah
Lespedeza hirta L. Hornem.	Hairy Bush-clover	S4	Yes	Yes
Lysimachia quadrifolia L.	Whorled Loosestrife	S4		Yes
Rosa carolina L.	Carolina Rose	S4		Yes
Sporobolus cryptandrus (Torr.) A. Gray	Sand Dropseed	S4		Yes
Ceanothus americanus L.	New Jersey Tea	S4		Yes
Symphyotrichum oolentangiense (Riddell) Nesom	Sky-blue Aster	S4		Yes
Andropogon gerardii Vitman	Big Bluestem	S4		Yes
Polygala senega L.	Seneca Snakeroot	S4		Yes
Polygala verticillata L.	Whorled Milkwort	S4		Yes
Vaccinium pallidum Aiton	Early Lowbush Blueberry	S4		Yes
Desmodium canadense L. DC.	Showy Tick-trefoil	S4		Yes
Lechea intermedia Legg.	Large-pod Pinweed	S4		Yes
Bromus kalmii A. Gray	Kalm's Brome	S4		Yes
Symphyotrichum urophyllum (Lindl. in DC.) Nesom	Arrow-leaved Aster	S4		Yes
Anemone cylindrica A. Gray	Long-headed Anemone	S4		Yes
Lespedeza capitata Michx.	Round-head Bush-clover	S4		Yes
Ranunculus fascicularis Muhlenb. ex Bigelow	Early Buttercup	S4		Yes
Asclepias tuberosa L.	Butterfly Milkweed	S4		Yes
Amelanchier alnifolia (Nutt.) Nutt. ex R. Roem.	Saskatoon	S4?		Yes
Helianthus strumosus L.	Pale-leaf Sunflower	S5		Yes
Symphyotrichum laeve L. Löve & Löve var. laeve	Smooth Aster	S5		Yes
Rhus aromatica Aiton	Fragrant Sumac	S5		Yes
Comandra umbellata L. Nutt.	Umbellate Bastard Toad-flax	S5		Yes
Erigeron pulchellus Michx.	Robin's Plantain	S5		Yes
Campanula rotundifolia L.	Harebell	SNA		Yes
Sphenopholis nitida (Biehler) Scribn.	Shiny Wedge Grass	S1	Yes	
Uvularia perfoliata L.	Perfoliate Bellwort	S1	Yes	
Frasera caroliniensis Walter	American Columbo	S2	Yes	
Morus rubra L.	Red Mulberry	S2	Yes	
Cornus florida L.	Eastern Flowering Dogwood	S2?	Yes	
Aureolaria flava L. Farw.	Smooth Yellow False Foxglove	S2?	Yes	
Eurybia schreberi (Nees) Nees	Schreber's Aster	S2S3	Yes	
Thalictrum thalictroides L. A.J. Eames & B. Boivin	Rue-anemone	S3	Yes	
Carya glabra (Miller) Sweet	Pignut Hickory	S3	Yes	
Persicaria virginiana (L.) Gaertner	Virginia Knotweed	S4	Yes	

Prosartes lanuginosa (Michaux) D. Don	Yellow Mandarin	S4	Yes	
Quercus velutina Lam.	Black Oak	S4	Yes	
Polygonatum biflorum (Walter) Ell.	Giant Solomon's Seal	S4	Yes	
Juglans nigra L.	Black Walnut	S4	Yes	
Malus coronaria L. Miller	Sweet Crabapple	S4	Yes	
Vitis aestivalis Michx.	Summer Grape	S4	Yes	
Carex gracilescens Steud.	Slender Loose-flowered Sedge	S4	Yes	
Collinsonia canadensis L.	Canada Horse-balm	S4	Yes	
Helianthus decapetalus L.	Thin-leaved Sunflower	S5	Yes	
Euonymus obovata Nutt.	Running Strawberry Bush	S5	Yes	

Appendix 7: Fauna

Appendix 7. Faunal species at Waterdown-Sassafras Woods Heritage Lands *indicates a non-native species

BP/IC = Bayview Park/Indian Creek; CVP = City View Park; FC = Falcon Creek; FP = Forestvale Park; H = Huges; K1 = Kerncliff 1; K2 = Kerncliff 2; K/WP = Kerns/Westbury Park; M = McNally; ST = Sassafras Tributary; TGC = Tyandaga Golf Course; UHC = Upper Hager Creek; URC/MP = Upper Rambo Creek/Mansfield Park; WR = Waterdown Road; WW = Waterdown Woods

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
Birds																									
	Branta canadensis	Canada Goose	G5	S5						PO		x	x		x	x	x			x			x	x	
	Aix sponsa	Wood Duck	G5	S5			h			PO	x	x			x	x	x		x		x		x	x	
	Anas platyrhynchos	Mallard	G5	S5						PO	x	x	x		x	x	x		x		x	x	x	x	
	Bonasa umbellus	Ruffed Grouse	G5	S4			h			PO		x	x		x	x	x			x			x	x	
	Meleagris gallopavo	Wild Turkey	G5	S5				HU		PO	x														
	Ardea herodias	Great Blue Heron	G5	S4			h			M	x	x			x	x	x		x		x		x	x	
	Butorides virescens	Green Heron	G5	S4B			h	HU		PO		x			x	x	x						x	x	
	Cathartes aura	Turkey Vulture	G5	S5B			h			M	x	x	x		x	x	x		x		x	x	x	x	
	Accipiter striatus	Sharp-shinned Hawk	G5	S5	NAR		H	HU	Yes	PO			x			x	x					x		x	
	Accipiter cooperii	Cooper's Hawk	G5	S4	NAR		H	HU	Yes	PO			x												
	Buteo jamaicensis	Red-tailed Hawk	G5	S5	NAR					PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Falco sparverius	American Kestrel	G5	S4			h			PO		x	x		x	x	x					x	x	x	
	Rallus limicola	Virginia Rail	G5	S5B			h			PO		x			x	x	x						x	x	
	Porzana carolina	Sora	G5	S4B			h	HU		PO		x			x	x	x		x		x		x	x	
	Charadrius vociferus	Killdeer	G5	S5B,S5N						PO		x	x		x	x	x		x	x	x	x	x	x	
	Actitis macularia	Spotted Sandpiper	G5	S5						PO		x	x		x	x	x		x		x	x	x	x	
	Scolopax mir	American Woodcock	G5	S4B						PO		x	x		x	x	x		x	x	x	x	x	x	
*	*Columba livia*	Rock Pigeon	G5	SNA						PO		x	x		x	x	x			x			x	x	
	Zenaida macroura	Mourning Dove	G5	S5			h			PO	x	x	x	x	x	x	x		x	x	x	x	x	x	
	Coccyzus erythropthalmus	Black-billed Cuckoo	G5	S5B			H	HU		PO		x	x		x	x	x		x	x	x	x	x	x	
	Bubo virginianus	Great Horned Owl	G5	S4			h			PO		x	x		x	x	x			x			x	x	
	Antrostomus vociferus	Eastern Whip-poor-will	G5	S4B	THR	THR	H	HR	Yes	PO			x							x					
	Chaetura pelagica	Chimney Swift	G5	S4B,S4N	THR	THR	h	HU		M	x														
	Archilochus colubris	Ruby-throated Hummingbird	G5	S5B			h			PO	x	x			x	x	x		x		x		x	x	
	Megaceryle alcyon	Belted Kingfisher	G5	S4B			h			PO	x	x			x	x	x						x	x	
	Melanerpes erythrocephalus	Red-headed Woodpecker	G5	S4B	THR	SC	H	HR		PO			x							x					
	Melanerpes carolinus	Red-bellied Woodpecker	G5	S4			h	HU		PO	x	x	x			x	x		x	x	x		x	x	
	Sphyrapicus varius	Yellow-bellied Sapsucker	G5	S5B			H	HU	Yes	PO		x			x	x	x						x	x	
	Picoides pubescens	Downy Woodpecker	G5	S5						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Picoides villosus	Hairy Woodpecker	G5	S5			h		Yes	PO	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Colaptes auratus	Northern Flicker	G5	S4B						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Dryocopus pileatus	Pileated Woodpecker	G5	S5			h	HU	Yes	PO	x	x	x		x	x	x		x	x			x	x	
	Contopus cooperi	Olive-sided Flycatcher	G4	S4B	THR	SC				M									x						
	Contopus virens	Eastern Wood-pewee	G5	S4B	SC	SC				PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Empidonax alrum	Alder Flycatcher	G5	S5B			h		Yes	PO		x				x	x		x		x		x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Empidonax traillii	Willow Flycatcher	G5	S5B				HU		PO		x	x			x	x		x	x	x	x	x	x	
	Empidonax minimus	Least Flycatcher	G5	S4B			h	HU	Yes	PO		x	x		x	x	x			x			x	x	
	Sayornis phoebe	Eastern Phoebe	G5	S5B			h			PO		x	x		x	x	x		x	x	x		x	x	
	Tyrannus tyrannus	Eastern Kingbird	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Myiarchus crinitus	Great Crested Flycatcher	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Vireo flavifrons	Yellow-throated Vireo	G5	S4B			h	HR	Yes	PO			x							x					
	Vireo gilvus	Warbling Vireo	G5	S5B						PO	x	x			x	x	x		x		x		x	x	
	Vireo olivaceus	Red-eyed Vireo	G5	S5B						PO	x	x	x	x	x	x	x		x	x	x	x	x	x	
	Cyacitta cristata	Blue Jay	G5	S5						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Corvus brachyrhynchos	American Crow	G5	S5B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Eremophila alpestris	Horned Lark	G5	S5B				HU		SL		x			x	x	x						x	x	
	Progne subis	Purple Martin	G5	S4B			h	HU		PO		x			x	x	x						x	x	
	Tachycineta bicolor	Tree Swallow	G5	S4B						PO		x			x	x	x		x		x		x	x	
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	G5	S4B				HU		PO	x	x	x		x	x	x		x	x	x		x	x	
	Petrochelidon pyrrhota	Cliff Swallow	G5	S4B			h			PO	x														
	Hirundo rustica	Barn Swallow	G5	S4B	THR	THR				SL		x	x		x	x	x			x			x	x	
	Poecile atricapillus	Black-capped Chickadee	G5	S5						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Baeolophus bicolor	Tufted Titmouse	G5	S4			H	HU	Yes	PO			x							x					
	Sitta carolinensis	White-breasted Nuthatch	G5	S5					Yes	PO	x	x	x		x	x	x		x	x	x		x	x	
	Certhia americana	Brown Creeper	G5	S5B			h	HU	Yes	PO		x			x	x	x						x	x	
	Thryothorus ludovicianus	Carolina Wren	G5	S4			H	HR		PO	x		x			x	x		x			x		x	
	Troglodytes aedon	House Wren	G5	S5B						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Troglodytes hiemalis	Winter Wren	G5	S5B			h	HU	Yes	PO		x													
	Regulus satrapa	Golden-crowned Kinglet	G5	S5B			H	HR		PO		x	x		x	x	x		x	x			x	x	
	Regulus calendula	Ruby-crowned Kinglet	G5	S4B						M		x	x		x	x	x		x	x			x	x	
	Polioptila caerulea	Blue-gray Gnatcatcher	G5	S4B			h	HU	Yes	PO		x	x			x	x		x		x	x	x	x	
	Sialia sialis	Eastern Bluebird	G5	S5B	NAR		h	HU		PO		x				x	x		x		x		x	x	
	Catharus fuscescens	Veery	G5	S4B					Yes	PO			x							x					
	Catharus ustulatus	Swainson's Thrush	G5	S4B						M			x							x					
	Catharus guttatus	Hermit Thrush	G5	S5B					Yes	M									x						
	Hylocichla mustelina	Wood Thrush	G5	S4B	THR	SC				PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Turdus migratorius	American Robin	G5	S5B						PO	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Dumetella carolinensis	Gray Catbird	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Toxostoma rufum	Brown Thrasher	G5	S4B			h			PO	x	x	x		x	x	x		x	x	x	x	x	x	
*	*Sturnus vulgaris*	European Starling	G5	SNA						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Bombycilla cedrorum	Cedar Waxwing	G5	S5B						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Vermivora cyaptera	Blue-winged Warbler	G5	S4B			h	HU		PO		x	x		x	x	x		x	x	x		x	x	
	Oreothlypis ruficapilla	Nashville Warbler	G5	S5B			h	HR		PO		x			x	x	x						x	x	
	Setophaga petechia	Yellow Warbler	G5	S5B						PO	x	x	x		x	x	x		x	x	x	x	x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Setophaga pensylvanica	Chestnut-sided Warbler	G5	S5B			h	HU		PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Setophaga tigrina	Cape May Warbler	G5	S5B						M			x							x						
	Setophaga caerulescens	Black-throated Blue Warbler	G5	S5B			H	HR	Yes	PO		x	x		x	x	x			x			x	x	
	Setophaga coronata	Yellow-rumped Warbler	G5	S5B			H	HR		M	x	x	x			x	x		x	x	x		x	x	
	Setophaga virens	Black-throated Green Warbler	G5	S5B			H	HU	Yes	PO			x							x					
	Setophaga fusca	Blackburnian Warbler	G5	S5B			H	HR	Yes	PO		x	x		x	x	x			x			x	x	
	Setophaga pinus	Pine Warbler	G5	S5B			h	HU	Yes	PO	x		x							x					
	Setophaga castanea	Bay-breasted Warbler	G5	S5B						M			x							x					
	Setophaga cerulea	Cerulean Warbler	G4	S3B	END	THR	H		Yes	PO		x	x			x	x		x	x	x		x	x	
	Mniotilta varia	Black-and-white Warbler	G5	S5B			h	HU	Yes	PO									x						
	Setophaga ruticilla	American Redstart	G5	S5B			h		Yes	PO	x	x	x		x	x	x		x	x	x		x	x	
	Seiurus aurocapillus	Ovenbird	G5	S4B					Yes	PO		x	x		x	x	x		x	x	x		x	x	
	Parkesia veboracensis	Northern Waterthrush	G5	S5B				HU		PO			x							x					
	Geothlypis philadelphia	Mourning Warbler	G5	S4B				HU		PO	x	x			x	x	x						x	x	
	Geothlypis trichas	Common Yellowthroat	G5	S5B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Setophaga citrina	Hooded Warbler	G5	S4B	NAR		H	HR		PO		x				x	x		x		x		x	x	
	Cardellina canadensis	Canada Warbler	G5	S4B	THR	SC	h	HR	Yes	PO		x			x	x	x						x	x	
	Piranga olivacea	Scarlet Tanager	G5	S4B			h		Yes	PO	x	x	x		x	x	x		x	x	x		x	x	
	Pipilo erythrophthalmus	Eastern Towhee	G5	S4B			h	HU		PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Spizella passerina	Chipping Sparrow	G5	S5B						PO	x	x	x			x	x		x	x	x		x	x	
	Spizella pallida	Clay-colored Sparrow	G5	S4B			H			SL		x				x	x		x		x		x	x	
	Spizella pusilla	Field Sparrow	G5	S4B						SL	x	x	x		x	x	x		x	x	x	x	x	x	
	Pooecetes gramineus	Vesper Sparrow	G5	S4B			h	HU		SL		x				x	x		x		x		x	x	
	Passerculus sandwichensis	Savannah Sparrow	G5	S4B					Yes	PO		x	x		x	x	x		x	x	x	x	x	x	
	Ammodramus savannarum	Grasshopper Sparrow	G5	S4B	SC	SC	h	HU	Yes	SL		x				x	x		x		x		x	x	
	Melospiza melodia	Song Sparrow	G5	S5B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Melospiza georgiana	Swamp Sparrow	G5	S5B						PO	x														
	Zotrichia albicollis	White-throated Sparrow	G5	S5B			h	HU		M		x			x	x	x		x				x	x	
	Junco hyemalis	Dark-eyed Junco	G5	S5B						M		x													
	Cardinalis cardinalis	Northern Cardinal	G5	S5						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
	Pheucticus ludovicianus	Rose-breasted Grosbeak	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Passerina cyanea	Indigo Bunting	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Dolichonyx oryzivorus	Bobolink	G5	S4B	THR	THR			Yes	SL	x	x	x		x	x	x		x	x	x		x	x	
	Agelaius phoeniceus	Red-winged Blackbird	G5	S4						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Sturnella magna	Eastern Meadowlark	G5	S4B	THR	THR			Yes	SL		x	x		x	x	x			x		x	x	x	
	Quiscalus quiscula	Common Grackle	G5	S5B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Molothrus ater	Brown-headed Cowbird	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Icterus spurius	Orchard Oriole	G5	S4B			h	HR		PO	x	x	x			x	x		x		x	x	x	x	
	Icterus galbula	Baltimore Oriole	G5	S4B						PO	x	x	x		x	x	x		x	x	x	x	x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Haemorphous purpureus	Purple Finch	G5	S4B			H	HU		M	x														
*	*Haemorhous mexicanus*	House Finch	G5	SNA						PO	x	x	x		x	x	x		x	x	x	x	x	x	
	Carduelis tristis	American Goldfinch	G5	S5B						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
*	*Passer domesticus*	House Sparrow	G5	SNA						PO	x	x	x		x	x	x	x	x	x	x	x	x	x	
Mammals																									
	Blarina brevicauda	Northern Short-tailed Shrew	G5	S5							x		x							x					
	Sorex cinereus	Masked Shrew	G5	S5									x							x					
	Sorex fumeus	Smoky Shrew	G5	S5									x							x					
	Condylura cristata	Star-sed Mole	G5	S5									x							x					
	Myotis lucifugus	Little Brown Bat	G5	S4	END	END							x							x					
	Sylvilagus floridanus	Eastern Cottontail	G5	S5								x	x		x	x	x		x	x	x	x	x	x	
	Marmota monax	Groundhog (Woodchuck)	G5	S5								x	x		x	x	x		x	x		x	x	x	
	Sciurus carolinensis	Eastern Grey Squirrel	G5	S5							x	x	x		x	x	x	x	x	x	x	x	x	x	
	Tamias striatus	Eastern Chipmunk	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Tamiasciurus hudsonicus	Red Squirrel	G5	S5							x	x	x		x	x	x			x		x	x	x	
	Microtus pennsylvanicus	Meadow Vole	G5	S5							x		x							x					
	Ondatra zibethicus	Muskrat	G5	S5								x			x	x	x						x	x	
	Peromyscus leucopus	White-footed Mouse	G5	S5							x	x	x			x	x		x	x	x		x	x	
	Zapus hudsonius	Meadow Jumping Mouse	G5	S5							x		x							x					
	Canis latrans	Coyote	G5	S5								x	x			x	x		x	x	x		x	x	
	Vulpes vulpes	Red Fox	G5	S5								x	x		x	x	x			x			x	x	
	Procyon lotor	Raccoon	G5	S5								x	x		x	x	x			x		x	x	x	
	Mephitis mephitis	Striped Skunk	G5	S5									x			x	x			x		x		x	
	Mustela frenata	Long-tailed Weasel	G5	S4							x														
	Odocoileus virginianus	White-tailed Deer	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
Amphibians																									
	Notophthalmus viridescens viridescens	Red-spotted Newt	G5T5	S5			h					x	x			x	x		x	x	x		x	x	
	Ambystoma jeffersonianum	Jefferson salamander	G4	S2	END	END						x				x	x		x		x		x	x	
	Ambystoma jeffersonianum-laterale	Jefferson/blue-spotted salamander complex	GNA	S2			H	HU				x	x			x	x		x	x	x		x	x	
	Ambystoma maculatum	Spotted Salamander	G5	S4			h	HU				x	x			x	x		x	x	x		x	x	
	Plethodon cinereus	Eastern Red-backed Salamander	G5	S5							x	x	x		x	x	x		x	x	x		x	x	
	Bufo americanus	American Toad	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Hyla versicolor	Gray Treefrog	G5	S5							x		x							x					
	Pseudacris crucifer	Spring Peeper	G5	S5								x	x			x	x		x	x	x		x	x	
	Pseudacris triseriata	Western Chorus Frog (Great Lakes/ St. Lawrence population)	G5TNR	S4	THR	NAR		H?					x							x					
	Lithobates clamitans	Green Frog	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Lithobates pipiens	Northern Leopard Frog	G5	S5	NAR							x	x		x	x	x		x	x	x		x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Lithobates sylvaticus	Wood Frog	G5	S5							x	x	x			x	x		x	x	x		x	x	
Reptiles																									
	Chrysemys picta marginata	Midland Painted Turtle	G5T5	S4								x	x		x	x	x		x	x	x		x	x	
	Diadophis punctatus	Ring-necked Snake	G5	S4			H	HR				x	x		x	x	x		x	x	x		x	x	
	Lampropeltis triangulum	Milksnake	G5	S3	SC	SC						x	x		x	x	x		x	x	x		x	x	
	Nerodia sipedon sipedon	Northern Watersnake	G5T5	S5	NAR	NAR	h	HU				x				x	x		x		x		x	x	
	Storeria dekayi	DeKay's Brownsnake	G5	S5	NAR	NAR						x	x		x	x	x		x	x	x	x	x	x	
	Storeria occipitomaculata occipitomacula	Red-bellied Snake	G5	S5			h					x	x		x	x	x		x	x	x		x	x	
	Thamphis sirtalis sirtalis	Eastern Garter Snake	G5T5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
Fish																									
*	*Carassius auratus*	Goldfish	G5	SNA									x							x					
	Rhinichthys atratulus	Blackse Dace	G5	S5				HU					x							x					
	Semotilus atromaculatus	Creek Chub	G5	S5									x			x	x			x		x		x	
	Catostomus commersoni	White Sucker	G5	S5									x							x					
Dragonflies and Damselflies																									
	Cordulegaster obliqua	Arrowhead Spiketail	G4	S2									x							x					
	Aeshna canadensis	Canada Darner	G5	S5				HU				x				x	x		x		x		x	x	
	Aeshna constricta	Lance-tipped Darner	G5	S5								x			x	x	x						x	x	
	Aeshna umbrosa	Shadow Darner	G5	S4				HU				x				x	x		x		x		x	x	
	Anax junius	Common Green Darner	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Basiaeschna janata	Springtime Darner	G5	S5				HR				x				x	x		x		x		x	x	
	Epitheca cysura	Common Baskettail	G5	S5				HU				x				x	x		x		x		x	x	
	Celithemis elisa	Calico Pennant	G5	S5							x	x			x	x	x						x	x	
	Celithemis eponina	Halloween Pennant	G5	S4				HR					x			x	x					x		x	
	Erythemis simplicicollis	Eastern Pondhawk	G5	S5								x				x	x		x		x		x	x	
	Leucorrhinia intacta	Dot-tailed Whiteface	G5	S5								x				x	x		x		x		x	x	
	Libellula luctuosa	Widow Skimmer	G5	S5							x	x				x	x		x		x		x	x	
	Libellula pulchella	Twelve-spotted Skimmer	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Libellula semifasciata	Painted Skimmer	G5	S2				HR				x				x	x		x		x		x	x	
	Pachydiplax longipennis	Blue Dasher	G5	S5							x	x				x	x		x		x		x	x	
	Pantala flavescens	Wandering Glider	G5	S4				HR				x				x	x		x		x		x	x	
	Plathemis lydia	Common Whitetail	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Sympetrum obtrusum	White-faced Meadowhawk	G5	S5								x			x	x	x		x		x		x	x	
	Sympetrum semicinctum	Band-winged Meadowhawk	G5	S4				HU			x														
	Sympetrum vicinum	Yellow-legged Meadowhawk	G5	S5				HU				x				x	x		x		x		x	x	
	Tramea carolina	Carolina Saddlebags	G5	SNA								x				x	x		x		x		x	x	
	Tramea lacerata	Black Saddlebags	G5	S4							x	x	x			x	x		x		x	x	x	x	
	Sympetrum rubicundulum	Ruby Meadowhawk	G5	S5							x	x				x	x		x		x		x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Calopteryx maculata	Ebony Jewelwing	G5	S5							x	x	x			x	x		x	x	x		x	x	
	Lestes disjunctus	Common Spreadwing	G5	S5				HR				x				x	x		x		x		x	x	
	Lestes dryas	Emerald Spreadwing	G5	S5							x	x				x	x		x		x		x	x	
	Lestes rectangularis	Slender Spreadwing	G5	S5								x				x	x		x		x		x	x	
	Lestes unguiculatus	Lyre-tipped Spreadwing	G5	S5				HU				x				x	x		x		x		x	x	
	Argia apicalis	Blue-fronted Dancer	G5	S4				HR			x														
	Enallagma annexum	Northern Bluet	G5	S4				HR			x														
	Enallagma civil	Familiar Bluet	G5	S5							x	x				x	x		x		x		x	x	
	Ischnura hastata	Citrine Forktail	G5	SNA								x				x	x		x		x		x	x	
	Ischnura posita	Fragile Forktail	G5	S4				HR			x	x				x	x		x		x		x	x	
	Ischnura verticalis	Eastern Forktail	G5	S5							x	x				x	x		x		x		x	x	
	Nehalennia irene	Sedge Sprite	G5	S5				HU				x				x	x		x		x		x	x	
Butterflies and Moths																									
	Anatrytone logan	Delaware Skipper	G5	S4							x	x	x			x	x		x		x	x	x	x	
	Ancyloxypha numitor	Least Skipper	G5	S5							x		x			x	x					x		x	
	Epargyreus clarus	Silver-spotted Skipper	G5	S4							x	x	x			x	x		x	x	x	x	x	x	
	Erynnis baptisiae	Wild Indigo Duskywing	G5	S4				HR					x			x	x					x		x	
	Erynnis juvenalis	Juvenal's Duskywing	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Erynnis lucilius	Columbine Duskywing	G4	S4				HR			x														
	Erynnis martialis	Mottled Duskywing	G3	S2	END	END					x	x	x			x	x		x	x	x	x	x	x	
	Euphyes vestris	Dun Skipper	G5	S5								x	x			x	x		x		x	x	x	x	
	Poanes hobomok	Hobomok Skipper	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Polites mystic	Long Dash Skipper	G5	S5							x														
	Polites origenes	Crossline Skipper	G4G5	S4								x				x	x		x		x		x	x	
	Polites peckius	Peck's Skipper	G5	S5							x	x				x	x		x		x		x	x	
	Polites themistocles	Tawny-edged Skipper	G5	S5							x	x				x	x		x		x		x	x	
	Pompeius verna	Little Glassywing	G5	S4								x	x			x	x		x		x	x	x	x	
	Thorybes pylades	Northern Cloudywing	G5	S5							x	x	x			x	x		x	x	x	x	x	x	
	Thymelicus lineola	European Skipper	G5	SNA							x	x	x		x	x	x		x	x	x	x	x	x	
	Wallengrenia egeremet	Northern Broken-Dash	G5	S5							x	x	x			x	x		x		x	x	x	x	
	Papilio cresphontes	Giant Swallowtail	G5	S4								x				x	x		x		x		x	x	
	Papilio glaucus	Eastern Tiger Swallowtail	G5	S5							x	x	x			x	x		x	x	x	x	x	x	
	Papilio polyxenes	Black Swallowtail	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Papilio troilus	Spicebush Swallowtail	G4?	S4				HR			x		x			x	x					x		x	
	Colias eurytheme	Orange Sulphur	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Colias philodice	Clouded Sulphur	G5	S5							x	x	x			x	x		x		x	x	x	x	
*	*Pieris rapae*	Cabbage White	G5	SNA							x	x	x		x	x	x		x	x	x	x	x	x	
	Celastrina ladon	Spring Azure	G4G5	SU								x				x	x		x		x		x	x	
	Celastrina neglecta	Summer Azure	G5	S5								x	x			x	x		x	x	x	x	x	x	

	Scientific Name	Common Name	GRANK	SRANK	COSEWIC	ESA	Hamilton NAI	Halton NAI	Area Sensitive	Breeding Status	BP/IC	CVP	FC	FP	H	K1	K2	K/WP	M	ST	TGC	UHC	URC/MP	WW	WR
	Cupido (Everes) comyntas	Eastern Tailed Blue	G5	S5								x	x		x	x	x		x		x	x	x	x	
	Glaucopsyche lygdamus	Silvery Blue	G5	S5							x	x				x	x		x		x		x	x	
	Satyrium acadica	Acadian Hairstreak	G5	S4				HU					x			x	x					x		x	
	Satyrium calanus	Banded Hairstreak	G5	S4							x	x	x			x	x		x	x	x	x	x	x	
	Satyrium caryaevorus	Hickory Hairstreak	G4	S4								x	x			x	x		x		x	x	x	x	
	Satyrium liparops	Striped Hairstreak	G5	S5							x	x			x	x	x						x	x	
	Satyrium titus	Coral Hairstreak	G4G5	S5				HU			x		x			x	x					x			
	Cercyonis pegala	Common Wood-Nymph	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Chlosyne nycteis	Silvery Checkerspot	G5	S5				HU					x			x	x					x		x	
	Coenympha tullia	Common Ringlet	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Danaus plexippus	Monarch	G5	S2N,S4B	SC	SC					x	x	x		x	x	x		x		x	x	x	x	
	Edia anthedon	Northern Pearly-Eye	G5	S5								x	x			x	x		x	x	x	x	x	x	
	Libytheana carinenta	American Sut	G5	SNA									x			x	x					x		x	
	Limenitis archippus	Viceroy	G5	S5							x	x			x	x	x		x		x		x	x	
	Limenitis arthemis astyanax	Red-spotted Purple	G5T5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Megisto cymela	Little Wood-Satyr	G5	S5							x	x	x		x	x	x		x	x	x	x	x	x	
	Nymphalis antiopa	Mourning Cloak	G5	S5							x	x	x		x	x	x		x		x	x	x	x	
	Phyciodes cocyta	Northern Crescent	G5	S5								x	x		x	x	x			x			x	x	
	Phyciodes tharos	Pearl Crescent	G5	S4							x	x	x			x	x		x		x	x	x	x	
	Polygonia interrogationis	Question Mark	G5	S5							x	x	x			x	x		x		x	x	x	x	
	Satyrodes eurydice	Eyed Brown	G4	S5								x				x	x		x		x		x	x	
	Speyeria cybele	Great Spangled Fritillary	G5	S5							x	x				x	x		x		x		x	x	
	Vanessa atalanta	Red Admiral	G5	S5								x	x		x	x	x		x	x	x	x	x	x	
	Vanessa cardui	Painted Lady	G5	S5								x	x			x	x					x	x	x	
	Vanessa virginiensis	American Lady	G5	S5							x	x	x			x	x		x		x	x	x	x	

Appendix 8: Summary of Management Issues and Preliminary Opportunities

Appendix 8. Summary of management issues and opportunities at Waterdown-Sassafras Woods Heritage Lands

Waterdown-Sassafras Woods Heritage Lands																		
MANAGEMENT ISSUE	**DESCRIPTION OF OPPORTUNITY/ISSUE**	**MANAGEMENT RECOMMENDATION**	**MANAGEMENT PRIORITY**	**McNally**	**Waterdown Woods**	**Waterdown Road**	**Sassafras Tributary**	**Falcon Creek**	**Bayview Park/ Indian Creek**	**Upper Hager Creek**	**Forestvale Park**	**Kerncliff 1**	**Kerncliff 2**	**City View Park**	**Upper Rambo Creek/ Mansfield Park**	**Tyandaga Golf Course**	**Kerns/ Westbury Park**	**NOTES**
Issues Pertaining to Current EcoPark Lands and Stewardship Lands																		
Overarching Cootes to Escarpment EcoPark System Management Issues																		
Cootes to Escarpment EcoPark System Identity Issue	• no way of knowing when you are in the EcoPark System or out of it • there are a few signs posted to indicate that you are entering or are in the EcoPark System • Burlington will be adding more signs in their parks this summer • system identity is important for raising the profile of the EcoPark System, increasing public awareness, branding, usership, funding	• consistent signage throughout the EcoPark System • promoting a higher profile in the community • consistent recognition in all partner documentation		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Current EcoPark Lands Boundary Identification	• natural areas extend beyond partner-owned land holdings and trail networks appear to extend between privately owned and Current EcoPark Lands • as a user, it is difficult to know if you are on public versus private lands, and whether or not access is permitted on privately-owned lands • posting of “No Trespassing” signs	• consistent signage throughout the EcoPark System • consistent boundary delineation for all Current EcoPark Lands • all partners commit to consistently showing/mapping boundaries of EcoPark System		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Relative Isolation of some Current EcoPark Lands	• limited ecological and recreational linkage between some of the Current EcoPark Lands in the landscape	• continue pursuing acquisition or intervening lands • continue pursuing stewardship initiatives on intervening lands			x					x								
Wildlife Crossing	• annual King Road closure for salamander migration			x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Lack of Uniform Set of Rules for EcoPark System/Current EcoPark Lands	• CH has different policies than BTC, Region, Burlington • users generally do not know what the rules are, or who owns the land they are on • a unified set of rules may be part of building the EcoPark System’s identity			x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Waterdown-Sassafras Woods Heritage Lands																		
MANAGEMENT ISSUE	**DESCRIPTION OF OPPORTUNITY/ISSUE**	**MANAGEMENT RECOMMENDATION**	**MANAGEMENT PRIORITY**	**McNally**	**Waterdown Woods**	**Waterdown Road**	**Sassafras Tributary**	**Falcon Creek**	**Bayview Park/ Indian Creek**	**Upper Hager Creek**	**Forestvale Park**	**Kerncliff 1**	**Kerncliff 2**	**City View Park**	**Upper Rambo Creek/ Mansfield Park**	**Tyandaga Golf Course**	**Kerns/ Westbury Park**	**NOTES**
Uses on Adjacent Lands																		
Hanson Brick	• removal of woodland for Hanson Quarry expansion • stormwater management pond appears to be causing erosion in Indian Creek	• continue working with Hanson Brick to look for opportunities for restoration following extraction						x	x									
Ippolito Group	• trail access from lands	• establish formal easement						x										
Utility Corridors	• several utility corridors pass through Waterdown-Sassafras Woods • informal single foot track hiking • hydro corridors require routine maintenance to maintain vegetation • hydro corridors in Waterdown-Sassafras Woods provide habitat for several SAR, which could potentially be impacted during routine maintenance • hydro corridors also rife with invasive species, especially DSV	• sanction low key trail use			x			x				x	x		x	x		
Municipal Roads	• barriers to wildlife movement, recreation connectivity • potential for safety issues associated with recreational sues/access (e.g. conflicts between vehicles and bicycles) • lack of safe parking options on King Road, Waterdown Road/access to natural areas	• further study to enhance safe use/crossing within ROWs		x		x	x					x	x					
Residential Uses	• Upper Hager Creek, Forestvale Park, Kerns/Westbury Park, Upper Rambo Creek/Mansfield Park neighbourhoods and others in close proximity to Current EcoPark Lands • see also encroachment from adjacent lands	• ongoing support of stewardship initiatives with adjacent landowners								x	x	x		x	x	x	x	
Burlington Christian Academy	• appear to be accessing Indian Creek lands adjacent to their property • tire swing, ad hoc paths, tarps in stream, web of ropes suspended from trees	• outreach opportunity							x									
Fernhill School	• interest in nature-based education, according to school website • close proximity to EcoPark System lands	• outreach opportunity							x									

Waterdown-Sassafras Woods Heritage Lands																		
MANAGEMENT ISSUE	**DESCRIPTION OF OPPORTUNITY/ISSUE**	**MANAGEMENT RECOMMENDATION**	**MANAGEMENT PRIORITY**	**McNally**	**Waterdown Woods**	**Waterdown Road**	**Sassafras Tributary**	**Falcon Creek**	**Bayview Park/ Indian Creek**	**Upper Hager Creek**	**Forestvale Park**	**Kerncliff 1**	**Kerncliff 2**	**City View Park**	**Upper Rambo Creek/ Mansfield Park**	**Tyandaga Golf Course**	**Kerns/ Westbury Park**	**NOTES**
Issues Within Current EcoPark Lands																		
Trails																		
Duplication of Trails	• duplication of trails exacerbates the trampling of ground flora, compaction and exposure of tree roots, and spread of invasive species • duplication appears to largely be a result of mountain biking activity • extreme duplication of trails appears to be a fairly localized management issue	• formalization of existing ad hoc trails • re-routing some trails to less sensitive areas • improved access throughout • closure of some ad hoc trails to improve safety and mitigate environmental impact			x			x				x		x			x	• duplication of trails extensive in some parts of Waterdown Woods
Density of Trails	• some areas have a very high density of trails, which causes issues of trampling, compaction, loss of ground flora/regeneration				x													
Water on Trails/Ponding	• indicator of poor trail design • causes erosion, trail widening				x										x		x	
Erosion on or near Trails	• erosion on or near trails was noted occasionally on slopes and near watercourses • sometimes associated with seepages • local improvements (sanctioned or unsanctioned) have often been undertaken to resolve trail erosion issues (e.g., bridges, boardwalks, placement of logs, small retaining walls)	• remove and replace/relocate with properly designed structure specific to the local drainage pattern and sensitivity to the environment • build awareness of impacts of developing ad hoc structures		x	x			x		x		x		x	x		x	• locations with water on trail /need for boardwalk
Unsanctioned Improvements	• unsanctioned trail improvements (placing stepping stones and boardwalks in wet areas, clearing brush and cutting deadfall over trails, etc.) were noted mostly on ad hoc trails • self-organized groups taking on invasive species management and building trails and structures	• not necessarily an issue • need to connect and coordinate with those making these unsanctioned trail improvements • two-way awareness building		x	x			x		x		x		x	x		x	
Commemorative Opportunities	• commemorative opportunities and integration into the trail system							x				x	x	x				

Waterdown-Sassafras Woods Heritage Lands MANAGEMENT ISSUE	DESCRIPTION OF OPPORTUNITY/ISSUE	MANAGEMENT RECOMMENDATION	MANAGEMENT PRIORITY	McNally	Waterdown Woods	Waterdown Road	Sassafras Tributary	Falcon Creek	Bayview Park/ Indian Creek	Upper Hager Creek	Forestvale Park	Kerncliff 1	Kerncliff 2	City View Park	Upper Rambo Creek/ Mansfield Park	Tyandaga Golf Course	Kerns/ Westbury Park	NOTES
Hiking																		
Overuse of Trails	• many trails appear to be very well used and worn • in some areas, tree roots are exposed in part due to trail use • some ad hoc foot paths branch off larger sanctioned trails, leading to trail duplication and deterioration of ecosystem health/biodiversity through unnecessary impact • garbage was very occasionally noted along trails	• undertake a systematic approach to trail management planning • develop a hierarchy to develop a system of trail types, design principles and appropriate uses		x	x			x				x		x				
Off-leash Dogs	• hikers are sometimes accompanied by off-leash dogs • off-leash dogs impact wildlife by disturbing ground-nesting birds, chasing mammals (white-tailed deer, squirrels, ducks, etc.), spreading invasive species, and damaging/trampling sensitive ground flora and wildlife habitat • dog urine in nesting and sensitive wildlife habitats "marks" the territory and makes it undesirable or uninhabitable to the wildlife living there • off-leash dogs extend the zone of impact that surrounds a trail considerably	• sign post leashed areas and enforce and/or promote casual enforcement with reporting stations and online digital ‘user police’ initiatives		x	x			x	x	x		x		x	x		x	
Bicycle Use																		

Waterdown-Sassafras Woods Heritage Lands																		
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Use of Trails	• multiplicity of uses on many trails • causes impacts to soil (erosion), animals, plants, tree roots, soil organisms, resulting in ecosystem degradation • habitat destruction, displacement of soil, noise • speed, distance travelled, increase in number of visitors that bikes allow, increased trail-building all factor into extent of impact • manner of riding (skidding, braking, acceleration, turning, etc.) and tire tread type influence degree of impact • also, impacts to other users include loss of feelings of safety, loss of natural setting feeling	• develop hierarchy of trail uses		x	x			x	x	x		x		x	x		x	
Overuse of Trails	• only in specific concentrated areas • impacts listed above become exacerbated through overuse of trails • ecological tipping points, shifting an ecosystem to a new state (significant changes to biodiversity and the services to people it underpins) • changes are long-lasting and hard to reverse • can be a significant time lag between the pressures driving the change and the appearance of impacts, making management difficult	• develop site specific management protocols that address overuse		x	x			x	x	x		x		x	x		x	
Mountain Biking/BMX Structures/Trail Modification	• presence of old decaying bike structures (i.e., rails, pump tracks and jumps) • intense concentration of impacts • safety and liability issues • conflicts between and among user groups (e.g., mountain biking community, hiking, etc.)	• dismantle old structures and leave rotted timber scattered in the forest • work with user group to develop strategic plan for appropriate use and management of cycling uses		x	x			x	x	x		x		x	x		x	• ramps, embankments, jumps
Winter Bike Use	• use snowmobile trails • hikers sometimes mess up trails in early spring / conflict in use			x	x			x	x	x		x		x	x		x	

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Motorized Vehicle Use																		
Trail Use	• ATV use historically in City View/Kerncliff Park • eBikes use trails in City View/Kerncliff • also, dirt bikes and snowmobiles • snowmobiles use pipeline easements in winter • motorized vehicile use is not permitted	• assess impacts on specific use areas and promote or relocate if popular in the ATV community • setting specific management protocols, monitoring and reporting framework that must be met in order to remain an active use		x	x			x	x	x		x		x	x		x	
Off-trail Use	• ATVs, snowmobiles, dirt bikes • Motorized vehicle use extends off trails into natural areas, causing impacts to vegetation and wildlife, safety, erosion, etc.			x	x			x	x	x		x		x	x		x	
Other Recreational Uses																		
Rock Climbing	• rock climbing hardware was noted in a few locations on rock faces of the Niagara Escarpment • rock climbing can impact cliff vegetation, disturb sensitive microclimates, deface rock faces, and can potentially be a serious safety or liability issue	• develop clear set of management protocols to control the use based upon self-policing and reporting framework			x													
Geocaching/Orienteering	• this activity is largely participant-created and run with little oversight for monitoring and control • caches are often placed off-trail and often in environmentally-sensitive areas • garbage left behind “cache in trash out” • expands off-trail use • there is an active geocaching community in the area but there are no real management concerns	• make use official within the management plan as basis for inclusion in education and communications programming			x					x		x		x	x			
Adventure Racing	• higher impact on trails than hiking • some race courses extend beyond trails			x	x			x	x	x		x		x	x			

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Bow Hunting	• bow hunting for deer occurs Waterdown Woods (according to some mountain bikers) • incompatible use, safety/liability issue	• low level use • no management response needed			x			x				x		x				
Invasive Species																		
Garlic Mustard	• can displace native plants • reduces biodiversity and wildlife habitat • threatens several species at risk • known allelopathic effects • interferes with growth of fungi and nutrient uptake	• pull plants before seeds develop • fall digging of rosettes can also be effective • mowing can deplete seed bank • spray 1-6% glyphosate just before flowering in early spring, but may require at least 5 years of treatment • controlled burns may be considered in large monocultures		x	x		x	x	x	x	x	x	x	x	x	x	x	• species, extent, severity, estimated populations size
Dog-strangling Vine	• transforms healthy forest into open woodland • strangles vegetation and prevents forest regeneration • can interfere with recreational activities • increases grazing pressure on native plants • threatens Monarch, a species at risk	• mechanical control generally ineffective • spray 1-6% glyphosate in flowering season, performing multiple passes • Arsenal® (imazapyr) also recommended but may kill nearby trees • trials underway with several insect species		x	x		x	x	x	x	x	x	x	x	x	x	x	• DSV widespread in utility corridors southeast of Kerncliff
English Ivy	• forms dense mats through spread by rhizomes • outcompetes native vegetation			x	x		x	x	x	x	x	x	x	x	x	x	x	
Periwinkle	• forms dense mats through spread by rhizomes • outcompetes native vegetation	• tarp small areas • spray 1-6% glyphosate June to August, multiple passes may be necessary for full eradication		x	x			x	x	x	x	x		x	x	x	x	
Himalayan Balsam	• can completely cover an area and crowd out native vegetation • prolific nectar producer, drawing pollinators away from surrounding native species • an annual species that can aggressively replace native perennial plants along river banks, leading to soil erosion				x										x			

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Japanese Knotweed	• seriously damages houses, buildings, hard surfaces and infrastructure growing through concrete, tarmac and other hard surfaces • threatens native plants and animals by forming dense thickets • block routes used by wildlife to disperse • in riparian settings, damages flood defence structures and reduces the capacity of channels to carry flood water				x					x		x			x	x		
Phragmites	• forms dense monocultures, choking out all other vegetation • difficult to manage populations, requiring a lot of resources • small patches found in ponds at Old Quarry				x													
Purple Loosestrife	• generally well-controlled by Purple Loosestrife beetle • small pockets found in wetland vegetation fringe around ponds at Old Quarry and in other small low-lying areas throughout the heritage lands				x			x	x									
White Mulberry	• hybridizes with native Red Mulberry • readily spread by birds you disperse seeds after eating mulberries			x	x		x	x	x	x	x	x		x	x	x	x	
Common Buckthorn	• forms dense thickets that crowd and shade out native plants • it can alter nitrogen levels in the soil, creating better conditions for its own growth and discouraging the growth of native species • it produces large numbers of seeds that germinate quickly and prevent the natural growth of native trees and shrubs	• small specimens can be pulled out of moist soils and larger plants can be dug out or pulled out using a weed wrench tool, re-sprouting can occur unless all roots are removed or chemical control is used • cutting should be following up with an application of 1-6% glyphosate to ensure that re-sprouting does not occur		x	x		x	x	x	x	x	x		x	x	x	x	

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Non-native Honeysuckles	• rapidly forms dense thickets • rapidly colonizes forest ecosystems, reducing biodiversity and degrading habitat • hybridize with native relatives • allelopathic effect, which inhibits forest regeneration	• small specimens can be pulled out of soft sand or moist ground • spray foliage summer-early fall with 1-6% glyphosate • cut and treat individuals stumps with 0.33mL of concentrated glyphoste per 5cm dbh • Amitrol 240 (triazole) also recommended in control		x	x		x	x	x	x	x	x	x	x	x	x	x	
Multiflora Rose	• forms impenetrable thickets that exclude native plant species • readily invades open woodlands, forest edges, successional fields, savannahs and prairies that have been disturbed			x	x		x	x	x	x	x	x	x	x	x	x	x	
Japanese Barberry	• forms dense thickets that reduce wildlife habitat, affect native plants and restrict recreational activities along trails • dense growth shades out native species in the forest understory • capable of invading undisturbed forests			x	x		x	x	x	x	x	x	x	x	x	x	x	
Norway Maple	• form dense forest canopy that shades out most other species • seedlings can form a thick mat on the forest floor that will further limit regeneration of other native trees and shrubs • forest floor vegetation becomes more scarce, exposing bare soil and leading to increased erosion			x	x		x	x	x	x	x	x	x	x	x	x	x	
Manitoba Maple	• aggressive growth dominates a site to exclude all other species, and remains dominant on the site indefinitely in the absence of management • aggressively invades almost all habitat types			x	x		x	x	x	x	x	x	x	x	x	x	x	

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Black Locust	• spreads clonally as well as by seed • dense thickets shade out native vegetation • leaf litter has a higher nitrogen concentration than most native trees • in low nutrient habitats, excess nitrogen can facilitate invasion by weedy, nitrogen-loving non-natives, which can slow and sometimes alter patterns of succession • forest stand dominated by Black Locust at McNally property			x														
Gypsy Moth	• sprayed 5-6 years ago: Cootes Paradise to Oakville (aerial spray operation) – North Aldershot area • see LEMP report for details			x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Ecological Management Issues																		
Management of SAR Habitat and Habitat of Rare Species	• habitat for SAR and rare species is present within the Waterdown-Sassafras Woods Heritage Lands • some habitats (e.g., open woodlands) require specific disturbance regimes to maintain their character • since certain disturbance regimes (e.g., fire) are supressed, other forms of management to maintain the open character of these habitats is necessary in order to maintain the species assemblages that rely on them			x	x	x	x	x	x	x	x	x	x	x	x	x	x	• especially in open woodlands
Ecosystem Restoration	• many ecosystems have undergone significant degradation which has had a negative impact on biological diversity • ecosystem restoration is a fundamental element of ecosystem management • restoration of treed and open (meadow) habitats • augment riparian cover • restoration of plantations	• ecosystem level approach • recommend a study to determine ecological priorities and specify management needs		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Convert Sod to Natural Vegetation	• convert areas of sod near Tyandaga Golf Course to natural vegetation					x					x		x		x			

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Invasive Species Management	• invasive species were noted throughout Waterdown-Sassafras Woods • invasive species presence, extent and severity differed through, with some areas only minimally impact while others extensively impacted	• prepare an invasive species management plan • develop early detection and rapid response (EDRR) protocols where invasion not advanced • develop clear action plan to approach invaded areas • include native restoration replanting program and repeat management • map invasive species populations and set priorities • develop monitoring and reporting program		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Blowdowns/Lightning Strikes	• none noted at Waterdown-Sassafras				x							x						
Ash Tree Death and Dieback	• white ash and green ash are common associated species within the forests in Waterdown-Sassafras Woods • emerald ash borer is causing ash tree death and dieback • dead/dying ash trees can become hazardous if along a trail, forest edge • management effort is one-off, and resource intensive in infested areas • “surgical” extraction of infested trees required in difficult to access environments • requires disposal plan of dead trees removed	• tie to existing local municipal or regional Emerald Ash Borer Management Plan • if not too advanced, develop EAB plan with immediate action plan		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Earthworm Invasion	• non-native earthworms are changing soil conditions and impacting forest health			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Need for Interpretation	• some ecological and recreational issues require interpretation to educate users of issues (invasive species, restoration activities, mountain biking structures, trail closures, etc.)							x				x						
Oak Decline	• due to lack of management (mostly related to Red Oak) • area off Waterdown Rd • need for hazard tree management			x	x													

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Encroachment from Adjacent Lands																		
Yard Waste Dumping	• clippings and brush dumped into natural setting behind properties • smothers vegetation and can introduce invasive species • can inhibit forest regeneration	• prepare homeowner education package		x						x	x	x	x	x	x	x	x	
Structures (e.g., picnic tables, lounge chairs, composters)	• discarded refuse and litter dumped near trails • some adjacent landowners place structures beyond their property boundaries, within Current EcoPark Lands • further extends edge impacts • removes/tramples natural vegetation • potential impacts to wildlife habitat	• develop stewardship program to modify behaviour		x						x	x	x	x	x	x	x	x	
Yard Extension (e.g., mowing, flower beds)	• some adjacent landowners extend their yards by mowing portions of and/or installing flower beds within Current EcoPark Lands • extend perceived land ownership and add utility to property by mowing and planting back into natural area	• municipal by-law and enforcement • legal survey and mapping		x						x	x	x	x	x	x	x	x	
Swimming Pool Drainage	• this issue was not noted within the Waterdown-Sassafras Woods lands, but could occur • overtime, eroded gullies can form, which can cause tree failure • impacts to water quality	• education		x						x	x	x	x	x	x	x	x	
Tree Cutting/Topping	• to maintain views	• fine perpetrators • education		x	x		x			x	x	x	x	x	x	x	x	
Safety Issues																		

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Hazard Tree Management	• hazardous trees were occasionally noted along trails and adjacent to privately owned lands • some associated with EAB and others • broken branches, destabilization of trees, exposed roots • susceptibility of non-native trees to disease and structural (tree) failure • this is a safety and liability issue	• develop tree hazard abatement program • education • active tree management		x	x		x	x	x	x	x	x		x	x	x	x	• related to death and dieback from ash trees
Safe Access and Parking	• general issue with lack of access • limited parking available on King Road • poor sightlines for motorists in relation to roadside parking • safety issue and lack of access could hinder use	• conduct traffic counts and survey to determine use patterns and potential risks • report incidences of conflict/accidents • develop safe parking and crossings where data suggests		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Noxious Weeds	• e.g., Poison Ivy, Giant Hogweed, Wild Parsnip • poses danger to EcoPark System users (skin rashes, etc.)			x	x		x	x	x	x	x	x		x	x	x	x	
Infrastructure Issues																		
Parking	• see safe access and parking above • general need for more parking • pull off parking bays and on-road parking with poor sightlines	• monitor level of use • conduct risk assessment and implement vehicular access and parking strategy in future		x	x		x	x	x	x					x			
Trail Access	• see safe access and parking above • informal in all cases • no clear indication of where to enter and what you are entering	• study patterns of access and develop hierarchy of access types • close access points that contradict with natural heritage values or where risk to public safety is unreasonable																
Trail Surface	• mostly earthen trails, a few areas with screening • erosion/sloughing of granular in places • formation of rivulets • improper surface for use	• study use patterns • determine surfacing based on type of use allowed (hierarchy) and frequency		x	x		x	x	x	x					x			

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Bridges and Boardwalks	• BTC has constructed several bridges and boardwalks along the BT in Waterdown-Sassafras Woods • all BTC structures appeared to be in good condition • ad hoc crossings, drainage improvements and retaining structures	• remove and replace or relocate with properly designed structure specific to the local drainage patter and sensitivity to the environment • build awareness of impacts in developing ad hoc structures		x	x		x	x	x	x					x		x	
Other Activities																		
Party Spots, Fire pits, Rope Swings	• evidence of camping, garbage and/or vandalism present • dumping of litter, large soil-compacted areas, ad hoc seating and burning of brush	• restore sites where in conflict with natural setting • formalize other sites into small group gathering sites • prohibit fires with signage and enforcement		x	x			x	x	x		x		x	x		x	
Unsanctioned Access Points	• related to lack of access • development of multiple access points, including some over private properties	• assess all access points and linkages • evaluate most important and formalize these • close all others • use bio-sensitive techniques to close and monitor			x		x	x		x								
Trespassing on Adjacent Private Property	• related to issue of partner-owned boundary identification • signs posted for “no trespassing” • can lead to angry/frustrated landowners • trail creation on private lands as a result of unclear demarcation of property lines	• conduct boundary survey using an Ontario Land Surveyor			x							x		x				
Other Management Issues																		
Dumping	• old tires, stoves, building materials, etc. dumped within edge of natural area or down into ravines • tire pile in ravine at Holland Property • old stoves in Grindstone Creek ravine • dumping of beer bottles, etc. also noted in several areas • clinical waste issue/sanitary issue			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

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Erosion	• see Swimming Pool Drainage • natural drainage pattern altered by presence of trails and construction of ad hoc drainage conveyance features • erosion noted downstream of SWM ponds on Hanson Brick site in Indian Creek valley	• remove and restore ad hoc features • address drainage across trails that are to remain		x	x		x	x	x	x	x	x		x	x		x	• cause, severity, approximate extent
Old Paige Wire Fencing	• old fencing noted in several areas within Waterdown-Sassafras Woods • often in state of disrepair and hard to see in the forest • can be trip or impalement hazard	• fencing should be removed unless it is contributing to a management technique		x	x			x	x	x		x		x	x			
Remnant Logging Roads	• a few locations in Waterdown-Sassafras Woods • overgrown and unused	• potential to re-open if generate key connections			x			x	x			x		x	x			
Built Heritage and Cultural Heritage Landscape Conservation	• significant views/landscapes • stone foundation at Little property							x				x	x					

Appendix 9: Photographs of Management Issues

Cootes to Escarpment EcoPark System

Waterdown - Sassafras Woods Heritage Lands

Appendix 9: Management Issues Key Map

Legend

- Waypoints
- Study Area
- Waterdown - Sassafras Woods Heritage Lands

Cityview Park
Upper Rambo Creek/ Mansfield Park
Mountain Brow Road
Kerncliff 1
Kerncliff 2
McNally
Waterdown Woods
Hughes
Tyandaga Golf Course
King Road
Upper Hager Creek
Forestvale Park
Kerns/Westbury Park
Kerns Road
HWY 407
Waterdown Road
Sassafras Woods
Bayview Park/ Indian Creek
Falcon Creek
Sassafras Tributary
HWY 403

0 100 200 400 600 800 1,000

Meters

North-South Environmental Inc.

Specialists in Sustainable Landscape Planning

Geosphere Infomatic Services

February 8, 2016

Issue #	Easting	Northing	Management Issue	Description
4	592026	4799106	ad hoc trail management	long view at rock cliff edge to harbour (requires safety rail)
11	594226	4799997	stream erosion	
19	593195	4798020	garbage/dumping	
25	592032	4799078	invasive species	ad hoc path to look out; DSV; mountain climbing hardware fastened to rock
37	594115	4799744	stream erosion	
38	594250	4800022	stream erosion	
39	593233	4797998	stream erosion	erosion in creek with downcutting, tire swing and web-of-dreams
41	593266	4797973	picnic area/fire pit	
45	594114	4799866	trail erosion	
46	594319	4800018	trail erosion	
48	592731	4798437	trail erosion	erosion issue corner of parking lot
49	592233	4799760	trail erosion	
52	594155	4799724	encroachment	
53	593036	4801004	encroachment	
56	592230	4798737	trail erosion	
57	592252	4798722	garbage/dumping	
58	592470	4800282	encroachment	active management storage area/ stockpile brush and mulch
62	591304	4798631	ad hoc trail management	
65	592317	4798709	ad hoc trail management	
71	592097	4798687	ad hoc trail management	
74	592239	4797789	trail erosion	
76	591682	4798885	high density of trails	
80	591738	4798854	trail erosion	braided trail section/ erosion/ soil compaction/ strt side trail forks off
81	592168	4799381	high density of trails	braided trails
82	591876	4798930	high density of trails	braided trails section
87	592144	4798493	crossing structure needed	

Issue #	Easting	Northing	Management Issue	Description
88	592122	4798517	stream erosion	creek crossing needs structure/ site of more bank scour
90	592870	4797044	crossing structure needed	
93	592310	4798676	invasive species	
95	592295	4797762	hazard trees	
96	591346	4798640	ad hoc trail management	
97	592533	4797569	crossing structure needed	
98	591962	4799213	ad hoc trail management	drinage crossing
105	592582	4797338	trail erosion	
106	592051	4798469	trail erosion	
107	592081	4798452	stream erosion	erosion/ exposed roots/ deep cut channel erosion
108	592239	4798696	trail erosion	
109	592203	4798753	garbage/dumping	
110	592380	4798709	garbage/dumping	
111	592430	4797622	trail erosion	
112	591696	4798844	ad hoc trail management	
113	592523	4797601	ad hoc trail management	
114	592007	4799081	safety rail needed	
116	593388	4798431	garbage/dumping	marked entry point/ dumped tire/ pastoral view west toward farmfield
117	591163	4798678	trail erosion	mud and bike wheel rutting
118	592342	4797680	trail erosion	
119	592548	4797469	invasive species	
120	592451	4800384	picnic area/fire pit	rock stairs, fire pit
121	591975	4799180	trail erosion	
123	592107	4798486	stream erosion	
124	592087	4799124	safety rail needed	
125	592052	4799092	safety rail needed	
126	592581	4797424	hazard trees	
127	592133	4798672	gully erosion	

Issue #	Easting	Northing	Management Issue	Description
128	592216	4798622	gully erosion	
129	592508	4797519	trail erosion	
130	591530	4798603	mountain bike structures	three trails intersect (two side trails branch off BT)/ old bike structure
131	592139	4798092	invasive species	
132	592105	4798089	gully erosion	
133	592127	4798072	vegetation clearing	
134	592007	4798319	garbage/dumping	
135	592019	4798347	garbage/dumping	
138	591991	4799271	invasive species	
139	592015	4799306	invasive species	
140	592254	4797821	invasive species	
141	592254	4797858	invasive species	
142	592286	4797853	invasive species	
143	591489	4798557	encroachment	
170	590786	4798209	invasive species	
171	590977	4798162	hazard trees	
172	591880	4799035	picnic area/fire pit	
173	592010	4799055	trail erosion	
174	591962	4799006	safety rail needed	
175	591991	4798963	garbage/dumping	
176	592448	4799793	vegetation clearing	
177	593029	4799826	garbage/dumping	
178	592537	4800724	ad hoc trail management	
179	592524	4800817	invasive species	
180	592558	4800909	mountain bike structures	
181	592959	4800838	encroachment	
182	593072	4801025	invasive species	
183	593132	4801091	hazard trees	

Issue #	Easting	Northing	Management Issue	Description
184	593174	4801147	stream erosion	
185	593243	4801174	encroachment	
186	593193	4801384	invasive species	
187	593316	4799778	invasive species	
188	593387	4799743	encroachment	
189	593288	4799689	hazard trees	
190	593249	4799426	encroachment	
191	593049	4799469	encroachment	
192	593442	4799134	encroachment	
193	593672	4799371	encroachment	
194	593513	4799473	hazard trees	
195	593428	4799567	invasive species	
196	594285	4800058	encroachment	
197	594094	4799842	encroachment	
198	594350	4799618	encroachment	
199	594250	4799954	high density of trails	
200	594165	4799914	invasive species	
201	593949	4799873	garbage/dumping	
202	593803	4798983	garbage/dumping	
203	593875	4798955	stream erosion	
204	593983	4798929	encroachment	
205	594263	4798912	encroachment	
206	594270	4798864	stream erosion	
207	594117	4798886	garbage/dumping	
208	592743	4798402	gully erosion	
209	592765	4798328	garbage/dumping	
210	593394	4798060	garbage/dumping	
211	593341	4798362	hazard trees	
212	593332	4797943	stream erosion	

Issue #	Easting	Northing	Management Issue	Description
213	593402	4797888	picnic area/fire pit	
214	592411	4796342	invasive species	

Photograph Examples of Management Issues at Waterdown-Sassafras Woods Heritage Lands
(photographs taken by Mirek Sharp, Markus Hillar, and Leah Lefler)

Ad Hoc Trail Management


Issue #4

Encroachment

Garbage/Dumping

High Density of Trails

Issue #82

Issue #81

Invasive Species

Mountain Bike Structures

Picnic Area/Fire Pit

Stream Erosion


Issue #39


Issue #39

Trail Erosion


Issue #117


Issue #48