BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

Saw-Whet Property Environmental Impact Study
Town of Oakville, Ontario

Prepared For:

Saw-Whet Golf Course Ltd.

Prepared By:

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Date: *Project:*

April 2015 **212091**

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1. Introduction

This Environmental Impact Study (EIS) has been prepared in support of a site-specific development application for the Saw-Whet Golf Course property owned by Saw-Whet Golf Course Ltd. The proposed development was the subject of a report prepared by Beacon Environmental dated February 2014. This updated report is based on the updated draft plan and addresses the proposed changes to the draft plan layout. The report has also been updated with the updated technical studies prepared by the other technical members of the team. The Saw-Whet Golf Course (the "Subject Property") is approximately 55 hectares (ha) in size, and is located south of Upper Middle Road and east of Bronte Road in the Town of Oakville. The Study Area includes the Subject Property as well as the natural heritage features associated with the Fourteen Mile Creek and its valleylands, which are owned by Infrastructure Ontario (IO) (see **Figure 1**).

Prior to the completion of the Saw-Whet EIS, the Town of Oakville requested a comprehensive study of the undeveloped lands generally located on the north side of the Queen Elizabeth Way (QEW) between Bronte Road and Third Line. This broader area includes the Subject Property in its entirety as well as a number of other properties, is approximately 234 ha, and is referred to as the Merton Tertiary Planning Area (the "TPA") (see **Figure 1**).

The TPA has been identified by the Town of Oakville as an area for potential future development that requires comprehensive land use planning, environmental assessment, and servicing studies to establish appropriate future land uses and policies. In response to this requirement, a Tertiary Planning Study was initiated in 2012 by a multi-disciplinary team (i.e., planners, ecologists, hydrogeologists, hydrologists, fluvial geomorphologists, geotechnical specialists and engineers) led by Saw-Whet Golf Course Ltd., one of the principal landowners in the TPA. Concurrently, the Town of Oakville retained a multi-disciplinary team with expertise in the required fields to review the various technical study submissions. The Town of Oakville, with the support of its peer review team, as well as the Region of Halton and Conservation Halton, has provided ongoing direction and input to the TPA study process. All comments received to date, pertaining to the Subject Property, are addressed in this EIS.

Terms of Reference for the TPA study were previously developed in consultation with the Town of Oakville, the Region of Halton and Conservation Halton. The Terms of Reference outline the policy framework for the study, landowner responsibilities, study objectives, timing and process, area-wide and site-specific technical study requirements for the EIS. A copy of the final Terms of Reference (dated May 6, 2013) is included in **Appendix A**.

Beacon Environmental Ltd. was retained by Saw-Whet Golf Course Ltd. to prepare a comprehensive area-wide EIS for the TPA in two phases to accommodate the land use planning process, as follows.

- Phase 1 of the Merton EIS was submitted in May 2013. Phase 1 fulfilled objectives 1, 2 and 3 of the Terms of Reference by (1) characterizing the biophysical environment within the TPA, (2) identifying environmental constraints and opportunities to future development, and (3) identifying a Natural Heritage System to establish future development limits for the purposes of informing the land use planning exercise.
- Phase 2 of the Merton EIS was submitted in December 2013. The Phase 2 EIS is intended to fulfill all the objectives of the approved Terms of Reference for the TPA (see **Appendix**

A), and address all comments received from the Town, Region and Conservation Halton on the Phase 1 submission. The impact assessment for this submission was based on the general land use plans in the three land use options presented to the public in May 2013.
- In response to Town, Region and agency comments, a revised version of the Phase 2 Merton EIS was prepared and re-submitted in October 2014.

In addition to the area-wide Merton EIS, site-specific EISs are also required for each development application within the TPA to assess the potential impacts related to each specific development. This report constitutes a site-specific EIS for the Subject Property. The proposed development falls within the same environmental planning framework as that of the Merton EIS. This EIS relies upon much of the same site-specific data and analyses presented in support of the Merton TPA EIS; however, it addresses constraints and opportunities, anticipated impacts and mitigation, and policy compliance within the context of the Subject Property and in relation to the proposed Draft Plan. Since the monitoring framework developed through the Merton EIS is inclusive of the Subject Property it does not require any modifications. It has nevertheless been included in this EIS for ease of reference and for completeness.

This EIS has integrated all relevant information from available area-wide and site-specific technical studies, and also integrates input from other members of the multi-disciplinary team to ensure the report is comprehensive.

This EIS specifically provides, for the Subject Property and adjacent lands:

- the planning context (**Section 2**);
- the biophysical context and related analyses of the ecological functions, sensitivities and significance of the natural heritage features (**Section 3**, **Section 4**, **Section 5**);
- the proposed development concept (**Section 6**);
- an assessment of anticipated environmental impacts related to the proposed development concept and recommended mitigation measures (including appropriate buffers) associated with these impacts (**Section 7**);
- a detailed monitoring Terms of Reference (**Section 8**); and
- an evaluation of compliance of the proposed development and associated mitigation measures with applicable planning policies and regulations (**Section 9**).

1.1 Study Objectives and Scope

The objectives this EIS are consistent with those for the Merton EIS, but have been refined to apply specifically to the Subject Property, as follows:

1. Characterize natural heritage resources and ecological functions of the Study Area;
2. Identify significant natural heritage resources and functions to inform land use planning on the Subject Property;
3. Identify environmental constraints and opportunities for use in evaluating land use alternatives on the Subject Property;
4. Assess potential impacts of future development on significant natural heritage features and ecological functions at the site-specific level for the Subject Property;

Study Area

Figure 1

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Merton Tertiary Plan Area (TPA)
- Watercourse
- Swale

Note:
IO = Infrastructure Ontario

First Base Solutions
Web Mapping Service 2010

UTM Zone 17 N, NAD 83

N
W E
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0 85 170 340 Meters

1:9,000

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5. Recommend mitigation measures for avoiding or minimizing potential development related impacts to significant natural heritage features and functions at the site-specific level for the Subject Property; and
6. Develop detailed Terms of Reference for a monitoring program that evaluates changes to key environmental indicators and assesses the effectiveness of recommended mitigation measures.

1.2 Study Team

This EIS was prepared with input from a multi-disciplinary team. Study team members prepared individual reports related to their areas of expertise in the fields of planning, geology, geomorphology, hydrogeology, hydrology, terrestrial and aquatic ecology. This EIS has integrated information from the various reports to develop a comprehensive understanding of the ecological inter-relationships between groundwater, surface water, and natural heritage resources within the Study Area. Through collaboration with the various team members, a thorough understanding of the biophysical environment in the Study Area has been developed to inform: the identification of environmental constraints and opportunities, assessment of potential impacts, and identification of mitigation and monitoring needs. A list of Study Team members, their qualifications, and role in the EIS is provided in **Table 1**.

Table 1. Composition of Study Team, Key Roles and Reports Provided

Firm	Individuals	Title - Qualifications	Key Role and Reporting
Beacon Environmental Ltd. (Beacon Environmental)	Ken Ursic	Project Manager / Sr. Ecologist - M.Sc. Ecol.	Project Management ***EIS Report – Primary Author***
	Daniel Westerhof	Int. Ecologist – B.Sc., MES	Vegetation Surveys, Incidental Wildlife, EIS Report Input
	Rosalind Chaundy	Sr. Ecologist – M.Sc. F.	Wildlife Surveys and Assessment, EIS Report Input
	Yves Scholten	Wildlife Ecologist – B.Sc.	Wildlife Surveys
	Lindsey Waterworth	Aquatic Ecologist – B.Sc.	Aquatic Habitat Assessments
	Sarah Aitken	Aquatic Ecologist – B.Sc.	Aquatic Habitat Assessments, EIS Report Input
	Erik Daly	GIS Specialist – B.Sc.	EIS Mapping
	Andrew Keaveney	Wildlife Biologist – B.Sc.	Wildlife Surveys
	Michael King	Field Biologist	2014 Odonate and Lepidoptera surveys
Sorensen Gravely Lowes Inc. (SGL)	Paul Lowes	Principal - MES, MCIP, RPP	Planning and Policy Review, Input to EIS Report
R.J. Burnside & Associates Limited	Joanne Thompson	Sr. Project Advisor – M.Sc., P.Geo	Hydrogeological Study Review
	Jackie Shaw	Project Manager – P. Eng.	***Hydrogeological Study – Primary Author***
David Schaeffer Engineering Ltd. (DSEL)	Mike Baldesarra	Manager of Design Administration – P.Eng	***Hydrology Study – Primary Author***
Parish	John Parish	Sr. Advisor / Principal – M.A.,	Fluvial Geomorphological Study

Firm	Individuals	Title - Qualifications	Key Role and Reporting
Geomorphic		P.Geo.	Review
	Tatiana Hrytsak	Jr. Fluvial Geomorphologist – M.Sc.	***Fluvial Geomorphological Study – Primary Author***
Soil Engineers Ltd.	Bernard Lee	Geotechnical Project Manager / Project Engineer - P.Eng.	***Geotechnical Study – Primary Author***
	Mumta Misrty	Geotechnical Technician - B.A.Sc.	Geotechnical Study Support
Gerrard Design Associates Inc.	David Gerrard	Principal - OALA. CSLA. LEED AP	Mapping and Graphics Support

1.3 Report Outline

An overview of the sections on this EIS report and their content is provided below:

Section 1 - Introduction: outlines the purpose, objectives and scope of work, and presents the report organization.

Section 2 - Environmental Policy Framework: describes the environmental planning context for the Study Area and provides an overview of key environmental policies, legislation, and regulation that are directly relevant to the EIS.

Section 3 - Study Methodology: describes the methodologies used to characterize the biophysical environment, identify constraints and opportunities, and assess impacts related to the proposed development.

Section 4 - Study Findings: summarizes the findings of the background reviews and field investigations, characterizes the biophysical environment on a site-specific basis, and includes analyses to evaluate the significance of the biophysical resources in the context of applicable environmental planning policies, regulations and legislation.

Section 5 - Constraints and Opportunities: identifies natural heritage and natural hazard constraints to future land uses, and identifies opportunities for enhancement to the proposed Natural Heritage System.

Section 6 - Description of the Proposed Development: describes the proposed development for the Subject Property and details of the preliminary grading, servicing and stormwater management approaches associated with the proposed development.

Section 7 - Impact Assessment and Recommended Mitigation: assesses the anticipated impacts of the proposed land uses on the proposed Natural Heritage System and its functions, and identifies a range of appropriate mitigation measures to address these impacts.

Section 8 - Monitoring Program – Proposed Terms of Reference: provides detailed Terms of Reference for pre- and post-development monitoring of key environmental parameters to evaluate changes to the environment and effectiveness of recommended mitigation for the Subject Property, and the Merton TPA as a whole.

Section 9 - Policy Conformity Evaluation: evaluates the proposed development plan, and recommended mitigation measures, in terms of their compliance with the applicable environmental policies, regulations and legislation.

Section 10 - Conclusions: summarizes key study findings and recommendations, and provides a concluding statement.

2. Environmental Policy Framework

This section provides an overview of key federal, provincial, and local environmental policies, legislation, and regulations that are directly relevant to this EIS and land use planning for the Subject Property.

The EIS includes a review of the following legislation, policies and regulations:

- Federal *Fisheries Act*
- Ontario *Endangered Species Act*
- Provincial Policy Statement
- Parkway Belt West Plan
- Region of Halton Official Plan
- Town of Oakville Official Plan (Livable Oakville)
- *Conservation Authorities Act* and Ontario Regulation 162/06

The following review is not intended to be comprehensive, but has been included to highlight key policy, regulatory and legislative requirements as they relate to environmental planning for the Subject Property to ensure that land use planning within the Subject Property is in conformity with the existing policy framework. **Section 9** of this EIS includes an evaluation to confirm that proposed land use plans are in conformity with existing environmental policies and regulations. A complete understanding of that evaluation requires an understanding of this section.

2.1 Federal *Fisheries Act*

The Subject Property and adjacent lands contain several watercourses that support fish habitat. As direct fish habitat is present within the Subject Property, which has potential to be impacted, the *Fisheries Act* (1985) is a key piece of legislation relevant to the proposed development.

Fish habitat is protected under the Federal *Fisheries Act* (1985). In Ontario, the federal department of Fisheries and Oceans Canada (DFO) manages fish habitat and the Ontario Ministry of Natural Resources (OMNR) manages fisheries.

The *Fisheries Act* has recently been updated through Bill C-38 which came into effect November 25th, 2013. Key changes include the combination of former Sections 32 and 35 into a new Section 35 addressing the removal of Harmful Alteration, Disruption or Destruction (HADD) of fish habitat. The

prohibitions on killing fish and causing harmful alteration, disruption or destruction of fish habitat (HADD) have been replaced with a single prohibition in Section 35 against causing '*serious harm to fish'* that are part of a commercial, recreational or aboriginal fishery, or to fish that support such a fishery.

> *"Serious harm to fish"* is defined as "*the death of fish or any permanent alteration to, or destruction of, fish habitat*". "*Serious harm to fish"* includes the following:
>
> 1. *The death of fish*
> 2. *A permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes*
> 3. *The destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.*

Commercial, recreational or aboriginal fisheries include those fish that fall within the scope of applicable federal or provincial fisheries regulations as well as those that can be fished by aboriginal organizations or their members for food, social or ceremonial purposes, or for purposes set out in a land claims agreement. Fish that support these fisheries are those that contribute to the productivity of a fishery and may reside in bodies of water that contain fisheries or in water bodies that are connected by a watercourse to such water bodies.

Determining the applicability of the Section 35 prohibition to particular water bodies is now made on a case-by-case basis through a self assessment process to determine impacts fish and fish habitat and next steps. Development activities taking place in or near water may affect fisheries by adversely affecting fish or fish habitat. DFO recommends that proponents of these activities should:

- understand the types of impacts their projects are likely to cause;
- take measures to avoid and mitigate impacts to the extent possible; and,
- request authorization from the Minister and abide by the conditions of any such authorization, when it is not possible to avoid and mitigate impacts of projects that are likely to cause serious harm to fish.

Definitions of avoid, mitigation and offset are outlined below and taken from the Fisheries Protection Policy Statement (2013):

<u>Avoidance</u>

- *Avoidance is the undertaking of measures to completely prevent serious harm to fish. Avoidance measures may include locating infrastructure or designing a project or one or more of its components to avoid serious harm to fish. Careful timing of certain activities may also avoid harm to fish and fish habitat.*
- *For some projects, serious harm to fish may be fully avoided while for others, serious harm to fish may only be partially avoided. When serious harm to fish cannot be fully avoided, mitigation measures should be undertaken.*

Mitigation

- *Mitigation is a measure to reduce the spatial scale, duration, or intensity of serious harm to fish that cannot be completely avoided. The best available mitigation measures or standards should be implemented by proponents as much as is practically feasible.*
- *Mitigation measures include the implementation of best management practices during the construction, maintenance, operation and decommissioning of a project.*

Offsetting

If all efforts have been made to avoid and mitigate impacts, any residual serious harm to fish should be addressed by offsetting. An offset measure is one that counterbalances unavoidable serious harm to fish resulting from a project with the goal of maintaining or improving the productivity of the commercial, recreational or Aboriginal fishery. Offset measures should support available fisheries management objectives and local restoration priorities.

2.2 Ontario Endangered Species Act

Species at Risk in Ontario are those listed as provincially Endangered, threatened or special concern at the provincial level, however the act only regulates the habitat of those that are Endangered or threatened. In correspondence from the Ontario Ministry of Natural Resources (OMNR) (M. Thompson, Aurora District, 2012), they indicated that there are two current and two historical records of four Species at Risk in the vicinity of the Subject Property, as follows:

- Redside Dace (*Clinostomus elongatus*) – endangered;
- Eastern Flowering Dogwood (*Cornus florida*) (1985) – endangered;
- Barn Swallow (*Hirundo rustica*) (1985) – threatened, and
- Eastern Meadowlark (*Sturnella magna*) – threatened.

The Ontario *Endangered Species Act* (2007) provides legal protection to Endangered and threatened species confirmed on a site. For context, relevant excerpts from this Act are included below:

> Subsection 9(1) of the Act states that:
> *No person shall,*
> *(a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;*
> *(b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,*
> *(i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species,*
> *(ii) any part of a living or dead member of a species referred to in subclause (i),*
> *(iii) anything derived from a living or dead member of a species referred to in subclause (i); or*
> (c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii).

Subsection 10(1)(a) of the Act states that:

> *No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species.*

However, under subsection 17(1) of the Act, the Minster may issue a permit that authorizes a person to engage in an activity that would otherwise be prohibited by subsection 9(1) or 10(1) of the Act provided the applicable legislative requirements of subsection 17(2) are satisfied. The *Endangered Species Act* Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits (OMNR, 2012a) is a document that provides guidance regarding permitting requirements under the Act. Relevant excerpts are provided below:

> *There are four types of permits that may be issued for authorizing activities where the activity:*
>
> - *is necessary for the protection of human health or safety - clause 17(2)(a);*
> - *has the main purpose to assist, and would assist, in the protection or recovery of the species - clause 17(2)(b);*
> - *has the main purpose not to assist in the protection or recovery of the species, but through specific and mandatory conditions outlined in the permit will result in an overall benefit to the species within a reasonable time - clause 17(2)(c); and,*
> - *will result in significant social or economic benefit to Ontario, but will not jeopardize the survival or recovery of species at risk - clause 17(2)(d).*
>
> *Permits may be issued where the following legislated requirements are satisfied:*
>
> The Minister is of the opinion that the main purpose of the activity authorized by the permit is not to assist in the protection or recovery of the species specified in the permit; but,
>
> *(i) the Minister is of the opinion that an overall benefit to the species will be achieved within a reasonable time through requirements imposed by conditions of the permit,*
> *(ii) the Minister is of the opinion that reasonable alternatives have been considered, including alternatives that would not adversely affect the species, and the best alternative has been adopted, and*
> *(iii) the Minister is of the opinion that reasonable steps to minimize adverse effects on individual members of the species are required by conditions of the permit.*

The Minister is not obligated to issue an Overall Benefit Permit to a proponent. An Overall Benefit Permit may only be issued where the legislated requirements in clause 17(2)(c) of the Act will be met by the conditions in the permit.

Notably, in July 2013, Ontario Regulation 176/13 (to amend O. Reg. 242/08) came into effect and simplifies the process for addressing activities that can potentially damage or destroy habitat for certain species such as Barn Swallow. As a result of this regulation, an Overall Benefit Permit is not needed if the Registry process as described in the regulation is followed, although habitat replacement and monitoring are still required.

2.3 Provincial Policy Statement (PPS)

The Provincial Policy Statement (PPS) (MMAH 2014) provides policy direction to municipalities on matters of provincial interest as they relate to land use planning and development. The PPS provides for appropriate land use planning and development while protecting Ontario's natural heritage. Development governed by the *Planning Act* must be consistent with the policy statements issued under the PPS.

Land use planning within the Study Area and on the Subject Property must be undertaken in a manner that is consistent with the corresponding PPS policies relating to the natural environment. These are outlined in Section 2.1 - Natural Heritage, Section 2.2 – Water, and Section 3.1 - Natural Hazards of the PPS, and relevant sections from each are provided in the following pages.

2.3.1 Natural Heritage

The PPS includes policies that speak to the identification and protection of natural heritage systems, as well as levels of protection for the various components that comprise such systems. A number of these feature components, as well as a connected Natural Heritage System, have been identified in the Study Area, and must be assessed in the context of these policies, as well as the applicable policies under the Provincial Greenbelt Plan, Regional Official Plan Amendment 38, and Liveable Oakville Plan.

The policies specific to natural heritage are found in Section 2.1 of the PPS and are provided in their entirety below:

2.1.1 Natural features and areas shall be protected for the long term.

2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.3 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.

2.1.4. Development and site alteration shall not be permitted in:

a. significant wetlands in Ecoregions 5E, 6E and 7E; and

b. significant coastal wetlands.

2.1.5 Development and site alteration shall not be permitted in:

a. significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;

b. significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);

c. significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);

d. significant wildlife habitat;
E. significant areas of natural and scientific interest; and
f. coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.1.9 Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue.

In terms of implementation, identification of the various natural heritage features noted above is a responsibility shared by the OMNR and the municipal planning authority. The OMNR is responsible for the confirmation of habitat of endangered species and threatened species, and for its regulation (under the Act as described above), as well as for the identification of Provincially Significant Wetlands and Areas of Natural and Scientific Interest (ANSIs). Local and regional planning authorities are responsible for the identification of Significant Woodlands, Significant Valleylands, and Significant Wildlife Habitat, with support from applicable guidance documents (i.e., Natural Heritage Reference Manual, OMNR 2010; Significant Wildlife Habitat Technical Guidelines, OMNR 2000; Draft Significant Wildlife Habitat Criteria for Ecoregion 7E, OMNR 2012). Local and regional planning authorities in southern Ontario also typically work with their local conservation authority to identify and confirm non-provincially significant wetlands that may have significance at the local or regional level. As described in Section 2.1 above, identification and verification of fish habitat is now self-regulated although enforcement of the related policies and regulations is still managed by OMNR and regulated by DFO.

In areas where significant natural heritage features have been identified by the appropriate agency or planning authority, the boundaries of such features can typically be refined through site-specific studies undertaken as part of the planning process, with input from the responsible agency and/or planning authority.

2.3.2 Water

Water resources in the Study Area and on the Subject Property will be a key consideration within this EIR/FSS. Section 2.2 of the PPS directs planning authorities to protect, improve or restore the quality and quantity of surface and groundwater water resources through watershed and land use planning, as per the policies below cited in their entirety.

2.2.1 Planning authorities shall protect, improve or restore the quality and quantity of water by:

a. *using the watershed as the ecologically meaningful scale for integrated and long-term planning, which can be a foundation for considering cumulative impacts of development;*
b. *minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts;*
c. *identifying water resource systems consisting of ground water features, hydrologic functions, natural heritage features and areas , and surface water features including shoreline areas, which are necessary for the ecological and hydrological integrity of the watershed;*
d. *maintaining linkages and related functions among ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas;*
e. *implementing necessary restrictions on development and site alteration to:*
    a. *protect all municipal drinking water supplies and designated vulnerable areas; and*
    b. *protect, improve or restore vulnerable surface and ground water, sensitive surface water features and sensitive ground water features, and their hydrologic functions;*
f. *planning for efficient and sustainable use of water resources, through practices for water conservation and sustaining water quality;*
g. *ensuring consideration of environmental lake capacity, where applicable; and*
h. *ensuring stormwater management practices minimize stormwater volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces.*

2.2.2 *Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored.*

Mitigative measures and/or alternative development approaches may be required in order to protect, improve or restore ***sensitive surface water features, sensitive ground water features, and their hydrologic functions.***

Compliance with these policies requires a multi-disciplinary and integrated approach to land use planning, as has been utilized in this EIS.

2.3.3 Natural Hazards

In addition to balanced protection of natural heritage and water resources, the PPS also includes policy direction regarding reducing the potential risk to Ontario's residents from natural or human-made hazards. Section 3.1 of the PPS generally discourages development within identified natural hazards (i.e., areas that are at risk of flooding and / or erosion).

Natural hazards that need to be considered on the Subject Property include the flooding and erosion hazards associated with Fourteen Mile Creek and its tributaries.

2.4 Parkway Belt West Plan

The Subject Property was removed from the Parkway Belt West Plan (PBWP) in 1998, but is located immediately adjacent to lands that still form part of the PBWP. The Fourteen Mile Creek valleylands adjacent to the Subject Property and the hydro corridor that bisects the Subject Property both remain zoned as PBWP, and therefore the PBWP's policies require some consideration.

The PBWP was implemented in 1978 with the intent of planning a multipurpose utility corridor, urban separator and linked open space system in the western GTA. A consolidated version of the PBWP was prepared in 2008, which incorporates numerous previous amendments.

The goals of the PBWP are as follows:

1) *Separate and define the boundaries of urban areas, thus helping to provide the residents with a sense of community identification.*
2) *Link urban areas and areas outside the region by providing space for the movement of people, goods, energy, and information, without disrupting community integrity and function.*
3) *Provide a land reserve for future linear facilities (such as highways, electric power transmission corridors, and pipelines) and for unanticipated activities requiring sites of high accessibility and substantial land area.*
4) *Provide a system of open space and recreational facilities linked with each other, nearby communities and other recreational areas.*

The PBWP categorizes lands within the plan area as Public Use Area and Complimentary Use Areas. These lands are subjected to corresponding policies. Permitted uses are limited to agricultural operations and associated dwellings, existing uses, single detached dwellings on existing lots, recreational uses including golf courses and driving ranges (subject to a number of conditions), forest, wildlife and fisheries management, archaeological activities, linear transportation, communication and utility facilities, small scale public uses, cemeteries, home occupations, home industries, veterinary clinics, animal kennels in conjunction with a single detached dwelling, watershed management and wayside pits or quarries and portable asphalt plants for public road construction.

2.5 Greenbelt Plan

The boundary of the Greenbelt Plan Area is illustrated on Schedules 1 and 4 of the Greenbelt Plan and is prescribed by Ont. Reg. 59/05, as provided by the *Greenbelt Act* (2005). Although the Greenbelt Plan Area is identified immediately to the west of the Subject Property, no portions of the Subject Property overlap with the Greenbelt Plan Area. The policies of the Greenbelt Plan do not apply to lands beyond the Greenbelt Plan Area, and therefore are not discussed further here.

2.6 Regional Municipality of Halton Official Plan

The Halton Region Official Plan (ROP), last consolidated in 2006, is the Official Plan which is currently in effect and applies to the Subject Property. Regional Official Plan Amendment (ROPA) 38, is partially in effect, and those policies were also considered in formulating responses to comments from

the Town's peer review team. Some discussion of the new policies included in ROPA 38 has been provided in **Section 2.6.2** below.

2.6.1 2006 Official Plan

Map 1 – Regional Structure of the 2006 Official Plan identifies the following overlays within the Subject Property (see **Figure 2**), which are described in the following sections.

- Urban Area
- Greenlands B
- Parkway Belt West Plan (PBWP) Area (hydro corridor)
- Environmentally Sensitive Area (ESA)

2.6.1.1 Urban System

The Subject Property is contained within the Urban Area and subject to the Urban System policies.

2.6.1.2 Greenlands System

The Fourteen Mile Creek valley which is adjacent to the Subject Property is identified as Greenlands A. The Greenlands A designation has been applied to the regulatory floodplain associated with this valley system. A small portion of the Subject Property associated with an agricultural field is designated Greenlands B. This designation includes Public Open Space, portions of the Fourteen Mile Creek Environmentally Sensitive Area (ESA) outside Greenlands A, Significant Woodlands, Areas of Natural and Scientific Interest and other environmental features.

The Regional Greenlands System includes Escarpment Natural Area, Greenlands A, Greenlands B and Regional Waterfront Parks. The goal of the Greenlands System is to "*maintain as a permanent landform an interconnected system of natural areas and open space that will preserve areas of significant ecological value while providing, where appropriate, some opportunities for recreation*".

Section 132 of the ROP states that it is the policy of the Region to:

> *132(1) Require Local Official Plans to include policies directing development in Urban Areas, Hamlets or Rural Clusters away from Greenlands B areas on those parcels of land that are partially within Greenlands B designation. Such policies may include transferring development potential from areas inside Greenlands B to areas outside.*
>
> *132(2) Consider all Woodlands 0.5 ha or larger to be an important natural heritage feature and candidates for assessment as Significant Woodlands in applying the criterion of Section 130(1) e).*
>
> *132(3) Enact a tree conservation bylaw, in accordance with Section 147(5) a) of this Plan.*
>
> *132(4) In areas where Greenlands B are not defined through Section 115 or 115.1, identify and show on Map 1 Significant Woodlands within Urban Areas as a component of Greenlands B as set out in Section 130(1) through Watershed Management Plans, Subwatershed Studies, or individual site-specific Environmental Impact Assessments.*

Part 3 of the ROP includes a number of policies relating to the Greenlands System. Section 115 contains policies relating to the identification and protection of the Greenlands System as well as policies for developing alternatives. Section 116.1 contains policies related to making adjustments to the boundaries of Greenlands System.

Policy 116.1 states:

116.1 The mapping of certain components of Greenlands A or B may be updated, with additions, deletions and/or boundary adjustments, through programs of the Ministry of Natural Resources, Conservation Authorities and/or the Region. The Region will maintain mapping showing such changes and incorporate such mapping expeditiously by amendment to this Plan.

The boundaries of the Regional Natural Heritage System may be refined, with additions, deletions and/or boundary adjustments, through:

- *a) a Sub-watershed Study accepted by the Region and undertaken in the context of an Area-Specific Plan;*
- *b) an individual Environmental Impact Assessment accepted by the Region, as required by this Plan; or*
- *c) similar studies based on terms of reference accepted by the Region.*

Once approved through an approval process under the Planning Act, these refinements are in effect on the date of such approval. The Region will maintain mapping showing such refinements and incorporate them as part of the Region' s statutory review of its Official Plan.

Section 118 contains policies that are particularly relevant to this EIS. Notably, what the Region calls an Environmental Impact Assessment (EIA) is equivalent to what the Town calls an EIS.

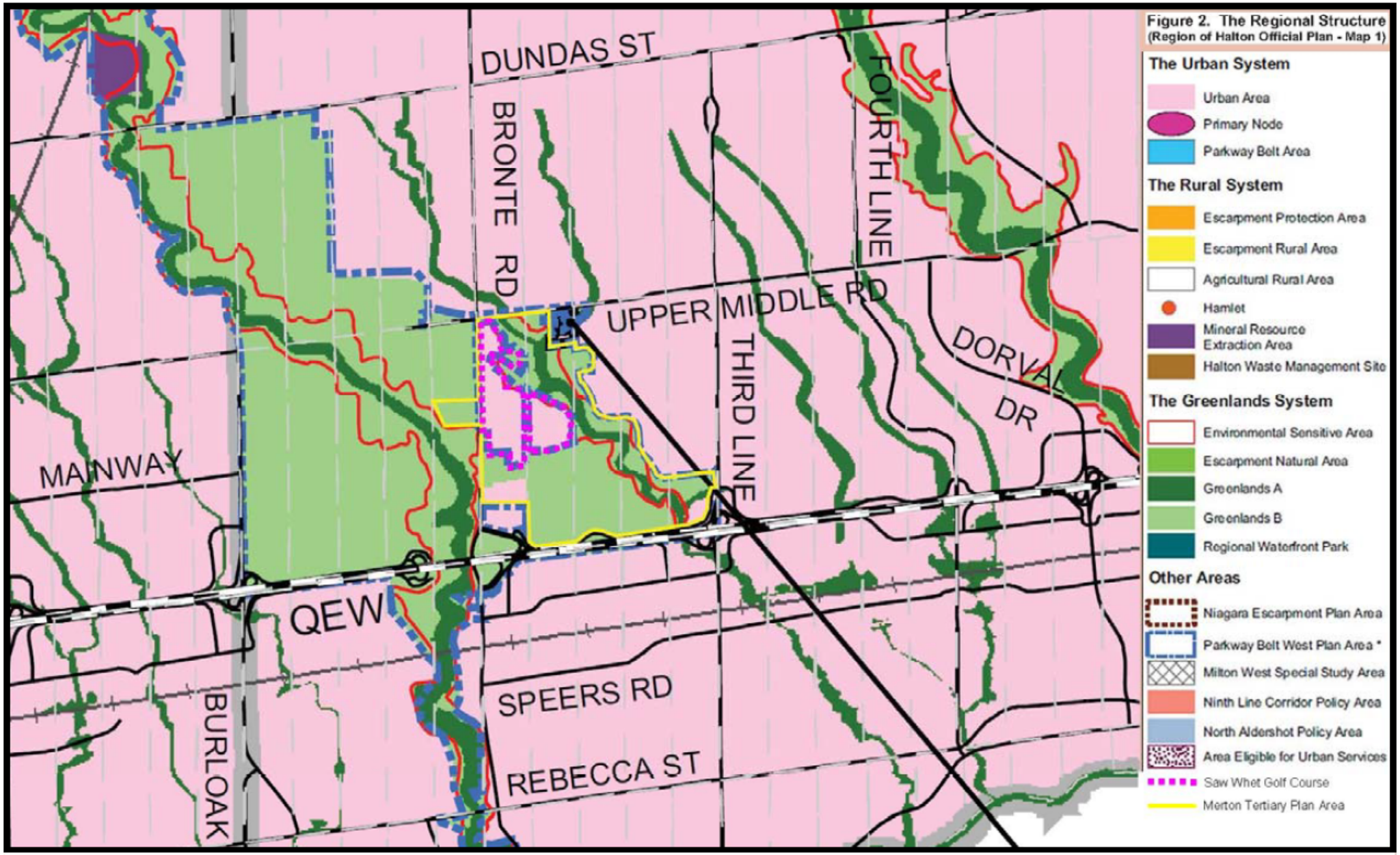
Policy 118 states that it *is the policy of the Region to*:

1) *Require Local Official Plans to recognize the Regional Greenlands System as identified in this Plan and include policies in accordance with its goal and objectives.*

2) *Restrict the alteration of the physical and/or biological features within the Greenlands System.*

3) *Require the proponent of any development, including public works, that is located wholly or partially within the Greenlands System or Adjacent Lands or that has the potential to alter the physical and/or biological features within the Greenlands System, to carry out an Environmental Impact Assessment (EIA), unless:*

    - *a) the proposed development is an individual consent;*
    - *b) a use conforming to the Local Official Plan and permitted by Local Zoning Bylaws; or*
    - *c) where Greenlands A and B have been defined through Section115 or 115.1, the requirements for the EIA and the implementation of its*


DUNDAS ST
BRONTE RD
FOURTH LINE
UPPER MIDDLE RD
THIRD LINE
DORVAL DR
MAINWAY
QEW
SPEERS RD
REBECCA ST
BURLOAK
Figure 2. The Regional Structure
(Region of Halton Official Plan - Map 1)
The Urban System
Urban Area
Primary Node
Parkway Belt Area
The Rural System
Escarpment Protection Area
Escarpment Rural Area
Agricultural Rural Area
Hamlet
Mineral Resource Extraction Area
Halton Waste Management Site
The Greenlands System
Environmental Sensitive Area
Escarpment Natural Area
Greenlands A
Greenlands B
Regional Waterfront Park
Other Areas
Niagara Escarpment Plan Area
Parkway Belt West Plan Area *
Milton West Special Study Area
Ninth Line Corridor Policy Area
North Aldershot Policy Area
Area Eligible for Urban Services
Saw Whet Golf Course
Merton Tertiary Plan Area

recommendations under Section 118(4) are met through Local Official Plan policies.

4) *Require that the recommendations of an Environmental Impact Assessment, including the placement of lot lines and structures, carried out under Section 118(3) and endorsed by the Region be implemented through official plan amendments, zoning bylaws, site plan control, conditions of planning approval or regulations by the appropriate authority.*

2.6.1.3 Environmentally Sensitive Area

The Subject Property contains portions of the Fourteen Mile Creek valleylands. These valleylands are identified as Environmentally Sensitive Areas (ESAs) by the Region of Halton. The Fourteen Mile Creek valleylands form part of the Fourteen Mile Creek Valley - ESA #12.

Policy 119 of the Region of Halton Official Plan describes ESAs as follows:

> *Environmentally Sensitive Areas (ESAs) are land and water areas within the Greenlands System containing natural features or ecological functions of such significance as to warrant their protection in the best long term interests of the people and environment of Halton. They are shown on Map 1 as an overlay, to which specific policies apply. Permitted uses in ESAs are governed by the underlying land use designations shown on Map 1. While the Region maintains mapping showing the general boundaries of the ESAs, precise boundaries of ESAs are to be established through an Environmental Impact Assessment (EIA). In designating ESAs, the Region will give specific regard to maintaining the long term viability of existing agricultural operations.*

Policy 120 of the Region of Halton Official Plan lists the objectives of ESAs as follows:

1. *To preserve and enhance natural biotic diversity.*
2. *To preserve the ecological integrity, including inter-connections, within and between natural ecosystems.*
3. *To preserve native species communities that are rare, threatened or endangered based on regional, Provincial or national scales of assessment.*
4. *To preserve examples of the landscape that display significant earth science features and their associated processes.*
5. *To preserve examples of original, characteristic landscapes that contain representative examples of bedrock, surface landforms, soils, flora and fauna, and their associated processes.*
6. *To preserve and enhance the quality and quantity of ground and surface water.*
7. *To preserve and enhance air quality.*
8. *To provide opportunities for scientific study, education and appropriate recreation.*
9. *To preserve the aesthetic character of natural features.*

Policy 121 of the Region of Halton Official Plan describes ecological criteria for ESA designation as follows:

ESAs include areas that are determined by the Region to meet the criteria and objectives for ESAs as contained in the report Environmentally Sensitive Area Study Addendum Report (September 1991). The primary criteria for designation, as detailed in the Appendix of this Plan, are as follows:

1. *Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.*
2. *Areas that are determined to serve a significant ecological function between adjacent natural systems.*
3. *Areas that contain a relatively high number of native plant communities in the context of Halton Region.*
4. *Areas that contain large (in the context of Halton Region), relatively undisturbed expanses of natural, native plant communities.*
5. *Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.*
6. *Areas that contain plant and/or animal species that are rare Provincially or nationally.*
7. *Areas that contain representative earth science and/or processes typical of those which were instrumental in forming Halton's landscape.*
8. *Areas that are determined to contribute significantly to local and/or regional groundwater recharge.*
9. *Areas that are determined to be significant groundwater discharge areas.*
10. *Areas that contribute significantly to groundwater quality.*
11. *Areas that contribute significantly to maintaining surface water quality.*

An area must fulfil at least one primary criterion to be considered for designation as an ESA. Secondary criteria are recognized, but do not factor into ESA designation. The Fourteen Mile Creek Valley (ESA #12) ESA fulfills multiple primary and secondary level criteria.

Fourteen Mile Creek Valley (ESA #12)

The following lists the primary ESA criteria that are satisfied by the Fourteen Mile Creek Valley ESA (#12) as identified in the *Halton Region Environmentally Sensitive Areas Consolidation Report (Regional Municipality of Halton and North - South Environmental Inc. 2005*).

3. *Areas that contain a relatively high number of native plant communities in the context of Halton Region.*
   At least seven native plant communities have been identified to date.

6. *Areas that contain plant and/or animal species that are rare provincially or nationally.*
   The following nationally or provincially rare plant species have been found in this ESA: Slender Sedge (Carex gracilescens), Hawthorn (Crataegus conspecta), Sharp-leaved Goldenrod (Solidago arguta var. arguta).This ESA contains the following nationally and provincially rare animal species: Redside dace (Clinostomus elongatus)

9. *Areas that are determined to be significant groundwater discharge areas.*
   A sand lens occurs upstream of the ESA and discharges water to the ESA (Axon pers. comm., 1992-93).

11. *Areas that contribute significantly to maintaining surface water quality and quantity.*
    The wooded hillsides and the well-developed floodplain communities serve to maintain surface water quality in Fourteen Mile Creek.

In addition to the primary criteria noted above, the Fourteen Mile Creek Valley ESA (#12) also fulfills one secondary ESA criterion which has no bearing on its designation.

2.6.2 Regional Official Plan Amendment (ROPA 38)

At the time of report preparation, ROPA 38 was still under appeal at the Ontario Municipal Board (OMB) and a Board Order had not yet been issued putting ROPA 38 into force. However, as there are no outstanding appeals related to the Subject Property, the EIS has had regard for the policies in the most recent consolidation of the ROPA 38 policies November 28, 2014) even though the Terms of Reference (**Appendix A**) do not explicitly require it.

Key changes put forward through ROPA 38 include:

- Greenlands A and B as well as Environmentally Sensitive Areas (ESAs) are no longer specifically referenced; these areas have now been integrated into the Region's Natural Heritage System (RNHS).
- The RNHS is comprised of additional features that were previously not specifically included within the Regional Greenlands Systems or ESAs (i.e., linkages, buffers, and enhancements to key features, as shown in Map 1G of ROPA 38).
- More clarity is provided in terms of the inter-relationship between the RNHS, Provincial Greenbelt NHS and the Escarpment Plan.
- Specifically related to this EIS:
    - Policy 118(3) requires that the proponent of any development or site alteration within 120 m of the RNHS undertake an Environmental Impact Assessment (EIA) to demonstrate that the development will not have a negative impact on the portions of the RNHS potentially affected by the activity.
    - Policy 116.1 allows for refinement to the RNHS boundaries through further studies such as an EIA. The purpose of this policy is to allow for refinements to be made to more accurately reflect the RNHS limits, and to allow for alternative RNHS configurations that achieve RNHS goals and objectives.

Notably, we understand an EIS to be synonymous with an EIA. This EIS has been prepared to fulfil the requirements of an EIA at the site specific level and draws heavily on the broader scale data collection and analyses conducted for the TPA-wide Merton EIS.

Through the TPA-wide Merton EIS, recommendations for refinements to the boundaries of the RNHS as identified on ROPA 38 Map 1G were made using a systems based approach like that used to develop the current RNHS, but applied to new and more detailed information obtained through current and comprehensive field assessments on the Subject Property and adjacent lands.

The refined NHS boundaries (see **Section 4.3.12**) proposed through this EIS more accurately define the RNHS limits and are inclusive of all identified key features, linkages, buffers, and enhancements to key features, including some additional areas not currently reflected on ROPA 38 Map 1G.

2.7 Liveable Oakville Plan (2009)

As the Subject Property is entirely within the Town of Oakville, it is also subject to the Town's in force Official Plan, Liveable Oakville (2009).

- Schedule A-1 of the Livable Oakville Plan establishes the general 'Urban Structure'. Urban structure categories on the Subject Property include Residential.
- Schedule H of the Liveable Oakville Plan designates land use on the Subject Property primarily as 'Private Open Space' (ref. **Figure 3**).
- Schedule B of the Liveable Oakville Plan identifies Natural Features and Natural Hazards (ref. **Figure 4**).

In these schedules, the Subject Property is identified as having the following Natural Feature and Natural Hazards overlays: Floodplain (Fourteen Mile Creek), Woodlands (Fourteen Mile Creek), Wetlands (along Fourteen Mile Creek) and Environmentally Sensitive Area (Fourteen Mile Creek valleylands). Policies relating Natural Areas are provided in Section 16 of Livable Oakville. The purpose of this designation is to ensure the long term protection of natural features and functions. The policies state that features may also have some passive recreation opportunity, including trails and education.

Natural Areas include:

i. *significant habitat of endangered species and threatened species;*
ii. *wetlands;*
iii. *woodlands;*
iv. *valleylands;*
v. *significant wildlife habitat;*
vi. *Environmentally Sensitive Areas;*
vii. *areas of natural and scientific interest*
viii. *fish habitat; or,*
ix. *natural corridors.*

Section 16.1.7 contains policies relating to wetlands. It states that development and site alteration are not permitted within a provincially, regionally or locally significant wetland or within the 30 m buffer. The final width of a wetland buffer is to be established through an Environmental Impact Study (EIS) or subwatershed study. Development within 120 m of a wetland must demonstrate through an EIS that there are no negative impacts to the features of ecological functions of the wetland. There are no evaluated wetlands within the Study Area; however wetlands associated with the NHS could be considered locally and regionally significant.

Section 16.1.8 contains policies relating to woodlands. It states that development or site alteration is not permitted within regionally significant woodlands or within their required 10 m buffers. Any development within 120 m of a regionally significant woodland must be supported by an EIS that can demonstrate that the proposed development will not negatively impact the woodland or its ecological functions. There are portions of woodlands on the Subject Property that meet the regional Official Plan criteria for significant woodlands, and these woodlands and a corresponding 10 m buffer are protected within the NHS developed through this EIS.

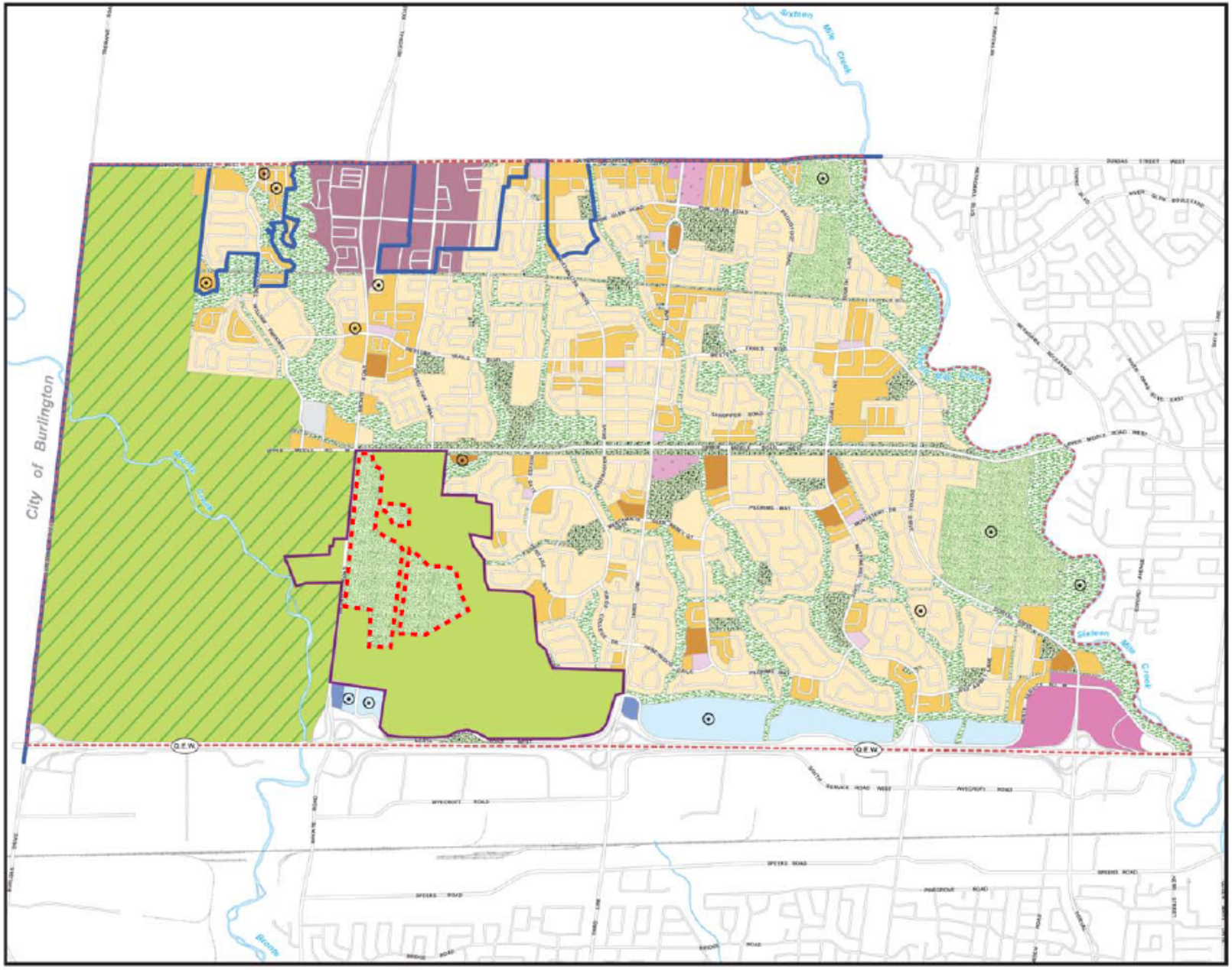


Figure 3. West Oakville Land Use

(Livable Oakville Plan - Schedule H)

- SAW WHET GOLF COURSE
- MERTON TERTIARY PLAN AREA
- BUILT BOUNDARY
- SCHEDULE AREA BOUNDARY
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- COMMUNITY COMMERCIAL
- CORE COMMERCIAL
- OFFICE EMPLOYMENT
- BUSINESS COMMERCIAL
- NATURAL AREA
- PARKWAY BELT
- PARKS AND OPEN SPACE
- PRIVATE OPEN SPACE
- UTILITY
- GROWTH AREA*
- GREENBELT**
- RAILWAY

* Refer to Part E, Growth Area Policies

** Refer to Part E, Special Policy Areas

⊙ Refer to Part E, Exceptions

N.T.S.

September 7, 2012

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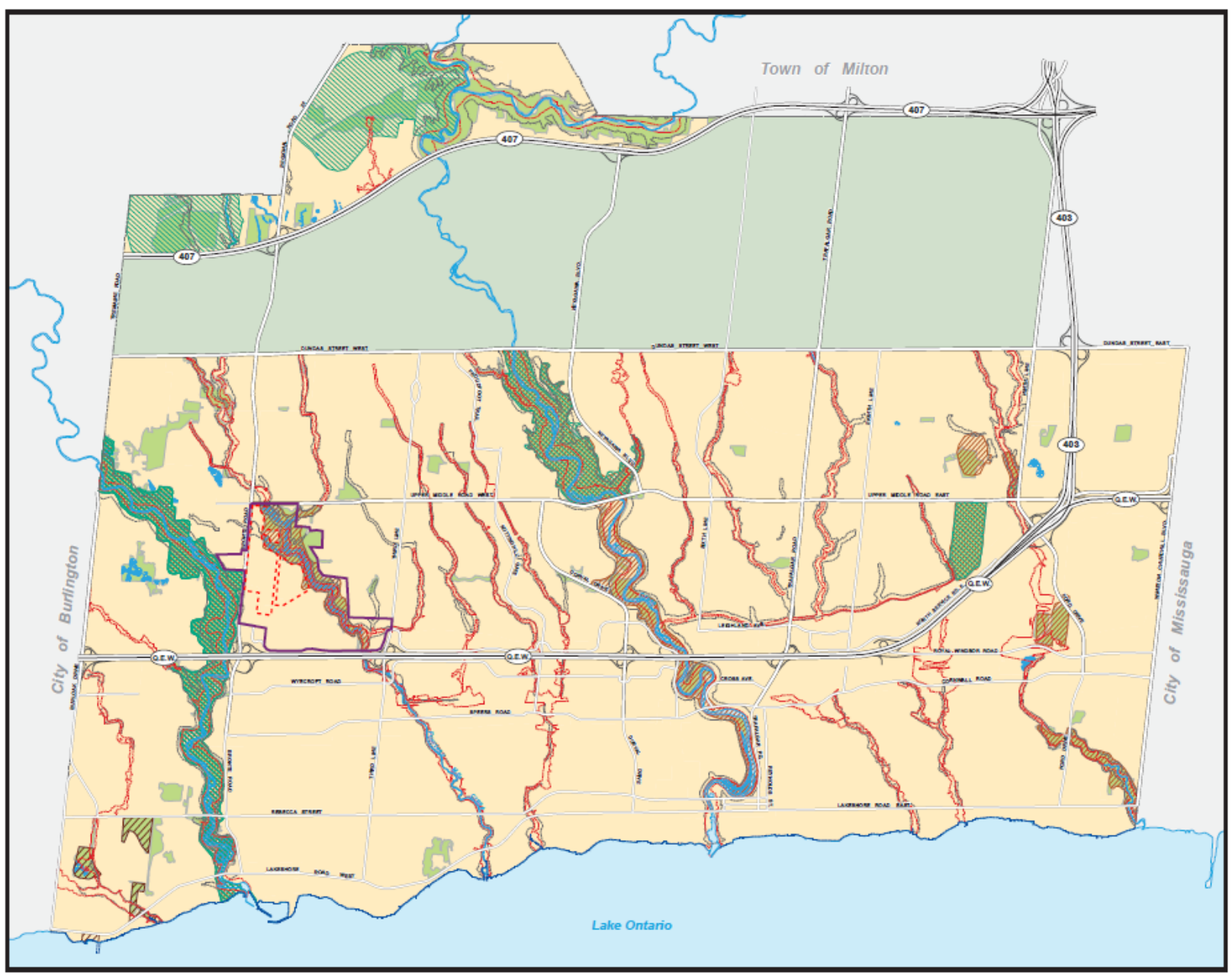

Figure 4. Natural Features and Hazard Lands

(Livable Oakville Plan - Schedule B)

- SAW WHET GOLF COURSE
- MERTON TERTIARY PLAN STUDY AREA
- FLOODPLAIN
- SHORELINE FLOOD LIMIT
- VALLEYLANDS
- SIGNIFICANT WILDLIFE HABITAT
- AREA OF NATURAL AND SCIENTIFIC INTEREST
- ENVIRONMENTALLY SENSITIVE AREAS
- WETLANDS
- WOODLANDS
- LANDS NOT SUBJECT TO THE POLICIES OF THIS PLAN

NOTE: Natural features and hazard lands are shown conceptually and for reference purposes only.

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Section 16.1.9 contains policies relating to valleylands. It states that development and site alteration are not permitted within valleylands or their setbacks, with the exception of recreational uses and essential public works. The limits of valleylands are defined by their long-term stable top of slope as determined through geotechnical assessments. A setback of 7.5 m is assigned to minor valley systems (such as Fourteen Mile Creek valley). The valleylands adjacent to the Subject Property are being protected in the proposed NHS, and a 7.5 m setback to their long-term stable top of slope has been applied.

Section 16.1.10 contains policies relating to significant wildlife habitat. It states that development is not permitted in significant wildlife habitat unless it can be demonstrated through and EIS that there will be no negative impact on the significant wildlife habitat features or functions. Any development within 120 m of significant wildlife habitat requires an EIS. There is no candidate significant wildlife habitat on the Subject Property; however there is some associated with the adjacent valleylands. These habitats and their functions are identified in the EIS as being protected.

Section 16.1.11 contains policies relating to ESAs. It states that development or site alteration within or adjacent to ESAs is restricted, in accordance with the development policies of Region of Halton Official Plan. Notably, both the current Regional Official Plan (2006). The proposed ROPA 38 policies allow for boundary refinement of natural features, including ESAs, through an EIA (considered synonymous with an EIS) (i.e., policies 118 and 116.1 respectively). Notably, ROPA 38 no longer explicitly idenitifies or includes ESAs as a component of the Regional Natural Heritage System.

Section 26.5.1 states that the Merton lands have "*been identified for potential future development and should be comprehensively studied to determine future land uses and policies".* Comprehensive studies for potential future development areas are intended to address servicing and infrastructure needs, including a detailed transportation needs analysis, phasing of servicing and development, and appropriate land uses. Approvals for individual site development applications in these areas are considered premature until the necessary comprehensive studies are completed. With respect to the Subject Lands, a comprehensive EIS was completed and submitted, along with the other required studies, as part of the Merton TPA study process in 2013. Therefore, this EIS, which has been submitted subsequently and draws heavily on these more comprehensive studies, is not considered premature.

2.8 *Conservation Authorities Act* and Regulations

The Study Area includes regulated areas such as valleylands, floodplains, watercourses and wetlands. Ontario Regulation (Ont. Reg. 162/06) under the *Conservation Authorities Act* relates to Regulation of Development, Interference with Wetlands and Alterations to Shoreline and Watercourses. Under this regulation, any development of site alteration within a regulated area requires a permit from Conservation Halton.

According to the Policy and Guidelines for the Administration of Ont. Reg. 162/06 & Land Use Planning Document (Conservation Halton 2011), development is prohibited within 15m of the stable top of bank of major valleys and 7.5m of the stable top of slope of minor valleys. In addition, proposals for development within 30 m of any wetland features require that an EIS be prepared to the satisfaction of the Conservation Authority.

As of November 25th, 2013, Conservation Authorities no longer completes screenings on behalf of DFO under the Federal *Fisheries Act* and so overseeing fish habitat related approvals is no longer within their mandate.

3. Study Methodology

The following tasks were completed as part of the Subject (Saw-Whet) Property EIS:

- Background information collection and review;
- Consultations with the Study Team, Town, and Agencies;
- Field Investigations;
- Feature Staking;
- Identification of Constraints and Opportunities;
- Evaluation of the Proposed Development;
- Impact Assessment;
- Recommendations for Mitigation and Monitoring; and
- Policy Compliance.

A general description of the methods and/or approach used to complete these tasks for each discipline is provided below.

As part of the background review, the Optimal Use Report and Natural Heritage Study QEW & Bronte Road (GSP Group Inc. *et al*., 2011) was considered by the Study Team. In addition, a number of technical studies have been completed within the Study Area in support of this EIS by members of the multi-disciplinary Study Team. The technical studies cover disciplines that are critical:(a) to the understanding of the environmental conditions in the Study Area, and (b) for identifying opportunities and constraints to future land uses. Key technical studies that have been relied upon in preparation of this EIS are listed below:

- Hydrogeological Study – Merton Tertiary Planning Area (R.J. Burnside & Associates Limited, 2014)
- Hydrologic Study - Area Servicing Plan and Functional Servicing Study (DSEL, 2014, revised January 2015)
- Geomorphic Assessment of Fourteen Mile Creek and Tributaries (Parish Geomorphic, 2013)
- Geotechnical Investigation – Saw-Whet Golf Course Property (Soil Engineers Limited, 2012)

A brief description of the study scope for each of these supporting technical studies is provided in the following sections. For more detailed study methods and descriptions, please refer to the individual technical reports provided under separate cover.

3.1 Physical Environment

3.1.1 Hydrogeology

A detailed hydrogeological assessment of the Subject Property was completed by R.J. Burnside & Associates Limited over 2012, 2013 and 2014.

The main elements of the hydrogeological study are listed below:

1) Review of the Ministry of the Environment (MOE) well records;
2) Review of published geological and hydrogeological mapping and reports;
3) Review of geotechnical information for the subject lands including borehole logs and grain size data to characterize the soil conditions;
4) Installation and monitoring of observation wells and drive-point piezometers to investigate shallow groundwater conditions;
5) Hydraulic conductivity testing of selected monitoring wells to assess the *insitu* hydraulic conductivity of the surficial soils;
6) Spot flow monitoring of surface water along Fourteen Mile Creek and its tributaries;
7) Surface and groundwater quality sampling;
8) Completion of a water balance analysis to estimate the groundwater recharge potential on the Subject Property under pre-development and post-development conditions;
9) Feature-based groundwater balance for the Fourteen Mile Creek tributaries; and,
10) Evaluation of groundwater related low-impact development (LID) measures that could be incorporated into the development to promote recharge.

The locations of piezometers, groundwater wells, and surface flow monitoring stations are shown on **Figure 5**.

Detailed descriptions of the study scope of work and methodology are provided in the R.J. Burnside & Associates Limited report, *Hydrogeological Study, Merton Tertiary Planning Area, Town of Oakville, Ontario* (2014).

Additional water balance calculations were also prepared by Burnside for the Subject Property based on the Draft Plan concept. These calculations are provided in Appendix F of the Functional Servicing Report (FSR) prepared by David Schaeffer Engineering Limited (DSEL, 2015).

3.1.2 Hydrology

A FSR was prepared for the Subject Property by David Schaeffer Engineering Ltd. (DSEL) (2015). The FSR includes an assessment of existing surface drainage conditions and proposed servicing conditions. The FSR has identified pre-development and post-development drainage boundaries and catchments, and hydrologic requirements for the sensitive natural features and watercourses that are planned to receive runoff from the proposed development, which falls within the Fourteen Mile Creek watershed.

The FSR outlines how the proposed development will be serviced in such a way as to meet stormwater management targets with respect to quantity, quality and erosion control. The FSR also

links the proposed stormwater plan to the infiltration targets outlined in the hydrogeological study (R.J. Burnside & Associates Limited, October 2014).

The Town of Oakville has undertaken an update to the existing conditions hydrologic model for Fourteen Mile and McCraney Creeks. The Fourteen Mile Creek/ McCraney Creek Flood Management Alternative Assessment (AMEC, July 2013) and associated calibrated PCSWMM model form an important part of the FSR, as they quantify the existing flows and water levels in Fourteen Mile Creek and its tributaries under various storm events. This calibrated, existing condition information was used to derive appropriate quantity control targets for stormwater management for the area within the Subject Property that is to drain to Fourteen Mile Creek.

The Ministry of the Environment *Stormwater Management Planning & Design Manual* (MOE, 2003) and Ministry of Natural Resources *Draft Guidance for Development Activities in Redside Dace Protected Habitat* (OMNR, 2011) were used to derive appropriate quality control targets, while the fluvial geomorphology study (discussed in **Section 3.1.3**) was used to define erosion targets. Stormwater management pond requirements were obtained from the Ministry of Environment *Stormwater Management Planning & Design Manual* (MOE, 2003).

For additional details, please refer to the FSP for the Subject Property (DSEL, 2015).

3.1.3 Fluvial Geomorphology

A geomorphic assessment of Fourteen Mile Creek and its tributaries was completed by Parish Geomorphic (2014). Information from this study has been integrated into this EIS.

The purpose of the geomorphic assessment is to characterize the existing function of the Fourteen Mile Creek and its tributary channels within the Study Area, and develop an understanding of the existing conditions and potential for functional changes in response to changes in land use.

The geomorphic assessments consisted of the following components:

1) Review of relevant background information;
2) Delineation of channel reaches associated meander belt widths, and erosion hazard limits within the Study Area;
3) Field reconnaissance of the watercourses within the Study Area;
4) Collection of detailed channel geometry and sediment data at selected locations to gauge relative stability and further characterize site conditions; and
5) Determination of erosion thresholds (critical discharges) at select sites.

Reach delineation within the Study Area was based on delineations from previous geomorphic assessment work (Parish Geomorphic Ltd., 2008; AECOM 2010). Delineations were reapplied with the exception of reaches R-74 and R-75. These reaches were split into two sub-reaches (R-74a/b and R-75a/b) for the current study based on the presence of a tributary junction and a change in sinuosity. An additional reach break was also added to 14W-E1 (known as R-75a in Oakville Erosion 2008/2010) to separate the channel into two reaches: R-75a-1 and R-75a-2 for the current study (**Figure 5**). This break was based on change in valley setting, surrounding vegetation, and channel characteristics.

Aquatic and Hydrological Monitoring Sites

Figure 5

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Reach Breaks
- Swale
- Watercourse
- 1 Pond

Monitoring Stations (Locations Approximate)

- Water Temperature (2012)
- Water Temperature (2013)
- Surface Water Flow
- Surface Water Flow and Quality
- Piezometer
- Ground Water Monitoring Well

First Base Solutions
Web Mapping Service 2012

UTM Zone 17 N, NAD 83

0 45 90 180 Meters

1:5,000

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Reaches were characterized using detailed fieldwork and two established reconnaissance techniques, the Rapid Geomorphic Assessment (RGA) and the Rapid Stream Assessment Technique (RSAT). The reconnaissance work examines the channel's overall health and stability using representative geomorphic indicators while the detailed work provides a quantitative description of the channel hydraulics and dimensions. Rapid assessments were completed for all reaches and detailed fieldwork was conducted on representative reaches SW2, R75a and 73 (**Figure 5**).

For additional details regarding the methods used, please refer to the *Geomorphic Assessment of Fourteen Mile Creek and Tributaries* (Parish Geomorphic, 2013).

3.1.4 Geotechnical Assessment

Slope stability assessments were conducted on the Subject Property by Soil Engineers Ltd. (2012). The purpose of the slope stability assessment was to identify slope related constraints to the proposed development. The assessments were based on background information, visual inspections, borehole investigations and cross-sections.

A total of 15 boreholes were completed to document stratigraphy and groundwater elevations. This information was used to develop twelve cross-sections to provide a comprehensive overview of the slope profile and condition. The slope stability was analysed using force-moment-equilibrium criteria of the Bishop Method and the soil strength parameters.

For additional information regarding the methodologies employed, please refer to the report by Soil Engineers Ltd. (2012).

3.2 Natural Heritage Features and Functions

3.2.1 Background Review

Background information pertaining to the natural heritage resources on the Subject Property and adjacent features was gathered and reviewed at the outset of the project. Primary and secondary information sources consulted for this study are listed below.

- Ontario Ministry of Natural Resources (OMNR) Natural Heritage Information Centre (NHIC) 2012 – Biodiversity Explorer (https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do)
- *A Bio-physical Inventory of the Fourteen Mile Creek Valley* (ESA #12), Oakville, 1987, Halton Region Conservation Authority (prepared by B.K. Axon, G. Chuter and R. Huizer)
- *Halton Natural Areas Inventory*, 2006, Halton/North Peel Naturalists' Club, Conservation Halton, South Peel Naturalists' Club, Halton Region, Hamilton Naturalists Club.
- *Fourteen Mile Creek, East Branch, Scoped Subwatershed Plan East of Regional Road 25*, 2000, Philips Engineering Ltd.
- *Halton Environmentally Sensitive Area Study*. Prepared for the Regional Municipality of Halton, Planning Department. Ecological and Environmental Advisory Committee. 1978.
- *Halton Environmentally Sensitive Area Study*, prepared for the Regional Municipality of Halton, Planning and Development Department. Geomatics International Inc. 1993.

- *Halton Environmentally Sensitive Area Study*, internal report prepared by the Regional Municipality of Halton, Planning and Development Department, Regional Municipality of Halton. 1995. Updating the Geomatics International 1993 ESA Report.
- *Halton Environmentally Sensitive Areas, Consolidation Report*, Halton Region Planning and Public Works Department and North-South Environmental Inc. 2005
- Ontario Breeding Bird Atlas (2001-2005) data for square 17PJ00, http://www.birdsontario.org/atlas/datasummaries.jsp?lang=en
- *Fourteen Mile Creek, McCraney Creek, Watershed Planning Study, prepared for the Town of Oakville*, Triton Engineering Services Ltd., Ecological Services for Planning, Terraqua Investigations Ltd., J.L. Cox Planning Consultants, and D.W. Draper.1992
- *Optimal Use Report and Natural Heritage Study QEW & Bronte Road, Oakville*, 2011, Prepared for Infrastructure Ontario by GSP Group Inc., Natural Resource Solutions Inc., MTE Consultants Inc., N. Barry Lyons, Paradigm Transportation Solutions Ltd.
- *Urban Creeks and Supplemental Monitoring Long Term Monitoring Program*, 2009, Conservation Halton
- Conservation Halton wildlife species records (received on October 29, 2012)
- Audubon's Christmas Bird Count Results 1960's - 2013 (South Peel Christmas Bird Count)
- Aurora District Ministry of Natural Resources Species at Risk Information Request response (M. Thompson-Black, 2012)
- Current (2012) and historical air photos (1934, 1956, 1978, 1995,1999, 2002, 2005, 2006, 2008, 2010)
- *Fourteen Mile Creek, Main and West Branches Subwatershed Plan, June 2000* (revised January 2002), Philips Engineering Ltd.

3.2.2 Field Investigations

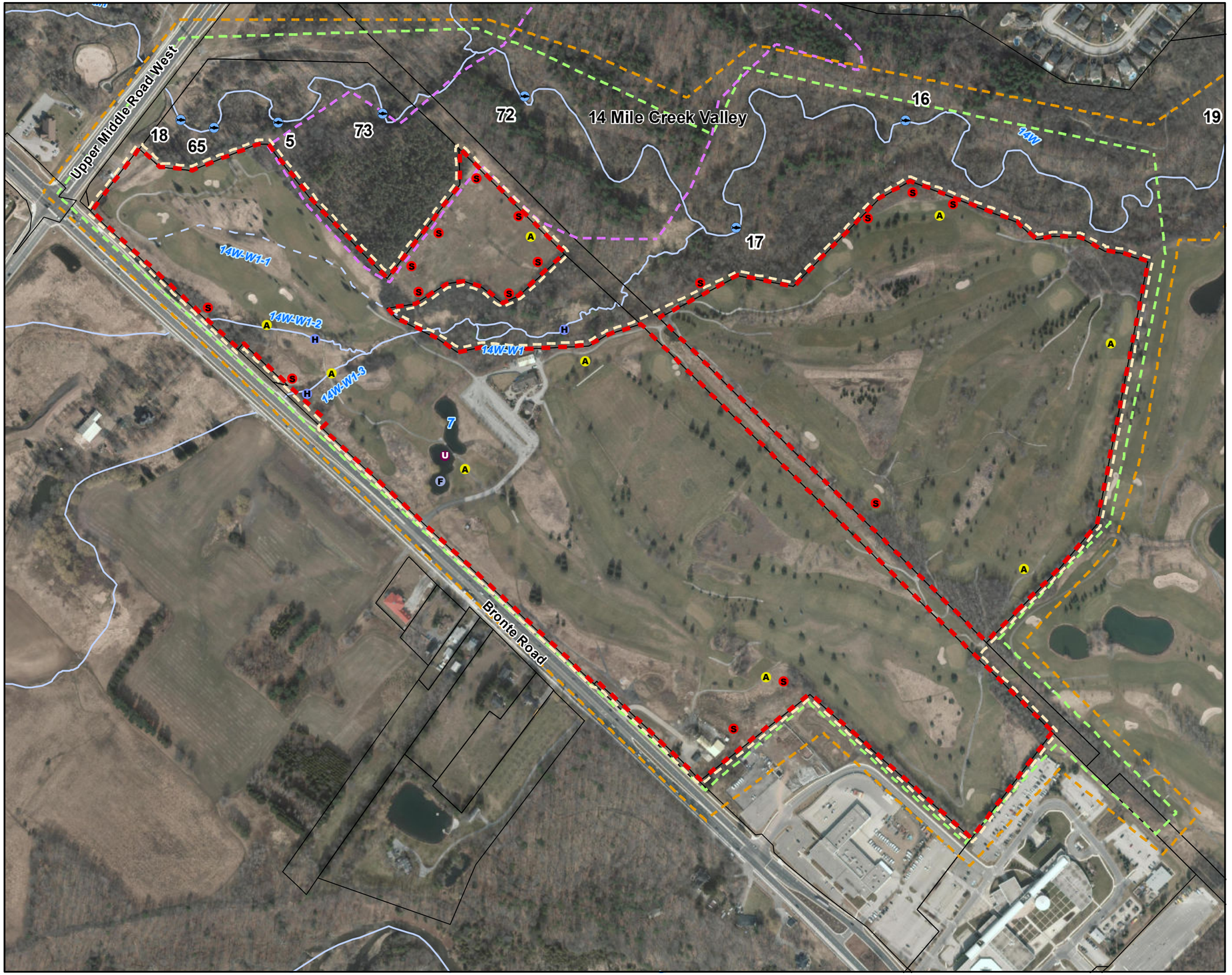
Beacon Environmental undertook a variety of terrestrial and aquatic surveys of the Subject (Saw-Whet) Property and adjacent lands over 2012, 2013 and 2014. Comprehensive field studies were also undertaken on the adjacent Deerfield Golf Club lands (owned by Infrastructure Ontario) by another firm. For details on the results of studies undertaken on neighbouring properties in the TPA, see the *Phase 2 EIS, Merton (QEW/Bronte Rd) Tertiary Planning Study, Town of Oakville, Ontario* (Beacon Environmental, 2013).

A summary of the most recent ecological surveys completed for the Study Area is presented in **Table 2**. The location of the biological surveys is presented on **Figure 6**.

Biological Survey Sites

Figure 6

Saw-Whet EIS – Saw-Whet Golf Course Ltd.



Legend

- Subject Property
- Swale
- Watercourse
- 1 Pond

Subject Property and Adjacent 14 Mile Creek Valley Surveys

- Breeding Bird, Lepidoptera and Odonata Survey
- Ecological Land Classification

Subject Property Wide Surveys

- Crayfish, Snake and Tree Inventory Surveys

Station-Specific Surveys

- U Turtle Survey
- F Fish Survey - Beacon
- 16 Fish Survey - Conservation Halton
- H Aquatic Habitat Assessment Characterization
- S Snake Survey (Cover Board)
- A Breeding Amphibian Survey

Other Surveys

- Winter Owl Survey

First Base Solutions
Web Mapping Service 2012

UTM Zone 17 N, NAD 83

N W E S

0 50 100 200 Meters

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Table 2. Recent Ecological Surveys of the Subject Property and 14 Mile Creek Valley

Survey Type	Surveyed Area	Survey Date(s)	Surveying Firm / Agency
General Site Reconnaissance	Saw-Whet Property	March 27, June 6, Aug 8, Oct 30, Nov 1 and 23, 2012	Beacon Environmental
Vegetation Communities and Flora	Saw-Whet and Fourteen Mile Creek ESA	May 8, July 3 & 11, Aug 9, Sept 13 & 28, 2012; April 30, May 24, June 11, Sept 5, 2013	Beacon Environmental
Tree Inventories	Saw-Whet Property	July 2012	Cosburn Giberson
Amphibians	Saw-Whet and Fourteen Mile Creek ESA	May 8,June 9, 2012; April 17, May 6, June 11, 2013	Beacon Environmental
Reptiles	Saw-Whet and Fourteen Mile Creek ESA	May 6, May 24, June 7, June 11, June 21, Jul 8, Sept 5, Sept 10, Sept 17, 2013	Beacon Environmental
Breeding Birds	Saw-Whet and Fourteen Mile Creek ESA	May 30 & 31 and June 23 & 24, 2012; May 30, June 25, 2013	Beacon Environmental
Fall and Winter Wildlife	Saw-Whet and Fourteen Mile Creek ESA	December 21, 2012 January 29, 2013 February 21, 2013 March 21, 2014	Beacon Environmental
Lepidoptera and Odonates	Saw-Whet Property	May 30, June 23, Sept 10, 2012, Sept 10 2013 June 15, 2014 July 5, 2014 August 1, 2014 August 19, 2014	Beacon Environmental
Aquatic Habitat Surveys	Saw-Whet and Fourteen Mile Creek ESA	June 16 and Sept 9, 2012	Beacon Environmental
Fish and Benthic Sampling	Saw-Whet Property	November 6, 2013	Beacon Environmental
Redside Dace Habitat Classification	Saw-Whet Property	July 4, 2013	Beacon Environmental OMNR Conservation Halton
Crayfish Surveys	Saw-Whet Property	Oct 30 and Nov 1, 2012, October and November 2013	Beacon Environmental
Stream Temperature Monitoring	Saw-Whet and Fourteen Mile Creek ESA	June – Sept 2012 Sept 2012 – Jan 2013	Beacon Environmental R.J. Burnside Limited
	Saw-Whet, Fourteen Mile Creek ESA	May 2013 to October 2013	Beacon Environmental

Survey Type	Surveyed Area	Survey Date(s)	Surveying Firm / Agency
Feature Staking Woodlands, Top of Slope	Saw-Whet Property	January 17, 2013	Beacon Environmental Conservation Halton Halton Region
Feature Staking Wetlands	Saw-Whet Property	June 21, 2013	Beacon Environmental, Conservation Halton

3.2.3 Vegetation Surveys

Ecological Land Classification (ELC) and floristic surveys of the Subject Property and adjacent valleylands up to the edge of Fourteen Mile Creek were conducted on:

- May 8, July 3 and 11, August 9, and September 13 and 28, 2012, and
- April 30, May 24, June 11, Sept 5, 2013.

3.2.3.1 Ecological Land Classification

Vegetation communities within the Study Area were mapped and described according to the Ecological Land Classification (ELC) system for southern Ontario (Lee *et al.*, 1998). ELC is a standardized method of classifying vegetation communities based on the key biological factors (e.g. vegetation composition and structure) and physical attributes (e.g. substrate type, moisture regime, drainage class, etc.) of the plant community.

The ELC data collected during recent field investigations was used to classify and map vegetation communities to the ecosite or ecoelement. To generate a seamless map of vegetation communities for the Subject Property and adjacent Fourteen Mile Creek valleyland, ELC mapping of the Fourteen Mile Creek ESA from the 2006 Halton Natural Areas Inventory (Dwyer, 2006) was integrated with the 2012/2013 ELC mapping prepared by Beacon Environmental.

3.2.3.2 Floristic Surveys

Three season (spring, summer and fall) floristic surveys were completed for the Subject Property between 2012 and 2013. Nomenclature follows *Flora Ontario – Integrated Botanical Information System (FOIBIS)* (Newmaster and Ragupthy, 2012). Species conservation status is based on NHIC rankings (OMNR, 2012b) and *The Vascular Plants of Halton Region* (Crins *et al.,* 2006).

3.2.3.3 Tree Inventories

In addition to the classification of vegetation communities and floristic surveys, an inventory of treed resources on the Subject Property was undertaken by Cosburn Giberson Landscape Architects between August and September 2012. All trees with trunks that measured over 10 cm in diameter at breast height (DBH) were tagged with numbered aluminum tags. Tree inventory information collected for each tree included the following: species, DBH, tree height, crown spread, biological health and condition, quality rating, remarks, preservation priority rating, and transplant potential rating.

3.2.4 Amphibian Surveys

Breeding amphibian call surveys were conducted on the Subject Property on five nights in the spring and early summer (May 8 and June 9, 2012; April 17, May 6 and June 11, 2013). Surveys were

conducted according to the Marsh Monitoring Program (MMP) protocols (Bird Studies Canada 2009). Suitable breeding habitat such as wetlands and ponds were surveyed after dusk under suitable weather conditions. The surveys focused on a pond, several wetland features, and tableland woodlots, as well as the valley woodlands adjacent to the Subject Property (ref. **Figure 6**). Weather details (i.e., air temperature, precipitation, wind speed, and cloud cover) at the time of survey were recorded.

Surveys were conducted using the point count method whereby the surveyor stands at a set point for a specific period of time and record all species that can be heard calling from the location. Each survey station was surveyed for three minutes. Calling activity for each species detected was assigned a call code as follows:

0 - no calls;
1 - individuals of one species can be counted, calls not simultaneous;
2 - some calls of one species simultaneous, numbers can be reliably estimated; and,
3 - full chorus, calls continuous and overlapping.

For call codes of 1 and 2, the estimated number of calling individuals was recorded.

Survey locations are shown in **Figure 6.** More detailed survey information (i.e., time of surveys and weather conditions) is provided in **Appendix H**.

3.2.5 Reptile Surveys

Reptile surveys on the Subject Property and adjacent features were conducted by Beacon Environmental in 2012 and 2013 using a combination of visual searches and cover board surveys.

The 2012 surveys were limited to recording incidental observations over the course of the field season during vegetation surveys on May 8, July 3 and 11, August 9, and September 13 and 28, 2012.

In 2013, 17 snake coverboards were placed on the Subject Property. The boards were placed in locations where snakes were likely to be found (i.e., at edges of woodlands and wetlands), resulting in boards clustered in an area. The forested valleylands adjacent to the Subject Property were assumed to contain snakes and were therefore not surveyed. Boards were also not placed on the golf greens as these areas provide limited habitat for snakes and would have interfered with the golf course. The boards were checked on eight occasions: May 6, May 24, June 7, June 11, June 21, July 8, Sept 5, Sept 10, and Sept 17, 2013. Additionally, on these days, turtle searches were undertaken in the golf course pond, and incidentally during all other surveys.

When snakes or turtles were detected, the species, sex (if known), number of individuals, approximate length, and behavior were recorded.

See **Figure 6** for locations of snake boards and reptile surveys, and **Appendix H** for additional survey details (i.e., time of surveys and weather conditions).

3.2.6 Avifaunal Surveys

3.2.6.1 Breeding Bird Surveys

Breeding bird surveys were conducted for the Subject Property on the mornings of May 30 and 31 and June 23, 24 and 25 2012; and May 30 and June 25 2013. Surveys times were between 5:30 am to 11:00 am; 6:30 am to 8:30 am; 5:15am to 8:45 am, and 5:30 am to 8:30 am respectively. A total of 14 hours was spent undertaking breeding bird surveys. Weather conditions during the surveys were suitable. Temperatures were within +/- 5°C of normal, without precipitation, and low winds between 0 and 2 on the Beaufort scale.

The breeding bird community was surveyed using a roving/walking type of survey in which the entire property was walked to within approximately 50 m to maximize detection of observable or calling individuals. Point count sampling was not utilized for these surveys as it generally provides for less comprehensive coverage of the site. The entire property was covered twice in 2012 (once on May 30 and 31, 2012 combined and once on June 23 and 24, 2012 combined) and twice in 2013. Additionally, any birds observed in the adjacent forested Fourteen Mile Creek valley were recorded. The location of all individuals observed or heard was noted on an aerial photograph. All species observations were assumed to be breeding, with the exception of high flyovers.

See **Figure 6** for locations of breeding bird surveys and **Appendix H** for the times and weather conditions of the surveys.

3.2.6.2 Wintering Bird and Owl Surveys

Surveys for wintering birds and roosting owls were conducted on December 21, 2012, January 29, and February 21, 2013, and on January 10, February 13, and March 21, 2014 by Beacon Environmental. The surveys were focused on portions of the Subject Property with suitable habitat where wintering owls had historically been observed, including most parts of the Subject Property and parts of the Fourteen Mile Creek valley, including both sides of the valley. The historical owl areas corresponded with the Scots Pine plantation adjacent to the Subject Property (ELC Unit 13) and other nearby areas of conifer forest along Fourteen Mile Creek (ELC Unit 27) (ref. **Figure 10**).

The surveys were conducted during the daytime with low wind and typical winter temperatures. The coldest survey day was February 13th, 2014 when at the start of the survey the temperature was minus 11^{0}C. Surveys consisted of searching for roosting owls in suitable habitat and searching the ground for owl pellets (clumps of fur and bone regurgitated by owls after feeding) or feathers. In the first winter, snow cover was not present during the December 21st, 2012 survey, but there was snow cover during the January 29th, 2013 and February 21st, 2013 surveys. In the second winter, there was snow cover, (fresh or old) during all surveys, making any pellets and feathers present easier to see. All wintering birds observed were recorded.

See **Figure 6** for general centroid locations of owl and winter bird surveys and **Appendix H** for the times and weather conditions of the surveys.

3.2.7 Mammal Surveys

No species-specific targeted mammal surveys were undertaken in the Study Area; however incidental observations of mammals and evidence of mammal habitat utilization (tracks, scat, hair, etc.) were

noted by staff during all field visits to the Subject Property. Additionally, during three of the four winter bird surveys when there was snow cover, all mammal tracks were noted on the Subject Property and in the adjacent Fourteen Mile Creek valley.

3.2.8 Lepidoptera (Butterfly) and Odonate (Dragonfly/Damselfly) Surveys

Surveys for lepidoptera and odonates were conducted on the Subject Property over a three year period between 2012 and 2014.

In 2012, surveys were undertaken on May 30, June 23 and September 10, 2012. On the first two dates observations were made between about 05:30 and 11:00 concurrent with bird surveys, and on September 10, 2012 the survey was conducted between 10:30 and 12:15. Weather conditions on the early summer days was warm (above 17ºC), with little wind and no precipitation. Conditions during the September 10, 2012 survey were >15°C with low wind and no precipitation. All individuals observed were identified to species where possible, but if not were identified to genus or family.

In 2013, a survey was undertaken on September 10, 2013, between 11:45 and 14:10. Conditions were warm (27 ºC - 31 ºC) with low wind and no precipitation. All individuals observed were identified to species where possible, but if not were identified to genus or family.

In 2014, surveys were undertaken on June 15, July 5, August 1, and August 19, 2014. These taxa-specific, intensive surveys occurred on warm days, generally between 10:00 am and 4:00 pm during days of low winds (refer to **Appendix H** for survey details). Species were identified with binoculars, or for more difficult to identify taxa, were netted for identification and then released. The abundance and general location of each observation was recorded.

3.2.9 Aquatic Resource Surveys

3.2.9.1 Aquatic Habitat Characterization

Beacon Environmental aquatic ecologists undertook aquatic habitat assessments of watercourses on and adjacent to the Subject Property on June 16, 2012 and September 9, 2012.

The assessment of aquatic resources and habitat within the Subject Property was completed following the Rapid Assessment Methodology as described in Section 4 Module 4 of the Ontario Stream Assessment Protocol (OSAP) (Stanfield *et al.,* 2010). The survey involved a visual assessment of the following characteristics of each watercourse:

- stream morphology, runs, pools, riffles;
- channel width and depth profile, bank height, bank stability;
- substrate types and distribution;
- seepage areas;
- dams and obstructions;
- riparian and in-stream cover type and extent;
- floodplain vegetation;
- wetland and pond areas; and
- side channels and floodplain.

Observed flow conditions were also noted and recorded as dry conditions, standing water or flowing water.

The approximate locations of aquatic habitat assessment sites are shown on **Figure 6**.

3.2.9.2 Fish Community Sampling

Site specific fish sampling was not carried out in the watercourses within the Study Area under the advice of OMNR due to the presence of Redside Dace (*Clinostomus elongatus*) (listed as endangered under the *Endangered Species Act* – see **Section 2.2** for further discussion). Conservation Halton, OMNR and other environmental consultants have previously undertaken fish sampling at multiple locations within the Fourteen Mile Creek system, in the proximity of the Subject Property at various times since 1972. Fish sampling records were obtained from Conservation Halton and used to describe the fish community structure within the Study Area.

In 2013, Beacon completed fish community sampling in the pond located on the Subject Property. Sampling included the use of baited minnow traps to assess the presence/absence of small bodied fish in the pond.

3.2.9.3 Benthic Invertebrates and Crayfish

Conservation Halton sampled benthic invertebrate communities using the kick and sweep methodology described in the Ontario Benthos Biomonitoring Network Protocol (OBBN) and provide data for benthic invertebrates communities in Fourteen Mile Creek in the *Urban Creek and Supplemental Long Term Environmental Monitoring Program Report* (Conservation Halton, 2009).

Benthic invertebrate studies were not completed on the Subject Property; however Beacon Environmental undertook targeted searches for Chimney Crayfish on October 30, 2012, November 1, 2012 and November 6, 2013. These investigations involved walking around the perimeter of wetland features and the dug pond (Pond #7) on the Subject Property (see **Figure 6**) looking for evidence of the species' distinctive chimney burrows. In addition, baited minnow traps were deployed in Pond 7 on the Subject Property in 2013 to verify for the presence/absence of crayfish.

3.2.9.4 Stream Temperature Monitoring

In-stream temperature data was measured spatially at specific sites in the Fourteen Mile Creek East and West Branches and Tributary 14W-W1 in 2012. This data was used to determine the thermal regime of the watercourses throughout the TPA. In addition, a comprehensive temperature monitoring program was undertaken in 2013 for the entire TPA. For the results of this study please refer to the Phase 2 EIS Merton TPA study report (Beacon Environmental, 2013).

Three temperature loggers were installed in the watercourses on the Subject Property (14W-W1-2, 14W-W1-3 and SW3), with an additional two temperature loggers installed downstream of the Subject Property in 14W-W1 (reaches SW1 and SW2). Four temperature loggers were installed in Fourteen Mile Creek West Branch, upstream and downstream of the Subject Property.

The temperature loggers were continuous HOBO loggers and were set to record temperature every 15 minutes. The temperature loggers were deployed from April 2013 to October 2013. Details of the

temperature monitoring program are provided in **Table 3**. The locations of the temperature loggers are shown on **Figure 5**.

Temperature Data Analysis

The daily maximum and minimum water data collected in 2012 and 2013 were temporally plotted against air temperatures (from Environment Canada) to display temperature trends and variations in water temperatures across the monitoring locations. The graph also identified if any of the loggers were out of the water.

To characterize the thermal regime, the temperature data was plotted using a nomogram as outlined in the *Evaluation of a Simple Method to Classify the Thermal Characteristics of Streams Using a Nomogram of Daily Maximum Air and Water Temperatures* (Chu et al., 2009). This nomogram uses the temperature data from July 1 to August 31, when the daily maximum air temperature is above 24.5°C. On these days, the corresponding daily maximum water temperature as measured between 16:00 and 18:00 is plotted against the corresponding daily maximum air temperatures. The spatial range of analysis includes temperatures recorded from July 1 to July 31 2012 (SW2 and 14W) and July 1 to August 31, 2013. The data was plotted against ranges of five thermal classifications (Cold, Cold-Cool, Cool, Cool-Warm, Warm) to determine the thermal classification of the watercourses in the TPA.

Lastly, in order to relate the 2013 water temperatures to Redside Dace habitat and life functions, temperature data for the watercourses was further analyzed by comparing the data set to the preferred temperature range and period for spawning, as well as to the upper tolerance threshold for the species.

Table 3. Summary of Stream Temperature Monitoring in the Study Area

Tributary/Reach	Station(s)	Dates	Monitoring Details
14W-W1-1	Temp Stn. 1	2012-06-16 to 2012-09-09	Beacon Environmental Surface Water Temp - Hobo Loggers – 2 hr. intervals
14W	Temp Stn. 2	2012-06-16 to 2012-09-09	Beacon Environmental – Surface Water Temp - Hobo Loggers – 2 hr. intervals
14W	Temp Stn. 1	2013-04-16 to	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W	Temp Stn. 2	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-W1-2	Temp Stn. 5	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-W1-3	Temp Stn. 6	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-W1 (SW3)	Temp Stn. 7	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-W1 (SW2)	Temp Stn. 8	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-W1 (SW1)	Temp Stn. 9	2013-04-16 to 2013-10-16	Beacon Environmental Surface Water Temp - Hobo Loggers – 15 min. intervals
14W-M1	1	2012-09-11 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014
14W-W1-2	3	2012-09-11 to	R.J. Burnside – Spot Flows – Manual – Monthly until

Tributary/Reach	Station(s)	Dates	Monitoring Details
		2014-09-24	September 2013, quarterly until September 2014
14W-W1-3	4	2012-09-11 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014
14W-W1-1	5	2012-09-11 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014
14W-W1	6	2012-09-11 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014
14W-W1	7	2012-09-11 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014
14W	8	2012-12-17 to 2014-09-24	R.J. Burnside – Spot Flows – Manual – Monthly until September 2013, quarterly until September 2014

3.3 Constraint Analysis

A constraint analysis was undertaken for the Study Area to identify significant ecological features and functions that would represent potential environmental constraints to future development. The goal of this analysis was to identify, with reasonable certainty, a comprehensive environmental constraint line that could be used to establish limit to future development.

The constraint analysis was prepared based on the following:

(i) identification of significant natural heritage features / areas and associated functions;
(ii) field delineation of environmental features with the Region and/or conservation authority; and
(iii) evaluation and application of policy-related environmental constraints.

The constraint analysis consisted of overlaying maps of the various significant natural features associated with the Study Area, and applying buffers and / or setbacks based on their ecological sensitivities and / or applicable policy requirements. The most restrictive of these constraints were utilized to generate a comprehensive environmental constraint line.

3.3.1 Constraint Considerations

The following biophysical systems, features, functions and attributes were considered when identifying environmental constraints for the Study Area.

- Natural Heritage System
- Linkages
- ESAs
- ANSIs
- Significant woodlands
- Valleylands
- Floodplains
- Slopes
- Erosion-prone areas
- Watercourses
- Wetlands

- Fish habitat
- Habitats for endangered and threatened species
- Significant wetlands, and
- Candidate significant wildlife habitats

3.3.2 Feature Staking

The boundaries of key environmental features (i.e., significant woodlands, wetlands, and top of valley slopes) were delineated in the field under the supervision of staff from the Region of Halton and Conservation Halton. The top of valley slope and limits to significant woodlands on the Subject Property were staked on January 17, 2013 by Beacon Environmental and DSEL under the supervision of Conservation Halton staff (L. Smith, K. Barrett) and Region of Halton staff (R. Reinholt, R. Clark, and S. Dinka). The staked limits to these features were subsequently surveyed and used as a reference for establishing ecological appropriate setbacks and limits to future development.

3.4 Impact Assessment

To assess potential impacts associated with the various land uses and to evaluate their effect on the physical and biological environment, an impact assessment matrix was developed to provide a framework for the assessment in accordance with the EIS Terms of Reference (**Appendix A**). The matrix is organized by technical discipline (e.g., hydrogeology, hydrology, aquatic biology, terrestrial biology, etc.) and describes the various anticipated impacts by identifying: feature and/or function expected to receive the impact, the proposed activity expected to result in impacts, the potential impacts, the recommended mitigation (including special monitoring or management needs), and the anticipated net effects (or residual impacts), if any.

4. Study Findings

4.1 Study Area Setting

The Subject Property corresponds with the Saw Whet Golf Course situated in West Oakville, north of the Queen Elizabeth Way (north of the North Service Road), east of Bronte Road, and south of Upper Middle Road. The broader Study Area includes the Merton TPA lands (ref. **Figure 1**). This area between Bronte and Palermo was settled in 1812 and grew to include a blacksmith shop, two schools, a church and a post office. The lands were used for mixed farming and orchards. The community began to decline in the early 1900's and was further disrupted by the construction of the QEW highway. The Subject Property was used intensively for agriculture until the late 1960's after which time the lands were converted to golf course uses (ref. **Photo 1**).

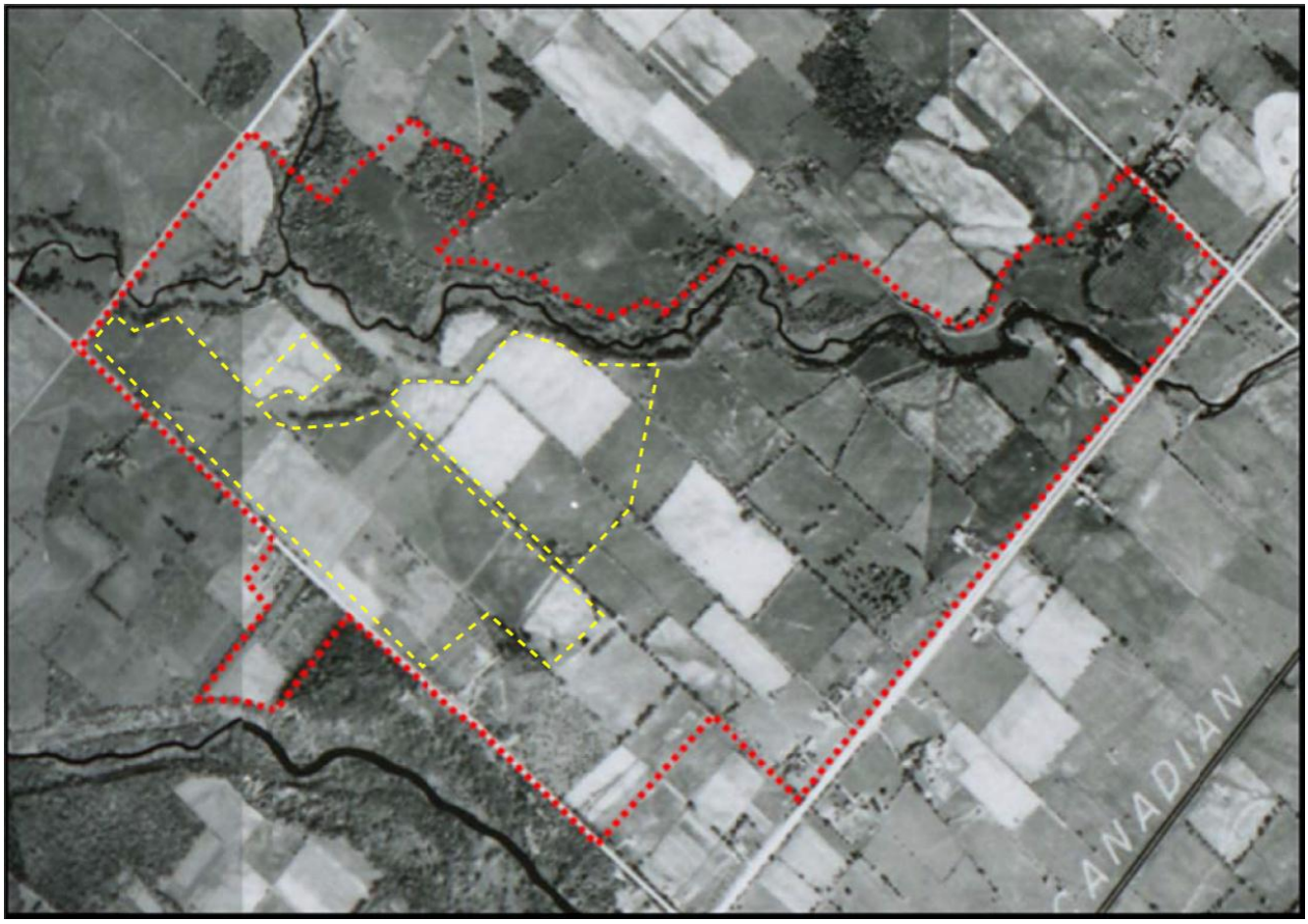

Photo 1. Aerial photograph of the Subject Property (yellow line) within the Merton Tertiary Plan Area (red line) in 1954

4.2 Physical Environment

4.2.1 Topography and Drainage Conditions

The Subject Property is located within the Fourteen Mile Creek watershed. The land surface across the Subject Property is characterized by an undulating till surface with the land sloping generally towards Fourteen Mile Creek and its tributaries (see **Figure 7**). The highest elevations (133 masl) are found in the northwestern corner of the Subject Property and the lowest elevations (120 masl) are found along the Fourteen Mile Creek watercourse valley in the southeastern corner of the Subject Property.

The West Branch of Fourteen Mile Creek flows in an easterly direction north of the Subject Property and several tributaries to the West Branch are located in the western portion of the Subject Property.

Flow monitoring of watercourses on the Subject Property indicate that Tributary 14W-W1, as well as the west branch of Fourteen Mile Creek are perennial watercourses. Tributaries 14W-W1-2 and 14W-

Existing Conditions - Physical - Topography, Catchments and Drainage

Figure 7

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- 1 Pond
- Swale
- Watercourse
- Bronte Creek / 14 Mile Creek Watershed Divide
- Contours (0.5 m Interval)

First Base Solutions
Web Mapping Service 2012

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W1-3 were found to be intermittent. Tributary 14W-W1-1 is ephemeral and is considered by CH to represent a hydrologic connection rather than a watercourse.

4.2.2 Physiography

The Subject Property is situated largely within the South Slope physiographic region of Ontario. This region represents the south slope of the Oak Ridges Moraine and extends from the Niagara Escarpment to the Trent River. The western portion of the South Slope lies north of the Peel plain, and also includes the Trafalgar Moraine south of the Peel plain and the adjacent drumlinized till plain on which the Planning Area is situated (Chapman and Putnam, 1984).

4.2.3 Bedrock and Surficial Geology

The Subject Property is underlain by shale bedrock of the Queenston Formation, which generally slopes from north to south across the region. A buried bedrock valley is present in the western portion of the Subject Property, trending towards Bronte Creek. The results of the geotechnical investigation (Soil Engineers Ltd., 2012) indicate that the top of bedrock was encountered between 120.5 masl and 122 masl in the eastern portion of the Subject Property. In the western portion of the Subject Property, in the area of the interpreted bedrock valley, bedrock was not encountered in the boreholes, which were drilled to depths of up to 12.5 m (elev. 113.9 masl).

Surficial geology mapping prepared by the Ontario Geological Survey (2010) indicates that most of the Subject Property is covered by Halton Till consisting of silty to clayey glacial deposits (**Figure 8**). Exposed shale bedrock is mapped along Fourteen Mile Creek valley and a coarse-textured glaciolacustrine deposit is mapped in the southwestern corner of the Subject Property.

Detailed soil mapping from the Agriculture Canada (2000) is provided in **Figure 9**, which shows that the much of the Subject Property is covered in clay loams and localized deposits of sandy loams. The Oneida Clay Loam, which occurs across much of the Subject Property, developed on the reddish tills of the Trafalgar Moraine, just north of the study Area (Chapman and Putnam, 1984).

Borehole samples obtained from the Subject Property by Soil Engineers Ltd. (2012) are consistent with the published mapping and show that the surficial deposits are generally comprised of silty clay till mixed with sand and traces of gravel. Within the silty clay till, occasional layers or seams of sand and silt were encountered. The depth of the till typically ranges between 0.5 m and 5 m in thickness and is underlain by shale bedrock.

Thicker overburden deposits are found in the western portion of the Subject Property within the interpreted bedrock valley. A sand layer is found in this area at a depth of 4 m to 11 m and is approximately 5 m to 10 m in thickness. Borehole logs available for the Subject Property and surrounding lands are provided in Appendix B of the Hydrogeological Study (Burnside, 2014).

4.2.4 Soil Hydraulic Conductivity

Hydraulic conductivity testing was completed in four wells located on the Subject Property. The results of this testing indicate that the hydraulic conductivity of the deeper sand layer encountered in the northwest corner of the Subject Property is approximately 7×10^{-4} cm/sec. Testing of the sandy silt till soils found hydraulic conductivities ranging from 9×10^{-5} cm/sec to 1×10^{-4} cm/sec. These values

indicate moderate to relatively low hydraulic conductivity conditions. The results of testing in a well completed in the shale bedrock indicated a hydraulic conductivity of 1 x 10^{-5} cm/sec. Hydraulic conductivity testing was not conducted for the silty clay/clay silt till soils found at surface across the Subject Property; however, a very low hydraulic conductivity on the order of 1 x 10^{-6} cm/sec would be expected for this soil type.

4.2.5 Hydrogeology

4.2.5.1 Groundwater Level Monitoring

The groundwater level monitoring results show that the seasonally high water table is typically more than 2 m below ground surface across the upland portions of the Subject Property. Higher groundwater levels (within 1 m of ground surface) are found along the watercourses. Detailed hydrographs produced using the data from automatic water level recorders installed in three monitoring wells and four drive-point piezometers installed across the Subject Property show that the water table has a very small response to precipitation events, illustrating the poor connection between the ground surface and the water table due to the low hydraulic conductivity soils found at surface.

Monitoring data collected during all four seasons (between September 2012 and September 2014) show that the groundwater levels vary by up to 2 m seasonally, with the highest readings in the spring and lowest in the summer months. Detailed hydrographs for each of the monitoring wells and piezometers are provided in Appendix E of the hydrogeological study prepared by Burnside (2014). Monitoring locations are shown on **Figure 5**.

4.2.5.2 Groundwater Flow

The interpreted shallow groundwater flow mimics the surface water flow patterns with groundwater generally flowing eastward to Fourteen Mile Creek. A groundwater flow map has been produced and is provided as Figure 10 in the hydrogeological study prepared by Burnside (2014).

4.2.5.3 Recharge/Discharge Conditions

Groundwater recharge areas (areas with downward flow gradients) are generally located in topographically high areas. The rate of recharge is limited due to the relatively low hydraulic conductivity silty clay till that covers the Study Area.

Discharge conditions (upward gradients) tend to be found in topographically low areas along watercourse valleys. Fourteen Mile Creek is a perennial watercourse and has been identified as an area of groundwater discharge. A monitoring well nest installed near Tributary 14W-W1 as well as two drive-point piezometer nests installed along this tributary show upward hydraulic gradients and potential discharge conditions along this watercourse. Small gains in baseflow were also measured along this watercourse. This is consistent with the temperature monitoring (discussed below in **Section 4.3.9.4**), which showed this watercourse to be a coolwater thermal regime, typically indicating some groundwater contribution to flows.

Groundwater level measurements in drive-point piezometers installed near the upstream locations (i.e., near Bronte Road) along Tributaries 14W-W1-2 and 14W-W1-3 indicate recharge conditions at these locations. This absence of groundwater discharge conditions is consistent with the surface water flow monitoring which found these watercourses to be intermittent. The presence of watercress

Existing Conditions - Physical - Surficial Geology

Figure 8

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Swale
- Watercourse

Surficial Geology

- Bedrock
- Halton Till
- Lacustrine and outwash sand
- Stream deposits

Data Source

Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV
ISBN 978-1-4435-2482-7

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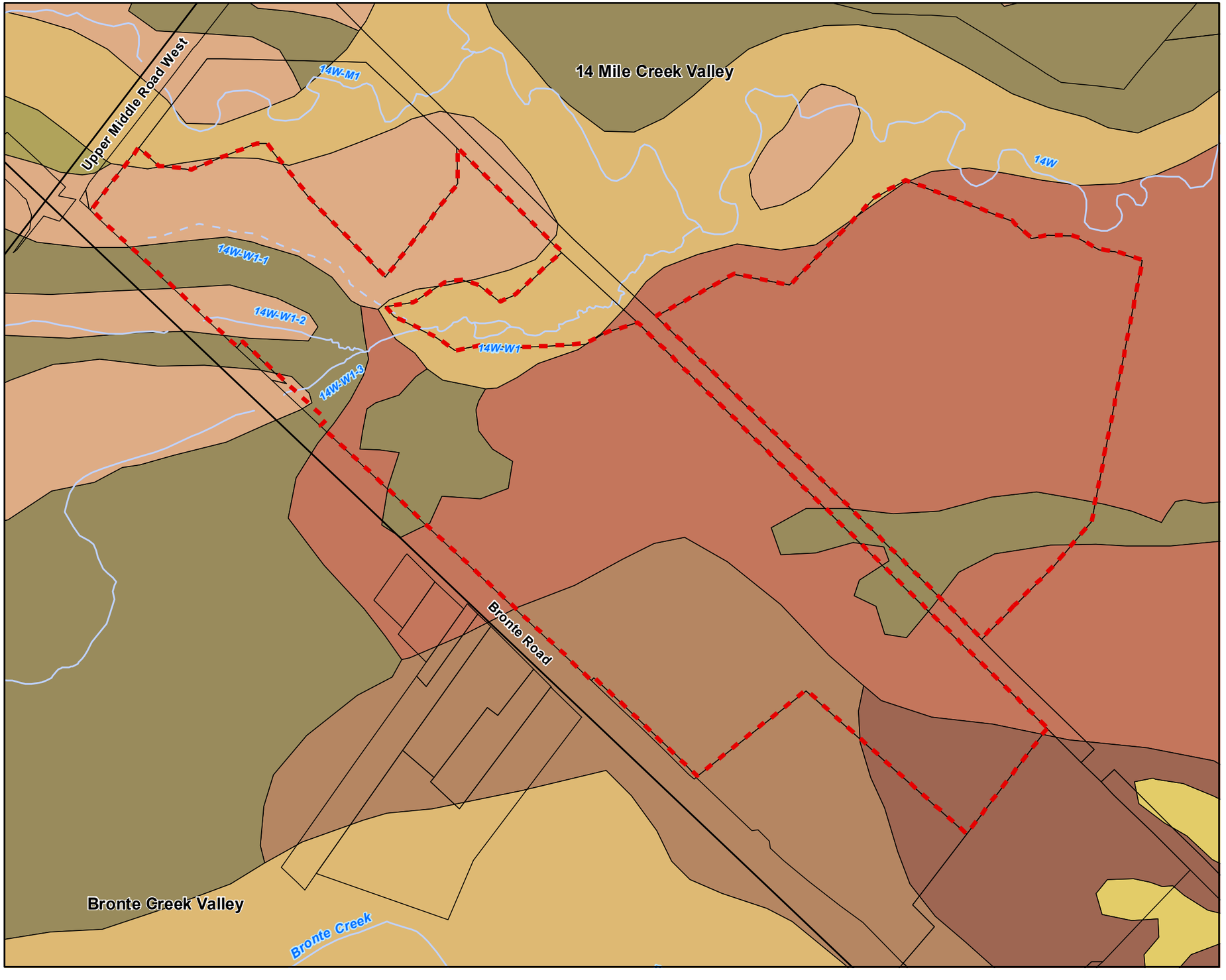

Existing Conditions - Physical - Physiography and Soils

Figure 9

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Swale
- Watercourse

Soil Type

- BOTTOM LAND
- BRADY SANDY LOAM
- CHINGUACOUSY CLAY LOAM
- CHINGUACOUSY CLAY LOAM - ROCKY PHASE
- FOX SANDY LOAM
- GRIMSBY SANDY LOAM
- JEDDO CLAY LOAM
- ONEIDA CLAY LOAM
- ONEIDA CLAY LOAM - ROCKY PHASE
- URBAN LAND

Data Sources

Soils: National Soil Database, Agriculture and Agri-Food Canada. 2000.

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further downstream is interpreted to indicate groundwater discharge occurs in the lower reaches of these watercourses, close to their convergence. However, the watercourses were dry during the late summer, confirming that the groundwater discharge is seasonal. The flow monitoring and groundwater monitoring data from the drive-point piezometer installed along Tributary 14W-W1-1 indicate recharge conditions at this watercourse.

The results of the flow monitoring along the West Branch of Fourteen Mile Creek show that gains in baseflow are very small indicating the amount of groundwater discharge along this watercourse is minor. A map illustrating areas of groundwater discharge is provided as Figure 11 in the hydrogeological study prepared by Burnside (2014).

4.2.5.4 Base Flows

The baseflow in Fourteen Mile Creek was estimated in previous regional studies to be 10 L/s (Triton, 1992). The site specific flow monitoring data completed in support of the TPA show that the baseflow in the West Branch of Fourteen Mile Creek is currently approximately 20 L/s. This was measured at Upper Middle Road and approximately half-way through the Study Area (near the south limit of the Subject Property) under low flow conditions in 2012, 2013 and 2014.

An estimate of potential groundwater seepage discharging to the West Branch and Main Branch of Fourteen Mile Creek from the TPA has been made based on the site specific soils and interpreted groundwater flow conditions. The potential groundwater discharge flows from the TPA are calculated to be 2.5 x 10^{-4} m^3/s (0.25 L/s). This discharge rate is consistent with the field observations of minor groundwater inputs and limited baseflows in Fourteen Mile Creek. This information indicates that the baseflow in the creek predominantly comes from upgradient of the Subject Property. It has been noted by the Town of Oakville during previous studies that a more significant discharge area is located approximately 100 m north of Upper Middle Road, upstream of the Subject Property, which may be a source of the baseflow in this creek.

4.2.5.5 Water Quality

Results from the groundwater sampling across the Subject Property show that the groundwater quality is generally good compared to the Ontario Drinking Water Quality Standards (ODWQS). The groundwater is hard and has high turbidity and total dissolved solids (TDS).

The surface water quality sampling results show that low levels of nitrate are found in the surface water and total phosphorus is found at concentrations above the Provincial Water Quality Objective (PWQO). Both nitrate and total phosphorus are indicators of potential impacts of agricultural use (which are found upstream of the Subject Property), as they are commonly found in fertilizers and human or animal wastes making agricultural runoff and areas serviced by septic systems potential sources. Boron, copper, iron and zinc were reported at concentrations above the PWQO in samples obtained to the south of the Subject Property. These high metal concentrations are likely due to natural mineralization from the shale bedrock, which is exposed along these watercourses. The recent water quality data findings are consistent with the historical water quality data in Fourteen Mile Creek.

The results of the water quality testing are provided in Appendix F of the hydrogeological study prepared by Burnside (2014).

4.2.6 Hydrology

4.2.6.1 Regional Hydrology

The Subject Property lies mainly within the Fourteen Mile Creek watershed. The Study Area of approximately 75 ha is tributary to Fourteen Mile Creek (see **Figure 7**). Fourteen Mile Creek outlets directly to Lake Ontario.

Fourteen Mile Creek is part of the Fourteen Mile Creek and McCraney Creek Watershed. A significant portion of the upstream drainage area consists of existing residential development with a variety of stormwater management ponds at strategic outlet points along the system. The lands north of Dundas Street remain primarily rural or agricultural, but are expected to be subject to urbanization at a future date.

4.2.6.2 Local Hydrology – Fourteen Mile Creek

The majority of the Subject Property is located on the west side of the main Fourteen Mile Creek valley system. A small, isolated area on the east side of the valley has existing local outlets to the valley.

The lands on the west side of Fourteen Mile Creek valley outlet at a location along the west edge of the watercourse. External drainage from eastern portion of the Enns Lands (see **Figure 1**) is conveyed across Bronte Road via roadside drainage and eventually through the 14W-W1 tributary to the west branch of Fourteen Mile Creek. Areas located north of the 14W-W1 tributary system outlet directly to the 14W-W1 tributary, and are eventually conveyed to the west branch of Fourteen Mile Creek. The area south of the 14W-W1 tributary system generally has an existing drainage pattern that flows from west to east, towards the western edge of the west branch of Fourteen Mile Creek. Along the valley wall, there are multiple locations where flows are directed to the watercourse system. These existing outlet locations have been influenced by the grading of the lands for the existing golf course usage.

4.2.7 Water Balance

Pre-development water balance calculations were completed for the Subject Property. An infiltration rate of 126 mm/year was used for the golf course fairways and greens, and the landscaped areas found on the Subject Property. In the wooded areas, an infiltration rate of 120 mm/year was used. These infiltration rates were calculated using the Ministry of the Environment (MOE) *Stormwater Management Planning and Design Manual* (2003) methodology and reflect the soil conditions on the Subject Property. The annual pre-development infiltration volume for the Subject Property was calculated to be approximately 68,000 m^3. The annual pre-development surface runoff volume was calculated to be approximately 108,000 m^3.

Refer to the water balance memo completed by Burnside and presented as Appendix F of the FSR prepared by DSEL (2015) for the Subject Property for the detailed water balance calculations.

4.2.7.1 Feature-Based Water Balance

To protect the fisheries associated with the Fourteen Mile Creek system, it is important to ensure that surface and groundwater inputs are maintained at pre-development levels to the extent feasible under

post-development conditions. Characterization of the existing flow regimes in the watercourses is the first step in developing appropriate strategies for protection of groundwater and surface water contributions.

The findings of the hydrogeological study (Burnside, 2014) suggest that:

- Tributaries 14W-W1-1 to 14W-W1-3 are intermittent prior to convergence, and the resulting watercourse 14W-W1 becomes perennial and receives groundwater inputs.
- Groundwater inputs to the West Branch of Fourteen Mile Creek in reach 75A (in the vicinity of the Subject Property, as shown in **Figure 5**) are minimal.
- The Main Branch of Fourteen Mile Creek receives seasonal groundwater discharge, and the creek may be losing groundwater baseflows (i.e., there may be recharge from the creek to the underlying soils or bedrock) during certain times of the year.

Based on site-specific flow monitoring data obtained at Upper Middle Road and near the south limit of the Subject Property under low flow conditions in 2012, 2013 and 2014, it is estimated that baseflow contributions to the West Branch of Fourteen Mile Creek are approximately 20 L/s.

Flow measurements in the West Branch of Fourteen Mile Creek upstream and downstream of the Subject Property indicate that the change in flow across the Subject Property is minimal (i.e., there are no significant gains or losses of baseflow). However, on a reach-by-reach basis, Tributary 14W1-W1 has been identified as receiving perennial groundwater discharge which is important for fisheries habitat.

Refer to the hydrogeological study prepared by Burnside (2014) for the detailed water balance calculations.

4.2.7.2 Simulated Surface Runoff Flows

Independent of the planned development of the TPA, the Town of Oakville has proceeded with a Fourteen Mile Creek and McCraney Creek Flood Prevention Opportunities Study (from Lake Ontario to Dundas Street), and has developed a watershed model calibrated with available rainfall and watercourse monitoring information in order to provide a comprehensive detailed assessment of the overall watershed. To inform the EIS and FSR for the Merton TPA, the Town provided the Study Team with a copy of the *Fourteen Mile Creek / McCarney Creek Flood Management Alternative Assessment* (AMEC, July 17, 2013) and associated calibrated PCSWMM model of Fourteen Mile Creek under existing conditions. When continuous annual historical rainfall for a selection of years (representative of particularly wet, dry, and average years) is applied to the calibrated existing conditions model, annual peak, annual average, and cumulative annual flow estimates can be generated for the surface runoff contributions to Fourteen Mile Creek and its tributaries. The PCSWMM model does not, however, account for groundwater contributions.

The following table summarizes simulated average annual surface flow characteristics in specific reaches within the TPA under pre-development conditions, based on the existing conditions model described above (detailed in the FSR) and historical continuous hourly rainfall data from the Toronto airport for six years between 1960 and 2003. The six years selected from the rainfall record are representative of the overall range of conditions: 1963 and 1997 are particularly dry years, 1979 and 1993 are average years, and 1980 and 1995 are particularly wet years. A summary of rainfall statistics supporting this assessment is provided in the Areas Servicing Plan (ASP) (DSEL, 2014).

For additional information on modelling and results, please refer to the FSR (DSEL, 2015). These estimated annual flows provide a baseline for the flow in the watercourses within the TPA under existing conditions that is attributed to surface water runoff, so as to inform the feature-based water balance under proposed development conditions. As noted above, the simulated annual surface runoff flow estimates from the existing conditions model do not include groundwater contributions to the watercourses. The site specific drainage area characteristics have been determined to be sufficiently similar to the TPA drainage area characteristics as set forth in the ASP. As such, the annual average surface runoff flows for the TPA are applicable to the Subject Property.

The flow monitoring results that were completed as part of the hydrogeological study (Burnside, 2014) are within the expected ranges of the estimated pre-development characteristics for flow in Fourteen Mile Creek and its tributaries, when the groundwater baseflow estimates discussed above are taken with the surface runoff estimates provided in **Table 4**. See **Figure 5** for reach segment locations.

Table 4. Summary of Simulated Annual Average Surface Runoff Flows in Fourteen Mile Creek and Tributaries within the Tertiary Planning Area, as per Area Servicing Plan (DSEL 2014)

Tributary (Reach)	Total Precipitation (mm)	Peak Flow (m^3/s)	Average Flow (m^3/s)	Total Volume (1000 m^3)
14W-W1 (SW-2)	455	4.1	0.006	105
14W (75A)	455	38.5	0.098	1640
14W (73)	455	37.7	0.103	1730
14 Main Branch (5b)	455	38.7	0.115	1930

4.2.8 Fluvial Geomorphology

4.2.8.1 Rapid Assessments and Detailed Survey Work Results

The results of the Rapid Geomorphic Assessment (RGA) (**Table 5**) classify five of the reaches, four of which were located within the Subject Property, as stable. The fifth reach is located at the downstream end of the study area. These reaches were small channels with little definition that likely only carry flow during rainfall events. Reach SWN-1, not illustrated in the table but shown in **Figure 5**, is a small depression hardly distinguishable from the surrounding landscape that crossed one of the golf course greens. While it is considered as a channel on Ontario Base Mapping, field assessments reveal that SWN-1 is an undefined depression which does not need to be considered as a formal drainage feature.

The main method of adjustment in the study area is widening with aggradation as a secondary process. Indications of widening included fallen/leaning trees, exposed tree roots, large organic debris in the channel, and bank scouring resulting in steep bank angles. Most reaches of Fourteen Mile Creek contain remnants of bank protection structures such as large metal stakes with logs placed between the stake and the bank. In most cases, the protection has failed and only the stakes remain. Some reaches (R-75a and R-75b) exhibited evidence of planform adjustment such as chute formation suggesting that the channel is adjusting its form under high flow conditions. This was most severe in

R-76 where significant woody debris has encouraged the development of islands and high flow chutes. The highest adjustment score was found in R-74a which had significant aggradation as a result of a beaver dam and several log jams. These elements created large backwater areas as well as side channels and chutes. Along downstream reaches of Fourteen Mile Creek (R72, R73 and R5b) the channel has large sections of exposed bedrock, whereas bedrock was only found in pool areas in the upstream reaches.

Table 5. Summary of Rapid Geomorphic Assessment results

Channel	Reach	Factor Value				Stability Index	Condition
		Aggradation	**Degradation**	**Widening**	**Planimetric Adjustment**		
14 Mile Creek West Branch	R-74a	**0.88**	0.29	**0.63**	0.43	0.55	In Adjustment
	R-74b	0.38	0.29	**0.63**	0.00	0.32	Transitional/Stressed
	R-75a	0.50	0.29	**0.63**	0.14	0.39	Transitional/Stressed
	R-75b	0.50	0.14	**0.63**	0.29	0.39	Transitional/Stressed
	R-76	**0.44**	0.14	**0.75**	0.43	0.44	In Adjustment
	72	0.13	0.43	**0.63**	0.00	0.29	Transitional/Stressed
	73	0.25	**0.57**	0.50	0.14	0.37	Transitional/Stressed
	5b	0.00	0.43	0.25	0.00	0.17	In Regime
14 Mile Creek West Tributaries	SW-1	0.50	0.29	**0.63**	0.14	0.39	Transitional/Stressed
	SW-2	**0.63**	0.00	**0.63**	0.14	0.35	Transitional/Stressed
	SW-3	0.00	0.14	0.13	0.00	0.07	In Regime
	SW-4	0.11	0.14	0.13	0.29	0.17	In Regime
	SWN-1	0.00	0.29	0.00	0.00	0.07	In Regime
	SWS-1	0.11	0.14	0.13	0.14	0.13	In Regime
	8	0.33	0.43	0.25	0.00	0.25	Transitional/Stressed
	R-75a-1	0.11	0.43	0.25	0.43	0.30	Transitional/Stressed
	R-75a-2	0.22	0.29	0.38	0.29	0.29	Transitional/Stressed

The Rapid Stream Assessment Technique (RSAT) scores (**Table 6**) were consistent throughout the Study Area. All reaches were classified as having “moderate” health conditions, with scores falling in a small range of 24.5 to 28.5.

All reaches along the West Branch of Fourteen Mile Creek and reaches SW-1 and SW-2 along Tributary 14W-W1 on the Subject (Saw-Whet) Property received low scores in channel stability and scour/deposition due to the high amount of activity. Reach SW-3 of Tributary 14W-W1, along with reach SW-4 of Tributary 14W-W1-2 and reach SWS-1 of Tributary 14W-W1-3 all received high scores

in channel stability and riparian conditions because they lack consistent flow with which to modify boundaries.

Table 6. Summary of Rapid Stream Assessment Technique (RSAT) Results

Channel	Reach	Factor Value						Overall Score	Condition
		Channel stability	Scour / deposition	Instream Habitat	Water Quality	Riparian Condition	Biological Indicators		
	Max. Score	**11**	**8**	**8**	**8**	**7**	**8**	**50**	
14 Mile Creek West Branch	R-74a	4	3.5	5.5	3.5	4	5	25.5	Moderate
	R-74b	5	4	5	3.5	4	5	26.5	Moderate
	R-75a	5	4.5	5	3.5	4	5	27	Moderate
	R-75b	5	5	5.5	4	4	5	28.5	Moderate
	R-76	5	4.5	5	3.5	4	4.5	26.5	Moderate
	72	5	4	4	5	4	5	27	Moderate
	73	4	5	6	5	4	4	28	Moderate
	5b	5	4	4	5	4	4	26	Moderate
14 Mile Creek West Tributaries	SW-1	5	4	5.5	3.5	4.5	4	26.5	Moderate
	SW-2	7	5	5	3	4.5	3.5	28	Moderate
	SW-3	8	5.5	3	2	4.5	2	25	Moderate
	SW-4	8	6	1	2	5.5	2	24.5	Moderate
	SWN-1	8	7	2	1	5	2	25	Moderate
	SWS-1	9	6	2	2	5.5	2	26.5	Moderate
	8	6	4	4	4	2	5	25	Moderate
	R-75a-1	4	4	3	3	5	4	23	Moderate
	R-75a-2	5	5	4	4	4	4	26	Moderate

Detailed field assessments (e.g., cross-section and bed sediment surveys) were completed along the West Branch of Fourteen Mile Creek at reaches R-75a, SW-2 and 73. As part of the detailed field assessment, standard protocols and known field indicators were used to quantify bankfull cross-sectional dimensions (e.g. bankfull depth and width). A total of five cross sections were completed for each of the three sites, the average bankfull dimensions for these cross sections are noted in **Table 7**. For further detail see Geomorphic Assessment of Fourteen Mile Creek and Tributaries (Parish Geomorphic, 2014).

Table 7. Average Bankfull Geometry for Detailed Sites

Reach:	73*	R-75a	SW-2
Bankfull Width (m)	7.01	8.18	3.01
Average Bankfull Depth (m)	0.45	0.46	0.24
Maximum Bankfull Depth (m)	0.66	0.62	0.37
Bankfull Width: Depth	15.63	17.98	12.66
Cross-sectional Area (m^2)	3.19	3.31	0.73
Wetted Perimeter (m)	7.42	8.48	3.26
Hydraulic Radius (m)	0.43	0.39	0.22
Bankfull Gradient (%)	0.30	0.40	1.2
Left Bank Angle (bankfull) (^{o})	26.40	25.98	26.25
Right Bank Angle (bankfull) (^{o})	30.50	17.71	27.87

* downstream of the Study Area within the Merton Tertiary Plan Area (TPA)

Bankfull channel dimensions are formed to carry a certain discharge. Channel gradient and bankfull dimensions can be used to determine bankfull discharge as well as other flow characteristics by applying standard open-channel hydraulics formulas (e.g., Manning's Equation - see, for example, Chow (1959)). The average values for the hydraulic calculations for each site are contained in **Table 8**.

Table 8. Average Bankfull Hydraulics for Detailed Sites

Reach :	73*	R-75a	SW-2
Bankfull Discharge (m^3/s)	3.33	3.68	1.00
Average Bankfull Velocity (m/s)	0.87	1.03	1.14
Maximum Bankfull Velocity (m/s)	1.29	1.39	1.83
Average Shear Velocity [u*] (m/s)	0.11	0.12	0.16
Stream Power (W/m)	98.10	144.30	117.63
Average Shear Stress (N/m^2)	12.68	15.48	26.29
Maximum Shear Stress (N/m^2)	19.14	24.13	42.84
Critical Particle Diameter for Analysis (m)	0.06	0.06	0.04
Bankfull Gradient (%)	0.30	0.40	1.2

* downstream of the Study Area within the Merton Tertiary Plan Area (TPA)

4.2.9.1 Evaluation of Channel Conditions

The erosion hazard limit was delineated for all confined reaches based on Provincial Policy Statement (PPS) 3.1.1(b). Meander belt widths were determined (see **Table 9**) to establish a corridor for unconfined reaches in which the natural channel processes can occur without damaging the surrounding area. Meander belt widths were also delineated for confined reaches which were classified as occupied or recovery Redside Dace habitat to facilitate the application of the required habitat setback (30m). An erosion threshold analysis determines the hydraulics, such as discharge,

channel depth, or average channel velocity, at which the channel produces enough shear stress to initiate the mobilization of sediment of a given size, usually D_{50}. The analysis also helps evaluate a reach's erosion sensitivity by comparing the boundary shear stress associated with modeled flows to the critical shear stress required to entrain sediment.

4.2.9.1.1 Application of Provincial Policy Statement (PPS) 3.1.1(b)

The application of PPS 3.1.1(b) for defining the erosion hazard limit of river and stream systems is based on the degree of valley confinement, erosion and slope stability. The erosion hazard limit delineation methodology is dependent on the distance between the toe of the valley slope and the watercourse: where the valley toe is greater than 15 m from the bank, only a stable slope allowance and erosion access allowance are required; where the valley toe is less than 15 m from the bank, a toe erosion allowance is required in addition to the stable slope and erosion access setbacks. The study area displays a confined valley with a meandering watercourse resulting in valley toe transitioning from less than to greater than 15 m from the watercourse. For the study area, the toe erosion allowance was based on the slope material (Queenston Shale) and evidence of active erosion resulting in a setback of 3 m based on PPS 3.1.1(b) guidelines. The stable slope is a horizontal setback measured landward from the valley toe or toe erosion allowance and is proportionate to the valley height by 3:1. Valley relief was variable throughout the study area ranging from a minimum of 3 m to a maximum of 10 m. Valley relief was most frequently between 7-8 m. Therefore stable slope allowances based on relief varied from 9.0 m to 30.0 m (ref. Figure 15). The erosion access allowance is a predetermined and comprehensive measure of 6 m to allow for emergency access, construction access, and protection against unforeseen conditions.

4.2.9.1.2 Meander Belt Widths

Preliminary meander belt widths were established based on the outermost governing meanders and the surrounding topography. In lieu of accurate 100-year migration rates, a 10% setback was instead applied on either bank as a factor of safety for future erosion. The main reaches of Fourteen Mile Creek and the larger tributaries (SW-1, SW-3, 9a, 9b, and 9c) are classified as occupied or recovery Redside Dace habitat. This requires a separate 30 m setback applied to each bank from the preliminary belt width. This is the furthest setback and thus governs the final meander belt width.

Table 9. Summary of Meander Belt Width Parameters

Reach	Condition based on RGA results	Preliminary Meander Belt Width (m)	Factor of Safety (10% on each bank) (m)	Preliminary Belt Width + Redside Dace Setback (m)
R-74a	In Adjustment	85	8.5	145
R-74b	Transitional/Stressed	70	7	130
R-75a	Transitional/Stressed	85	8.5	145
R-75b	Transitional/Stressed	110	11	170
R-76	In Adjustment	80	8	140
SW-1	Transitional/Stressed	50	5	110
SW-2	Transitional/Stressed	40	4	100

Reach	Condition based on RGA results	Preliminary Meander Belt Width (m)	Factor of Safety (10% on each bank) (m)	Preliminary Belt Width + Redside Dace Setback (m)
SW-3	In Regime	40	4	N/A
SW-4	In Regime	20	2	N/A
SWS-1	In Regime	20	2	N/A
73	Transitional/Stressed	85	8.5	145
72	Transitional/Stressed	85	8.5	145
5b	In Regime	80	8	100
R-75a-1	Transitional/Stressed	20.0	2.0	80.0
R-75a-2	Transitional/Stressed	20.0	2.0	80.0

4.2.9.1.3 Final Constraint Delineation

Based on the delineation of the erosion hazard limit and the meander belt width it was necessary to determine the governing constraint. The constraint lines were overlain to identify that which covered the maximum extent and would therefore be most conservative. The mapping indicated that the constraint lines covered very similar extents and neither was greater over the full extent of the study area; in some locations the erosion hazard limit was greater in others it was the 30 m setback applied to the meander belt for Redside Dace habitat protection. Therefore, the recommendation for the final constraint is to utilize the greater of the two setbacks (which varies locally) to establish one comprehensive constraint line (ref. **Section 5.3**).

4.2.9.1.4 Erosion Thresholds

Erosion threshold analysis was undertaken for reaches SW-2, R-75a, and 73 based on measured cross-sections and consideration of the median bed substrate size D_{50}. Results of the erosion threshold analyses are presented in **Table 10**. The results indicate that for both of the reaches on the main branch (R-75a and 73) the critical discharge for the mobility is higher than the bankfull discharge. This indicates that the channel is not fully competent to transport bedload at bankfull stage, and therefore energy is dissipated by eroding the finer bank material resulting in the widening described above. The high critical discharge also explains the tendency for material to accumulate in poorly formed bars. The tributary reach (SW-2) is capable of transporting material at 43% of the bankfull. This is attributed to both the smaller grain size and the steep gradient.

Erosion threshold analysis was also done for the banks because widening was identified as the primary form of adjustment in the Study Area. The critical discharge calculated for the banks was significantly lower than those calculated for the bed. For SW-2 and R-75a, transport would occur at approximately 7% of bankfull, at discharges of 0.07 and 0.27m^3/s. In reach 73 the critical discharge is slightly higher (0.63m^3/s) indicating that transport would occur at approximately 19% of bankfull. The bank material in the three reaches was similar, composed of fine, cohesive sediments which can be eroded relatively easily along the bank toe at sustained flows. This type of erosion is slow and will only lead to small bank failures over the long-term depending on the geotechnical strength of the bank. The more important process is that which occurs during high flow events. Through the duration of a high flow event bank material becomes saturated which weakens the cohesive strength allowing

substantial erosion and collapse to occur more readily. The widening is more likely attributed to a hydrological regime that is characterized by frequent, flashy flood events.

Table 10. Bankfull characteristics and erosion thresholds using bed material

Parameter	Reach R-75a		Reach 73*		Reach SW-2	
Bankfull Geometry						
Average Bankfull Width (m)	8.18		7.01		3.01	
Average Bankfull Depth (m)	0.46		0.45		0.24	
Bankfull Gradient (%)	0.40		0.30		1.2	
Bank and Bed Material						
Bed Material D_{50} (mm)	62.67		57.19		41.03	
Bed Material D_{84} (mm)	111.89		139.19		102.67	
Bankfull Hydraulics						
Manning's n (estimate)	0.035		0.035		0.035	
Average Bankfull Velocity (m/s)	1.03		0.87		1.14	
Average Bankfull Discharge (m^3/s)	3.68		3.33		1.00	
Thresholds						
Method of analysis	Bed threshold Komar (2001)	Bank threshold (Chow, 1959)	Bed threshold Komar (2001)	Bank Threshold (Chow, 1959)	Bed threshold Komar (2001)	Bank threshold (Chow, 1959)
Critical particle size (mm)	62.67	Fine/cohesive sediment	57.19	Fine/cohesive sediment	41.03	Fine/cohesive sediment
Critical Discharge (m^3/s)	4.02	0.27	4.26	0.63	0.43	0.07
Critical: Bankfull Discharge (%)	111%	7.34%	128%	18.9%	43%	7%
Critical Velocity (m/s)	1.32	0.35	1.27	0.47	1.09	0.37
Critical Shear Stress – average (N/m2)	18.70	14.37	15.22	14.37	19.64	14.37
Critical Shear Stress – maximum (N/m2)	24.94	N/A	21.19	N/A	30.40	N/A
Critical Depth – average (m)	0.48	0.15	0.52	0.24	0.17	0.09
Critical Depth – maximum (m)	0.64	0.22	0.72	0.33	0.26	0.13
No of cross-sections analyzed	5	5	5	5	5	5

* downstream of the Study Area within the Merton Tertiary Plan Area

For further detail see the *Geomorphic Assessment of Fourteen Mile Creek and Tributaries* (Parish Geomorphic, 2013).

4.2.9 Slope Stability Assessment

A slope stability assessment was completed on the Subject Property in 2012 by Soil Engineers Ltd. The assessment was based on information obtained from both boreholes and cross-sections. The investigation disclosed that beneath a veneer of topsoil and a layer of earth fill at one location, a stratum of stiff to hard silty clay till overlies strata of very dense silty sand till and fine to coarse sand with rock fragments which bed onto shale bedrock.

Visual inspection of slopes along Fourteen Mile Creek outside the Subject Property revealed that the slope is wooded, with a thick ground cover of leaves. At localized steep areas, surface sloughing was visible and the ground surface was bare. Active erosion was noted along the entire creek bank and deep-seated failure was noted, especially where the gradient of the slope was observed to be steeper than 1 vertical: 1 horizontal, and where the watercourse was located directly at the bottom of slope.

Twelve cross-sections were selected for analysis to provide a comprehensive overview of the slope profile and condition. The surface profile of each cross-section was interpreted from the contour lines on the topographic plan. The subsurface profile was interpreted boreholes logs. The slope along Fourteen Mile Creek has an overall height of 5.0± to 9.0± m, measured from the bottom of slope to the existing top of slope, with gradients ranging from 1 vertical: 0.25± to 3.0± horizontal. Groundwater, where encountered, was modeled to taper towards Fourteen Mile Creek, slightly below the toe of slope, as per on site observations. Slope stability was analysed using force-moment-equilibrium criteria of the Bishop Method.

The results of the analyses indicate that the factor of safety (FOS) for the existing slope at the locations of Cross-Sections A-A, C-C, D-D, F-F, H-H and K-K ranges from 1.525 to 2.894, which exceeds the Ontario Ministry of Natural Resources (OMNR) guideline requirements for active land use (minimum FOS 1.5). Furthermore, the distance from the creek to the bottom of slope exceeds a toe erosion allowance of 8.0 m at these cross-sections, except at Cross-Section K-K. As such, the existing slope at these locations, with the exception of Cross-Section K-K, are considered geotechnically stable for the proposed residential usage. Refer to Soil Engineers Limited (2012) for mapping of cross-sections.

Cross-Sections B-B, E-E, G-G, I-I, J-J and L-L, the FOS for the bank ranges from 1.012 to 1.499, which fails to meet the minimum guideline requirement. Refer to Soil Engineers Limited (2012) for mapping of cross-sections. As such, the slope is considered to be geotechnically unstable. Geotechnically stable gradients ranging from 1 vertical: 1.1 to 1.9 horizontal are recommended, depending on the soil conditions as identified by the borehole investigation. Due to the occurrence of shale bedrock near Cross-Sections H-H to L-L, a steeper gradient is acceptable at these locations provided that the slope meets the required toe erosion allowance and minimum FOS. The watercourse is located at the immediate bottom of slope at Cross-Section K-K, and the bank at this location further analysed given a toe erosion allowance. The remodelled slope at Cross-Sections B-B, E-E, G-G, I-I, J-J, K-K and L-L yields a FOS ranging from 1.513 to 2.552, which satisfies the OMNR requirements.

Within the Subject Property, for the watercourse feature at the toe of creek bank (slope) with little to no floodplain (SWS1 and SWS3 as shown on **Figure 5**), an erosion setback of 5.0 m and 8.0 m will be required where the soils at the base of the slope consist of shale bedrock and hard/very dense tills, respectively. The resulting Long-Term Stable Slope Line (LTSSL), incorporating the specified stable

gradient component and toe erosion setback, is presented in the slope stability assessment prepared by Soil Engineers Limited (2012).

4.3 Natural Heritage Resources

4.3.1 Background Review

A number of ecological surveys have been completed within the Study Area in recent years. Some site specific technical studies were conducted on the Subject Property and broad scale studies were focused primarily on natural areas associated with the Fourteen Mile Creek valley. Some included field work, while others were completed from desktop reviews. Data collected from the Fourteen Mile Creek valley has been included in the existing conditions for the Study Area as part of this feature is immediately adjacent to the Subject Property.

An annotated list of relevant studies is provided below:

Pre-1990

Halton Environmentally Sensitive Area Study. Prepared for the Regional Municipality of Halton, Planning Department. Ecological and Environmental Advisory Committee. 1978.

- The 1978 Halton ESA study is based on a synthesis of natural heritage information collected from Halton's ESA between 1976 and 1978.
- Vegetation and wildlife surveys were completed for the Fourteen Mile Creek (ESA #12) and Bronte Creek Valley (ESA #10) to evaluate ESA criteria.

A Bio-physical Inventory of the Fourteen Mile Creek Valley (ESA #12), Oakville, 1987, Halton Region Conservation Authority (prepared by B.K. Axon, G. Chuter and R. Huizer)

- This study was prepared as a background document for a proposal to construct a reservoir in the valley and a subsequent management plan. The Study Area was limited to the Fourteen Mile Creek valleylands and ESA.
- Vegetation communities were mapped and classified in 1986 using aerial photography with some ground truthing.
- Floristic surveys completed in May and August 1986.
- Breeding bird surveys conducted between mid-May and August 1986.
- Incidental surveys of mammals.
- Incidental surveys of herpetofauna.
- No fish surveys. Based on background.

1990 - 2000

Fourteen Mile Creek, McCraney Creek, Watershed Planning Study, prepared for the Town of Oakville, Triton Engineering Services Ltd., Ecological Services for Planning, Terraqua Investigations Ltd., J.L. Cox Planning Consultants, and D.W. Draper.1992.

- A comprehensive environmental management plan that overlaps with portions of the TPA Most of the information is based on background data.
- Emphasis on hydrology and improving creek conditions through flood and erosion control.
- Water quality data is available for Fourteen Mile Creek.
- 1990 Fish Sampling data for Fourteen Mile Creek.
- No vegetation or wildlife field data – only background.

Halton Environmentally Sensitive Area Study. Prepared for the Regional Municipality of Halton, Planning and Development Department. Geomatics International Inc.1993.

- ESA Study Update – No additional field work.
- Desktop boundary refinements.

2000 – present

Fourteen Mile Creek, Main and West Branches Subwatershed Plan, Philips Engineering Ltd., 2000. Revised January 2002

- This scoped subwatershed plan study was focused on lands immediately north of the TPA.
- Ecological surveys (vegetation and wildlife) did not extend into the TPA.
- Fish sampling was limited to the Fourteen Mile Creek West Tributary where they intersect with Upper Middle Road.
- Drainage features in the upper portion of the TPA were examined from a hydraulic and morphological perspective.

Fourteen Mile Creek, East Branch, Scoped Subwatershed Plan East of Regional Road 25, Philips Engineering Ltd., 2000.

Halton Environmentally Sensitive Areas, Consolidation Report, Halton Region Planning and Public Works Department and North-South Environmental Inc. 2005

- ESA Study Update – No additional field work.
- Species listings per ESA.

Halton Natural Areas Inventory, 2006, Halton/North Peel Naturalists' Club, Conservation Halton, South Peel Naturalists' Club, Halton Region, Hamilton Naturalists Club.

- The most recent and comprehensive ecological survey for Fourteen Mile Creek and Bronte Creek ESAs.

- Comprehensive summaries of significant flora and fauna based on background work and recent field work.
- Floral and faunal surveys conducted in 2003 and 2004 in ESA #10.
- ELC and faunal surveys conducted in 2003 and 2004 in ESA #12.

Optimal Use Report and Natural Heritage Study QEW & Bronte Road, Oakville. Prepared for Infrastructure Ontario by GSP Group Inc., Natural Resource Solutions Inc., MTE Consultants Inc., N. Barry Lyons, Paradigm Transportation Solutions Ltd. 2011.

- Land use planning study.
- Natural heritage information based on background data with some field verification.

4.3.2 Vegetation Resources

4.3.2.1 Vegetation Communities

The Study Area is comprised of a mixture of forested valleylands and recreational open space. The tableland portions of the Study Area are generally devoid of natural vegetation cover as they have been converted to a golf course; however, the Fourteen Mile Creek valleylands have remained in a natural state and support a diversity of plant communities.

The forests in the valley are representative of the Deciduous Forest Region – Niagara Section and the Great Lakes – St. Lawrence Forest Region – Huron – Ontario Section (Rowe 1972). The Fourteen Mile Creek ESA occupies most of the TPA. This natural area includes the Fourteen Mile Creek valleylands and sections of adjoining tableland. In general, the valley slopes consist predominantly of mid-aged to mature White Ash forest and Sugar Maple hardwood forests, while the bottomlands are dominated by Willow forests. Successional communities within the valley, apparently recovering from past disturbance, include hawthorn thicket/savannah, gray dogwood thicket, and old field meadow.

Vegetation communities largely classified using the ELC system (Lee *et al.,* 1998), on the Subject Property are illustrated on **Figure 10**. A summary of the vegetation types is presented in **Table 11**. ELC data cards for these communities are provided in **Appendix B**.

Table 11. Summary of Vegetation Types in the Subject Property and Merton Tertiary Plan Area (TPA)

Community Type	Vegetation Type	Area on Subject Property (ha)	Total Area in Merton TPA (ha)
Cultural / Anthropogenic Communities	Anthropogenic (ANT)	1.05	31.85
	Manicured (M)	41.65	105.71
	Buckthorn Cultural Thicket (CUT1)	0.28	0.91
	Hedgerow (H)	0.53	4.46
	Scotch Pine Coniferous Plantation (CUP3-3)	0.25	2.56
	Cultural Savannah (CUS1)	0	2.31
	Cultural Woodland/Coniferous Plantation (CUW/CUP3)	0	3.81

Community Type	Vegetation Type	Area on Subject Property (ha)	Total Area in Merton TPA (ha)
	Dry-Moist Old Field Meadow (CUM1-1)	12.5	33.31
	Gray Dogwood Cultural Thicket (CUT1-4)	0.002	2.78
	Raspberry Cultural Thicket (CUT1-5)	0	0.36
	Sumac Cultural Thicket (CUT1-1)	0.03	0.95
	Pondweed Submerged Shallow Aquatic (SAS1-1) – dug ponds	0	2.77
	Coontail Submerged Shallow Aquatic (SAS1) – dug pond	0.30	0.30
	Open Water (OAO) – dug pond	0	0.42
	Waterweed Submerged Shallow Aquatic (SAS1-3) – dug pond	0	0.05
	Water Milfoil Submerged Shallow Aquatic (SAS1-4) – dug ponds	0	0.62
	Total Cultural Area:	**56.59**	**193.17 ha**
Forest Communities	Dry-Fresh Hickory Deciduous Forest (FOD2-3)	0	0.11
	Dry-Fresh Oak-Hardwood Deciduous Forest (FOD2-4)	0	0.27
	Dry-Fresh Poplar Deciduous Forest (FOD3-1)	0	2.56
	Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1)	0.17	14.54
	Dry-Fresh Sugar Maple-Beach Deciduous Forest (FOD5-2)0	0	1.56
	Dry-Fresh Sugar Maple-White Ash Deciduous Forest (FOD5-8)	0	1.63
	Dry-Fresh Sugar Maple-White Birch Deciduous Forest (FOD5-10)	0.02	0.81
	Dry-Fresh White Ash Deciduous Forest (FOD4-2)	1.63	3.38
	Dry-Fresh White Pine-Sugar Maple Mixed Forest (FOM2-2)	0	9.22
	Dry-Fresh White Pine Coniferous Forest (FOC1-2)	0	0.75
	Fresh-Moist Black Walnut Deciduous Forest (FOD7-4)	0	1.07
	Fresh-Moist Green Ash Deciduous Forest (FOD7-2)	0.02	2.73
	Fresh-Moist Poplar Deciduous Forest (FOD8-1)	0	0.14
	Fresh-Moist Sugar Maple-Ash Deciduous Forest (FOD6-1)	0	0.31
	Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3)	0	15.84
	Total Forest Area:	**1.84**	**54.92 ha**
Wetland Communities	Cattail Mineral Shallow Marsh (MAS2-1)	0.03	0.22
	Forb Mineral Shallow Marsh (MAS2-9)	0	0.02
	Mineral Meadow Marsh (MAM2)	0.07	0.08
	Reed Canary Grass Mineral Meadow Marsh (MAM2-2)	0.48	0.95
	Silver Maple Mineral Deciduous Swamp (SWD3-2)	0	0.09
	Willow Mineral Thicket Swamp (SWT2-2)	0.14	0.14
	Total Wetland Area:	**0.72**	**1.50 ha**

4.3.2.1.1 Vegetation Communities

Much of the Subject Property consists of an existing golf course, with three small woodlands, several hedgerows, scattered patches of cultural meadow, and a few small wetland features. The following is a detailed summary of the ELC vegetation communities documented on and adjacent to the Subject Property during the 2012 and 2013 field seasons (see **Figure 10**).

Fresh-Moist Green Ash Deciduous Forest (FOD7-2)

Unit 25 is a large mid-aged forest situated in the valleylands north of the Subject Property. In this area the forest canopy consists of Green Ash, with lesser associates of Manitoba Maple (*Acer negundo*), and White Elm. Canopy closure ranges from 50% to 70%, with occasional gaps. Buckthorn is abundant in the understory throughout this area and Hawthorns are also common throughout. Other shrubs common to this area include Gray Dogwood (*Cornus racemosa*) and Wild Red Raspberry (*Rubus ideas* spp. *strigosus*). Ground covers include a mix of woodland species and old field species, notably Garlic Mustard, Calico Aster (*Symphyotrichum lateriflorum*), Tall Goldenrod (*Solidago canadensis* var. *scabra*), and Herb Robert, among others. The structure and composition of the vegetation in this community suggests that the area is recovering from past disturbances, likely associated with historic agricultural use of the land.

Unit 34 is situated in the floodplain of Fourteen Mile Creek, north of the Subject (Saw-Whet) Property. The canopy is comprised of Green Ash, in association with Ironwood (*Ostrya virginiana*), Manitoba Maple, Basswood (*Tilia americana*), and Sugar Maple (*Acer saccharum*). The understory is sparse, consisting of Buckthorn and Green Ash saplings. Dominant ground covers include Thicket Creeper, Garlic Mustard, Calico Aster, and Zig-zag Goldenrod (*Solidago flexicaulis*).

Dry-Fresh Sugar Maple Deciduous Forest (FOD5)

There are a number of forest communities situated in the valleylands adjacent to the Subject Property, which are characterized by the presence of Sugar Maple as the primary component of the forest canopy.

Units 15, 21, 22, and ***32*** are mature Sugar Maple communities situated on steep valley slopes adjacent to the Subject Property. These forest communities are fairly similar to one another as they are all about the same age and dominated by Sugar Maple, but differ in terms of the presence and dominance of other hardwood tree species. Typical hardwood associates within these communities include White Ash (*Fraxinus americana*), Red Oak (*Quercus rubra*), White Birch (*Betula papyrifera*), Basswood, American Beech (*Fagus grandifolia*), and Ironwood. These forest communities have well-developed canopies and subcanopies comprised of trees of various sizes and ages.

The understory, however, is generally sparse (10-25% cover), consisting primarily of Chokecherry (*Prunus virginiana*), Sugar Maple, White Ash, and Buckthorn in various concentrations. Ground covers are also generally sparse, especially later in the summer. In the spring, these forests support spring ephemerals such as Yellow Trout Lily (*Erythronium americanum*), White Trillium (*Trillium grandiflorum*), and May-apple (*Podophyllum peltatum*). Other ground covers typical of these communities include Garlic Mustard, Early Meadow-rue (*Thalictrum dioicum*), Zig-Zag Goldenrod, Wild Geranium (*Geranium maculatum*), Blue-stem Goldenrod (*Solidago caesia*), and Pennsylvania Sedge (*Carex pensylvanica*).

Existing Conditions - Biological - Ecological Land Classification

Figure 10

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Unit	ELC Vegetation Type/Ecosite	ELC Code	Unit	ELC Vegetation Type/Ecosite	ELC Code
1	Dry-Fresh White Ash Deciduous Forest	FOD4-2	21	Dry-Fresh Sugar Maple-White Birch Deciduous Forest	FOD5-10
2	Dry-Moist Old Field Meadow	CUM1-1	22	Dry-Fresh Sugar Maple Deciduous Forest	FOD5-1
3	Buckthorn Cultural Thicket	CUT1-1	23	Fresh-Moist Willow Lowland Deciduous Forest	FOD7-3
4	Reed Canary Grass Mineral Meadow Marsh	MAM2-2	24	Reed Canary Grass Mineral Meadow Marsh	MAM2-2
5	Mineral Meadow Marsh	MAM2	25	Fresh-Moist Green Ash Deciduous Forest	FOD7-2
6	Coontail Submerged Shallow Aquatic	SAS1	26	Dry-Moist Old Field Meadow	CUM1-1
7	Cattail Mineral Shallow Marsh	MAS2-1	27	Dry-Fresh White Pine Coniferous Forest	FOC1-2
8	Deciduous Hedgerow	DH	28	Dry-Moist Old Field Meadow	CUM1-1
9	Dry-Fresh White Ash Deciduous Forest	FOD4-2	29	Dry-Fresh White Ash Deciduous Forest	FOD4-2
10	Deciduous Hedgerow	DH	30	Willow Mineral Thicket Swamp	SWT2-2
11	Buckthorn Cultural Thicket	CUT1	31	Sumac Cultural Thicket	CUT1-1
12	Dry-Moist Old Field Meadow	CUM1-1	32	Dry-Fresh Sugar Maple-Beech Deciduous Forest	FOD5-2
13	Scotch Pine Coniferous Plantation	CUP3-3	33	Dry-Fresh White Pine Coniferous Forest	FOC1-2
14	Reed Canary Grass Mineral Meadow Marsh	MAM2-2	34	Fresh-Moist Green Ash Deciduous Forest	FOD7-2
15	Dry-Fresh Sugar Maple-White Ash	FOD5-8	35	Manicured Lawn	M
16	Gray Dogwood Cultural Thicket	CUT1-4	36	Dry-Fresh White Pine-Sugar Maple Mixed Forest	FOM2-2
17	Dry-Fresh White Ash Deciduous Forest	FOD4-2	37	Gray Dogwood Mineral Cultural Thicket	CUT1-4
18	Raspberry Cultural Thicket	CUT1-5	38	Cultural Woodland/Coniferous Plantation	CUW1/CUP3
19	Reed Canary Grass Mineral Meadow Marsh	MAM2-2	39	Dry-Fresh Poplar Deciduous Forest	FOD3-1
20	Fresh-Moist Sugar Maple-Ash Deciduous	FOD6-1	46	Anthropogenic	ANT

Legend

- Subject Property
- 7 Pond
- Swale
- Watercourse
- Ecological Land Classification

First Base Solutions
Web Mapping Service 2012

UTM Zone 17 N, NAD 83

N W E S

0 40 80 160 Meters

1:5,000

BEACON ENVIRONMENTAL

Project 212091
February 2014

Fresh-Moist Sugar Maple-Ash Deciduous Forest (FOD6-1)

Unit 20 is a mid-aged forest with a canopy of Sugar Maple, Green Ash, White Elm, and Manitoba Maple. There are many younger, small diameter trees in this area and an abundance of deadfall. The understory is sparse, comprised of Buckthorn, Wild Red Raspberry, Tatarian Honeysuckle, and Riverbank Grape (*Vitis riparia*). Ground covers include Thicket Creeper, Calico Aster, Herb Robert, and Garlic Mustard.

Dry-Fresh White Ash Deciduous Forest (FOD4-2)

There are several forest communities on and adjacent to the Subject Property in which White Ash is the dominant tree species. These include ELC units 1, 9a/9b, 17, and 29.

Unit 1 is a small forest patch situated on the northwest side of the Subject (Saw-Whet) Property adjacent to Bronte Rd. The canopy is comprised of White Ash, Black Walnut, and White Elm (*Ulmus americana*). Common Buckthorn (*Rhamnus cathartica*) is abundant in the understory. Ground covers include common native and exotic species typical of disturbed woodlands, notably Garlic Mustard (*Alliaria petiolata*), Urban Avens (*Geum urbanum*), Buckthorn seedlings, and Thicket Creeper (*Parthenocissus vitacea*).

Unit 9a is a mid-aged forest patch situated just north of the transmission lines near the southeast end of the property. White Ash is the dominant canopy species, with lesser associates of Bur Oak (*Quercus macrocarpa*), Red Oak (*Quercus rubra*), and Shagbark Hickory (*Carya ovata*). Most of the larger trees in this forest patch are in the range of 30-50 cm dbh, with a few mature specimens in the range of 75 cm to 100 cm dbh. The understory is quite dense, and consists mostly of Buckthorn. Similar to Unit 1, ground covers include Buckthorn seedlings, Garlic Mustard, Herb Robert (*Geranium robertianum*), and Thicket Creeper. ***Unit 9b*** is situated at the eastern corner of the property and is very similar to Unit 9a in structure and composition.

Unit 17 is a mid-aged, secondary growth forest dominated by White Ash, which are generally in the range of 15 cm to 25 cm dbh. There is a dense understory of Buckthorn, Hawthorn, and Gray Dogwood. Ground cover diversity is very low and includes weedy species such as Garlic Mustard, Buckthorn seedlings, Urban Avens, and mosses.

Unit 29 is a mid-aged, secondary forest situated on a valley slope adjacent to the property. White Ash is dominant, with lesser associates of Trembling Aspen (*Populus tremuloides*) and White Birch. Similar to Unit 17, this community has dense understory of Buckthorn, Gray Dogwood, and Hawthorns. Ground covers are sparse, but include Garlic Mustard, Buckthorn Seedlings, Herb Robert, and Poison Ivy (*Toxicodendron radicans*).

Dry-Fresh White Pine Coniferous Forest (FOC1-2)

Units 27 and **33** are mature coniferous forest dominated by White Pine (*Pinus strobus*), with scattered hardwood tree such as Sugar Maple, White Ash, and White Elm accounting for less than 25% total canopy cover. Understory species include White Ash, Gray Dogwood, and Buckthorn. Ground covers are sparse but include common species such as Garlic mustard, Enchanter's Nightshade, Poison Ivy, Thicket Creeper, and Herb Robert.

Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3)

Unit 23 is a mid-aged forest community situated in the bottomlands along Fourteen Mile Creek. It is characterized by an abundance of Reddish Willow, a common floodplain tree in Southern Ontario, in association with Manitoba Maple, Green Ash, White Elm, Basswood, and occasionally Sugar Maple. The understory is patchy and generally sparse overall, consisting predominantly of Buckthorn, Wild Red Raspberry, Wild Black Currant (*Ribes americanum*), and Chokecherry. Typical ground covers include Garlic Mustard, Calico Aster, Jewelweed (*Impatiens capensis*), Creeping Charlie (*Glechoma hederacea*), and Tall Goldenrod.

Reed Canary Grass Mineral Meadow Marsh (MAM2-2)

There are several meadow marsh communities, both on the Subject Property and in the adjacent valleylands, which are dominated by Reed Canary Grass (*Phalaris arundinacea*), a ubiquitous perennial wetland grass.

Unit 4, situated along the Fourteen Mile Creek Tributary**,** is dominated by Reed Canary Grass and Creeping Bentgrass (*Agrostis stolonifera*), with sparse amounts of Panicled Aster (*Symphyotrichum lanceolatus*), Tall Goldenrod, Elecampange (*Inua hellenium*), and Teasel (*Dipsacus fullonum*). Shrub cover is patchy, consisting mainly of Bebb's Willow (*Salix bebbianna*).

Unit 14 is a very small tableland wetland pocket situated on the edge of an old field (Unit 12). It is comprised largely of Reed Canary Grass, Fox Sedge (*Carex vulpinoidea*), Soft Rush (*Juncus effusus*), and Red Top (*Agrostis gigantea*).

Unit 19 is situated in the valleyland adjacent to the Subject Property. Within this feature, Reed Canary Grass is abundant, with a diversity of other wetland plants such as Purple Loosestrife (*Lythrum salicaria*), Jewelweed, Panicled Aster, Rice Cutgrass (*Leersia oryzoides*), willowherbs (*Epilobium* spp.), Joe-Pye Weed (*Eupatorium maculatum*), and Cattails (*Typha* spp), among others. Overall, soils are mineral (clay loam) and very moist; however there are some wetter pockets fed by groundwater seepage in which organic soils have developed to depths of approximately 60 cm. There are also a few drier patches of old field meadow vegetation.

Unit 24 is situated in the floodplain in the adjacent valleylands. Dominant species in the marsh community include Reed Canary Grass, willowherbs, Purple Loosestrife, and Broad-leaved Cattail (*Tyhpa latifolia*), among other wetland plants. Similar to Unit 19, Soils are mineral and very moist; however, there is also an area of groundwater seepage from the toe of the valley slope, which has created wetter anaerobic conditions in which organic soils have developed.

Common Reed Mineral Meadow Marsh (MAM2)

Unit 5 is a small meadow marsh community situated along Bronte Rd. Common Reed (*Phragmites australis*) is abundant throughout, which is typical of many roadside wetlands. Other wetland species that occur in this wetland include Panicled Aster, Reed Canary Grass, Red Top, and Purple Loosestrife. A patch of Bebb's Willow is also present.

Willow Mineral Thicket Swamp (SWT2-2)

Unit 30 is a small tableland wetland pocket situated within the main golf course that supports a low diversity of wetland vegetation. Bebb's Willow is abundant (>60 % cover). Reed Canary Grass is dominant in the ground layer. Soils are mineral (sandy clay loam) and very moist.

Cattail Mineral Shallow Marsh (MAS2-1)

Unit 7 is a small tableland marsh, situated within the main golf course near the entrance road. Cattails (*Typha latifolia, T. angustifolia*) are dominant. Among the cattails, other common wetland species are to be found, including Red Top, Panicled Aster, and Purple Loosestrife. Soils are mineral and very moist.

Coontail Submerged Shallow Aquatic (SAS1)

Unit 6 is a dug irrigation pond situated on the tableland of the Subject Property. The pond (#7) contains patches of Common Hornwort/Coontail (*Ceratophyllum demersum*), a submerged aquatic plant, and a few Broad-leaved Pondweed (*Potomogeton natans*) plants. A narrow band of marsh vegetation occurs along the edge of the pond including Broad-leaved Cattail, Fox Sedge, and Green Bulrush (*Scirpus atrovirens*).

Dry-Moist Old Field Meadow (CUM1-1)

There are several meadow/field communities scattered throughout the golf course property and in the adjacent valley.

Unit 2 occurs throughout the golf course grounds. Many of the meadow patches consist of overgrown turf grass mixed with other grasses and old field forbs. Typical species include various cool season grasses (*Poa pratensis, Festuca* spp., *Phleum pratensis*), Tall Goldenrod, Creeping Thistle (*Cirsium arvense*), Canada Goldenrod (*Solidago canadensis*), various asters (*Symphyotrichum spp.*), Tufted Vetch (*Vicia cracca*), and Common Milkweed (*Asclepias syriaca*). Some old field patches contain planted trees such as Green Ash, Spruce (*Picea* spp.), Carolina Poplar (*Populus* X *canadensis*), Red Oak, Black Walnut (*Juglans nigra*), and others.

Unit 12 is a large tableland meadow community that is periodically farmed. At the time of the field survey in 2012 dominant species included Tall Goldenrod, Panicled Aster, Red Top, Teasel, Creeping Thistle, and Queen Anne's Lace (*Daucus carota*).

Unit 26 occurs in the floodplain of Fourteen Mile Creek. Dominant species include Tall Goldenrod, Reed Canary Grass, Wild Parsnip (*Pastinaca sativa*), Creeping Thistle, and Teasel. Within these areas, there are some moister spots that support Jewelweed, Purple Loosestrife, and Joe-Pye Weed. Tree cover is generally sparse and includes occurrences of Green Ash, Manitoba Maple, and Reddish Willow.

Buckthorn Cultural Thicket (CUT1)

Unit 3 is small thicket of Buckthorn that occurs on a slope above the tributary to Fourteen Mile Creek. Buckthorn is abundant, with lesser amounts of Hawthorn. There are several White Elm and Bur Oak in the canopy. No herbaceous cover was recorded, likely due to the density of Buckthorn.

Unit 11 is a fairly large thicket community situated on a narrow strip of tableland and valley slope adjacent to the tributary to Fourteen Mile Creek Common Buckthorn is abundant, with lesser amounts of Hawthorn, Apple (*Malus pumila*), and Gray Dogwood. There are scattered young trees among the Buckthorn, mostly White Ash. Ground covers include Enchanter's Nightshade (*Circaea lutetiana*), Thicket Creeper, Heal-all (*Prunella vulgaris*), Urban Avens, and Buckthorn seedlings.

Hedgerows (H)

There are four hedgerows on the Subject Property (Units 8a, 8b, 8c, and 10). ***Units 8a*** and ***8b*** are situated near the southeast corner of the property. Both hedgerows are comprised of mid-aged and mature Bur Oak and Green Ash trees. The understory is very dense with Buckthorn, Gray Dogwood, hawthorn, and Green Ash. Dominant ground covers include Garlic Mustard, Buckthorn seedlings, Urban Avens, and Thicket Creeper.

Unit 8c, situated on the eastern property boundary, consists mostly of mid-aged Green Ash and Scotch Pine (*Pinus sylvestris*). The undergrowth consists of Buckthorn and is extremely dense. There are few ground covers.

Unit 10, situated along the powerlines, is comprised of a single row of trees, mostly remnant Bur Oak and some Shagbark Hickory. There is little understory to speak of and the ground covers consist of field species including overgrown turf grass, Tall Goldenrod, and New England Aster.

4.3.2.1 Flora

A total of 381 plant species have been documented from the Merton TPA and the adjacent Fourteen Mile Creek valley through various studies conducted in the area over the past 35 years. A checklist has been compiled using background data and recent field data collected during 2012 and 2013 site investigations by Beacon Environmental, provided in **Appendix C.**

Of the plant species recorded, 139 were documented on the Subject Property and 168 species were documented on adjacent lands within the Fourteen Mile Creek valley.

Of the 139 species observed on the Subject Property, over half (74 of 139) are considered non-native to the GTA. Aside, from Black Walnut (*Juglans nigra*), all native species observed on the property are ranked S5, indicating that they are common and secure in Ontario. Black Walnut is ranked S4, indicating that natural occurrences of this species are uncommon, but not rare in the province (the species is apparently secure). The relatively high proportion of non-native species and common native species is unsurprising given that much of the property is developed as golf course with very few natural vegetation communities remaining. However, several plant species on the property, while common in Ontario, are considered to be regionally rare or uncommon.

Of the 168 species recorded in the Fourteen Mile Creek valley adjacent to the Subject Property in 2012, approximately a third (62 of 168) are considered non-native to the GTA. The majority of the native species recorded are ranked S5 by the NHIC, and five are ranked S4, which includes Black Walnut, White Cutgrass (*Leersia virginica*), Carpenter's Square Figwort (*Scrophularia marilandica*), Summer Grape (*Vitis aestivalis*), and Black Maple (*Acer nigrum*). One species, Honey-locust (*Gleditsia triacanthos*), is ranked S2, indicating that it is imperilled in Ontario; however, it is considered

an introduced species in Halton Region (Crins *et al.*, 2006). The Honey-locust on the property is a horticultural variety that is frequently planted as a landscape tree. Provincially and regionally rare/uncommon species are discussed in the following section.

4.3.2.2 Significant Flora

There are records of significant plant species from the vicinity of the Study Area based on historic and recent floristic surveys. Seven species are considered rare and 30 species are considered uncommon in Halton Region (Crins *et al*., 2006). The majority of these occur in the Fourteen Mile Creek ESA. These are listed in **Appendix D.**

A single Species at Risk (SAR) is on record in the vicinity of the Subject Property. Eastern Flowering Dogwood (*Cornus florida*), an endangered species in Ontario, was originally reported from the Fourteen Mile Creek ESA in 1978 (Halton Region, 1978). Eastern Flowering Dogwood was not observed during any of the vegetation surveys conducted in 2012 or 2013 on the Subject Property and adjacent valleylands.

Other provincial species of conservation concern (i.e., species ranked S1, S2 or S3) recorded in the TPA include Sharp-leaved Goldenrod (*Solidago arguta*), Pignut Hickory (*Carya glabra*), Slender Sedge (*Carex gracilescens*), and Honey Locust. As mentioned above, Honey Locust is ranked S2 (imperilled in Ontario); however, it is an introduced species in Halton Region (Crins *et al.*, 2006) and the specimens observed in the TPA are a horticultural variety that is frequently planted as a landscape tree, so not considered significant in the TPA.

Sharp-leaved Goldenrod (S3) and Slender Sedge (S3) have been reported in the Fourteen Mile Creek ESA (Halton Region, 2005); however, neither species was observed during recent field investigations. Anderson Associates Ltd. (1985) reported Pignut Hickory (*Carya glabra*/*Carya ovalis*, S3) in a hedgerow in the western portion of the WWTP plant property. The species was also reported in the Fourteen Mile Creek ESA (Halton Region, 1978). However, there are no recent sightings of this species in the area.

In addition to the four species discussed above, there are 17 regionally rare and uncommon species documented in previous inventories of the Fourteen Mile Creek ESA that were not recorded during field investigations conducted in 2012 and 2013, as follows:

- Southern Arrow-wood (*Viburnum dentatum*)
- Blueflag (*Iris versicolor*)
- Eggert's Hawthorn (*Crataegus dilatata*)
- American Plum (*Prunus americana*)
- Cow Parsnip (*Heracleum maximum*)
- Fireweed (*Erechtites hieracifolia*)
- Woolly Sedge (*Carex pellita*, formerly *C. lanuginosa*)
- Late Lowbush Blueberry (*Vaccinium angustifolium*)
- Canada Plum (*Prunus nigra*)
- Umbellate Bastard Toad-flax (*Comanra umbellata*)
- Lecontes Violet (*Viola affinis*)
- Black Willow (*Salix nigra*)
- Grove Meadow Grass (*Poa alsodes*)

- Wild Garlic (*Allium canadense*)
- Fireberry Hawthorn (*Crataegus chrysocarpa*)
- Showy Orchis (*Galeris spectibilis*)
- Gaywings (*Polygala paucifolia*)

Specific location data for these species is not available; consequently, it is not known whether any observations overlap with the Study Area or whether these populations may have been extirpated.

One regionally rare and six regionally uncommon plant species were observed on the Subject Property by Beacon in 2012 and 2013, including:

- Common Hornwort (*Ceratophyllum demersum*);
- Variable Hawthorn (*Crataegus macrosperma*);
- Floating Pondweed (*Potamogeton natans*);
- White Trout-lily (*Erythronium albidum*)
- Schuette's Hawthorn (*Crataegus schuettei*)
- Long-thorned Hawthorn (*Crataegus macracantha*); and
- Tall Bur-marigold (*Bidens vulgatus*)

Common Hornwort, White Trout-lily, Long-thorned Hawthorn, Schuette's Hawthorn, and Variable Hawthorn are considered uncommon in Halton Region, while Floating Pondweed is considered regionally rare (Crins *et al*., 2006). Both Common Hornwort and a few individuals of Floating Pondweed were observed in a dug irrigation pond (ELC Unit 6) in 2012. Notably, neither species was observed in the pond in 2013. The three hawthorn species were found in several locations on and immediately adjacent to the Subject Property, primarily along the edges of ELC Units 8a, 9a, 12, 13, 17, 22a, 25, and 29a. White Trout-lily was observed along the edge of ELC Unit 22a. Tall Bur-marigold was observed along the edge of ELC Unit 12 adjacent to ELC Unit 13.

Four regionally uncommon plant species were observed within the Fourteen Mile Creek ESA adjacent to the Subject Property by Beacon Environmental in 2012, including:

- Square-stem Monkey-flower (*Mimulus ringens*);
- Ditch-stonecrop (*Penthorum sedoides*);
- Carpenter's Square Figwort (*Scrophularia marilandica*); and
- Summer Grape (*Vitis aestivalis*).

4.3.2.3 Tree Inventory

A preliminary tree inventory of the Subject Property was completed by Cosburn Giberson Landscape Architects (2012). Based on the preliminary findings of the tree inventory, the property contains a mix of native and exotic trees, which range in size from 10 cm to 110 cm DBH; however, most trees are in the range of 15 cm to 25 cm DBH. Tree preservation opportunities will be identified at the detailed design stage. For more information, please refer to Cosburn Giberson Landscape Architects (2012).

4.3.3 Landscape Connectivity

Structural landscape connectivity refers to "*the physical relationships among habitat patches such as habitat corridors or inter-patch distances*" (Taylor *et al*., 2006). Structural landscape connectivity

within the Study Area is primarily associated with the major stream valleys and contiguous tableland forest patches.

The Fourteen Mile Creek valleyland plays an important role in maintaining both regional and local scale landscape connectivity. These valley systems and their associated tributaries form part of larger drainage network that extends far beyond the Subject Property to the north and northwest. The relatively close proximity of the Fourteen Mile Creek valley to the Bronte Creek valley, particularly to the northwest of the Subject Property, facilitates inter-watershed linkages that are important for maintaining the long-term viability of local populations of flora and fauna.

The Fourteen Mile Creek valleyland supports a complex mosaic of inter-connected habitats including floodplain and valley slope forests, riparian wetlands and successional habitats. Mid-aged to mature forests consisting of Maple, Oak, Hickory, and Pine occur along the valley slopes and brows, while forests consisting of Willow, Ash, and Elm are common in the bottomlands. The valleys are also comprised of successional communities (i.e., meadows and thickets) that correspond with areas formerly disturbed by clearing and farming activities.

The Fourteen Mile Creek valley system ranges in width from 80 m at the eastern end along the North Service Road to 500 m in width at the western end along Upper Middle Road. This segment of the Fourteen Mile Creek valley forms of a relatively wide, contiguous natural area that facilitates the east-west movement of terrestrial and aquatic biota. The landscape surrounding this valley segment is largely urbanized and natural areas are generally small and confined to the upstream portions of the western branches of Fourteen Mile Creek. Linkages to the upstream areas are partially restricted by the presence of major roadways such as Upper Middle Road and Bronte Road. Linkages to the east along the main branch of the Fourteen Mile are substantially restricted by the QEW. Within the Study Area, Tributary 14W1-W1 provides a key linkage between the Fourteen Mile Creek and Bronte Creek valley systems. While this linkage is partially restricted by Bronte Road, the two large box culverts associated with Tributary 14W1-2 and Tributary 14W1-3 facilitate movement of small and large wildlife respectively. The external dimensions of the northern culvert are 3 m wide and 2 m tall and 47 m in length. The culvert is sufficiently large to support the movements of small wildlife species (e.g., raccoon, skunk, coyote, and fox) and there is evidence that raccoon are utilizing this culvert. The external dimensions of the southern culvert are 4 m wide and 2.5 m tall and 41 m in length. It is sufficiently large to support the movement of small wildlife as well as larger wildlife (e.g., deer), and there is evidence that deer are utilizing this culvert.

The tableland portions of the Subject Property are comprised primarily of golf course and agricultural lands and do not support natural features. Despite the lack of natural features, the openness of these areas supports the movement of certain wildlife (e.g., deer, coyote, and some small mammals that are tolerant of humans and disturbed landscapes). However there are limited opportunities for wildlife to safely move beyond the Subject Property due to the presence of major roads and existing development. Opportunities for wildlife to move safely between Fourteen Mile Creek and Bronte Creek valley within the vicinity of the Subject Property are limited by Bronte Road, which represents a significant barrier to movement. The only safe wildlife crossing between these two systems is in the vicinity of tributaries 14W1-2 and 14W1-3 which pass through oversized box culverts under Bronte Road. Deer and other mammals have been observed using these wildlife crossings.

Other connections outside the Subject Property are facilitated by over-sized culverts along Upper Middle Road and on Bronte Road immediately north of Upper Middle Road. These culverts are sufficiently large to allow large and small terrestrial wildlife to move upstream along the west branches

(14W-M1 and 14W-E1) of Fourteen Mile Creek and gain access to remaining rural lands to the northwest as well as Bronte Creek Provincial Park.

Opportunities for improving site-specific and broader scale connectivity are illustrated in **Figure 16** and described in **Section 4.3.12.4**.

4.3.4 Breeding Birds

4.3.4.1 Earlier Studies

Axon *et al.,* (1987) surveyed the Fourteen Mile Creek valley extensively from late spring through summer 1986. A summary off this study and others in the valley is included as it falls within the Study Area, and is immediately adjacent to the Subject Property.

Axon *et al.,* (1987) recorded 54 breeding bird species as well as Great Blue Heron (*Ardea herodias*) feeding in the creek. These species and all other known breeding species in the Study Area are listed in **Appendix E**. Notably, migrants and wintering species have been excluded from this list because there are few records from these seasons, and S-Rank and regional statuses apply to breeding birds.

The authors noted that the valley supported a high diversity of species, but that Gray Catbird (*Dumetella carolinensis*), Yellow Warbler (*Dendroica petechia*), Song Sparrow (*Melospiza melodia*), American Goldfinch (*Cardeulis tristis*), Black-capped Chickadee (*Poecile atricapillus*), Blue Jay (*Cyanocitta cristata*), Northern Cardinal (*Cardinalis cardinalis*), House Wren (*Troglodytes aedon*) and Eastern Kingbird (*Tyrannus tyrannus*) were particularly abundant.

Axon *et al*., (1987) also discussed several rare or notable breeding species that they or others recorded (notably species that are no longer considered rare are not discussed here):

- Eastern Meadowlark (*Sturnella magna*) threatened was observed in suitable nesting habitat (although it was not noted specifically where or how many were recorded);
- A small colony (of the usually non-colonial) Green Heron (*Butorides virescens*), regionally uncommon, was recorded in the pine plantation;
- A record of breeding Red-headed Woodpecker (*Melanerpes erythrocephalus*) (nationally threatened, provincially Special Concern) was included from a previous sighting but was not confirmed as part of their study;
- Long-eared Owl (*Asio otus*) (regionally rare breeder) was known to have bred in the valley in 1983; and
- Orchard Oriole (*Icterus spurius*) (regionally rare breeder) was recorded but is increasing in abundance and range in southern Ontario and may no longer be rare.

Additionally, several species were recorded that are uncommon breeders in Halton Region, including such as Black-billed Cuckoo (*Coccyzus erythropthalmus*) Brown Creeper (*Certhia americana*), and Least Flycatcher (*Empidonax minimus*), as well as several forest area-sensitive species, such as Black-and-White Warbler (*Mniotilta varia*), and Hairy Woodpecker (*Picoides villosus*).

The Halton Natural Areas Inventory (Halton/North Peel Naturalists' Club *et al.,* 2006) has records of 68 bird species in Fourteen Mile Creek valley (NAI-12) with 45 of these recorded in 2004 field surveys. This report lists six rare breeding bird species and eleven locally uncommon bird species. The rare breeding bird list includes the previously mentioned Long-eared Owl and Orchard Oriole,

however it also includes four rare species recorded by Axon *et al.,* (1987) as late migrants, thus it is very probable that these species are migrants and not breeding species.

The Ontario Breeding Bird Atlas (Bird Studies Canada *et al.*, 2006) data for the 10 kilometre square in which Subject Property lies showed that 81 bird species were recorded during the 2001 to 2005 survey period. This square contained several Species at Risk: Chimney Swift (*Chaetura pelagica*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Barn Swallow (*Hirundo rustica*), Hooded Warbler (*Wilsonia citrina*), Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*). It is not readily possible to tell which of these species might be associated with TPA, but the Beacon Environmental 2012 and 2013 surveys (as described below) determined that only Barn Swallow was present in the Subject Property. The Chimney Swift is likely present in the more urbanized portion of the atlas square (away from the Subject Property), and the Bobolink and Eastern Meadowlark are probably no longer present in the Subject Property or the TPA as there are no large meadows in the area and they were not recorded by Beacon Environmental. The Hooded Warbler might have been recorded in either the Fourteen Mile Creek valley or Bronte Creek valley, but would not be expected to occur outside the valleylands based on its habitat requirements.

4.3.4.2 Recent Surveys

The breeding bird surveys conducted by Beacon Environmental in 2012 and 2013 identified a total of 34 species breeding on the Subject Property (see **Appendix E**).

The majority of the Subject Property is comprised of manicured turf of the golf course, golf course roughs, and sporadic clusters of trees and shrubs. The open space of the golf course is suitable for open-country bird species such as, Eastern Kingbird (*Tyrannus tyrannus)*, Song Sparrow (*Melospiza melodia)*, European Starling (*Sturnus vulgaris*), Red-winged Blackbird (*Agelaius phoeniceus*) and American Goldfinch (*Cardeulis tristis)*, however species that will use open habitat with scattered trees were also common. These include American Robin (the most abundant species observed), Mourning Dove (*Zenaida macroura*), Warbling Vireo (*Vireo gilvus),* and Chipping Sparrow (*Spizella passerine)*. Numerous other edge or thicket species were found in small numbers. With the exception of Orchard Oriole (*Icterus spurius*) (one recorded) all of these species are common to abundant in the Region.

One species considered by the OMNR to be an area-sensitive (grassland) species, Savannah Sparrow (*Passerculus sandwichensis),* was recorded on the Subject Property. Area-sensitive species are those that require larger patches of habitat to breed, or are more productive in larger patches of habitat. Three individuals were observed in areas of uncut meadow or golf course rough over two years.. Although the Savannah Sparrow requires large areas of open land, it will breed in many types of large field habitats including active agricultural lands. This species is found frequently in both agricultural and old fields, and is a common to abundant species in southern Ontario.

All of the species recorded as breeding are ranked provincially as apparently secure (S4), secure (S5), or non-native (SE) by the OMNR (NHIC, 2013).

4.3.4.2.1 Bird Species at Risk – Subject Property

One species, Barn Swallow (*Hirundo rustica),* recorded on the property is listed as threatened nationally (by the Committee on the Status of Endangered Wildlife in Canada - COSEWIC) and provincially (by the Committee on the Status of Species at Risk in Ontario - COSSARO). Thus this

species is protected under the Provincial *Endangered Species Act* (see **Section 2**). No other endangered or threatened bird species were recorded.

Barn Swallow is an aerial insectivore. It is a very widespread and common species and the most widespread swallow species in the world (Turner and Rose 1989). The species has become closely associated with humans, to the extent that in some regions it is now almost commensal. It nests in or on a great variety of artificial structures (e.g., buildings, barns, bridges). While foraging, it often feeds in open country habitat over human-modified landscapes (e.g., short turf, agricultural lands, around livestock) as well as over more natural habitats such as wetlands and open water. While it is breeding this swallow typically prefers areas where water is nearby. It is likely that the swallow has benefitted greatly from human activities; previously it was likely confined to coasts and upland areas with caves and cliffs.

Like many species of birds that specialize on a diet of flying insects, Barn Swallow appears to have experienced sharp declines since the mid to late 1980s. The causes of the recent population decline are not well understood, however it is notable that previous declines have been documented in North America in the nineteenth century and in central and western Alaska since 1920 (Turner and Rose 1989).

There are seven active Barn Swallow nests located in total on the property in two separate locations. In 2012 three nests were recorded under the small bridge south of the main golf course buildings (**Figure 11**), and four nests were recorded in a small snack machine structure in the south of the Subject Property (**Figure 11**). In 2013, the bridge supported two nests with one confirmed as active, and five nests in the snack structure, however only two were assessed as being active or successful. It is likely that these nesting birds forage over the golf course, nearby valleys, and fields.

A Species at Risk information request made to the Aurora District, Ministry of Natural Resources yielded records of two wildlife Species at Risk in the area, including Eastern Meadowlark (*Sturnella magna*) and Barn Swallow (M. Thompson-Black, 2012). Based on the results of the breeding bird surveys undertaken in 2012 and 2013, we have confirmed that no Eastern Meadowlark are breeding on the property; however, as discussed above, breeding Barn Swallow are present. Additionally, it is believed that the 1986 record of the Eastern Meadowlark was from the opposite (northeast) side of the valley, in an area that was farmland, but is now residential housing (R. Huizer, Beacon Environmental, *pers. comm*., January 2013). Thus Eastern Meadowlark is not considered a breeding species in the TPA (which includes the Subject Property).

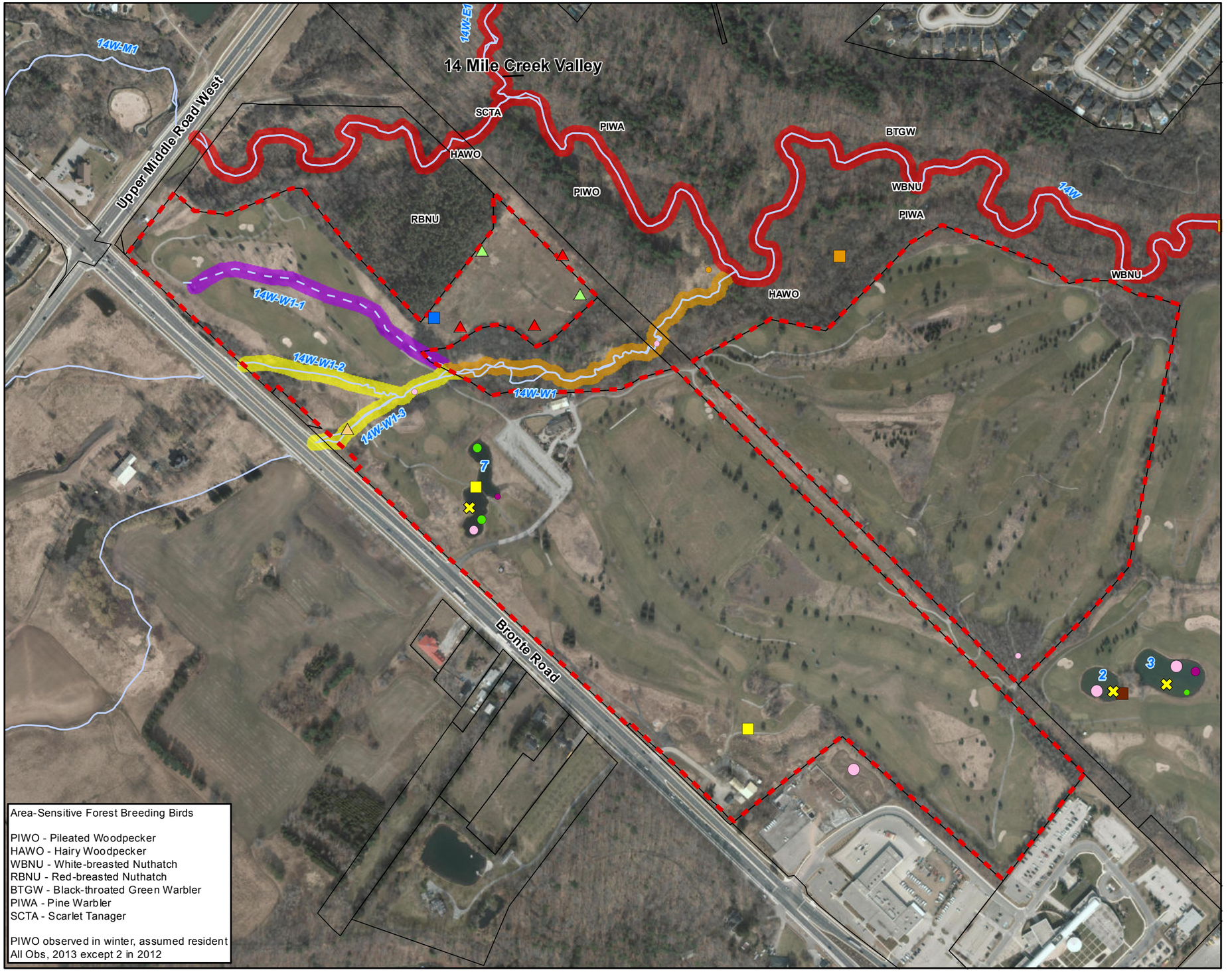
4.3.4.3 Fourteen Mile Creek Forested Valley

Beacon recorded a total of 38 species of breeding birds from the western half of the in the Fourteen Mile Creek area in 2013 and from the edge of the Subject Property in 2012. The results are similar to the Axon *et al.,* (1987) study in that many of most commonly recorded species are not forest specialists, but are disturbance-tolerant species or species that favour canopy gaps (e.g., Blue Jay, Black-capped Chickadee, House Wren, American Robin, Northern Cardinal, Song Sparrow and Common Grackle). This is probably because the area is surrounded by development and the downstream half of the valley consists of a very narrow band of forest, with much of the central strip of the valley associated with the creek being a semi-open canopy forest, which breaks the continuity of the overall forest canopy. The only common forest specialist recorded was Red-eyed Vireo (*Vireo olivaceous*). The species that were recorded in small numbers, mainly singles or pairs, were a mix of 'edge' species and forest species. The forest species included: Pileated Woodpecker (*Dryocopus*

Existing Conditions - Biological - Fish and Wildlife

Figure 11

Saw-Whet EIS – Saw-Whet Golf Course Ltd.



Area-Sensitive Forest Breeding Birds

PIWO - Pileated Woodpecker
HAWO - Hairy Woodpecker
WBNU - White-breasted Nuthatch
RBNU - Red-breasted Nuthatch
BTGW - Black-throated Green Warbler
PIWA - Pine Warbler
SCTA - Scarlet Tanager

PIWO observed in winter, assumed resident
All Obs, 2013 except 2 in 2012

Legend

- Subject Property
- Swale
- Watercourse
- 7 Pond

Redside Dace Regulated Areas

- Occupied
- Recovery
- Contributing
- Not Redside Dace Habitat

Species at Risk

- Barn Swallow Nest Locations
- Eastern Milksnake
- Snapping Turtle
- Eastern Wood-Pewee

Breeding Amphibians

- American Toad
- Green Frog
- Gray Treefrog
- Spring Peeper
- 1-3 Observed
- 4-9 Observed
- Chorus

Snake Species

- Brownsnake
- Red-bellied Snake
- Eastern Garter Snake
- Midland Painted Turtle

First Base Solutions
Web Mapping Service 2012

UTM Zone 17 N, NAD 83

N W E S

0 45 90 180 Meters

1:5,000

BEACON ENVIRONMENTAL

Project 212091
February 2014

pileatus), which was observed in winter and assumed to be a resident breeder, Hairy Woodpecker (*Picoides villosus),* Great-crested Flycatcher (*Myiarchus crinitus*), both nuthatches, Pine Warbler (*Dendroica pinus)*, and Black-throated Green Warbler (*Dendroica virens*). Seven of these species are forest area-sensitive species.

Other species of interest recorded were: fledged young Great Horned Owl (*Bubo virginianus*), Belted Kingfisher (*Ceryle alcyon*) which was apparently feeding and may nest along the creek, and a single Green Heron (*Butorides virescens*) observed in the downstream half of the creek valley. There was no evidence of a 'colony' of Green Heron in the broader TPA (including the Subject Property).

A single Eastern Wood Pewee (*Contopus virens*) was observed in 2012 and two individuals were observed in 2013 in the Fourteen Mile Creek valley (see **Figure 11**). This species is listed as Special Concern nationally due to population declines, but is not listed provincially (as of January 2014). The species is still a common and widespread species in all sizes of deciduous and mixed forest and many types of treed areas.

It is believed that both Red-headed Woodpecker and Long-eared Owl are not current breeding species, based on recent surveys.

4.3.5 Migratory and Wintering Birds

4.3.5.1 Migratory Birds

Information relating to the migratory or wintering bird use of the Subject Property and adjacent Fourteen Mile Creek is limited. The *Biological Survey of Fourteen Mile Creek Valley* (Axon *et al.,* 1987) contains some observational data on late spring migrants and wintering owls. Axon *et al.,* (1987) document the following late spring migrants during their surveys: Yellow-bellied Sapsucker (*Sphyrapicus varius*), Canada Warbler (*Wilsonia canadensis*), Dark-eyed Junco (*Junco hyemalis*), Magnolia Warbler (*Dendroica magnolia*), Nashville Warbler (*Vermivora ruficapilla*). With the possible exception of Canada Warbler these species are all common during migration in southern Ontario. One would expect that the Fourteen Mile Creek valley would provide good migratory habitat for these and many other warbler and songbird species in both spring and fall.

4.3.5.2 Wintering Owls

Although there are some historical records of Long-eared Owls and Saw-whet Owls in the TPA, based on the absence of species observation records and consultations with a number of background sources and local experts, it is probable that neither Long-eared Owls nor Saw-whet Owls roost in the TPA.

Axon *et al.,* (1987) noted that Long-eared Owls have been known to overwinter in the pine plantation adjacent to the Subject Property, and that Northern Saw-whet Owls (*Aegolius acadicus*) were also known to overwinter in the Fourteen Mile Creek valley. During the winter of 1986/7, a total of 15 Long-eared Owls and seven Northern Saw-whet Owls were observed in the Fourteen Mile Creek valley between early November and late March. The maximum number observed in single day was not noted. Most of the observations were from the pine plantation (ELC Unit 13), and pine regeneration area below the plantation (ELC Unit 27) and a planted pine area on the northeast side of the valley (ref. **Figure 10**). Wintering areas for owls are generally quite localized so one would expect that if the area was still being utilized that there would be more recent observational data available.

Beacon contacted several local area bird enthusiasts to inquire whether there have been any sightings of wintering owls in the Study Area in recent years (M. Jennings, *pers. comm*., November 13, 2012; R. Curry, *pers. comm*., November 11, 2012; R. Dobos, *pers. comm*., November 10, 2012; W. McIlveen, *pers. comm*., November 9, 2012). None of the inquiries could confirm recent utilization of the Study Area for wintering owls. It was suggested that the canopy cover within the plantation (ELC Unit 13) was no longer suitable for roosting owls.

Beacon also obtained Christmas Bird Count (CBC) data (Audubon, 2013) for the South Peel Region which includes a 75 km^2 area that overlaps with the Study Area. The data indicates that between one and seventeen Long-eared Owls have been recorded annually from the Region within the last 20 years, but it does not appear as if any of these observations were from the Study Area. Saw-whet Owls have only been recorded three times on the CBC in the last 20 years, most recently in 2002 (Audubon, 2013). It was not known if the Study Area is specifically covered during the CBC surveys, so to confirm, Beacon Environmental contacted the regional coordinator for the CBC (M. Cranford pers. comm. February 13, 2013). He did not have personal knowledge of the Study Area, but contacted M. Peck (February 13, 2013) who reported on wintering Long-eared Owls and Saw-whet Owls in Bronte Creek Provincial Park in recent years. However M. Peck did not comment on owl observations within the Fourteen Mile Creek valley, therefore it appears that the CBC information is data deficient for the Study Area.

A website that hosts many birders records, ebird.org, was checked for Long-eared Owl records. There were no Long-eared Owl records in the Study Area on ebird, with the exception of one record of a Long-eared Owl on the Subject Property (no other details) in 1995. This record does not constitute evidence of a Long-eared Owl roost in the Study Area. There are some historic (1973-1987) Hamilton Naturalist Club records for Long-eared Owl that are located at the junction of Upper Middle Road and Bronte Road. These records are not actually from the road junction, but could be from Bronte Creek Provincial Park, or from the Study Area, or both. Irrespectively, the records are historic and do not provide evidence of recent owl roosting activity in the Study Area.

Beacon conducted targeted surveys for wintering owls within the TPA in 2012/2013 and 2013/2014. No owls were observed during the six surveys although searching occurred for both the owls themselves and for evidence such as droppings and feathers. During dripline staking on January 17, 2013, Kim Barrett (Conservation Halton) and Steve Dinka (Region of Halton) observed a single owl pellet on the northern portion of the Subject Property. Based on the pellet size it is likely from a Great Horned Owl (*Bubo virginianus*), a species that is presumed to be resident and which does not form winter congregations. No other evidence of owls was noted during the targeted surveys. Based on the absence of species observation records, combined with the findings above, it's probable that neither Long-eared Owls nor Saw-whet Owls roost in the TPA with any regularity.

4.3.5.3 Other Wintering Birds

Wintering birds on the Subject Property and within the adjacent Fourteen Mile Creek valley were surveyed on three occasions in the winter of 2012-2013, and three times in the winter of 2013-2014 concurrent with owl roost surveys. Nineteen bird species were recorded during these surveys (ref. **Appendix F**). The majority of species are likely to be resident species. A few species (e.g., Dark-eyed Junco (*Junco hyemalis*) and American Tree Sparrow (*Spizella arborea*) are species which breed further north and which winter in southern Ontario. There was one large flock of American Robins

observed in late December 2012 which was present both on the golf course and the adjacent forest. Four species of forest area-sensitive species were observed in the valley (Hairy Woodpecker, Pileated Woodpecker *Dryocopus pileatus,* Red-breasted Nuthatch *Sitta canadensis*, and White-breasted Nuthatch). It is likely that these resident species breed in the forested valley (e.g., Hairy Woodpecker was observed during summer surveys). Species and numbers of birds observed were similar between the two winters. None of the species observed are rare or Species at Risk.

4.3.6 Herpetofauna (Amphibians and Reptiles)

4.3.6.1 Amphibians – Older Studies

The following herpetofauna (reptiles and amphibians) were recorded in by Axon *et al.,* (1987) within the Fourteen Mile Creek ESA:

- Eastern Red-back Salamander (*Plethodon cinereus*)
- Snapping Turtle (*Chelydra serpentina*)
- Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
- Brownsnake (*Storeria dekayi*)
- Wood Frog (*Rana sylvatica*)
- Northern Leopard Frog (*Rana pipiens*)
- Green Frog (*Rana clamitans*)
- Bullfrog (*Rana catesbeiana*)
- American Toad (*Bufo americanus*)
- Spring Peeper (*Pseudacris crucifer*)

4.3.6.2 Amphibians – Recent Studies

Beacon Environmental recorded two species of calling (breeding) amphibians during the 2012 surveys on the Subject Property: Spring Peeper and Green Frog (ref. **Figure 11**). Four Spring Peepers were recorded in the pond (ELC Unit 6, Pond #7) located west of the golf course buildings. This species may use the Fourteen Mile Creek as habitat outside of the breeding season.

Green Frogs were also recorded from ELC Unit 6. In total, 13 Green Frogs were recorded, both north and south of the bridge that crosses the pond (Unit 7). This species probably spends most of its life cycle within ponds, but may wander onto the nearby natural areas. Incidental observations of Green Frogs were recorded in ELC Unit 19 during the non-breeding season as well. One American Toad was recorded calling from the Fourteen Mile Creek valley in the vicinity of ELC Unit 26a during amphibian surveys on May 8, 2012 (ref. **Figure 11**).

Amphibian calling surveys in 2013 recorded very similar results with slightly fewer numbers of Green Frog and with the addition of one Grey Treefrog in the Subject Property pond (Unit 7) (ref. **Figure 11**).

Three species of amphibians were recorded by Natural Resource Solutions Inc. (NRSI) in 2013 from Deerfield Golf Course ponds within 120 m of Subject Property. The observations are noted on **Figure 11**. The three species are Spring Peeper, Grey Treefrog and Green Frog. Spring Peeper was the most abundant species.

4.3.6.3 Reptiles – Recent Studies

Coverboard surveys for snakes undertaken on the Subject Property in 2013 by Beacon Environmental recorded four species: Eastern Garter Snake (*Thamnophis sirtalis*), Red-bellied Snake (*Storeria occipitomaculata*), Brownsnake (*Storeria dekayi*), and Eastern Milksnake (*Lampropeltis triangulum*) (ref. **Figure 11**). All these species are considered common to abundant in Halton (Curry, 2006). Eastern Garter Snake, Red-bellied Snake and Brownsnake are ranked S5 provincially, and Eastern Milksnake is ranked S3 and also listed provincially as Special Concern. Out of a total 153 board inspections (17 boards each checked nine times), 12 inspections revealed snakes. On each occasion either one or two snakes were observed. Most observations were made at the edges of the forest, plantation and thicket communities surrounding the field (ELC Unit 12) (**Figure 10** and **Figure 11**). No snakes were observed under cover boards located within and near the edges of the golf course, with the exception of a semi-naturalized area along Tributary 14W-W1-2 where two Brownsnake were observed.

Midland Painted Turtle (*Chrysemys picta marginata*) was recorded on the Subject Property from Pond #7 on June 24, 2012. Midland Painted Turtles were also recorded from ponds on the adjacent Deerfield Golf Course, as was a Snapping Turtle (provincial Special Concern status) (ref. **Figure 11**). Snapping turtles were not observed on the Subject Property.

4.3.7 Mammals

There are 35 species of mammals reported from the vicinity of the TPA according to the Mammal Atlas of Ontario (Dobbyn, 1994). The Halton Natural Areas Inventory (Dwyer, 2006) notes ten mammal species from the Fourteen Mile Creek Valley ESA (#12) (ref. **Appendix G**).

Evidence of six mammal species were recorded on the Subject Property during the 2012 and 2013 field surveys including Woodchuck (*Marmota momax*), White-tailed Deer (*Odocoileus virginianus*), Eastern Cottontail (*Sylvilagus floridanus*), Eastern Chipmunk (*Tamias striatus*) and Red Squirrel (*Tamiasciurus hudsonicus*), and Coyote (*Canas latrans*). All of the observed mammals are considered common species in southern Ontario.

Winter tracking surveys in 2012/2013 on the Subject Property and parts of the adjacent Fourteen Mile Creek valley recorded many of these same species plus some unidentified 'small mammal' tracks and Raccoon (*Procyon lotor*). No new species were observed on January 10th, 2014. The annotated list below notes mammal species observed from the Subject Property and adjacent valleylands with comments on location and abundance:

- Eastern Cottontail –in the golf course and forested valley; most numerous in the valley and plantation
- Grey Squirrel –in the golf course and forested valley
- Small rodent – in the golf course and forested valley; small numbers observed; likely *Peromyscus* mice species in the valley and Meadow Vole (*Microtus pennsylvanicus)* in the rough areas of the golf course; some vole tunnels noted in the golf course
- Coyote – in the golf course and forested valley; throughout, probably one to several individuals
- Racoon – in the golf course and forested valley; small numbers in a variety of habitats
- White-tailed Deer – in the golf course and forested valley; small numbers of tracks indicating no concentrations

4.3.8 Lepidoptera and Odonates

The Halton Natural Areas Inventory (Halton/North Peel Naturalists' Club *et al*. 2006) recorded fourteen species of butterfly and eight species of odonates (dragonfly or damselfly) from the Fourteen Mile Creek valleylands (including Northern Bluet, *Enallagma cyathigerum*). Records of these and other species previously recorded in the vicinity of the Subject Property are listed in **Appendix G**.

4.3.8.1 Odonates

A total of 34 species of dragonfly and damselfly (odonates) were recorded from the Subject Property over three years of Beacon Environmental surveys. In 2012 and 2013 fifteen species were observed, while in 2014, 32 species were recorded. Common Green Darner (*Anax junius*), Slender Spreadwing (*Lestes rectangularis*), Familiar Bluet (*Enallagma civile*), Azure Bluet (*Enallagma aspersum*), Eastern Forktail (*Ischnura posita*) and Eastern Amberwing (*Perithemis tenera*) were the most numerous species observed.

Most of the odonates observed from the Merton TPA and Subject Property are ranked S4 or S5 provincially, with the exception of Carolina Saddlebags (*Tramea carolina)* which has not been assigned a rank. Species that are ranked either S1 to S3 or are listed as regionally rare based on Rothfels (2006) include the following:

- River Bluet *Enallagma anna* – S2, not listed in Halton Region
- Northern Bluet *Enallagma annexum* – S4, regionally rare
- Azure Bluet *Enallagma aspersum* – S3, regionally rare
- Skimming Bluet *Enallagma geminatum* – S4, regionally rare
- Fragile Forktail *Ischnura posita* – S4, regionally rare
- Unicorn Clubtail *Arigomphus villosipes* – S2/S3, regionally uncommon
- Halloween Pennant *Celithemis eponina* – S4, regionally rare
- Painted Skimmer *Libellula semifasciata* – S2, regionally rare
- Spot-winged Glider *Pantala hymenaea* – S4, regionally rare

One of the species observed, River Bluet (*Enallagma anna)* is not listed in Rothfels (2006). It was observed in the golf course pond (ELC Unit 6, Pond #7). The habitat of this species is almost always associated with flowing waters of streams and rivers. Thus, its observation is likely attributable to dispersal from some other habitat in the area (such as Bronte Creek or Fourteen Mile Creek).

The other three species of Bluets (Northern, Azure and Skimming) are most likely overlooked and represent under documented species. This is due to their similarity to other more common species and difficulty in identification. It is probable that these species are not as rare in Halton as noted in the Rothfels (2006) list.

Halloween Pennant and Painted Skimmer are species that are increasing in abundance in Ontario.

In 2012 and 2014, odonate observations were generally from two locations on the Subject Property, the golf course pond (ELC Unit 6, Pond #7), and the field (ELC Unit 12). There were also numerous observations made in meadows and hedgerows along the southeast and northeast margins of the golf course. It is thought that many of these latter observations were made due to odonates emerging from

ponds on the Deerfield golf course. A complete list of odonates recorded between 2012 and 2014 by Beacon Environmental is presented in **Appendix G**.

4.3.8.2 Lepidoptera

In total, 32 species of Lepidoptera (butterflies) were recorded from the Subject Property over three years of Beacon Environmental surveys. A listing of all observed species is presented in **Appendix G**. In 2014, 988 individuals of 28 species were recorded, while in 2012, sixteen species of butterfly were observed. Cabbage White (*Pieris rapae*), Common Ringlet (*Coenonympha tullia*), Clouded (or Common) Sulphur (*Colia philodice*), Common Wood-Nymph (*Cercyonis pegala*), and European Skipper (*Thymelicus lineola*) were the most numerous species observed.

All butterflies observed are S4 or S5 provincially, with the exception of: two which are SNA (not applicable due to being non-native), two which are SZB (no breeding rank), and one is S2N/S4B. The latter refers to the Monarch (*Danaus plexippus*). It is also a Special Concern species. This species is common and widespread throughout southern Ontario, but is considered vulnerable due to habitat loss in overwintering areas in Mexico as well as some migratory stop-over areas.

The following regionally rare butterflies were recorded: Wild Indigo Dusky-wing (*Erynnis baptisiae*) Giant Swallowtail (*Papilio cresphontes*), Common Buckeye (*Junonia coenia*), and Fiery Skipper (*Hylephila phyleus*) (status from Wormington 2006).

Wild Indigo Dusky-wing is a rare permanent resident; however since 2003 it has been discovered at additional locations suggesting that this species is increasing in the Region. The S-rank of this species was changed to S4 in 2012 in order to recognise that this species is increasing in abundance regionally.

The Giant Swallowtail is considered an 'immigrant' to Halton in the Natural Areas Inventory, and is a very mobile species whose habitat cannot be readily attributed to a specific location on the Subject Property.

All of the species recorded in 2012/2013 were also recorded in 2014 with the exception of Common Buckeye, Fiery Skipper, and two common Crescent species Orange Crescent (*Phyciodies cocyta*) and Pearl Crescent (*Phyciodes tharos*). The 2012 season was an unusual year for butterfly species, mainly due to the early warm spring temperatures and unusually hot summer weather. Many southern species, including immigrant species such as Common Buckeye and Fiery Skipper, were more common at this lattitude than usual.

On the Subject Property, butterflies were most abundant in meadow habitats associated with the fallow agricultural field corresponding with ELC Unit 12 and unmaintained portions of the golf courses along the edge of the valley. Few observations were made from the manicured golf course greens and fairways. These results are not unusual given many butterflies forage on wildflowers and tend to be found in higher abundances in meadows. This observation does not however suggest that the meadow habitats support populations of plants that are of particular significance to any one species for foraging or reproduction.

4.3.9 Aquatic Resources

The Study Area is located in the lower portions of the Fourteen Mile Creek watershed. Multiple studies have been completed in recent years that characterize the aquatic habitats of Fourteen Mile Creek in the vicinity of the Subject Property, including:

- *Halton Natural Areas Inventory*, 2006. Halton/North Peel Naturalists' Club, Conservation Halton, South Peel Naturalists' Club, Halton Region, Hamilton Naturalists Club
- *Fourteen Mile Creek, East Branch, Scoped Subwatershed Plan, East of Regional Road 25* (Philips Engineering Ltd, 2000)
- *Fourteen Mile Creek, Main and West Branches Subwatershed Plan*, Philips Engineering Ltd., 2000 (revised 2002)
- *Halton Region, Environmentally Sensitive Areas*, Consolidation Report (Halton Region and North-South Environmental Inc., 2005)
- *Town of Oakville, Fourteen Mile Creek, McCraney Creek, Watershed Planning Study,* 1992, Triton Engineering Services Ltd., Ecological Services for Planning, Terraqua Investigations Ltd., J.L. Cox Planning Consultants, and D.W. Draper
- *Optimal Use Report and Natural Heritage Study QEW & Bronte Road, Oakville*, 2011. Prepared for Infrastructure Ontario by GSP Group Inc., Natural Resource Solutions Inc., MTE Consultants Inc., N. Barry Lyons, Paradigm Transportation Solutions Ltd.
- *A Biophysical Inventory of the Fourteen Mile Creek Valley E.S.A. No 12 Oakville* (Axon *et al.,* 1987)
- *Urban Creeks and Supplemental Monitoring Long Term Monitoring Program*, 2009, Conservation Halton

4.3.9.1 Aquatic Habitat Characterization

The watershed divide for the Fourteen Mile Creek and Bronte Creek watersheds is located in the southeast portion of the Subject Property. The majority of the Study Area drains to Fourteen Mile Creek, while the remaining portion drains to the Lower Main Branch subwatershed of the Bronte Creek Watershed. No watercourses or drainage features are present within the Bronte Creek Watershed portion on the Subject Property.

Beacon characterized the aquatic habitat within portions of the West Branch of Fourteen Mile Creek (14W), Tributaries 14W-W1-2 and 14W-W1-3, and swale feature 14W-W1-1 located on the Subject Property (**Figure 5**). These tributaries have been further refined to reach level, SW4, SWS1, SW3 and SWN1 throughout the Subject Property (**Figure 5**). Tributaries 14W-W1-2 and 14W-W1-3 enter the Subject Property via culverts underneath Bronte Road and then traverse portion of the Subject Property in a southeastern direction for approximately 200 m prior to converging to form 14W-W1.

Habitat conditions along reaches SW4, SWS1 and SW3 are very similar. These three reaches have channels that become increasingly defined from upstream to downstream sections. The channel widths range from 0.25m to 0.5m with shallow, moderately stable banks that are approximately 0.10m high. Substrates are comprised predominantly of small cobble and gravel with pockets of sand. The reaches are well vegetated with reed canary grass; the densest vegetation occurring along SW4 and

SWS1. Pockets of watercress were observed along SW3 indicating the presence of seasonal groundwater inputs and an intermittent flow regime. Little evidence of groundwater inputs was noted in reaches SW4 and SWS1. In August 2012, pockets of standing water were noted along reaches SW4 and SWS1 and slight flows were noted in reach SW3.

Swale feature 14W-W1-1 (reach SWN1) originates in a ditch along Bronte Road, is piped under a berm and discharges to the Subject Property. The feature traverses the golf course lands in an area that has active greens and is managed as manicured grass throughout the majority of its length. The feature lacks a defined channel and has been characterized as a vegetated swale. No flows or standing water were observed during the June or August 2012 site visits. This feature conveys surface flows from the surrounding golf course lands to the valley for a limited period of time during the spring freshet but no evidence of groundwater was observed, nor did the hydrogeological results indicate any discharge. In this regard, the flow regime of this swale would be designated ephemeral.

Multiple studies have been completed which characterize the aquatic habitats of Fourteen Mile Creek in the vicinity of the Subject Property. Most recently, in 2011, NRSI undertook an evaluation of Fourteen Mile Creek from Upper Middle Road downstream to the QEW as part of the *Infrastructure Ontario Optimal Use Report and Natural Heritage Study QEW & Bronte Road* (GSP *et al*., 2011).

NRSI characterized the West Branch of Fourteen Mile Creek (14W) in this study as supporting riffle pool sequences with back water areas and in-stream cover consisting of woody debris, boulders and undercut banks. Channel substrates were described as a mixture of silt, clay, gravel, cobble, and shale bedrock. The riparian habitat is densely forested providing abundant canopy cover over the creek. NRSI notes that areas of groundwater seepage were evident in several locations along the ravine walls and floor. These habitat descriptions are consistent with the characterizations discussed in Philips Engineering Ltd. (2002) and Triton Engineering Services Ltd. *et al.,* (1992). Based on the habitat observed, NRSI considers the aquatic habitat suitable for spawning (GSP *et al*, 2011); however, the location of the spawning areas and associated species is not provided.

4.3.9.2 Fish Community

Beacon obtained fish collection records for Fourteen Mile Creek within the vicinity of the Study Area from Conservation Halton. The data contain fish sampling records collected from 13 sites within Fourteen Mile Creek within the vicinity of the Study Area and cover a period beginning in 1972 through to 2012. It should be noted that sampling was not carried out annually and that not all sites were sampled during each sampling year. Fish sampling locations are shown on **Figure 6**. **Table 12** summarizes the fish collection data for Fourteen Mile Creek obtained from Conservation Halton.

Since 1972, 22 species of fish have been collected from the stations within Fourteen Mile Creek in vicinity of the Study Area. Over half of these species (14) were still present in 2010 and 2012. The decrease in species captured does not necessarily indicate that there has been a reduction in species diversity but may be due to sampling timing and methods employed.

The species composition indicates that Fourteen Mile Creek system supports a diverse, coolwater fish community. Several species have been recorded that are known to be sensitive to environmental degradation, such as siltation and pollution, including the federally and provincially endangered Redside Dace (see **Section 4.3.9.2.1** for further discussion regarding Redside Dace).

On the advice of OMNR, site specific fish sampling was not completed for the Subject Property as OMNR classifies all the watercourses and tributaries on the property as regulated Redside Dace habitat. Visual observations for fish were carried out during the habitat assessments completed in June and September 2012. Visual assessment confirmed the presence of fish throughout reach SW1 and in the downstream extent of SW2. The fish community in SW1 and SW2 is likely comprised primarily of cyprinid species which gain access to the reaches from Fourteen Mile Creek during high flow conditions and persist in the isolated refuge pools which receive groundwater through reaches SW1 and SW2.

No fish were observed upstream of the golf cart path in reaches SWS1, SW4 or SW3 and it is unlikely that fish would be able to access these reaches due to the steep gradient of the upstream portions of SW2 and the lack of a permanent flow connection. Feature SWN1 is a vegetated swale which flows ephemerally during the spring freshet. SWS1, SW4, SW3 and SWN1 have likely contributed to fish habitat in downstream reaches through seasonal flow conveyance.

Beacon conducted a fish community survey of Pond #7 on the Subject Property in 2013. No fish species were captured. Pond #7 is completely isolated and no overland connection is present between it and the tributaries of Fourteen Mile Creek. The pond does not provide suitable habitat to support Redside Dace nor does it provide any contribution to habitat downstream.

4.3.9.2.1 Redside Dace (Clinostomus elongatus)

Redside Dace is a small colourful minnow that reaches a maximum length of about 12 cm. In Canada, this species is present only in southern Ontario where it occurs most frequently in streams between Oshawa and Hamilton, in the Holland River drainage, one tributary of the Grand River and three tributaries of Lake Huron.

Redside Dace require cool, clear flowing water with riffle-pool morphology and overhanging streamside vegetation. Stream sections flowing through open terrestrial habitats with overhanging vegetation, undercut banks and submerged branches and logs are most suitable. Channel depths are typically less than 1 m and substrate can vary from fine sediment to cobbles and boulders; however they are most often present in gravel/cobble bed habitat and often with a shallow surface covering of silt or detritus (RDRT, 2010). Redside Dace are a coolwater species and are usually associated with water temperatures of less than 24°C and dissolved oxygen concentration are at least seven milligrams per litre (McKee and Parker ,1982).

Spawning occurs when water temperature reaches 16°C to 18°C on gravelly riffles. It occurs with common tolerant coolwater fishes such as Creek Chub (*Semotilus atromaculatus*) and Common Shiner (*Luxilus cornutus*), and lays its eggs in the gravel nests of these ubiquitous species. This strategy improves egg survival through the guarding behaviour of these species as they provide protection and keep the eggs free of silt. The Redside Dace is a surface feeder and relies on a visual search of prey. It often leaps several centimetres out of the water to capture aerial insects (COSEWIC, 2012) and uses the overhanging vegetation as cover and insects are often concentrated in these areas.

These specialized spawning and feeding strategies make Redside Dace more susceptible to habitat disturbance. They are most often associated with small, cool headwater streams, are sensitive to siltation, and tend not to be widely dispersed because of this habitat preference. Destruction and degradation of habitat have been the major factors in the reduction of Redside Dace distribution.

Siltation, removal of riparian vegetation, channelization, agricultural run-off, and pollution of streams in urban areas all reduce suitable habitat and food sources for this species. For this reason, Redside Dace can be a useful indicator of the health of the aquatic ecosystem because when habitat quality starts to decline, Redside Dace are immediately affected (OMNR and OSCIA, 2002).

Redside Dace is listed as Endangered by COSSARO and is therefore protected under the Ontario *Endangered Species Act* (2007). It has an S-rank of S2 indicating that it is imperilled and vulnerable to extirpation (NHIC, 2012). COSEWIC also lists it as endangered, but it has not yet been listed on the federal *Species at Risk Act*.

Table 12. Conservation Halton Fish Species Records for Fourteen Mile Creek within Tertiary Planning Area (TPA)

Common Name	Scientific Name	Thermal Regime	Tolerance	Status				Sampling Station and Year											
				Regional /Local Rank	SRank	COSSARO	COSEWIC	2	5	13	14	15	16	17	18	19	41	65	72	73
Goldfish	*Carassius auratus*	warmwater	tolerant	E	SE										2000					
Northern Redbelly Dace	*Phoxinus eos*	coolwater	intermediate	HR	S5			1972							1985					
Redside Dace	*Clinostomus elongatus*	coolwater	intolerant	HR	S2	END	END	2000	1990 1998	1998 2000	1998 2000	1998	2006	1998	1985 1990 1998 2000 2001 2005	2000	2000	2005 2006 2007 2010	2012	2012
Brassy Minnow	*Hybognathus hankinsoni*	coolwater	intermediate	HR	S5				2003						1990					
Common Shiner	*Luxilus cornutus*	coolwater	intermediate	HU	S5			1972 2000 2007 2008 2012	1990 1998	1998 200	1998 2000	1998	1998 2006	1998	1985 1998 2000 2001 2005	2000	2000	2010	2012	2012
Golden Shiner	*Notemigonus crysoleucas*	coolwater	intermediate	HR	S5										2005					
Bluntnose Minnow	*Pimephales notatus*	warmwater	intermediate		S5	NAR	NAR	1972 2000 2007 2008 2010 2012	1990 1998	2000	1998 2000		1998		1985 1998 2000 2001 2005 2006	2000		2005 2006 2007 2012	2012	2012
Fathead Minnow	*Pimephales promelas*	warmwater	tolerant		S5			1972 2000 2007 2008 2010 2012	1990 1998	2000 2001			1998		1998 2000 2001 2006		2000 2001	2006	2012	2012
Blacknose Dace	*Rhinichthys atratulus*	coolwater	intermediate	HU	S5			2000 2007 2008 2010 2012	1990 1998	1998 2000 2001	1998 2000	1998	1998 2006	1998	1985 1998 2000 2001 2005 2006	2000	2000 2001	2005 2006 2007 2010 2012	2012	2012
Longnose Dace	*Rhinichthys cataractae*	coolwater	intermediate	HU	S5			2010												
Creek Chub	*Semotilus atromaculatus*	coolwater	intermediate		S5			1972 2000 2007 2008 2010 2012	1990 1998	1998 2000	1998 2000	1998	1998 2006	1998	1985 1990 1998 2000 2001 2003 2005 2006	2000	2000 2001	2005 2006 2007 2010 2012	2012	2012

Common Name	Scientific Name	Thermal Regime	Tolerance	Status				Sampling Station and Year											
				Regional /Local Rank	SRank	COSSARO	COSEWIC	2	5	13	14	15	16	17	18	19	41	65	72	73
White Sucker	*Catostomus commersonii*	coolwater	tolerant		S5			1972 2000 2007 2008 2010 2012	1998	1998 2000	1998 2000	1998	1998 2006	1998	1985 1998 2000 2001 2005 2006	2000	2000 2001	2005 2006 2007 2010 2012		2012
Brown Bullhead	*Ameiurus nebulosus*	warmwater	tolerant	HR	S5			2010		2000					2001					
Rainbow Trout	*Oncorhynchus mykiss*	coldwater	intolerant	E	SE			2007 2012							1998					
Brown Trout	*Salmo trutta*	coldwater	intolerant	E	SE			2007												
Brook Stickleback	*Culaea inconstans*	coolwater	intermediate	HR	S5			2007 2008 2010	1990 1998	1998	1998 2000		2006		1985 1998 2000 2001 2005 2006	2000		2006		
Rock Bass	*Ambloplites rupestris*	coolwater	intermediate	HU	S5												2000			
Pumpkinseed	*Lepomis gibbosus*	warmwater	intermediate	HU	S5			2010												
Largemouth Bass	*Micropterus salmoides*	warmwater	tolerant	HU	S5			1972							2001					
Rainbow Darter	*Etheostoma caeruleum*	coolwater	intolerant	HU	S4			2000 2007 2008 2010 2012		2000	2000		1998 2006			2000		2006 2007 2010	2012	2012
Fantail Darter	*Etheostoma flabellare*	coolwater	intolerant	HR	S4			1972 2000 2007 2010 2012	1990	1998 2000	1998 2000	1998	1998 2006	1998	1985 1998 2000 2005 2006	2000		2005 2006 2007 2010		
Johnny Darter	*Etheostoma nigrum*	coolwater	tolerant	HR	S5								2006					2006		

[1] Thermal regime and tolerance from Ontario Freshwater Fishes Life History Database (Eakins, 2012)
[2] Halton (Regional Status – (Dunn, 2006). **HU** – Uncommon; **HR** – Rare; **E** – Exotic
[3] S-Rank (Provincial Status - NHIC) **S2** = imperilled; **S4** = apparently secure; **S5** = secure; **SE** = exotic/introduced.
[4] COSARO (Committee on the Status of Species at Risk in Ontario). **END** = endangered
[5] COSEWIC (Committee on the Status of Endangered Wildlife in Canada). **END** = endangered

The *Endangered Species Act* (Section 9) generally prohibits the killing or harming of a threatened or endangered species, as well as the destruction of its habitat. As an endangered species, the following two key provisions in the Act apply to Redside Dace:

1. Section 9 prohibits the killing, harming, harassing, possession, collection, buying and selling) of extirpated, endangered, and threatened species on the SARO List; and

2. Section 10 prohibits the damage or destruction of protected habitat of species listed as extirpated, endangered or threatened on the SARO List. Under the Act, "habitat" is defined as either:

    - General Habitat (based on the general definition in clause 2(1)(b) of the Act) - an area on which a species depends directly or indirectly to carry on its life processes including life processes such as reproduction, rearing, hibernation, migration or feeding; or

    - Regulated Habitat (as defined in clause 2(1)(a) of the Act) - the area prescribed for a specific species in a habitat regulation.

The Redside Dace Recovery Strategy (2010) and provides a framework for action for responsible jurisdictions to secure the sustainability of Redside Dace in Ontario. Ontario Regulation 293/11 was released in July 2011 and Section 29.1(1) defines Redside Dace habitat as follows:

i. any part of a stream or other watercourse that is being used by a redside dace,
ii. any part of a stream or other watercourse that was used by a redside dace at any time during the previous 20 years and that provides suitable conditions for a redside dace to carry out its life processes,
iii. the area encompassing the meander belt width of an area described in subparagraph i or ii,
iv. the vegetated area or agricultural lands that are within 30 metres of an area described in subparagraph iii, and
v. a stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains the baseflow, coarse sediment supply or surface water quality of a part of a stream or other watercourse described in subparagraph i or ii, provided the part of the stream or watercourse has an average bankfull width of 7.5 metres or less.

Section 23.1 of this regulation also identifies circumstances where Clause 9(1) and subsection 10(1) of the Act do not apply with respect to Redside Dace. It relates to timing of approvals including *Planning Act,* Draft Plan, Class EA or *Condominium Act* provided that impacts to Redside Dace were considered as part of that approval.

Within Conservation Halton's jurisdiction there are several watercourses that have supported Redside Dace (i.e., Fourteen Mile Creek, Sixteen Mile Creek and Bronte Creek). Targeted Redside Dace sampling carried out by HRCA in 2007 showed that there is a substantial population of Redside Dace in Fourteen Mile Creek and fish collection records obtained from HRCA indicate that Redside Dace have been captured from fish sampling stations within the TPA as recently as September 2012.

The OMNR was contacted on March 28, 2012 to request information on the presence of regulated Redside Dace habitat on and adjacent to the Subject Property. The response from OMNR (M.Thompson-Black, 2012), stated the following:

> *"Fourteen Mile Creek and its tributaries within your Study Area have been designated as regulated habitat for Redside Dace under the Endangered Species Act, 2007 (ESA, 2007)…species may receive protection under the and thus, a permit may be required if the work you are proposing could cause harm to these species or their habitat. Please provide additional information on your proposal to our office, and we will assess it to determine whether a permit under the ESA, 2007 is required for the works to proceed."*

Further consultation with OMNR was sought to clarify the classification and the extent of regulated habitat on the Subject Property. John Pisapio (Biologist with Aurora District OMNR) visited the Subject Property in June 2012 to undertake a more in-depth evaluation of reaches SW1, SW2 and SW3 of Tributary 14W-W1, reach SW4 of Tributary 14W-W1-2, and reach SWS1 of Tributary 14W-W1-3. The result of the OMNR site visit concluded the following with regards to regulated Redside Dace habitat on and in the vicinity of the Subject Property:

- West Branch of Fourteen Mile Creek – Occupied Habitat;
- Reaches SW1 and SW2 – Recovery Habitat;
- Reaches SW3, SW4 and SWS1 – potentially Contributing Habitat however would need further evaluation of groundwater studies by OMNR to make a final determination.

A second site walk with OMNR occurred on July 4, 2013 on the Subject Property. Mark Heaton (Area Biologist with Aurora District OMNR) was on site with Beacon staff and a representative from CH to further assess Tributary 14W-W1. Reach 14W-W1 from its confluence with Fourteen Mile Creek up to the golf cart path on the Subject Property was confirmed as recovery Redside Dace habitat. Based on the site conditions including the presence of watercress and wetlands, the channel upstream of the golf cart path including tributaries 14W-W1-2 and 14W-W1-2 were designated as contributing habitat (**Figure 11**). Tributary 14W-W1-1 was determined not to be contributing habitat and is therefore not regulated for Redside Dace.

4.3.9.3 Benthic Invertebrates and Crayfish

Based on the results from the Conservation Halton benthic sampling station located in Fourteen Mile Creek, upstream of the QEW, this station is considered "potentially impaired" due to low ephemeroptera, plecoptera, and trichoptera (EPT) count and a high percentage of chironomidae in the sample. Conservation Halton reports that habitat conditions at the station are likely a contributing factor to the score as the site is dominated by bedrock substrate and has little habitat diversity.

Several crayfish were captured in Pond #7 on the Subject Property during the 2013 fish survey. A total of 39 crayfish were identified as Calico Crayfish (*Orconectes immunis*).

The Chimney (or Digger) Crayfish is presently ranked in the NHIC database as "G5" – very common; "N4" - apparently secure; and "S4" – apparently secure. It has a Canada General Status Rank of "sensitive" (Canadian Endangered Species Conservation Council 2011), meaning that it "*may require special attention or protection to prevent [it] from becoming at risk*". It is not designated as a Species at Risk by OMNR; therefore, it is not afforded any specific protection under the Ontario *Endangered*

Species Act. Little is known about the Chimney Crayfish, although it inhabits creek beds, wetlands and ditches as a semi-terrestrial burrower.

No evidence of Chimney Crayfish was observed during the species-specific investigations of the Subject Property in 2013 or through incidental observations on a number of occasions between spring and fall 2012.

4.3.9.4 Thermal Regimes

Thermal regime is a key component in sustaining the ecological integrity of aquatic ecosystems and limits the distribution and abundance of aquatic species. In order to understand and characterize the thermal regimes of the watercourses on the Subject Property and adjacent Fourteen Mile Creek, temperature data was collected in 2012 for select locations and a comprehensive temperature monitoring program was completed in 2013 for the entire TPA. The analysis of the temperature data is summarized below and presented based on the monitoring year.

2012 Temperature Data

Water temperature monitoring was undertaken by Beacon Environmental on the Subject Property in Tributary 14W-W1 and Fourteen Mile Creek in 2012.

A summary of stream temperatures collected in 2012 for the Subject Property and adjacent Fourteen Mile Creek are provided in **Table 13**, including the monthly average temperature, monthly average maximum and monthly average minimum temperature for each month monitored.

Table 13. Summary of Surface Water Temperatures Observed from 2012

Month	Subject Property (Beacon Environmental)					
	14 Mile Creek			Reach SW2		
	Avg. Daily Temp	Avg. Daily Max. Temp	Avg. Daily Min. Temp	Avg. Daily Temp	Avg. Daily Max. Temp	Avg. Daily Min. Temp
May	-	-	-	-	-	-
June	21.0	25.8	17.9	20.6	23.5	18.2
July	21.4	25.1	18.6	21.1	23.8	19.0
August	20.2	24.5	16.4	20.0	23.3	17.0
September	17.5	24.2	12.4	17.8	22.8	13.9
October	22.4	24.4	20.6	22.4	24.4	20.5

Note: Indicates no temperature data collected during the month of May on the Subject (Saw-whet) Property

On average, stream temperatures in Fourteen Mile Creek were slightly warmer (~1 ºC) than those in SW2 (14W-W1). Notable differences between temperatures were observed during the warmer summer months, where Fourteen Mile Creek experienced warmer temperatures than SW2.

Classification of Thermal Characteristics of Streams Using a Nomogram

Analysis of the temperature data was further refined by plotting the daily water and air temperature maximums using the thermal classification nomogram as described in Chu *et al.,* (2009). The use of the nomogram allows for the thermal regime to be described using five thermal categories (coldwater, cold-coolwater, coolwater, cool-warmwater and warmwater).

The thermal stability model indicates that Fourteen Mile Creek supports a warm-coolwater temperature regime and that reach SW2 of 14W-W1 supports a coolwater/cold-coolwater thermal regime. Note that data obtained from the Fourteen Mile Creek temperature logger for the period of July 27 to July 31, 2012 were determined to be unreliable as it appears to have been out of the water. **Figure 12a** depicts the thermal classification nomogram generated based on the daily maximum air and water temperatures.

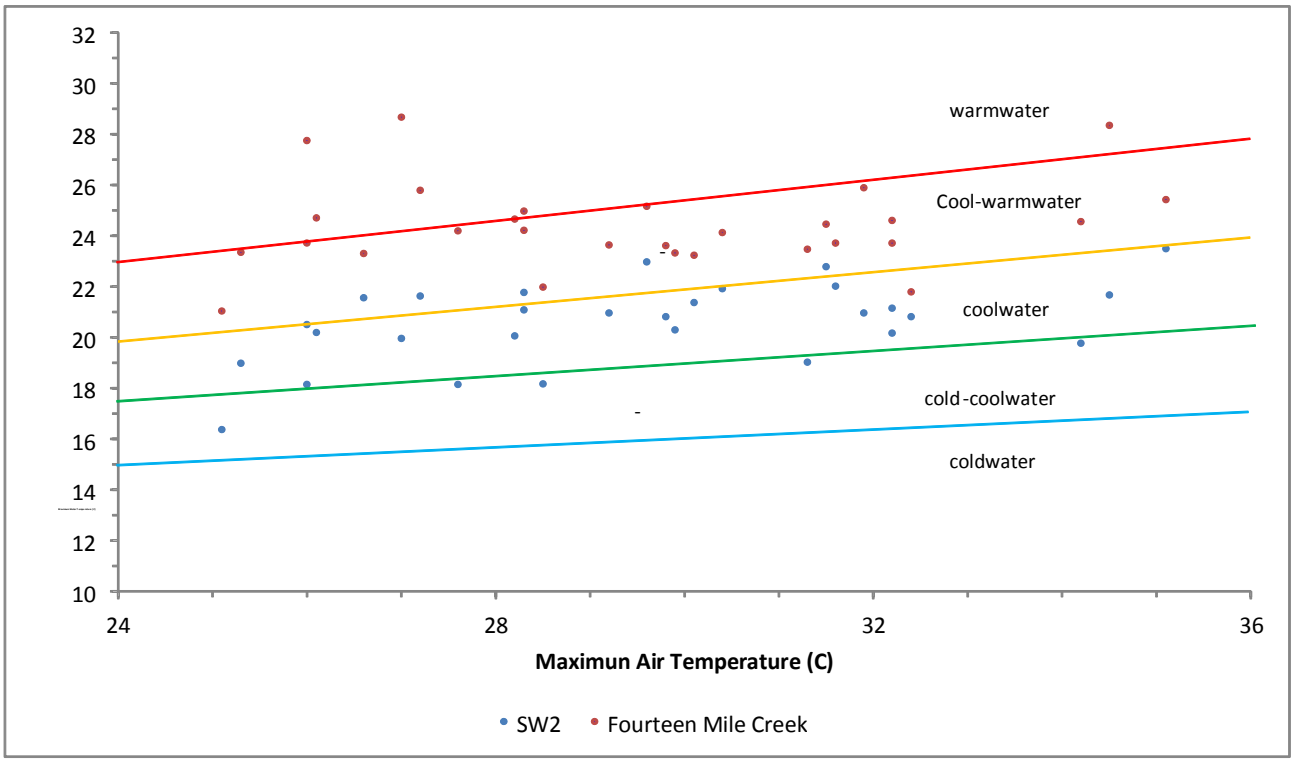


Figure 12a. Nomogram for Thermal Classification of Fourteen Mile Creek (14W) and Tributary 14W-W1 (SW2), 2012.

4.3.9.4.1 2013 Water Temperature Data

Nine sites were selected to characterize the thermal regime of the watercourses within the Subject Property and adjacent Fourteen Mile Creek study. Four sites were selected in Fourteen Mile Creek, loggers were placed at the most upstream location near Upper Middle Road and the furthest extent of the TPA downstream. The remaining two loggers were deployed downstream of the 14W-W1 confluence and the third just upstream of the 14E confluence. Five loggers were deployed in the 14W-W1 tributary to characterize the main branch and two tributaries. All but one of the continuous

temperature loggers was retrieved from Fourteen Mile Creek, 14-MC1, located at Upper Middle Road could not be located.

A summary of stream temperatures collected in 2013 are provided in **Table 14**, including the monthly average temperature, monthly average maximum and monthly average minimum temperature for each month monitored.

Table 14. Summary of Surface Water Temperatures Observed from 2013

Month	Fourteen Mile Creek		
	14 MC-2		
	Avg. Daily Temp	Max. Temp	Min. Temp
May	15.4	18.4	12.8
June	18.4	20.3	16.8
July	21.1	22.8	19.7
Aug	19.5	21.2	18.0
Sept	16.3	17.6	15.1
Oct	13.3	14.3	12.5

Month	Tributary 14W-W1								
	SWS1			SW4			SW3		
	Avg. Daily Temp	Max. Temp	Min. Temp	Avg. Daily Temp	Max. Temp	Min. Temp	Avg. Daily Temp	Max. Temp	Min. Temp
May	14.3	18.3	10.9	13.1	16.7	10.2	14.3	17.6	11.5
June	17.3	19.7	15.2	17.0	19.3	15.1	17.6	19.5	15.9
July	19.9	22.4	17.6	19.9	22.4	17.8	20.2	23.2	18.2
Aug	18.5	22.9	15.3	18.0	20.7	15.5	18.4	23.6	15.6
Sept	15.3	20.1	11.7	14.6	17.2	12.1	15.4	17.6	13.4
Oct	14.3	19.8	10.1	13.7	17.0	10.7	14.2	17.4	11.3

Month	Tributary 14W-W1					
	SW2			SW1		
	Avg. Daily Temp	Max. Temp	Min. Temp	Avg. Daily Temp	Max. Temp	Min. Temp
May	13.9	17.5	10.9	14.5	19.5	10.8
June	16.8	18.5	15.3	17.6	21.0	15.2
July	19.3	21.0	17.7	20.2	23.3	18.1
Aug	17.6	20.0	15.4	18.1	21.6	16.0
Sept	14.6	16.3	12.9	14.9	17.4	12.9
Oct	14.0	17.5	11.0	14.1	18.0	10.9

Monthly average stream temperatures in Tributary 14W-W1 varied on a spatial scale. Temperatures at SWS1 (14W-W1-3) were higher than SW4 (14W-W1-2) by approximately 1°C. The temperature logger at SW3 recorded the stream temperatures just downstream of their confluence. On average stream temperatures at SW3 were also higher than those recorded in SW4, and likely increased due to the mixing with the warmer waters observed at SWS1. Downstream at SW2, monthly average temperatures were consistently cooler than SW3 and similar to those observed at SW4. These cooler temperatures may also indicate groundwater inputs which is consistent with the findings in the hydrogeology study. Monthly average temperatures in SW1 were slightly higher than SW2.

The average monthly stream temperatures in Fourteen Mile Creek indicate that in general, slightly warmer temperatures were observed at 14MC-2 than those observed in the 14W-W1 tributary, (see **Table 14**).

Classification of Thermal Characteristics of Streams Using a Nomogram

Similar to the 2012 data set, the 2013 data for July and August was further refined by plotting the maximum daily water temperature from between 16:00 and 18:00 hours and maximum daily air temperature using the thermal classification nomogram as described in Chu *et al*. (2009).

The thermal stability model indicates that Tributary 14W-W1 supports a coolwater and cool-warmwater thermal regime, while the Fourteen Mile Creek West Branch supports a cool-warmwater temperature regime (see **Figure 12b** and **Figure 12c**). These thermal regimes have been classified based on the temperature data obtained in 2013. These thermal regimes may vary slightly based on sampling year and data logger location.

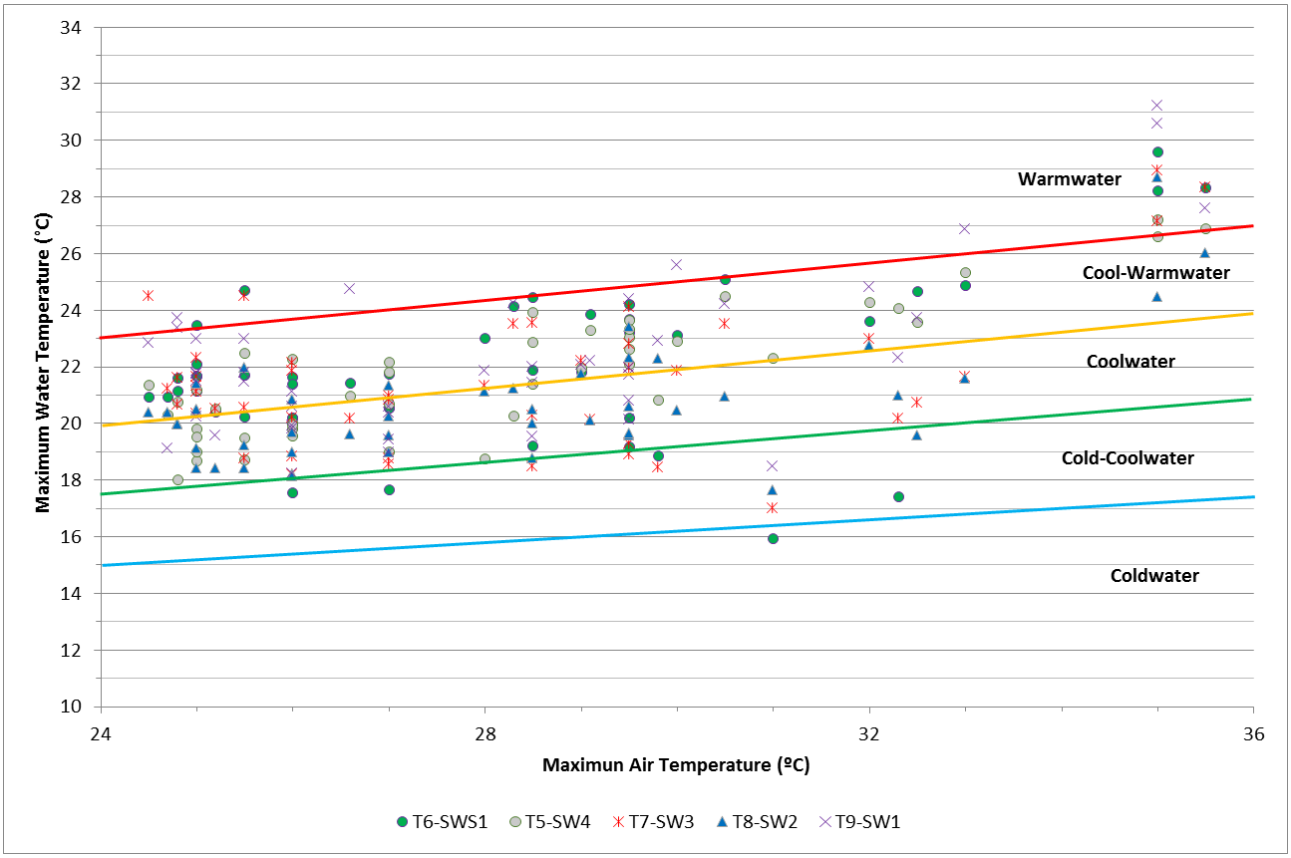


Figure 12b. Nomogram for Thermal Classification of Tributary 14W-W1, 2013.

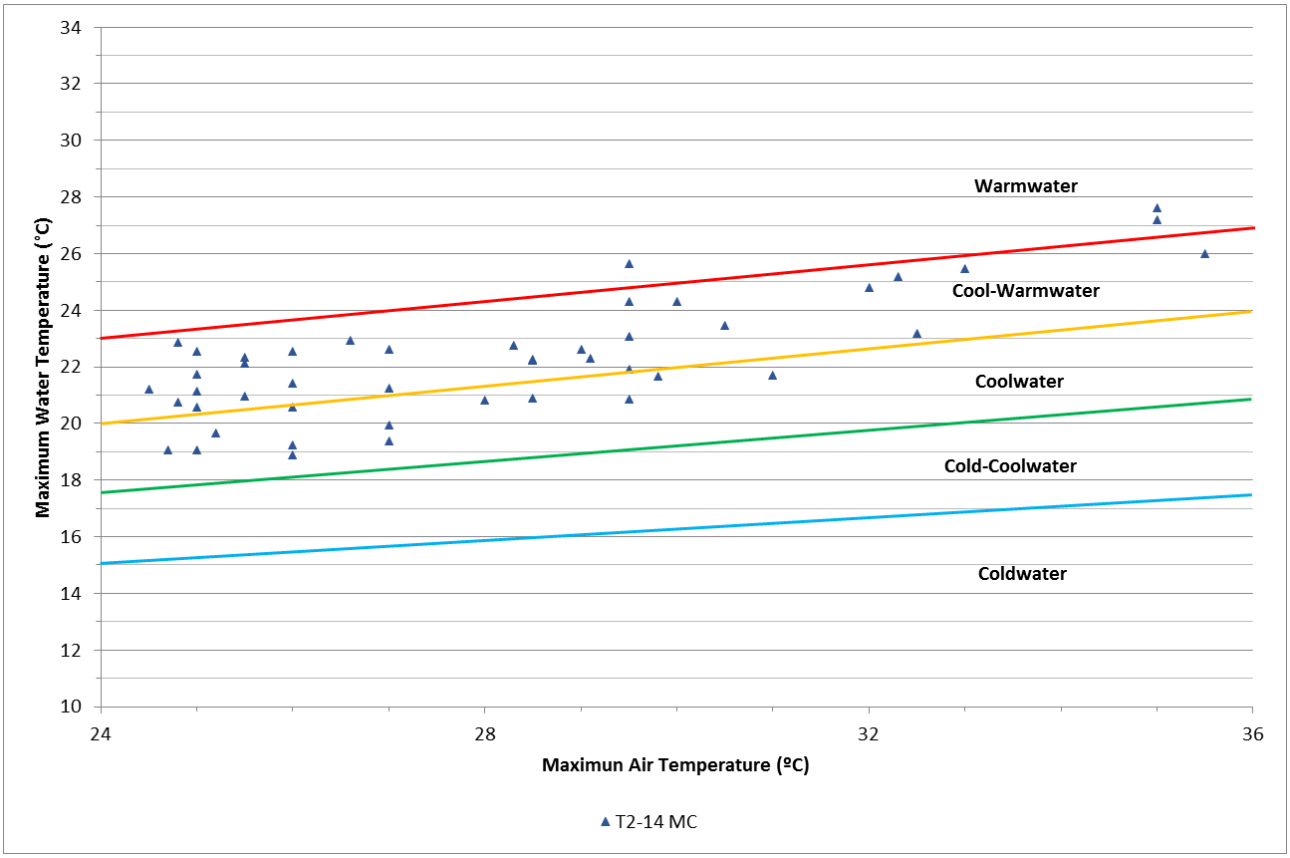


Figure 12c. Nomogram for Thermal Classification of Fourteen Mile Creek West Branch, 2013

Redside Dace Preferred Temperature Analysis

The 2013 temperature data was further analysed for each monitoring station in relation to temperature preferences of Redside Dace. Daily maximum stream temperatures for the 9 monitoring stations were compared to the Redside Dace upper lethal limit temperature (32.6°C), preferred temperature range of 14°C to 23°C, and mean preferred temperature. The Redside Dace spawning timing window was also plotted which occurs when temperatures are approximately 16 °C to 19°C and spawn between May and June (OMNR, 2011). The results of this analysis are presented in **Figure 13**.

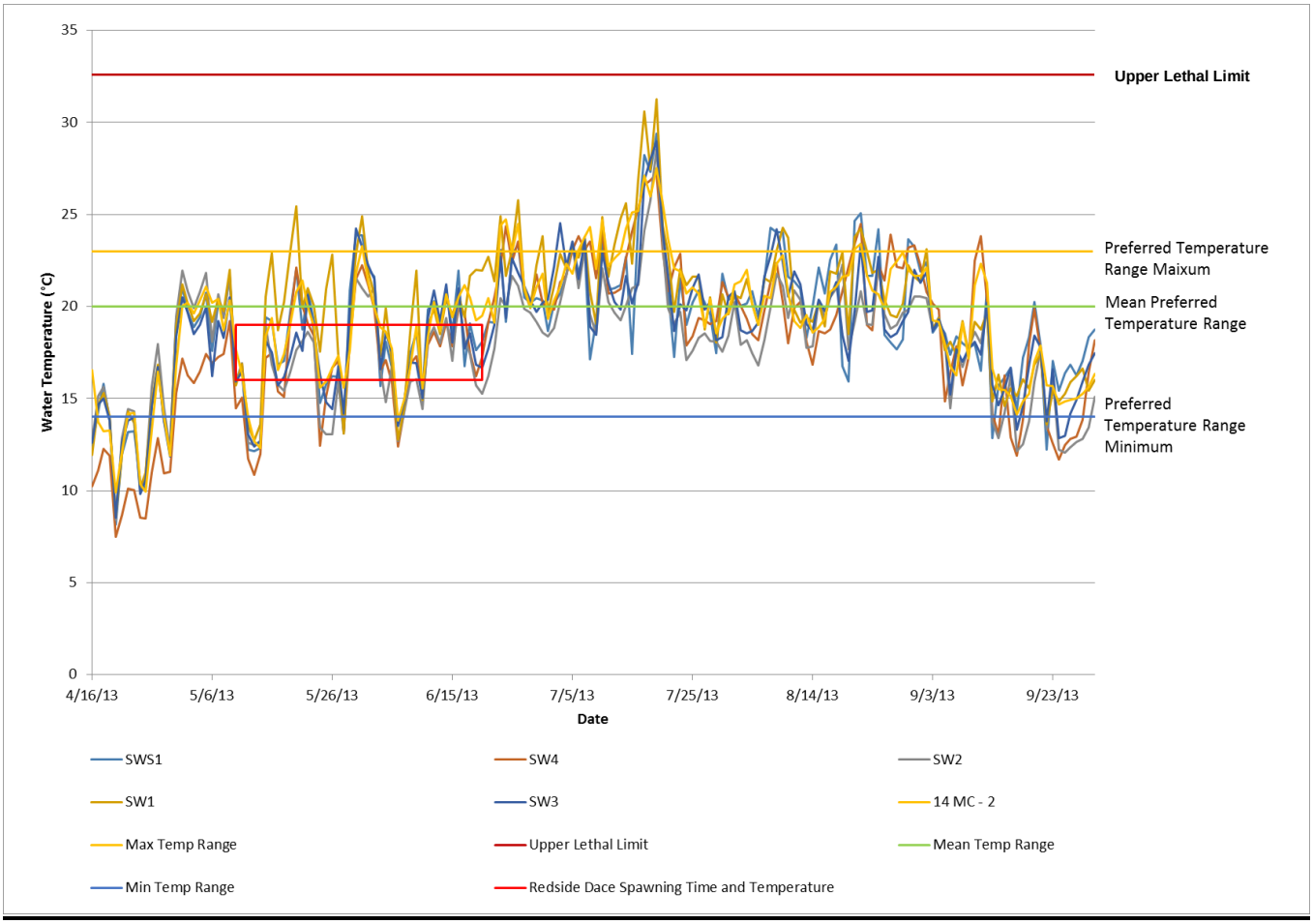


Figure 13. Maximum Surface Water Temperatures in the Fourteen Mile Creek West Branch and Tributary 14W-W1 Compared with the Upper Lethal Limit, Preferred Temperature Range and Spawning Temperatures of Redside Dace.

Summary

Water temperature is an important tool in assessing the quality of a watercourse and the type and health of the aquatic habitat it provides. Aquatic organisms require certain thermal regimes in order to carry out their life cycle. The temperature study undertaken for the TPA and Subject Property as well as the hydrogeology and hydrology studies provide valuable information in assessing potential impacts to the aquatic habitat and specifically to Redside Dace. The cooler water temperatures observed in SW2 (14W-W1) are consistent with the findings from the hydrogeology study which identified groundwater discharge within this reach. These temperatures also provide suitable habitat for the documented mixed fish species present and are not limiting to the Redside Dace. Furthermore tributary 14W-W1 provides cool water inputs to help regulate the warmer temperatures observed in the main branch of Fourteen Mile Creek.

In addition to groundwater inputs, other factors that regulate stream temperature are important. Features such as overhanging riparian vegetation, canopy cover and various types of land uses also play a role in moderating temperatures by shading streams from direct sunlight. Riparian vegetation

and canopy cover within the Fourteen Mile Creek valley is abundant, while the riparian vegetation and canopy cover along the upper reaches of Tributary 14W-W1 could be improved to help stabilize the thermal regime.

It is important to identify these cumulative effects of surrounding landscape characteristics within the Subject Property on the Fourteen Mile Creek and tributaries including the condition of the riparian vegetation and canopy cover, areas of groundwater discharge, and proposed landuses.

4.3.10 Environmentally Sensitive Areas (ESA) Assessment

As was discussed in **Section 2.6.3**, the Subject Property and adjacent lands include portions of the Fourteen Mile Creek valleylands. This valleyland system is identified as Fourteen Mile Creek Valley Environmentally Sensitive Areas (ESA #12) by the Region of Halton.

Policy 119 of the Region of Halton Official Plan (2006) states that:

> *Environmentally Sensitive Areas (ESAs) are land and water areas within the Greenlands System containing natural features or ecological functions of such significance as to warrant their protection in the best long term interests of the people and environment of Halton. They are shown on Map 1 as an overlay, to which specific policies apply. Permitted uses in ESAs are governed by the underlying land use designations shown on Map 1. While the Region maintains mapping showing the general boundaries of the ESAs, precise boundaries of ESAs are to be established through an Environmental Impact Assessment (EIA). In designating ESAs, the Region will give specific regard to maintaining the long term viability of existing agricultural operations.*

A summary of the criteria fulfilled by this ESA is provided in **Table 15**.

The Fourteen Mile Creek Valley ESA (ESA #12) represents a constraint to future land use and development on the Subject Property and adjacent lands as it triggers a Greenlands B designation in the current Regional Official Plan (2006). However, as described below, the areas captured by this mapping include some areas that appear not to meet ESA criteria, and exclude others that appear to meet these same criteria.

Item 7.1.3(vii) in the Terms of Reference for the TPA (**Appendix A**) requires that an evaluation of natural features in the TPA be undertaken to establish which areas satisfy Region of Halton ESA criteria and to recommend boundary modifications where necessary. This approach is endorsed by Policy 119 of the Region of Halton Official Plan (2006) which states that the "*precise boundaries of ESAs are to be established through an Environmental Impact Assessment (EIA)".* Furthermore, while ESAs are not specifically identified in ROPA 38, Policy 116.1 does allow for refinements to the Regional NHS boundaries through further studies.

The following section of the EIS includes an assessment of natural features and ESA boundaries. The assessment is based on a review of existing natural features, ecological functions and attributes and an evaluation of their role in fulfilling the recognized ESA criteria upon which the respective ESAs were designated. Refinements to ESA boundaries have been recommended based on the findings of this assessment and through application of the ESA boundary determination guidelines presented in the 1993 and 1995 ESA studies (Geomatics, 1993; Region of Halton, 1995).

Table 15. Summary of Primary and Secondary ESA Criteria for Fourteen Mile Creek ESA (#12)

Criterion	Description	Criterion Met?
Primary 1	***Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region***. *The loss of species is currently recognized as one of the greatest world-wide conservation problems. Its inclusion in local-level conservation initiatives such as Halton's ESA program is important. The term "species richness" refers to the number of species present and is preferred over "species diversity", which considers the relative number of individuals of each species in addition to the number of species. The criterion is intended to be applied with respect to Halton. Thus, areas should be assessed relative to other areas within Halton, not outside the Region.*	✓
Primary 2	***Areas that provide links among two or more adjacent natural systems.*** *This criterion should be used to protect natural systems that: (a) serve as significant wildlife corridors on their own; and (b) serve to link two or more designated natural areas together by acting as a migratory corridor or dispersal route for wildlife and plants. It is not, however, intended to enable designation of every hedgerow that extends between two natural areas. The natural areas being linked together must already be protected through programs such as the ESA program flood and fill regulations, provincial parks system, Areas of Natural and/or Scientific Interest program or other natural area programs.*	×
Primary 3	***Areas that contain a relatively high number of native plant communities in the context of Halton Region***. *The main intent of this criterion is to protect areas that contain a range of native communities or habitats that occur within one area. This would not only provide representation of a wide range of natural communities within one area, but would provide additional benefits such as preserving the natural biological, hydrogeological and hydrological interactions that occur among communities. As with Criterion 1, this criterion should be interpreted in a regional context.*	✓
Primary 4	***Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities.*** *The pattern of development throughout southern Ontario has left a disturbed, dissected landscape. Continuous expanses of native vegetation are uncommon and those that remain should be protected. "Undisturbed" is qualified since there are no completely undisturbed areas remaining in the Region. Undisturbed in this context basically means undeveloped, i.e. excludes aggregate extraction, agriculture, urban, suburban, hamlet and rural housing developments. Continuous should be interpreted in a biological sense, thus a road or utility right-of-way should not necessarily constitute a break in the continuity of an area. Size is not specifically defined here since it needs to be determined in a regional context. The criterion should thus protect the largest remaining areas in the Region.*	×
Primary 5	***Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.*** *The intent of this criterion is to protect at least one example of each of the vegetation types that occur in Halton. Rare communities are specifically noted since their designation and protection should be a high priority. Priority should be given to designating the best examples, with respect to extent (size) and quality. In addition, by capturing representative native vegetation in the ESA program, examples of pre-European settlement landscapes are also protected.*	×

Criterion	Description	Criterion Met?
Primary 6	***Areas that contain plant and/or animal species that are rare provincially or nationally.***	✓
Primary 7	***Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.*** *This criterion is designated to protect examples of at least one of each of the earth science features that occur in Halton. Priority should be given to designating the best examples, with respect to extent (size) and quality.*	×
Primary 8	***Areas that are determined to contribute significantly to local and/or regional groundwater recharge.*** *The intent of this criterion is to help maintain the quantity of groundwater resources in the Region. Owing to the lack of a region-wide groundwater data base with which to evaluate the significance of the recharge in a particular area, there will have to be some reliance on expert judgement to apply this criterion. Each time the criterion is applied the rationale and source of expertise should be documented.*	×
Primary 9	***Areas that are determined to be significant groundwater discharge areas.*** *This criterion is to protect areas that contribute significantly to maintaining surface water quantity. As with the previous criterion, expert judgement should be used and referenced when applying this criterion.*	✓
Primary 10	***Areas that contribute significantly to groundwater quality.*** *The intent of this criterion is to protect areas that contain filter beds, wetlands or large recharge areas without sources of contamination that contribute to groundwater quality.*	×
Primary 11	***Areas that contribute to maintaining surface water quality.*** *This should be used to designate areas that contribute to surface water quality by holding water and slowly releasing it, shading the water surface to prevent elevation of water temperature, filtering surface water, and contributing runoff low in pollutants.*	✓
Secondary 12	***Areas that contain regionally rare plants.*** *Regionally rare plants are perceived to be valuable as they contribute to the landscape that is unique to Halton. However, since many of these species may occur more commonly in areas adjacent to the Region, they are not considered sufficiently significant to warrant setting aside an area without the support of other criteria.*	✓
Secondary 13	***Areas that contain high quality assemblages of native plant and/or animal species.*** *This criterion is best used as support for other criteria. It can be assessed by evaluating the health, maturity and population size of vegetation in an area, determining the ratio of native to non-native species of plants or animals or the lack of human disturbance in a regional context.*	×
Secondary 14	***Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.*** *Aesthetic criteria can be highly subjective. It is therefore recommended that they not be used as the sole reason for designating an area. Use should be made of existing documentation to determine areas that are documented as being scenic areas or provide scenic views. This can include designated lookouts on the Bruce Trail or in park and conservation area master plans, references in The Niagara Escarpment Plan and its supporting documentation, etc.*	×
Secondary 15	***The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.*** *Studies in natural areas provide valuable documentation of baseline conditions. These are useful for monitoring the condition of the environment, identifying changes in natural areas and understanding the relationship between human activities and the environment. In addition, the education of the public is important for raising environmental consciousness and subsequently gaining support for the preservation of natural areas.*	×

4.3.10.1 Fourteen Mile Creek Valley ESA (#12)

The Fourteen Mile Creek Valley ESA (#12) overlaps with substantial portions of the TPA, as well as some parts of the Subject Property. The mapped boundaries of this ESA are generally consistent with the edge of the forested valleylands and floodplains. The ESA was originally established in 1978 by Halton EEAC, and its boundaries were confined to the forested valleylands of Fourteen Mile Creek between Upper Middle Road and the North Service Road. The boundary of the ESA was updated in 1993 to capture additional areas of tableland in the vicinity of the Saw-Whet and Deerfield properties. The current boundaries of ESA #12 are illustrated on Map 1 of the Region of Halton Official Plan and on Schedule B of the Livable Oakville Plan, and shown in **Figure 14**.

Through our background review, inventory and assessment of natural heritage features and functions, and application of the Region's ESA boundary determination guidelines, it has been confirmed that the current boundaries of ESA #12 do not accurately reflect the limits of this ESA in several portions of the TPA. This is not unusual as the mapping for many ESAs in Halton Region was based on older aerial photography from the 1970's and was never ground truthed. Policy 119 of the Regional Official Plan recognizes the coarseness of the mapping and indicates that **"***the precise boundaries of ESAs are to be established through an Environmental Impact Assessment (EIA)"* (or EIS).

Within the TPA, there are a number of instances where the ESA boundary either does not coincide with natural features, or overlaps with cultural features that do not satisfy any primary ESA criteria. Key examples are noted below:

- A large (8 ha+/-) tableland forest situated along the north side of the Fourteen Mile Creek valley (outside the Subject Property) is not mapped as ESA despite being contiguous with the valleyland forest.
- Forested valleylands outside the Subject Property immediately north of Upper Middle Road are not included in the ESA.
- Sections of the East Branch of Fourteen Mile Creek outside the Subject Property on the Third Line lands are not included within the ESA, despite the known presence of a Redside Dace fishery.
- Outside the Subject Property, the ESA overlaps with existing residential areas in several locations along the north side of the Fourteen Mile Creek valley.
- On the southern side of the Fourteen Mile Creek valley, within the Subject Property, portions of golf course, an agricultural field, and hydro right-of-way are mapped as ESA even though they do not meet any of the ESA criteria.

Though a more detailed evaluation, it was determined that certain features were erroneously included within the ESA. According to ESA mapping presented in the original 1978 ESA Study, the only portion of the Subject Property mapped as ESA was the actual Fourteen Mile Creek valleylands. All adjoining tableland features as well as the valleylands along Tributary 14W-W2 were excluded from the original ESA mapping. During the 1993/1995 ESA studies, select features were added to the ESA (i.e., ELC Units 17, 13, 14, 12, 11, 28, 32a, 19, 29a), including the periodically farmed cultural meadow (ELC Unit 12), and no subsequent modifications to the ESA #12 boundary were made during the 2002 and 2005 ESA update studies.

To better understand how the changes made during the 1993 ESA Study (Geomatics 1993) were implemented, we undertook a review of the various ESA and background studies. As part of the 1993

and 1995 ESA studies (Geomatics 1993, Region of Halton 1995), refinements were made to the boundaries of a number of ESAs, including ESA #12. From our review, it was confirmed that these changes were based on 1970's aerial photography and that they were not ground truthed for ESA #12. The refinements were also made in accordance with ESA boundary determination guidelines that were established through consultation with the Region of Halton. In reviewing these guidelines, it becomes apparent why certain tableland features on the Subject Property were appended to the ESA; however, it remains unclear why features such as the periodically farmed cultural meadow (ELC Unit 12) were included. The area was clearly identified as a "cultivated field" in the 1993 ESA Study and continues to be identified as such in the 2005 ESA Update Study. A review of historical and recent aerial photography confirms that this field has been farmed regularly for over a century, with the exception of brief periods during which it lay fallow. The ESA boundary determination guidelines do not contemplate inclusion of cultivated agricultural fields within ESA, irrespective of their proximity to other ESA components.

Based on this evaluation, we have included recommendations for revisions to the boundaries of ESA #12. The recommendations are based on current information relating to natural heritage features, functions and attributes and an evaluation of their role in fulfilling primary ESA criteria. An evaluation of which features or areas would satisfy primary ESA criteria is provided below in **Table 16**.

Table 16. Evaluation of Primary ESA Criteria Applicable to Fourteen Mile Creek ESA #12

Primary Criteria	Criterion Description	Evaluation	Criterion Satisfied
1	Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.	The natural forest and wetland communities associated with the valleylands of Fourteen Mile Creek and its tributaries support a high level of floral and faunal species richness. Natural communities in the TPA associated with drainage features (14W; 14W-W1; 14W-M1; 14W-W1-2; 14W-W1-3; 14W-E1; 14W-E-E1; 14W-E-W1;and 14M) should be considered ESA.	✓
2	Areas that provide links among two or more adjacent natural systems.	ESA #12 is isolated from other ESAs and Natural Areas and does not provide for regional scale linkage.	×
3	Areas that contain a relatively high number of native plant communities in the context of Halton Region.	The valleylands of Fourteen Mile Creek and its tributaries within the Subject Property do support a relatively high number of natural vegetation communities.	✓
4	Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities.	Aside from a few pockets of intact wetland and forest communities, the valleylands of Fourteen Mile Creek and its tributaries the natural area is relatively small and subject to flooding and erosion.	×
5	Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.	ESA #12 does not support any regionally rare native plant communities.	×
6	Areas that contain plant and/or animal species that are rare provincially or nationally.	ESA #12 supports habitat for provincially endangered Redside Dace, provincially ranked special concern Snapping Turtle and Milksnake.	✓

Existing and Proposed Boundaries for ESA#12

Figure 14

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Swale
- Watercourse
- Existing ESA Boundaries
- Proposed ESA Boundaries

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UTM Zone 17 N, NAD 83

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Primary Criteria	Criterion Description	Evaluation	Criterion Satisfied
7	Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.	ESA #12 does not support any significant earth science features.	×
8	Areas that are determined to contribute significantly to local and/or regional groundwater recharge.	ESA #12 does not contribute significantly to local of regional groundwater recharge due to the underlying surficial geology and soils which are relatively impermeable.	×
9	Areas that are determined to be significant groundwater discharge areas.	ESA #12 does not contribute significantly to local of regional groundwater discharge due to the underlying surficial geology and soils which are relatively impermeable. Estimated discharge rates in the TPA are considered relatively low. However, if the ESA boundary was to be extended to areas upstream of Upper Middle Road, where discharge rates are reported as being higher based on Conservation Halton field work conducted in 1998/1999, then it is likely that this criterion could be satisfied. Because this potentially higher discharge area is located off-site and upstream of the Subject Property, the proposed development will have no impact on this feature.	×
10	Areas that contribute significantly to groundwater quality.	ESA #12 does not contribute significantly to maintaining groundwater quality as the underlying surficial geology and soils are relatively impermeable and do allow for significant infiltration and aquifer recharge.	×
11	Areas that contribute to maintaining surface water quality.	Portions of the floodplain associated with Fourteen Mile Creek and its tributaries support wetland communities that contribute to maintaining surface water quality through storage and detention, erosion control, temperature control and sediment and contaminant removal.	✓

Through this evaluation, it has been confirmed that ESA #12 satisfies primary ESA criteria 1, 3, 6 and 11. Further, it is recommended that the boundary of ESA #12 be revised to coincide with the more restrictive of the following (as shown in **Figure 14**):

(i) the staked top of valley slope along Fourteen Mile Creek and its tributaries; or
(ii) the staked dripline of regionally significant woodlands associated with the valleylands of Fourteen Mile Creek valley and its tributaries.

During the Halton Natural Areas Inventory (Dwyer 2006), it was noted that the ESA boundaries should be extended to include portions of the Third Line lands as well as a segment of valleyland along the West Branch of Fourteen Mile Creek, upstream of Upper Middle Road. The recommended refinements include the areas identified for ESA expansion upstream of Upper Middle Road and on the Third Line lands.

4.3.11 Assessment of Significant Natural Heritage Features and Areas

The following sections describe the various analyses undertaken to characterize the biophysical functions and significant ecological features associated with the Study Area, and in particular the Subject Property, in more detail. The findings of the analysis and evaluation have been used to determine the relative significance of natural heritage features, functions and attributes in accordance with the applicable local, regional and provincial criteria, and to identify a proposed Natural Heritage System (NHS) for the Subject Property that ensures protection of significant natural heritage resources.

Significant natural heritage features and areas, as per the PPS (2014), include the following:

- significant habitat of endangered species and threatened species;
- significant wetlands;
- significant coastal wetlands
- significant woodlands;
- significant valleylands;
- significant wildlife habitat (SWH);
- significant areas of natural and scientific interest (ANSIs);
- fish habitat.

The Federal government, sometimes with support from OMNR (particularly when there is Species at Risk habitat), is ultimately responsible for regulating fish habitat. The Province is responsible for confirming significant habitat of endangered species and threatened species, Provincially Significant Wetlands (PSWs), and significant Areas of Natural and Scientific Interest (ANSIs). The Province also provides guidance (and in the case of significant wildlife habitat draft criteria) for determining significance of the remaining natural features and areas. However, it is ultimately the local planning authority, often in consultation with the local conservation authority, who makes the determination of significance for non-provincially significant wetlands, significant woodlands, significant valleylands and significant wildlife habitat (SWH). Municipalities may adopt individual approaches, as long as these approaches achieve or exceed objectives that are consistent with the provincial policies and supporting guidance.

Key sources of guidance for determining significance of the natural features and areas in the Study Area include: the PPS (OMNR, 2014) and supporting guidance[1], the in effect Region of Halton Official Plan (2006), the under appeal ROPA 38 (November 28, 2014), and the Town of Oakville's Livable Oakville Official Plan (2010). The following sections provide a summary of which natural heritage features and areas within the Study Area would be considered significant according to the policies, criteria and guidance provided in these documents. An overview of the relevant policies from each is provided in **Section 2**, with some additional relevant details provided below.

Within the Subject Property and adjacent lands, some significant natural heritage features and areas had been previously been identified in the Study Area by the Region and / or Town based on a combination of older technical studies in portions of the TPA, and somewhat coarse desktop analyses

[1] Key sources of relevant provincial guidance include: *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement* (OMNR 2010), the *Significant Wildlife Habitat Technical Guide* (OMNR 2000) and the Draft Criteria Schedules for Eco-Region 7E (OMNR 2012).

via remote sensing (i.e., air photo interpretation). However, these features, and others, required verification based on current and site-specific evaluation and analyses (as described in **Section 3**).

4.3.11.1 Significant Habitat of Endangered Species and Threatened Species

The Study Area is known to support habitat for several species of endangered and threatened wildlife. In regard to the habitat of endangered species and threatened species, significant is defined by the PPS (2014) as:

> *"the habitat, as approved by the Ontario Ministry of Natural Resources, that is necessary for the maintenance, survival, and/or the recovery of naturally occurring or reintroduced populations of endangered species or threatened species, and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of its life cycle"*

Redside Dace

Redside Dace (*Clinostomus elongatus*) is a provincially endangered fish species that occupies portions of Fourteen Mile Creek within the Study Area, but outside the Subject Property. Habitat mapping guidelines for the identification of habitat of Redside Dace in relation to the PPS (Section 2.3) are under development and not yet available. For the purposes of this study, Redside Dace habitat was mapped using guidance provided in the Redside Dace Recovery Strategy (OMNR, 2010) which recommends:

> *"all reaches currently occupied by Redside Dace, upstream headwaters (natural heritage features and supporting functions supporting the occupied reaches) and historically occupied reaches where there is a high likelihood of rehabilitation be prescribed as habitat within a habitat regulation under the Endangered Species Act, 2007"*.
>
> *"Redside Dace habitat consists of two elements. The first element includes bankfull stream width within the aquatic resource area. The second element of habitat includes the meander belt width of the stream and associated riparian habitat that is a minimum of 30 metres from the meander belt (measured horizontally)".*

Within the Study Area, the following watercourses areas are considered to fall within the habitat regulations as described above: West Branch of Fourteen Mile Creek reaches 14W (in the Fourteen Mile Creek valley) and14W-W1 (mainly outside the Subject Property within the wooded valley south of ELC Unit 12 and extending into the Fourteen Mile Creek valley, but with its upper segments extending into the Subject Property) (see **Figure 5**). The regulated habitat for Redside Dace includes these reaches as well as all lands within 30 m of the meander belt along those reaches.

The watercourse reaches west of Bronte Road that feed into 14W-W1 via box culverts do not meet the definitions for regulated habitat (i.e., they do not currently or did not historically support populations of Redside Dace). These reaches include 14W-W1-2 and 14W-W1-3. For these reaches, the contributing habitat is considered to be within the bankfull width of the channel.

A map illustrating the results of the habitat assessment for Redside Dace is presented in **Figure 11**.

Eastern Flowering Dogwood

Eastern Flowering Dogwood (*Cornus florida*) is a provincially endangered tree species that has been reported historically within the Fourteen Mile Creek valleylands. Recent surveys undertaken by the Region of Halton and others have failed to identify individuals or populations. It is likely that the species has been extirpated due to dogwood anthracnose, a disease which has been impacting populations throughout southern Ontario. The habitat for this species is not illustrated as it was not confirmed within or adjacent to the Subject Property.

Barn Swallow

Barn Swallow (*Hirundo rustica*) is a provincially threatened bird species that has been observed within the Subject Property. This species has been confirmed as nesting on man-made structures on the Saw-Whet Golf Course. The removal of the Barn Swallow habitat is allowed but must be mitigated through compensation in accordance with the *Endangered Species Act* (either through the OMNR Registry, or through an Overall Benefit Permit 17(2)(c) permit).

The habitat for this Species at Risk will be determined through consultations with OMNR. Beacon is continuing to consult with OMNR to determine the significance of this population and what protections apply under the Act. When development occurs on this part of the property, it will be in accordance with the applicable regulations.

There are no other provincially endangered or threatened species with habitat known to be directly associated with the Subject Property or adjacent lands.

4.3.11.2 Significant Woodlands

There are no woodlands on the Subject Property, but the adjacent lands support fairly extensive and contiguous wooded areas. Significant Woodlands are defined by the PPS (2014) as:

> *"an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or …the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history".*

Policy 277 of the Region of Halton Official Plan (2006) and comparable policies in ROPA 38, define a Significant Woodland as "*a woodland 0.5 ha or larger determined through a Watershed Management Plan, a Subwatershed Study or a site specific Environmental Impact Assessment to meet one or more of the four following criteria:*

- *the Woodland contains forest patches over 99 years old;*
- *the patch size of the Woodland is 2 ha or larger if it is located in the Urban Area, or 4 ha or larger if it is located outside the Urban Area but below the Escarpment Brow, or 10 ha or larger if it is located outside the Urban Area but above the Escarpment Brow;*
- *the Woodland has an interior core area of 4 ha or larger, measured 100m from the edge, or*

- *the Woodland is wholly or partially within 50m of a major creek or certain headwater creek or within 150m of the Escarpment Brow.*

To determine which woodlands in the Study Area are significant, the Regional criteria described above were used to evaluate all woodland patches. The evaluation is based on the identification of woodland patches greater than 0.5 ha and determination of whether they satisfy any of the above criteria. It should also be noted that some ELC communities such as cultural thicket may also satisfy the definition of woodland under the *Forestry Act* (1990) if tree densities are sufficiently high.

Woodlands that satisfy the regional criteria for Significant Woodland are generally confined to or contiguous with the Fourteen Mile Creek valleylands. The valleyland woodlands satisfy all of the above criteria. The Region of Halton's Forester participated in the demarcation of significant woodlands on and adjacent to the Subject Property, and these boundaries were surveyed used to establish limits to significant woodlands. In some areas these boundaries extended into the Subject Property.

There are several woodland patches situated outside the main valley lands that were evaluated as part of the EIS, discussed below.

- One of these patches occurs in the golf course near the southerly limit of the property adjacent to the Ontario Hydro corridor (ELC Unit 9a). This patch is comprised primarily of ash trees with the occasional bur oak and red oak, is not older than 99 years, and is less than 2 ha in area. It does not support 4 ha of interior core area, nor is it associated with a major creek, headwater, or the Escarpment Brow. As such it does not meet the regional significant woodland criteria. This feature was not staked by the Region during our review of the property.

- There are two other small woodland patches on the Subject Property:.
  - Unit 1 is less than 0.5 ha and was not evaluated.
  - Unit 9b is also less than 0.5 ha in area; however it is immediately adjacent to other woodlands within the Fourteen Mile Creek valley and is considered significant based on its proximity to other significant woodlands.

The ELC units are identified in **Figure 10**. The limits of significant woodlands within the Subject Property and adjacent lands are shown on the constraint map presented in **Figure 15**.

4.3.11.3 Significant Wetlands

There are no Provincially Significant Wetlands (PSWs) or OMNR evaluated wetlands within or adjacent to the Subject Property. In regard to wetlands, significant is defined by the PPS (2014) as:

> "*an area identified as provincially significant by the Ontario Ministry of Natural Resources using evaluation procedures established by the Province, as amended from time to time."*

This EIS has, however, identified several small non-PSW wetland features within the TPA. Wetland communities within the TPA are associated primarily with the floodplains along the Fourteen Mile Creek valley and its tributaries. There are also several small wetlands located on the tablelands and these are associated with dug ponds. None of the wetlands in the TPA have been evaluated under

the Ontario Wetland Evaluation System (OWES) to establish their significance. None of the wetlands in the TPA are greater than 2.0 ha which is generally the minimum size required to initiate an evaluation under OWES.

Significant wetlands are also recognized as a Key Feature of the Regional Natural Heritage System (RNHS) under ROPA 38 Policy 115.1. Wetlands associated with the Fourteen Mile Creek valleylands and Tributaries 14W-W1-2, 14W-W1-3, and the upper reach of 14W-W1 valley, could be considered significant under ROPA 38 (still under appeal) Policy 276.5 as they do provide ecological functions to the system such as flow attenuation, erosion control, riparian habitat, thermal mitigation to the fishery and flood storage. They are considered significant as part of this analysis and have been included in the proposed NHS.

Other smaller wetlands located on the tablelands outside the NHS and associated with the Subject Property Pond #7 are not considered significant, as they are more isolated, disturbed and provide very limited ecological functions, although they may provide overwintering habitat for some local turtles and/or amphibians.

4.3.11.4 Significant Coastal Wetlands

The PPS defines coastal wetlands as:

> a) *any wetland that is located on one of the Great Lakes or their connecting channels (Lake St. Clair, St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence Rivers); or*
> b) *any other wetland that is on a tributary to any of the above-specified water bodies and lies, either wholly or in part, downstream of a line located 2 kilometres upstream of the 1:100 year floodline (plus wave run-up) of the large water body to which the tributary is connected.*

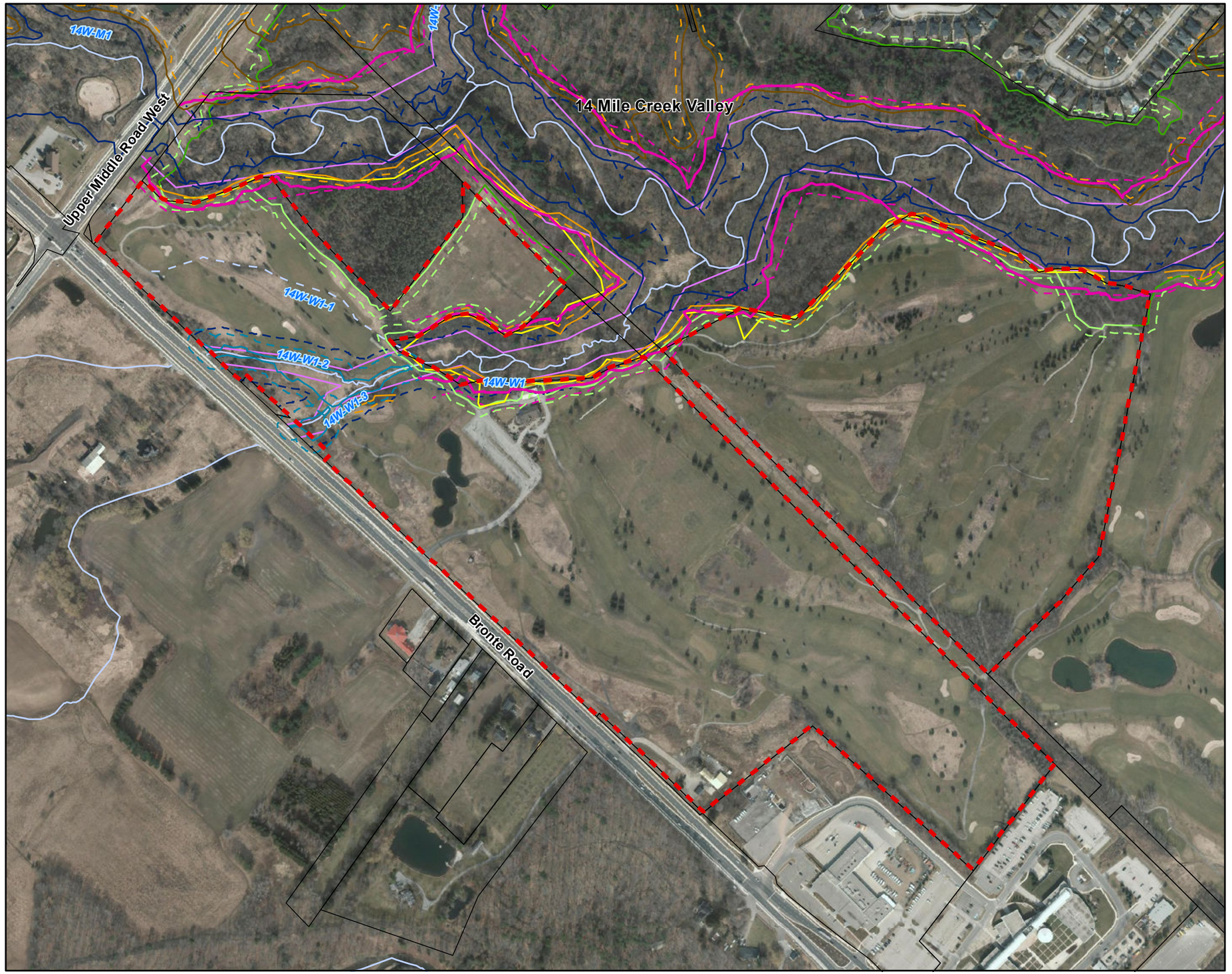
Significant coastal wetlands are also specifically recognized as a Key Feature of the RNHS under ROPA 38 Policy 115.1. However, there are no coastal wetlands within the Subject Property or adjacent lands as the area is situated more than 2 km from Lake Ontario.

4.3.11.5 Significant Valleylands

The Subject Property, and its adjacent lands, includes valleylands associated with Fourteen Mile Creek valley. In regard to valleylands, significant is defined by the PPS (2014) as:

> *"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 …"*

Significant valleylands are normally identified by municipalities with input from their agency partners. Significant valleylands are also recognized as a Key Feature of the RNHS under ROPA 38 Policy 115.1. The physical boundaries of valleyland landforms are generally defined by the top of slope. Within the Study Area, Conservation Halton has participated in top of slope delineation on the Subject Property (see **Figure 15**). Conservation Halton considers the Fourteen Mile Creek a minor valley system (CH, 2006b). This valley system is regulated and is considered a significant valleyland.



Physical and Biological Constraints

Figure 15

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Swale
- Watercourse
- Watercourse Buffer (30 m)
- Floodline
- Wetlands (Staked by Conservation Halton - June 21, 2013)
- Wetlands 15 m Buffer
- Top of Slope (Staked by CH 17/01/13)
- Top of Slope
- Top of Slope Setback (7.5 m / 15 m)
- Predicted Long-Term Stable Top of Slope (as determined through geotechnical study)
- Woodland Dripline (Staked by Region of Halton 17/01/13)
- Woodland Dripline
- Woodland Buffer (10 m)
- Erosion Hazard Limit
- Meander Belt
- Redside Dace Habitat (30 m setback to Meander Belt)

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UTM Zone 17 N, NAD 83

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4.3.11.6 Significant Wildlife Habitat (SWH)

Significant Wildlife Habitat (SWH) is one of natural heritage features that require site-specific, comprehensive analysis to identify candidate features. SWH is also recognized as a Key Feature of the RNHS under ROPA 38 Policy 115.1. It is typically the responsibility of the municipality to confirm SWH for within its jurisdiction; however it is our understanding that neither the Town of Oakville nor the Region have undertaken a jurisdiction-wide assessment. To determine if the Subject Property and ad/or adjacent lands support any candidate SWH, we used the *Significant Wildlife Habitat Technical Guide* (SWHTG) (OMNR 2000) as our primary source of guidance, as illustrated in **Table 17**.

Table 17. Significant Wildlife Habitat Evaluation for the Saw-Whet Property and adjacent Fourteen Mile Creek Valley

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
Seasonal Concentration Areas			
White-tailed deer winter yard	• protect the entire area of the deer yard • core areas in yards less than 10 km^2 should be entirely protected • protect at least 85% of core areas in larger yards • from a landscape perspective, ideally 10-30% of total deer range should be conifer-dominated stands, with a minimum conifer component of 70% and crown closure of 60% • ideally a minimum of 40% of deer range should be second growth or regenerating stands, occurring within 800 m of conifer shelter • as much as 300 m around certain deer yards may have to be protected if disturbance or other factors may affect the functions of the habitat	White-tailed deer are present in the TPA, and have been observed on the Subject Property, but OMNR mapping does not identify any winter deer yards within or in the vicinity of the Study Area. Surveys of the valley in winter 2012/2013 and January 2014 did not identify any large concentrations of deer.	NO
Moose late winter habitat	• protect the complete area of the site • in addition, protect sufficient conifer forest and patches of conifers within • hardwood forests to support number of moose in the planning area based on OMNR biologist estimates • as much as an additional 300m may need to be protected to ensure maintenance of functions	There are no Moose populations present in the vicinity of the Study Area. Not applicable.	N/A
Colonial-nesting birds	• protect the area of the site • protect an additional area to protect the birds from disturbance. The width of this area will vary depending on sensitivity of birds, local site conditions, and adjacent land use (see Appendix C of the SWH Technical Guide – OMNR 2000 - and the Decision Support System)	There are no populations or suitable habitats for colonial nesting birds in the Study Area. A Green Heron colony recorded in the 1980s no longer exists.	NO
Raptor wintering areas (hunting, roosting)	• protect the area of the site • protect several large blocks of fields (minimum of 15 ha, preferably much larger)	Available habitat for feeding in the Subject Property and adjacent lands is not large enough for significant numbers of diurnal	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	• protect key roosting sites adjacent to these areas • an additional 100 m width adjacent to this habitat may have to be protected to ensure that raptors are not disturbed	raptors to feed. Roosting habitat for owls is present (and was known to occur in the 1980's), but recent surveys have found no wintering raptors in the Study Area, and there area no other records since 1980s, except one Long-eared Owl record from 1995 on the Subject Property. It is not known how this bird was using the site, or its precise location. Nonetheless, a single resident pair of Great-horned Owls does not constitute a concentration.	
Landbird/shorebird/ butterfly migratory stopover area	• protect the area of the site • since the minimum threshold size of this habitat is unknown, existing significant sites should be protected in their entirety and not be reduced in area • protection of undisturbed sites with a diversity of suitable habitats and structure will improve the sustainability of long-term populations • for shorebirds, an additional 100 m may have to be protected to ensure the birds are not disturbed	Negligible habitat present for shorebird stopover, however the Fourteen Mile Creek valley and the associated tableland forests, included those adjacent to the Subject Property, could be a landbird stopover and is within 10 km of Lake Ontario. Despite the presence of some Monarchs, the Study Area would not be considered a butterfly stopover area as: the site has no history of concentrations; most stopover concentration areas are extremely close to Lake Ontario; and the presence of a few Monarchs would be expected in most sites with open early successional habitat in southern Ontario.	YES
Wild turkey winter range	• protect the area of the site • this habitat is best protected by protecting as many mature conifer stands and patches of conifers within hardwood stands, as well as springs and seeps, as possible • an additional 100 m or more may need to be protected so that	Species not observed during breeding nor wintering bird surveys.	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	birds are not disturbed		
Turkey vulture summer roost	• protect the area of the site • additional areas that should be considered part of significant wildlife habitat will vary according to local site conditions (e.g., height of cliff, adjacent land use, local topography, how remote the site is)	Species not observed during breeding nor wintering bird surveys.	NO
Bat/reptile hibernacula	• protect the area of the site • protection of all bat hibernacula is desirable because this habitat is limited • protect an additional 200 m from the entrance to bat hibernacula, although individual site inspections may find that a smaller protected area will provide adequate protection • this habitat for snakes is best protected by maintaining a variety of protected natural areas (see Chapter 2)	No mines or caves present (i.e., potential bat hibernacula) on the Subject Property or adjacent lands. No concentrations of reptiles observed or potential reptile hibernacula (rockpiles, etc.) observed during surveys on the Subject Property or adjacent lands.	NO
Bullfrog concentration area	• protect the area of the site • protection of wetlands and undisturbed shorelines will help to maintain long- term populations and fish habitat	Despite historical records of this species in the Fourteen Mile Creek valley, it was not observed during recent calling surveys on the Subject Property or adjacent lands, and there is minimal to no suitable habitat within the valley. If still present, we believe that there is insufficient habitat/numbers to warrant a Candidate SWH listing.	NO
Rare Vegetation Communities or Specialised Habitat for Wildlife			
Rare Vegetation Communities	• protect the area of the site • the amount of area that should be protected will vary depending on species' communities sensitivity to disturbance, adjacent land uses, area of community, hydrological conditions	No provincially rare vegetation communities present in the on the Subject Property or adjacent lands.	NO
Marten and fisher denning sites	• protect the area of the site • protect as many large blocks of contiguous mid-aged to mature forest as possible • the area protected may be larger if disturbance becomes a problem (an additional 100 m)	Marten and Fisher do not occur in this portion of the province.	N/A
Mink and otter	• protect the area of the site	River Otter does not occur in this part of the	N/A

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
feeding / denning sites	• protect as much wetland and undeveloped, undisturbed shorelines on lakes, rivers, and streams as possible • a large area may need to be protected if disturbance becomes a problem (100 m)	province. Mink could be present along Fourteen Mile Creek, but habitat conditions are not favourable and so the habitat along the creek is not considered Candidate SWH.	NO
Moose aquatic feeding areas	n/a	Species absent from this part of the province	N/A
Moose calving areas	n/a	Species absent from this part of the province	N/A
Moose mineral lick	n/a	Species absent from this part of the Province.	N/A
Black bear/other mammal foraging areas	• protect the area of the site • protect as many large blocks of contiguous forest with food species and associated openings as possible • a larger area may be required if site is exposed to disturbance (100-200 m)	Species generally absent from this part of the Province.	N/A
Waterfowl nesting habitat	• protect the area of the site (approximately 120 m of upland grassland cover within water) • protect as many upland grassland areas adjacent to wetlands and other water bodies • the entire area encompassing several small ponds should be protected	Minimal suitable habitat present in the TPA, including the Subject Property and adjacent lands. Although very low numbers of ducks or Canada Geese could nest (note: no breeding records on the Subject Property) adjacent to the ponds within the golf course, based on the amount and quality of habitat it is not considered Candidate SWH.	NO
Waterfowl staging areas	• protect the area of the site • protect large wetlands and shorelines of large water bodies • an additional 100 to 300 m may have to be protected depending on sensitivity of • birds, local site conditions, and adjacent land use	No suitable habitat present in the Study Area (i.e., no large bodies of water or wetlands).	NO
Osprey nesting habitat	• protect the area of the site • protect as much wetland and undeveloped, undisturbed shorelines (and islands) of large lakes and rivers as possible	No suitable habitat present in the TPA.	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	• protect large trees adjacent to wetlands and water bodies • an additional 100 m for Ospreys may be required if the area is subject to disturbance		
Raptor hunting areas	• protect the area of the site • protect as many large (minimum of 10 ha, preferably larger), contiguous blocks of undisturbed grasslands as possible • a larger area may be necessary for sites surrounded by incompatible land uses (e.g., 100 m)	Habitat availability in the TPA is insufficient to fulfil the required criteria (no large grasslands, old fields).	NO
Sites supporting area-sensitive forest species (specialized habitat for all area-sensitive forest species)	• protect the area of the site • where they exist, protect blocks of forest of at least 30 ha, and preferably with 50 ha or more • protect forest patches with at least 4 ha forest interior, and preferably larger areas • protection of as much forest as possible, with a variety of age classes, structure, • and composition will provide important habitat for many other wildlife species • in areas with little remaining forest cover, but where pre-settlement forest cover was high, a long-term recovery objective might be to eventually have 30% of planning area in native forest cover (Chapter 11)	There are recent records of seven, and at least 11 total records of area-sensitive forest bird species from the Fourteen Mile Creek valley. The relative abundances of area-sensitive forest birds in the valley compared to other natural areas in the Region is unknown. However, based on the presence of these species, it is possible that the forested valleylands outside but adjacent to the Subject Property could represent Candidate SWH.	YES
Woodland amphibian breeding ponds	• protect the area of the site • protect as many ponds (including vernal ponds) and adjacent woodlands as possible • the amount of area that requires protection will vary depending on local site • conditions such as slope, amount of riparian vegetation, high water mark, height and density of adjacent trees, and groundwater and surface water conditions	Several vernal ponds were observed in ELC unit 9a in the spring of 2013, which was a particularly wet spring. A single Spring Peeper was heard calling from this area on one occasion during 2013 breeding amphibian surveys. The presence of single Spring Peeper does not qualify the area as SWH.	NO
Turtle nesting areas	• protect the area of the site • protect as many undeveloped, undisturbed shorelines with sandy soils	Painted Turtles are known to be present in the Subject Property associated with dug ponds within the golf course. However, no	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	• an additional 30 to 100 m may have to be protected depending on local site conditions such as slope, amount of vegetation, adjacent land use, and the amount of nest predation	turtle nesting areas have been observed during surveys. See also Reptiles - Conservation Concern entry.	
Old-growth or mature forest stands	• protect the area of the site • protect as many mature stands as possible	There are no old-growth forest remnants present within the Subject Property or adjacent lands. Notably, there are several mature deciduous or mixed forest communities associated with the Fourteen Mile Creek valleylands outside the broader TPA (i.e. ELC units 15, 21, 22, 36 and 58) as well as some mature White Pine forest (ELC units 27 and 33) that could qualify.	NO
Forest stands providing a diversity of habitats	• protect the area of the site • protect as much forest with a variety of age classes, structure and composition as possible • maintain at least six cavity trees per ha; one super canopy tree (tree taller than the remainder of the woodland) per 4 ha; at least seven or eight mast-producing trees of each species per ha.	Although moderately diverse, the forests associated with the Fourteen Mile Creek valley are not considered areas "that exhibit(s) relatively high native plant and/or animal species richness in the context of Halton Region" under the ESA process, and thus they are not considered Candidate SWH under this category.	NO
Areas of high diversity	• protect the area of the site • protect a good representation of these sites more area may be required, particularly if the site is surrounded by incompatible land use	Natural habitats within the Subject Property are limited, and the adjacent lands are primarily forested, with some watercourse and valleyland features, thus the Study Area not considered an area of high diversity.	NO
Cliffs, caves	• protect the area of the site or portion of the site where habitat value appears to be the greatest (e.g., ledge where birds nest or roost) and provide additional area if required • the area protected will vary depending on local site conditions amount of vegetation, amount of disturbance, size of site; a buffer may not be required	None present	NO
Seeps, springs	• protect the area of the site or portion of the site where habitat value appears to be the greatest	Some seeps were found within ELC Units19 and 24 (in the Fourteen Mile Creek valley)	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	• size of the habitat protected will vary depending on local site conditions such as slope, amount of vegetation, height and density of adjacent trees, groundwater conditions • protect recharge areas	and at the base of the valley, however they were well outside the Subject Property and adjacent lands, and not considered substantial enough to be considered candidate SWH.	
Habitat of Species of Conservation Concern			
BIRDS			
Raptors – Conservation Concern	• protect the area of the site and an area of at least 200 m around active nests • (some species are more tolerant and smaller areas may suffice) • protect the largest and oldest contiguous forests of at least 30 ha (preferably 50 to over 100 ha) or the largest existing forest blocks remaining in the planning area • protect areas around inactive nests as well, as they may be re-used • plan for no reduction in area of existing forest cover in the planning area • plan for no increase in forest fragmentation in the planning area • there should be no activities permitted within 200 m of an active nest during the nesting season (Mar 1- Aug. 1 [Sept. 1 in northern areas])	One species of Conservation Concern was recorded breeding in the Subject Property and adjacent lands (Long-eared Owl), but the record was historical (1983) and there are no subsequent nesting records. Therefore the area is not considered Candidate SWH. Also see Raptor wintering areas (hunting, roosting) category.	NO
Area-sensitive birds - Conservation Concern Species	• protect the area of the site • protect large contiguous forests or grasslands with at least 4 ha (preferably at least 10 ha or more) of interior or the remaining forests and grasslands with the largest existing interiors • maintain as much forest cover in the landscape as possible (ideally 30% forest cover) • plan for no reduction in area of existing forest or large grassland • plan for no increase in fragmentation of forest or large grassland cover	None of the forest area-sensitive birds observed on the Subject Property or adjacent lands are considered species of conservation concern. None of the grassland area-sensitive birds observed on the Subject Property or adjacent lands (excluding historical records) are considered species of conservation concern.	NO
Grassland birds - Conservation Concern	• protect the area of the site • protect largest contiguous undisturbed grasslands of at least 30	The TPA, including the Subject Property and adjacent lands, does not support significant communities of grassland birds nor grassland	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
	ha (preferably 50 • ha or more) or the largest existing expanse of grassland in the planning area • additional area may be required for sites surrounded by incompatible land use • (200 m)	species.	
Other Birds - Conservation Concern		Red-headed Woodpecker, which is rare in Halton and Special Concern, was recorded in TPA historically (pre-1983) and not since. Orchard Oriole, documented adjacent to the Subject Property is considered rare in Halton, but is not identified as triggering Candidate SWH because its populations are on the increase.	NO
HERPETOFAUNA			
Amphibians - Conservation Concern	• protect the area of the site • protect best examples of suitable habitat for the species of concern • in general, protect as many wetlands and breeding ponds as possible • additional area may be required around significant breeding ponds	All species of amphibian observed are common and not of conservation concern.	NO
Reptiles - Conservation Concern	• protect the area of the site • protect all known hibernacula • protect all known nesting sites • protect best examples of suitable habitat for the species of concern • in general, protect a diversity of natural areas, and protect areas of suitable habitat in areas where specific species are known to occur • buffers may be required around hibernacula and nest sites	Eastern Milksnake and Snapping Turtle are designated Special Concern and S3. Snapping Turtle has been observed recently in one of the Deerfield property ponds within 120 metres of the Saw-Whet property (Pond #2). These are artificial ponds created as part of the golf course. Snapping Turtle could overwinter or nest on the Subject Property but the low number of turtles present and poor quality of the habitat do not warrant	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
		consideration of these features as Candidate SWH. E. Milksnake was observed along the woodland edge adjacent to the agricultural field on the Saw-Whet property. This species occupies a wide variety of habitats and therefore precise areas of habitat use are difficult to discern. The agricultural/disturbed field (ELC Unit 12) is not considered natural as it is periodically disturbed by farming practices, and as such should not qualify as Candidate SWH.	
MAMMALS			
Mammals - Conservation Concern	• protect the area of the site • protect best examples of suitable habitat for the species of concern • in general, protect a diversity of natural areas • protect as much forest, wetland, undisturbed grassland, and shoreline as possible	No species observed or known from the TPA are considered special concern.	NO
INSECTS			
Insects - Conservation Concern	• protect the area of the site • protect several colonies of species' food plant • protect best examples of suitable habitat for the species of concern • in general, protect areas with diversity of plant species	Odonates: Several regionally and provincially rare species of odonata were noted from the Subject Property; these are: River Bluet *Enallagma anna* – S2 not listed in Halton Region; ELC unit 6 (pond) Northern Bluet *Enallagma annexum* – S4, regionally rare; south edge golf course Azure Bluet *Enallagma aspersum* – S3, regionally rare; ELC unit 6 (pond), Unit 2b (southeast edge), east edge and north-central portions of golf course Skimming Bluet *Enallagma geminatum* – S4, regionally rare; ELC unit 6 (pond), Unit 12	NO

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
		(fallow field), Unit 2h (south rough), and east edge of golf course Fragile Forktail *Ischnura posita* – S4, regionally rare; ELC unit 6 (pond) Unicorn Clubtail *Arigomphus villosipes* – S2/S3, regionally uncommon; ELC unit 6 (pond) Halloween Pennant *Celithemis eponina* – S4, regionally rare; ELC unit 6 (pond) Painted Skimmer *Libellula semifasciata* – S2, regionally rare; Unit 12 (fallow field), Unit 2e (north-east edge), Unit 2b (west edge), and east edge. Spot-winged Glider *Pantala hymenaea* – S4, regionally rare; ELC Unit 12 (fallow field) Although the observations are from a variety of locations, there is a concentration of records from ELC Unit 6 (golf course pond). This pond is not considered a candidate SWH because: it is probable that some of these species are under-documented and would not be considered rare if sufficient distribution data was available (e.g., Azure Bluet, Skimming Bluet, and possibly others); River Bluet is thought to have dispersed from other habitats, and thus not be a breeding species; and some species are present in very small numbers that do not constitute a sufficient breeding population (e.g., Unicorn Clubtail, Fragile Forktail, Halloween Pennant). Thus, the pond is not candidate SWH because it does not contain sufficient quantities of rare breeding odonate species. Other wetland habitats in the Region (with flow, more	

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
		substrates, more variable depths, floating plants, etc.) would be expected to contain higher quality examples of odonate habitat than this location. The SWH Technical Guide (OMNR 2000) emphasizes that it is the best habitats that are to be protected as SWH. Note too that the Halton Natural Areas Inventory concedes that the knowledge of Halton Odonates is in its infancy, and since that document was written (2006) the provincial S-rank of several odonates has been 'downlisted' (e.g., from S3 to S4 etc.) Lepidoptera: Four species of regionally rare butterflies have been observed on the Subject Property: • Wild Indigo Dusky-wing (*Erynnis baptisiae*); Edge of golf course along Upper Middle Road, ELC Unit 12 (fallow field) • Giant Swallowtail (*Papilio cresphontes*); ELC Unit 2h (south rough) • Common Buckeye (*Junonia coenia*); ELC Unit 12 (fallow field) • Fiery Skipper (*Hylephila phyleus*); ELC Unit 12 (fallow field) Regionally rare species of butterflies observed either: represent wandering migrants (i.e., Giant Swallowtail, Common Buckeye and Fiery Skipper) and would not be expected to be seen most years; or are	

Category	Provincial Guidance	Application to the Subject (Saw-Whet) Property and Adjacent Lands	Candidate SWH
		increasing and are now fairly common (i.e., Wild Indigo Dusky-wing). Thus, these records do not comprise candidate SWH.	
PLANTS			
Plants - Conservation Concern	• protect the area of the site • additional area may be required to protect sensitive species or sites surrounded • by incompatible land use • in general, protect a diversity of natural areas	No S3 species or Special Concern plant species were observed on the Subject Property or adjacent lands. Regionally rare plant species discussed in this report are either outside the Study Area or were planted, with the exception of Floating Pondweed (ELC Unit 6). The presence of only one regionally rare species does not warrant candidate SWH designation.	NO
Animal Movement Corridors			
		There are local scale linkages thought to be provided by the Fourteen Mile Creek valley and associated tributaries. The linkage along the creek is not considered to be major due to substantial road barriers at the QEW and Upper Middle Road, and relatively narrow natural areas upstream and downstream of the TPA. As such, it is our opinion that the TPA does not support SWH for this category. Fourteen Mile Creek valley is nonetheless considered to provide some important linkage functions at the local scale (see **Section 4.3.3** for further discussion of landscape connectivity within the Study Area).	NO

Based on the analysis in the preceding table (**Table 17**), there are no Candidate SWH areas within the Subject Property; however, there are three Candidate SWH areas on the adjacent lands, all within the Fourteen Mile Creek valley, summarized in **Table 18**. These areas are identified as "Candidate" because it is ultimately the local planning authority who is responsible for confirming SWH, often in consultation with the local agencies (i.e., in this case Conservation Halton and/or OMNR).

Table 18. Summary of Candidate Significant Wildlife Habitat identified in the Study Area

Candidate Significant Wildlife Habitat Type	Location
Landbird Stopover Area	Forested portions of the Fourteen Mile Creek valleylands and associated forested tablelands.
Sites Supporting Area-Sensitive Forest Species	Main forested portions of the Fourteen Mile Creek valleylands and associated forested tablelands (some narrow portions and plantation would be excluded).
Old-growth or Mature Forest Stands	Mature forests of the Fourteen Mile Creek valley in the Study Area and beyond (i.e., ELC Units 15, 21, 22, 36, 58 and 27 and 33).

4.3.11.7 Significant Areas of Natural and Scientific Interest

The Study Area does not overlap directly with any designated Areas of Natural or Scientific Interest (ANSIs) although there are several ANSIs just outside the Study Area. In regard to ANSIs, significant is defined by the PPS as:

> *"areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education."*

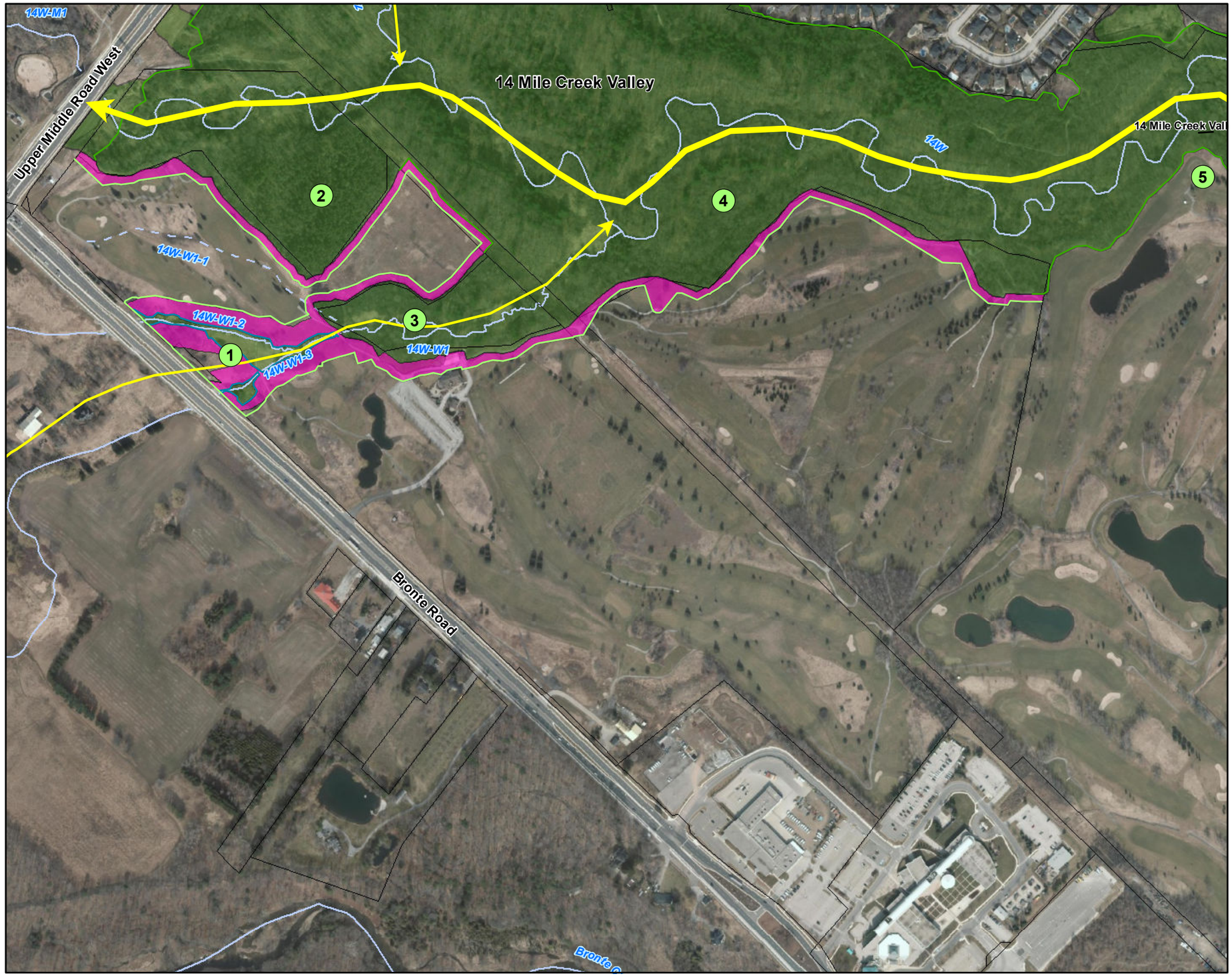
Significant ANSIs are also recognized as a Key Feature of the NHS under ROPA 38 Policy 115.1.

4.3.11.8 Fish Habitat

The Subject Property, and the adjacent lands, contain a number of watercourses that directly or indirectly support fish and are considered fish habitat and Redside Dace recovery and contributing habitat, respectively, as well as a reach that is not considered fish habitat and is not regulated as Redside Dace habitat (see **Figure 11**).

The PPS (2014) treats all fish habitat equivalently regardless of significance. All water features (i.e. permanent or intermittent streams, seasonally flooded areas, and natural ponds are generally considered fish habitat. Off-line man-made ponds, such as the one found on the tablelands within the Subject Property, are generally not considered fish habitat. The PPS applies only to waterbodies that constitute fish habitat, as defined by the *Fisheries Act* (1985).

Within the Subject Property and adjacent lands, watercourses have been classified as either direct or indirect fish habitat. A summary of these classifications is provided in **Table 19**. The significance of



Proposed Natural Heritage System

Figure 16

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Proposed Linkages
- Proposed Core Areas
- NHS Limits
- NHS Buffer
- Swale
- Watercourse
- 1 Proposed Restoration/Enhancement Areas

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UTM Zone 17 N, NAD 83

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October 2014

this habitat is somewhat elevated as it is related to the presence of the endangered Redside Dace (discussed in **Section 4.3.11.1**).

Table 19. Fish Habitat within the Saw-Whet Property and Adjacent Fourteen Mile Creek

Waterbody	Reach	Habitat
Fourteen Mile Creek – West Branch	14W	Direct Fish Habitat
Fourteen Mile Creek – West Branch	14W-W1 (14 Mile Creek to golf cart path)	Direct Fish Habitat
Fourteen Mile Creek – West Branch	14W-W1 (golf cart path to confluence with 14W-W1-2 and 14W-W1-3)	Indirect Fish Habitat
Fourteen Mile Creek – West Branch	14W-W1-1	Not Fish Habitat
Fourteen Mile Creek	14W-W1-2	Indirect Fish Habitat
Fourteen Mile Creek	14W-W1-3	Indirect Fish Habitat

* see **Figure 5** for reach identification

4.3.12 Natural Heritage System

The PPS describes natural heritage systems as follows:

> *"A system made up of natural heritage features and areas, linked by natural corridors which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems."*

One of the primary objectives of the Saw-Whet EIS is to:

> "*Preserve, enhance and protect the Town's and Region's environmental features, biological communities and natural heritage system*".

To satisfy this objective, a key direction from the Merton Tertiary Plan Study Terms of Reference (see **Appendix A**) is *"the identification of a natural heritage system, environmentally sensitive areas, open space corridors, valley lands, woodlands, groundwater resources, and other natural features and functions"*. The Terms of Reference require that the limits of the Natural Heritage System (NHS) be defined based on information derived from the characterization of natural heritage resources and their ecological functions, as well as potential contributions to the broader Greenlands system.

Through Sustainable Halton and ROPA 38, the Region of Halton identified a Regional Natural Heritage System (RNHS) for lands contained within the non-urban portions of the Region known as the Primary Study Area. Portions of the RNHS were also extended into the urban area, including the Subject Property, and are reflected as Key Features on ROPA 38 Map 1G. We understand that this mapping was developed at a high level and potentially incorporates outdated information as it was not ground truthed. Map 1G also erroneously identifies the entire RNHS on the Subject Property as a Key Feature, although more detailed assessments have revealed that the majority of the RNHS on the Subject Property and adjacent lands is actually comprised of several Key Features (i.e., significant woodlands, significant valleylands, significant wetlands, candidate significant wildlife habitat, fish habitat, and habitat for threatened and endangered species) as well as other RNHS components (i.e., buffers, enhancement areas, and linkages).

ROPA Policy 116.1 recognizes that not all RNHS components are mapped, that mapped features may be incorrect, and allows for refinements to be made to the boundaries of the RNHS though further detailed study. This EIS has adopted a systems based approach to establish a proposed NHS for the Subject Property that incorporates the findings of the ESA assessment (**Section 4.3.10**) and significant natural heritage features assessment (**Section 4.3.11**), and supplements these findings with the application of appropriate buffers and / or setbacks as well as linkages within the NHS, and between the local NHS and the broader RNHS (see **Section 4.3.12.2** and **Section 4.3.12.3**). In addition, a number of Restoration / Enhancement Areas both within and beyond the proposed NHS have been identified (see **Section 4.3.12.4**). The proposed NHS in this EIS (as presented in **Figure 16**) represents a refinement to the ROPA 38 RNHS and former Greenlands System that is consistent with the principles and objectives laid out in these policies (as described in **Section 2**) and incorporates key features, buffers and linkages, as well as restoration / enhancement areas.

NHS are generally comprised of Core Areas and Linkages, and may also include or be associated with Restoration/Enhancement Areas. Each of these components has been identified as part of the proposed NHS for the Subject Property, with some of the Restoration / Enhancement Areas being within the NHS and some being outside but adjacent to the NHS, as described in the following sections.

This EIS has identified a proposed NHS for the Study Area that is comprised of core areas, linkages, and restoration/enhancement areas. The components of the proposed NHS are illustrated on **Figure 16**, and described further below.

4.3.12.1 Core Areas

Core areas represent the backbone of a NHS. They are generally large areas comprised of key natural features such as watercourses, valleylands, woodlands, and wetlands. These areas generally support habitat for significant wildlife and significant species. Core areas should be connected to other core areas through linkages.

The ecological state of natural areas in urban landscapes is often impaired due to major scale land use transformations such as clearing for agriculture or urbanization. In such areas, opportunities may exist to restore or enhance the NHS through a variety of resource management and stewardship measures as is noted in Sustainable Halton (2007). Restoration and enhancement areas are typically included as part of natural heritage systems and can include resource management that improve the ecological integrity and function of core areas and linkages.

A NHS operates at several spatial scales. Within the Study Area, the Fourteen Mile Creek valley represents a core area of the NHS as it supports the key features. The Fourteen Mile Creek valley and its tributaries provide local scale linkages. Connections between the Bronte Creek and Fourteen Mile Creek valleys are presently limited by the presence of Bronte Road and existing urban development to the west.

Core areas within the Study Area include significant natural areas and key features. Key features that overlap with the Subject Property are limited to fish habitat along Tributaries 14W-W1-2 and 14W-W1-3.

The majority of the key features comprising the NHS are offsite and associated with the adjacent Fourteen Mile Creek valleylands. Key features associated with the Fourteen Mile Creek valleylands include significant valleylands, significant woodlands, significant wildlife habitat, significant wetlands, fish habitat, and the significant habitat of threatened and endangered species. The mapping for the Fourteen Mile Creek ESA (#12) was also considered when identifying core areas (ref. **Figure 14**).

4.3.12.2 Linkages

Linkages provide avenues for species to move among natural areas and assist in maintaining viable populations. They are generally linear in form and comprised of continuous or semi-continuous natural habitats and typically associated with drainage features or valley systems or hedgerows in fragmented landscapes. Linkages within the NHS have been identified on a conceptual level at the regional and local scale. Local scale linkages are provided by the Fourteen Mile Creek valley and associated tributaries. Due to the presence of major transportation corridors (QEW, Bronte Road, Upper Middle Road, and Third Line), as well as urban development to the east, north and west, the Subject Property is relatively isolated and offers limited connectivity to areas outside the TPA. The local scale linkages are nevertheless important for maintaining local scale wildlife connections and important ecological functions such as habitat for Redside Dace.

The limited ecological east-west connectivity in this area was recognized by the Town of Oakville's Council who directed staff to "*review connecting east-west corridors between Environmental Study Assessment ESA 12 (Fourteen Mile Creek)*" through the Merton TPA study in their meeting minutes from November 12, 2012. An appropriate linkage between the two ESAs has been identified through the Subject Property, as illustrated in **Figure 16**, along Tributaries 14W-W1-2 and 14W-W1-3. These tributaries pass through large culverts and represent the only viable connection across Bronte Road in the TPA. The valleylands associated with these tributaries have been identified as an NHS linkage as well as a Restoration / Enhancement Area that could be targeted to improve connectivity and other ecological functions.

Further detail about the type of restoration / enhancement activities that could be undertaken in this area is provided in **Section 4.3.12.4**. Notably, some of these overlap with core areas and / or their buffers and are therefore within the NHS, and some do not overlap with core areas and/or their buffers and are therefore outside the NHS.

4.3.12.3 Buffers

The primary purpose of a buffer is to provide protection to key feature(s) and ecological functions by mitigating potential adverse impacts from development or site alteration. There are many variables that need to be considered in order to identify an appropriate and scientifically defensible buffer to a protected feature. These include: slope and topography, soils, drainage, vegetative structure of the buffer area, the sensitivities of the feature, and the nature and scope of the proposed changes in adjacent land use. Although it is generally recognized that, given all the variables to consider, it is more scientifically defensible to identify buffers on a site specific basis, prescribed buffers are sometimes recommended or adopted by planning authorities because it simplifies the process, ensures a certain level of consistency, and provides more certainty about the amount of land that will need to be set aside for conservation purposes.

Although buffers are a mitigative tool that have become more or less standard as part of the natural heritage planning process in southern Ontario, they should be understood as only one of a multitude

of possible tools in helping to mitigate the effects of changes in adjacent land uses. For example, the effectiveness of a buffer is generally increased when it is naturalized and implemented in conjunction with other design measures (e.g., physical barriers that clearly separate the protected natural area from the developed area such as fences or trails).

In addition, although they may (and often do) provide some supportive habitat functions, buffers should not be identified for the purposes of providing habitat and/or trying to compensate for local or regional scale habitat removal and fragmentation. Compensation for local or regional scale habitat removal and fragmentation can be provided through habitat enhancement and restoration (see **Section 4.3.12**). However, the primary function of a buffer is, as stated above, to mitigate some of the impacts associated with changes in adjacent land uses, and ideally the width, length and structure of the buffer should be determined based on that consideration.

In the Region of Halton's ROPA 38 (November 28 2014 consolidation), buffers are defined as:

> *"an area of land located adjacent to Key Features or watercourses and usually bordering lands that are subject to development of site alteration. The purpose of the buffer is to protect the features and ecological functions of the Regional Natural Heritage System by mitigating impacts of the proposed development or site alteration. The extent of the buffer and activities that may be permitted within it shall be based on the sensitivity and significance of the Key Features and watercourses and their contribution to the long term ecological functions of the Regional Natural Heritage System as determined through a Sub-watershed Study, an Environmental Impact Assessment or similar studies that examine a sufficiently large area."*

The approach to buffers in this EIS is consistent with this policy guidance, and the other applicable regulatory requirements. Buffers identified through this EIS have been applied immediately adjacent to key features and watercourses that are established in areas that border future development, and are considered components of the NHS. Within the Study Area, buffers and setbacks have been prescribed to key features of the NHS as well as to other features such as natural hazards (i.e., slopes) in accordance with the applicable policies. The following is a summary of the various buffers and setbacks prescribed on the Subject Property through this EIS:

(i) Valley Slope Setback – 7.5 m from greater of the top of slope or long-term stable top of slope;
(ii) Redside Dace Occupied or Recovery Habitat – 30 m from the meander belt of watercourses;
(iii) Fish Habitat – 30 m from the bank of coolwater watercourses;
(iv) Non-PSW Wetlands – 15 m from the edge of the wetland; and
(v) Significant Woodlands – 10 m from the dripline.

These buffers are considered appropriate from an ecological perspective based on our assessment of the existing site conditions, the sensitivities of the various features and areas being protected (as presented in **Section 5, Table 20** and **Table 21**), and the nature of the proposed development (as described in **Section 6**).

The individual buffers and setbacks, which are consistent with the requirements above, are illustrated in **Figure 15**. The overall NHS buffer, as shown on **Figure 16**, reflects the outermost limit of most prohibitive of the buffers or setbacks listed above adjacent to the protected core features.

4.3.12.4 Restoration and Enhancement Areas

In addition to the identification of Core Areas and Linkages as components of the proposed NHS, there are several areas within and/or adjacent to Core Areas and Linkages that have been identified as candidate sites for ecological restoration and enhancement. Implementation of appropriate restoration and/or enhancement strategies at these sites is intended to improve the ecological integrity and function of the proposed NHS, and is consistent with the ROPA 38 definition for Enhancements to Key Features of the RNHS (Section 229.1.1) as "*ecologically supporting areas adjacent to key features and/or measures internal to key features that increase the ecological resilience and function of individual key features or groups of key features*".

Identification of candidate sites for ecological restoration and enhancement in the Subject Property requires an understanding of the various ecological communities and their functions, including their origin and history, ecological state and condition, and their relationship to the broader RNHS. Nearly all of the Subject Property and the broader TPA, including its valleylands, were extensively modified through logging, farming and, more recently, golf course uses. These activities have degraded the ecological integrity and resilience of the Core Areas and Linkages in the TPA. These features are presently in a state of ecological recovery, but their ecological integrity remains impaired.

It is not realistically possible to fully restore the ecological integrity of the NHS on the Subject Property and adjacent lands due to area's current urbanized context. It is however possible to maintain and restore some existing basic ecological functions to the NHS, which may improve its overall ecological resiliency.

Our approach to identifying candidate sites for restoration and enhancement specifically targets ecologically impaired portions of Core Areas and Linkages. The ecological health and integrity of certain portions of the NHS on, and adjacent to, the Subject Property has been compromised or degraded by past and current land uses and disturbances and ecological stressors such as invasive species. Without active intervention through appropriate natural resource management, these stressors will continue to weaken the ecological health, integrity and resilience of the NHS features and functions. As such, restoration and enhancement areas have been identified strategically by prioritizing those areas that would benefit most from management intervention. These areas generally correspond with existing natural and semi-natural ecological communities that are directly associated with the Fourteen Mile Creek valleylands. Additional opportunities for enhancement of NHS linkage functions exist along the Tributary 14W-W1 corridor connecting the valley to Bronte Road and beyond.

Although opportunities for restoration and enhancement on the tableland portions of the Subject Property also exist, they are considered to be of lower priority than the enhancements identified within the Core Areas and Linkages, as they do not directly address the issue of improving the ecological resiliency of the natural features that comprise the NHS. In addition, portions of the Subject Property that do not support environmental features and are otherwise not environmentally constrained were generally not considered for additional restoration and enhancement.

The assessment prioritized identification of restoration and enhancement sites using the following criteria:

(i) Linkage Enhancements – areas situated along existing linkages (i.e. watercourses, valleylands) where linkage functions could be improved through naturalization or bolstering of the linkages.
(ii) Biodiversity Enhancement – the Subject Property exhibits low levels of native diversity. This is due to the presence of populations of non-native and invasive species which have either displaced the native species or have simply taken hold following cessation of farming.
(iii) Redside Dace Habitat Enhancement - Fourteen Mile Creek supports populations of the endangered Redside Dace and managing the riparian environment is important for conservation of this species.

The full extent of the restoration/enhancement areas has not been depicted in detail on the NHS mapping (ref. **Figure 16**). Instead the candidate restoration and enhancement sites are identified symbolically on **Figure 15** and are described below. It is proposed that the detailed Restoration and Enhancement Plans be prepared as a condition of Draft Plan approval.

Restoration/Enhancement Area 1 - Tributary 14W-W1 Valley – The upper portion of this tributary valley overlaps with the Subject Property. The tributary corridor represents the only opportunity within the Merton TPA for a terrestrial linkage between the Bronte Creek and Fourteen Mile Creek valley systems. This linkage forms a key component of the NHS; however its functions are presently impaired by existing golf course uses. The linkage and habitat functions along this corridor could be enhanced through restoration of the area to a natural state. The riparian environment could be planted with native species that are compatible with the downstream fishery. The wetland habitats associated with the tributaries could be diversified with plantings of native shrubs and groundcovers. The valleylands could also be reforested to a more continuous band of greenspace along the corridor. Wildlife passage through the existing culverts could be also be enhanced by creating more suitable conditions and perhaps re-instating fencing.

Restoration/Enhancement Area 2 - Plantation (ELC Unit 13) – Just north of the Subject Property's ELC Unit 12 (the cultural meadow), there is a small Scotch Pine plantation associated with the tableland adjacent to the Subject Property. From an ecological perspective, Scotch Pine plantations tend to lack species and structural diversity, particularly when they are overstocked, and consequently provide limited wildlife habitat opportunities. The plantation is presently functioning as a nurse crop for native hardwoods and other species of conifers. This natural successional process could be advanced through selective thinning and under planting with native species.

Restoration/Enhancement Area 3 - Tributary 14W1-1 – Valley Slope (ELC Unit 11) – Also within the adjacent lands of the Subject Property, the northern slopes of this tributary valley between the golf course and hydro corridor are dominated by Common Buckthorn. Since the reach of Tributary 14W1-1 adjacent to ELC Unit 11 is considered Redside Dace habitat, it is highly desirable to enhance riparian vegetation conditions that benefit the species, as well as help control erosion and provide overall habitat enhancements.

Restoration/Enhancement Area 4 – Valleyland Terrace (ELC Unit 25) – This deciduous forest community is associated with a valleyland terrace adjacent to the Subject Property. The quality of this community is considered low due to the abundance of exotic and invasive tree and shrub species. Manitoba Maple and Common Buckthorn are prevalent throughout this community. Vegetation management to control and remove the invasive species and replace with desirable native species would improve the overall ecological resilience of the area.

Restoration/Enhancement Area 5 – Fourteen Mile Creek Bottleneck and Aquatic Habitat Creation – The Fourteen Mile Creek valley adjacent to the Deerfield property narrows rather abruptly forming a bottleneck along the valley corridor. This narrowing likely impairs local wildlife movement through the valley. The tablelands immediately adjacent to this valley bend are presently utilized for golf course. Restoration of a portion of this area to natural habitat would reduce this constriction and improve corridor functions.

There is also a golf course pond (Pond #5) situated in this area. The pond has been identified as supporting breeding for at least three species of amphibian. The retention of this pond feature, along with a natural connection to the valley, would serve to protect this function. Additionally, if the pond were to be enlarged and reconfigured into multiple cells, it could be designed to accommodate turtle over-wintering and foraging, as well as nesting functions. Such enhancements could offset potential impacts to local turtle and amphibian populations which are presently utilizing golf course ponds on the Deerfield property for breeding and possibly over-wintering.

More details related to objectives for, implementation mechanisms for, and anticipated outcomes of these Restoration / Enhancement Areas is provided in **Section 5.4**.

Additional Restoration / Enhancement Areas elsewhere in the broader Merton TPA were identified and described along with these five areas in the Phase 2 EIS for the Merton TPA (Beacon Environmental, 2013).

5. Constraints & Opportunities

Section 7.1.4 of Merton TPA EIS Terms of Reference (**Appendix A**) requires that physical and natural heritage constraints and opportunities being identified for the purposes of identifying an ecologically appropriate development area in order to facilitate land use planning. The findings of the biophysical inventories, assessments and evaluations presented in **Section 4** of this EIS provides the technical basis for the identification of potential constraints and opportunities to future development within the Subject Property.

Biophysical constraints generally represent features or functions that limit development of the land due to the hazard they present and/or their ecological significance or sensitivities. Opportunities typically include options for improved natural heritage feature and/or function protection, enhancement, restoration or expansion in the context of anticipated development.

The identification of biophysical constraints requires consideration of the individual constraining feature or function, as well as consideration of any applicable policies and / or regulations. In some cases, additional lands may be constrained to satisfy regulatory requirements for setbacks or thresholds. However, these lands may also provide opportunities for pursuing a net gain to the identified Natural Heritage System (NHS).

This EIS identifies the various constraints and opportunities associated in the context of proposed development of the Subject Property. These will be further refined at the detailed design stage.

The following sections summarize the physical and biological constraints to development identified through this EIS for the Subject Property. A constraint map is presented in **Figure 15** showing the various feature limits with applicable setbacks and buffers, while a cleaner comprehensive constraint line (equivalent to the NHS boundary) is presented in **Figure 17**.

5.1 Physical Constraints to Development

Physical constraints (as shown on **Figure 15**) to development of the Subject Property include:

- Watercourses (intermittent on site and perennial in the adjacent lands)
- Valleylands (minor on site and major in the adjacent Fourteen Mile Creek valley)
- Hazard Lands (steep slopes, flood and erosion prone areas) (almost entirely within the adjacent lands)
- Utility Corridors (bisecting the property)
- Potential Servicing Easements

A summary of physical constraints to development within the Subject Property is provided in **Table 20**.

Table 20. Summary of Physical Development Constraints: Subject (Saw-Whet) Property and Adjacent Lands

Category	Constraints to the Proposed Development
Groundwater / Surface Water Quantity	Fourteen Mile Creek and several of its tributaries receive groundwater discharge from the surrounding lands. These surface flows and the groundwater discharge (baseflow) to the creek and certain tributaries represent a development constraint. The proposed development on the Subject Property should incorporate LID measures to promote recharge and maintain baseflows. In areas where services will require construction below the water table, the use of appropriate best management practices for servicing and construction is recommended to prevent long-term water table lowering. Measures may include the use of cut-off collars or clay plugs to provide barriers to flow to prevent groundwater flow along granular bedding and erosion of the backfill materials. No major dewatering is anticipated due to the low hydraulic conductivity of the soils present across the Subject Property; however, dewatering requirements will need to be determined at the detailed design stage. If deeper excavations in the silt and sand soils present in the northern portion of the Subject Property are proposed, the use of a well-point dewatering system may be required. Stormwater runoff from the development must not raise water levels in the receiving watercourses, in order to protect downstream infrastructure. Stormwater runoff must be adequately controlled to ensure the receiving watercourses can fulfill their normal functions in terms of flood conveyance, water quality, and erosion processes.
Watercourses	Minor watercourses (tributaries to Fourteen Mile Creek) are present on the Subject Property. The West Branch of Fourteen Mile Creek runs adjacent to the Subject Property. Generally no development or site alteration is permitted within any watercourses; although crossings may be permitted provided an EIS is completed to address environmental impacts and the necessary permits are obtained from Conservation Halton (CH) and/or OMNR.

Comprehensive Constraints

Figure 17

Saw-Whet EIS – Saw-Whet Golf Course Ltd.

Legend

- Subject Property
- Comprehensive Constraint Line
- NHS Limits
- Swale
- Watercourse

First Base Solutions
Web Mapping Service 2012

UTM Zone 17 N, NAD 83

N W E S

0 45 90 180 Meters

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BEACON ENVIRONMENTAL

Project 212091
October 2014

Category	Constraints to the Proposed Development
	Where a watercourse provides fish habitat, development setbacks of 15 m or 30 m are required for warmwater and cool/coldwater fisheries respectively. **Watercourses in the Subject Property and adjacent lands are generally all classified as coolwater systems and therefore require a 30 m development setback to the creek bank**. Where watercourses are associated with a floodplain or valleyland, additional development setbacks may also apply. Notably, the watercourses within and adjacent to the Subject Property are also Redside Dace habitat, and regulated under the *Endangered Species Act* (2007) by OMNR. **The reaches on the Subject Property are classified as contributing Redside Dace habitat, which requires protection of the two year bankfull width. However, this width is superseded by the 30 m required setback for coolwater intermittent watercourses.** The setbacks to the remaining watercourses in the adjacent lands similarly fall within the wider long-term stable top of slope from the valleylands.
Valleylands	The Fourteen Mile Creek is considered a minor valley system. Development or site alteration is generally not permitted within major or minor valleylands. Development setbacks of 7.5 m and 15 m from the stable top of slope are typically required for minor and major valleylands respectively. On and adjacent to the Subject Property, setbacks of 7.5 m or greater have been applied as appropriate. Any proposed development or site alteration within a valleyland must be supported by an EIS that addresses environmental impacts, including geotechnical considerations, and requires a permit from CH and/or OMNR.
Hazard Lands	The hazard lands associated with the Subject Property are largely within the adjacent valleylands, but do jut out into the Subject Property in a few relatively small areas. Notably, the intermittent watercourses on the Subject Property are not constrained by valleylands. Hazard areas include the floodplains of Fourteen Mile Creek and the steep slopes along its associated valley. Development and site alteration are generally not permitted within hazard lands. **Development setbacks of 7.5 m and 15 m to the greater of the physical top of slope, or long-term stable top of slope, were applied where appropriate for minor and major valleylands respectively.**
Erosion Thresholds	Erosion thresholds have been established along the critical reaches of the relevant portions of Fourteen Mile Creek. Critical discharge rates have also been established and will govern future development outflows from end of pipe stormwater management facilities.
Utility Corridor	The Subject Property is traversed by a hydro transmission corridor that is approximately 21.8 m wide. Development is generally permitted adjacent to the corridor. Road crossings are also permitted with due consideration for grade changes below the corridor.
Servicing Easements	The Subject Property is traversed by a 2400 mm sanitary trunk sewer owned by Halton Region that conveys wastewater to the Mid-Halton Waste Water Treatment Plant. The servicing easement is 10 m wide and traverses the Subject and Deerfield Properties, and flanks the south side of the Fourteen Mile Creek valleylands. Where possible, the alignment of future roads within the developed areas should be coincident with the trunk sewer for improved access to the infrastructure. Other uses that would permit relatively easy access to the infrastructure would also be considered appropriate.
Existing Boundary Roads	The Subject Property is bounded to the north by Upper Middle Road, and to the west by Bronte Road. Due consideration will be required for the interaction of these existing road to the proposed development, as well as access points for the future road network. This is analyzed in greater detail in the Noise Impact Assessment and the Traffic Impact Assessment, provided

Category	Constraints to the Proposed Development
	under separate cover.

5.2 Natural Heritage Constraints to Development

Natural heritage constraints to development within and adjacent to the Subject Property include:

- Fish Habitat
- Habitats for Threatened and Endangered Species
- Wetlands
- Significant Valleylands
- Significant Woodlands
- Significant Wildlife Habitat
- The proposed Natural Heritage System

A summary of natural heritage constraints to development within the Subject Property is provided in **Table 21.** Natural heritage constraints are mapped on **Figure 15.**

Table 21. Summary of Natural Heritage Development Constraints: Subject (Saw-Whet) Property and Adjacent Lands

Feature Category	Constraints to the Proposed Development
Habitat of Threatened and Endangered Species	The TPA supports habitat for several Species at Risk, but only one (Redside Dace) represents significant environmental constraints to future development in the Subject Property. REDSIDE DACE: The habitat for Redside Dace is generally confined to the Fourteen Mile Creek and several of its tributaries. Protection of the habitat for this species can generally be achieved by restricting development to the tableland portions of the Subject Property. OMNR consider **the area within 30 m of the meander belt of a currently or previously occupied (recovery) reaches as the habitat for this species**. Alternatively, if the habitat has been identified as contributing habitat for Redside Dace, the form and function of the feature are regulated. Based on OMNR's July 2013 site review, Tributaries 14W-W1-3, 14W-W1-2, and the upper reach of 14W-W1 upstream of the golf cart path have been confirmed as contributing habitat for Redside Dace on the Subject Property. Recovery and Occupied Redside Dace habitat has been confirmed outside of the Subject Property (see **Figure 11**). **Required protection for occupied habitat is two years bankful width, and for occupied and recovery is the meander belt plus a 30 m setback on either side.** The presence of Redside Dace will also necessitate stormwater management requirements to comply with OMNR's guidelines for the protection of water quality and mitigation of temperature impacts from the stormwater runoff generated by the development. BARN SWALLOW: The presence of Barn Swallow has been confirmed on the Subject Property where the species nests on existing buildings and structures. The area containing the nests (and possibly the associated foraging area) represents habitat for this species. Beacon is

	consulting with OMNR to determine the significance of the Saw-Whet population and what protections apply under the Act. The removal of the Barn Swallow habitat is allowed but must be mitigated through compensation in accordance with the *Endangered Species Act* (either through the OMNR Registry, or through an Overall Benefit Permit 17(2)(c) permit. EASTERN FLOWERING DOGWOOD: Eastern Flowering Dogwood is known to have occurred historically within the TPA. However, the species is absent from the Subject Property, and could not be found in the adjacent lands, therefore is likely extirpated and does not represent a constraint.
Fish Habitat	Three watercourse reaches on the Subject Property are generally classified as coolwater and are confirmed contributing Redside Dace habitat (14W-W1-2, 14W-W1-3 and the upper reach of 14W-W1). One ephemeral reach is not fish habitat (14W-W1-1) except for a minor flow conveyance function. Fish **habitat reaches classified as coolwater require a 30 m setback on either side as per CH policies.** The remaining fish habitat is located within the Fourteen Mile Creek valley corridors that are outside the Subject Property and will not result in any additional constraints to the proposed development except where servicing and /or infrastructure may need to encroach within or cross these features. Stormwater runoff from the development must be controlled to comply with the requirements specified by MOE for total suspended solids removal and the protection of water quality. Dug ponds, like those found within the Subject Property as part of the golf course, are generally not considered fish habitat, even if they support fish, and are therefore not considered a constraint.
Significant Wetlands	There are no provincially or regionally significant wetlands on the Subject Property or adjacent lands.
Other Wetlands	The Fourteen Mile Creek floodplain adjacent to the Subject Property supports several small marsh and thicket swamp wetlands. These wetlands provide important flood attenuation and habitat contributions to the natural area. On the Subject Property, there are wetlands associated Tributaries 14W-W1-2, 14W-W1-3 and the upper reach of 14W-W1). These wetlands have been staked with Conservation Halton. These wetlands are associated with the watercourse reaches that are considered contributing habitat for Redside Dace. **A 15 m setback has been applied to these wetlands.** There are also several small wetlands associated with the golf course (ELC Units 7 and 30) as well as the agricultural field (ELC Unit 14). These wetlands were reviewed with Conservation Halton, but determined to be too small to regulate. These small wetland features perform limited ecological functions and do not contribute significantly to the NHS.
Significant Valleylands	The Subject Property abuts the Fourteen Mile Creek valleylands. Conservation Halton considers the Fourteen Mile Creek and its tributaries a minor valley system. The valleylands associated with the west branch of Fourteen Mile Creek (14W) as well as the valleylands associated with Tributary 14W-W1 downstream of the golf course were staked and surveyed by Conservation Halton and are considered significant valleylands. The valleyland associated with Tributaries 14W-W1-2 and 14W-W1-3 is poorly defined and was modified through golf course development. This valleyland was not staked and surveyed by

	Conservation Halton and is not considered a significant valleyland. Development and site alteration is generally not permitted within minor valleylands, and a **development setback of 7.5 m from stable top of slope has been identified** for the purposes of identifying constraints. Any proposed development or site alteration within a valleyland must be supported by an EIS that demonstrates no net impacts, as well as a permit from Conservation Halton.
Significant Woodlands	The Subject Property supports portions of woodlands that satisfy the regional criteria for significant woodlands. Significant woodlands are confined to the Fourteen Mile Creek valleylands and contiguous woodlands that extend onto the tablelands (ELC Units 13, 17 and 9b) (**Figure 10**). The limits of the significant woodland features have been staked with the Region of Halton, and **a 10 m buffer from the dripline of these staked boundaries has been applied** (as per Town of Oakville's policies). The Subject Property also supports several small woodland features and tree groupings; however these features (ELC Units 1 and 9a) are too immature and too small to satisfy regional significant woodlands criteria. Development and site alteration are generally not permitted within significant woodlands and/or their buffers unless supported by an EIS. **This EIS has recommended that a 10 m buffer be applied to the dripline of significant woodland features.** The 10 m buffer zone is presently occupied by golf course and would need to be naturalized to effectively function as buffer to future development.
Significant Wildlife Habitat (SWH)	There is no candidate SWH on the Subject Property. However, the Fourteen Mile Creek valleylands adjacent to the Subject Property contain ecological features and functions that qualify as candidate SWH (i.e., landbird stopover area, area-sensitive forest species, old growth-mature stands, and species of conservation concern). These habitats are all contained within the Fourteen Mile Creek valleylands and/or significant woodlands and therefore do not represent an additional constraint to those identified on the Subject Property.
Natural Heritage System	ROPA 38 Map 1G identifies an NHS on the Subject Property. The NHS generally follows the limits of the Fourteen Mile Creek ESA, but also includes a portion of the Tributary 14W-W1-3. These areas are all singularly identified as Key Features on Map 1G. This EIS has refined the boundaries of the NHS based on the findings of site-specific assessments to more appropriately reflect the specific components of the NHS, including key features (core areas), buffers, linkages and restoration / enhancement areas both within and adjacent to but outside the NHS. The proposed NHS illustrated on **Figure 16** captures key features associated with the valleylands of Fourteen Mile Creek and Tributary 14W-W1, as well as associated buffers and linkages, and restoration / enhancement areas where they overlap with core areas and/or their buffers. The boundaries of the proposed NHS differs slightly from the RNHS reflected on ROPA 38 Map 1G in that the proposed NHS identifies all of the constituent components of the NHS rather than just key features. The proposed NHS also differs from the RNHS in that it excludes portions of the agricultural field (ELC Unit 12) from the NHS as this area does not support key features, and has added Tributary 14W-W1, which has been identified as a key feature, and its associated buffers and regulatory setbacks. The proposed NHS represents a constraint to development. To conserve the ecological integrity and biodiversity of the NHS for the long term, development should be directed outside the NHS, and mitigation (including management and monitoring measures) should be implemented to minimize the secondary impacts of changes to the land use in the adjacent lands.

5.3 Comprehensive Constraint Line

This EIS has established limits to future development on the Subject Property based on the environmental constraints and their associated policy and regulatory constraints. This was achieved by overlaying the various constraints on a base map and selecting the most restrictive of the physical and natural heritage constraints, inclusive of the proposed NHS and its ecological buffer requirements as well as any regulatory setbacks or to ensure compliance with local and regional policies and regulations.

A map illustrating the comprehensive constraint line is presented on **Figure 17**. This comprehensive constraint line was used to establish the limits development on the Subject Property to inform the development proposal and Draft Plan of Subdivision (see **Figure 18** and **Figure 19** respectively).

5.4 Opportunities

Re-development of the Subject Property presents a number of opportunities for enhancement of the proposed NHS and associated ecological functions, as well as social benefits.

The opportunities identified through the EIS and related technical studies on the Subject Property and adjacent lands include:

- Strengthening of inter-watershed (and inter ESA) NHS linkages
- Enhanced protection of woodlands and valleylands through implementation of buffers
- Slope stabilization
- Erosion control through SWM measures
- Water quality improvement through SWM / LID measures
- Naturalization of riparian corridors
- Creation of wetland and aquatic habitats for amphibians and reptiles, including overwintering habitats for turtles
- Vegetation management to improve habitat diversity and quality of the NHS
- Tree preservation opportunities on the tableland, and
- Integration of a trail network that balances access with protection of sensitive NHS areas.

These opportunities are described in more detail in the following sections.

5.4.1 Restoration and Enhancement Areas

Section 4.3.12.4 identifies five areas on and adjacent to the Subject Property that would directly benefit from naturalization / restoration and enhancement. These areas are identified on **Figure 16,** and described in more detail here.

The primary goal of the enhancements is to increase ecological resilience and function of the NHS. This goal can be achieved by implementing management measures targeting key features that fulfil the following objectives:

Objective 1: Reduce cover of undesirable exotic plant species in the NHS and increase native plant diversity and cover
Objective 2: Improve habitat conditions for Redside Dace
Objective 3: Enhance linkages within the NHS
Objective 4: Restore and enhance wetland habitat within the NHS

These objectives can be achieved by adopting the approaches identified for each restoration / enhancement area identified below.

Restoration/Enhancement Area 1 - Tributary 14W-W1 Valley

Recommended Approaches:

- The woodland adjacent to Bronte Road contains undesirable exotic species (Common Buckthorn and Manitoba Maple). Implement mechanical and chemical methods to control Common Buckthorn and Manitoba Maple from the 0.1 ha on the south slope of watercourse 14W-W1 (ELC Unit 3).
- Plant native trees and shrubs along watercourses 14W-W1-2 and 14W-W1-3 to increase shade and reduce the temperature of water contributing to Redside Dace recovery and occupied reaches downstream.
- The golf course pathways and culverts could be removed and riparian cover enhanced along tributaries 14W-W1-2 and 14W-W1-3 on the east side of Bronte Road (and the western side as well if feasible).
- Create a shallow pond or series of pools in ELC Unit 4 to provide breeding and foraging habitat for amphibians and Odonates.
    - Diversify the meadow marsh wetland (ELC Unit 4) in by planting a variety of native wetland forbs, grasses, and sedges.
- Wildlife passage and linkage functions could also be improved.
    - Expand forest cover within the NHS by planting native trees, shrubs and ground covers along the valley slopes of watercourse 14W-W1-2 and 14W-W1-3.
    - Remove existing golf course pathways and culverts along watercourse 14W-W1, 14W-W1-2, and 14W-W1-3.
    - Facilitate movement of larger wildlife, such as deer, within the two culverts below Bronte Road (along watercourse 14W-W1-2 and 14W-W1-3) by adding granular stone to the culvert bottoms to fill in voids between the existing rip-rap stone.

Anticipated Benefits:

- Improvement to the quality (i.e., species composition and structure) of the woodland thereby improving habitat diversity.
- Strengthening of terrestrial and aquatic connections between the Bronte Creek Valley ESA (#10) and Fourteen Mile Creek Valley ESA (#12) by removing barriers and naturalizing existing corridors.
- Creation of more and better vegetative cover, thereby contributing the tributary water quality improvement, and better organic inputs.

Restoration/Enhancement Area 2 - Plantation (ELC Unit 13)

Just north of the Subject Property's ELC Unit 12 (the cultural meadow), there is a small Scotch Pine plantation associated with the tableland adjacent to the Subject Property. Scotch Pine is an introduced species and has been widely planted throughout southern Ontario, however it has become increasingly apparent over recent years that this species provides less than desirable yields as a commercial crop and serves as a host to a large number of forest pests and diseases that can afflict native pine. From an ecological perspective, Scotch Pine plantations tend to lack species and structural diversity, particularly when they are overstocked, and consequently provide limited wildlife habitat opportunities. The plantation is presently functioning as a nurse crop for native hardwoods and other species of conifers.

Recommended Approaches:

- Natural successional process could be advanced through selective and phased thinning and under planting with native species. Reductions in the density of Scotch Pine would allow for the growth and regeneration of a greater diversity of native species. Selectively thinning up to 25% (0.5 ha) of Scotch Pine from ELC Unit 13 would support this process.
- Implement mechanical and chemical methods to control Common Buckthorn and Manitoba Maple of up to 0.5 ha from ELC Unit 13 in canopy gaps following thinning of Scotch Pine.
- Plant a diversity of native trees, shrubs, and ground covers in canopy gaps following thinning of Scotch Pine plantation and removal of Common Buckthorn (ELC Unit 13). Species selected for planting should reflect the species composition of the deciduous and mixed forests within the NHS.
- This work could be initiated through the development process, particularly the thinning, and continue to be implemented (e.g., the plantings and ongoing invasive species control) with the support of Conservation Halton as well as local area volunteers.

Anticipated Benefits:

- Speeding up the natural successional process and encourage the regeneration of a diversity of woody, and non-woody, species, thereby improving the species composition and structural diversity of the wooded area, and providing better wildlife habitat.
- Opening up the woodland, making it more suitable for accommodating a woodland trail.
- Improvement to the quality (i.e., species composition and structure) of the woodland thereby improving habitat diversity.

Restoration/Enhancement Area 3 - Tributary 14W1-1 – Valley Slope (ELC Unit 11)

The northern slopes of this tributary valley between the golf course and hydro corridor are dominated by Common Buckthorn. This highly invasive shrub forms dense thickets and cuts of light from penetrating to the ground. As a consequence native vegetation is displaced in areas with dense cover of Common Buckthorn. In these areas, ground cover vegetation is sparse and can result in erosion and sedimentation of nearby watercourses. Since the reach of Tributary 14W1-1 adjacent to ELC Unit 11 is considered Redside Dace habitat, it is highly desirable to enhance riparian vegetation conditions that benefit the species.

Recommended Approaches:

- Implement mechanical and chemical methods to control Common Buckthorn and Manitoba Maple from up to 0.5 ha on the north slope of watercourse 14W-W1 (ELC Unit 11)
- Improve the quality of riparian habitat by removing Common Buckthorn and other invasive shrubs from within 10 m of watercourse 14W-W1.
- Plant a diversity of native trees, shrubs, and ground covers following removal of Common Buckthorn and Manitoba Maple. Species selected for planting should reflect the species composition of the forests within the NHS.
- Restore favourable riparian conditions by planting native shrubs (e.g. willows) and grasses adjacent to watercourse 14W-W1.
- This work could be initiated through the development process, particularly the thinning, and continue to be implemented (e.g., the plantings and ongoing invasive species control) with the support of Conservation Halton as well as local area volunteers.

Anticipated Benefits:

- The control of Common Buckthorn and replacement with desirable native vegetation would:
    - Help control soil erosion, and thereby support improved water quality, and
    - Benefit the fishery by providing more diverse cover and organic inputs.
- Reducing the potential for erosion.
- Diversification of the vegetative structure, thereby creating more diverse habitats for both plants and wildlife; and
- Improvement of the seed inputs from the area, thereby limiting the spread of invasive species further downstream to degrade the riparian areas associated with the Fourteen Mile Creek.

<u>Restoration/Enhancement Area 4 – Valleyland Terrace (ELC Unit 25)</u>

This deciduous forest community is associated with a valleyland terrace adjacent to the Subject Property. The area was previously cleared and farmed and is in an advanced state of ecological transition. The quality of this community is considered low due to the abundance of exotic and invasive tree and shrub species. Manitoba Maple and Common Buckthorn are prevalent throughout this community. While there are higher quality native associates present, they are being supressed by the invasive species.

Recommended Approaches:

- Vegetation management to control and remove the invasive species and replace with desirable native species.
- Plant a diversity of native trees, shrubs, and ground covers following removal of Common Buckthorn and Manitoba Maple. Species selected for planting should reflect the species composition of the forests within the NHS.

Anticipated Benefits:

- Improving the species composition and the diversity of the vegetative structure, thereby creating more diverse habitats for both plants and wildlife.
- Reducing the potential for erosion.

- Improving the seed inputs from the area, thereby limiting the spread of invasive species further downstream to degrade the riparian areas associated with the Fourteen Mile Creek.

Restoration/Enhancement Area 5 – Fourteen Mile Creek Bottleneck and Aquatic Habitat Creation
The Fourteen Mile Creek valley adjacent to the Deerfield property narrows rather abruptly forming a bottleneck along the valley corridor. This narrowing may impair local wildlife movement through the valley. It is also recognized that this area presents an opportunity for retention of a pond that is very close to the NHS, and creation of additional ponds, that could be naturalized and serve as suitable overwintering as well as year-round habitat for turtles, and potentially other herpetofauna that occur in the area.

Recommended Approaches:

- Restoration and enhancement of this area to natural habitat.
- Retention and naturalization of Pond 5.
- Creation of new ponds in the vicinity of Pond 5 to create aquatic habitats for breeding amphibians and overwintering turtles.
- Planting a diversity of native trees, shrubs, and ground covers in the current golf course lands. Species selected for planting should reflect the species composition of the forests within the NHS.

Anticipated Benefits:

- Aquatic habitat creation to support local herpetofaunal populations.
- Provision of additional water storage.
- Improving the species composition and the diversity of the vegetative structure, thereby creating more diverse habitats for both plants and wildlife.
- Improving the seed inputs from the area, thereby limiting the spread of invasives further downstream to degrade the riparian areas associated with the Fourteen Mile Creek.
- Supporting the local turtle population.
- Improving the functionality of the valley as a linkage by broadening of the valley corridor.
- Creating an additional natural setback between the Fourteen Mile Creek and the proposed development; thereby helping to mitigate the potential impacts of the changes in land use on this feature.

Overall, it is recommended that an Environmental Management Plan be prepared, in consultation with Infrastructure Ontario, the Town and Conservation Halton, at the detail design stage that further details the enhancement activities identified in this EIS.

6. Description of the Proposed Development

Key elements of the proposed development plan are illustrated in **Figure 18** (Proposed Land Use Option), **Figure 19** (Draft Plan of Subdivision), and **Figure 20** (Conceptual Grading Plan), and described below. Additional details are provided in the Functional Servicing Report (FSR) (DSEL, 2015) submitted under separate cover.

6.1 Preferred Land Use Option

As part of the Merton TPA study, three Land Use Options were developed and evaluated based on criteria, guiding principles/objectives, measures, and scale definitions established in consultation with the Town of Oakville. Based on the findings of the Phase 2 EIS for the Merton TPA (Beacon Environmental, 2013), the three land use options were ranked from least to most impactful from an environmental perspective, with the option anticipated to result in the least impacts to the natural environment identified as the preferred alternative.

The preferred option (**Figure 18**) was considered the best option from a natural environment perspective because it retains more area in Open Space and Natural Area than the other land use options. This effectively increases the net area of greenspace in the TPA supporting the functions of the existing NHS.

The preferred option provided the basis of the proposed Draft Plan for the Subject Property, described in **Section 6.2**.

6.2 Proposed Draft Plan

The proposed Draft Plan, as shown in **Figure 19**, identifies the majority of the Subject Property for residential and related purposes. The plan includes 760 residential ground related housing units consisting of single and semi-detached houses, as well as townhouses units, plus a high density residential block (0.92 ha).

The plan also includes a neighbourhood park (2.51 ha), a main street commercial block area, two stormwater management ponds (3.53 ha), open space (0.04 ha), and a Natural Heritage System both within the Subject Property (5.66 ha) and in the adjacent lands.

The development limits identified on the proposed Draft Plan were established to avoid the proposed NHS and all other biophysical constraints (i.e., associated regulatory setbacks and ecological buffers) to minimize any potential impacts to the NHS.

Additionally, a number of restoration and enhancement opportunities have been identified on lands within and adjacent to the Subject Property that will improve the ecological integrity of the NHS and its connectivity to other components of the RNHS. The proposed restoration / enhancement measures are described in **Section 4.3.12.4** and **Section 5.4**.

6.3 Preliminary Grading Requirements

As part of the Area Servicing Plan (ASP) for the TPA, DSEL developed a preliminary grading scheme. A site specific conceptual grading plan was developed by DSEL (2014) for the Subject Property (see **Figure 20**). The conceptual grading plan was prepared with the objective of minimizing earthworks and providing for major system runoff conveyance to the receiving tributaries.

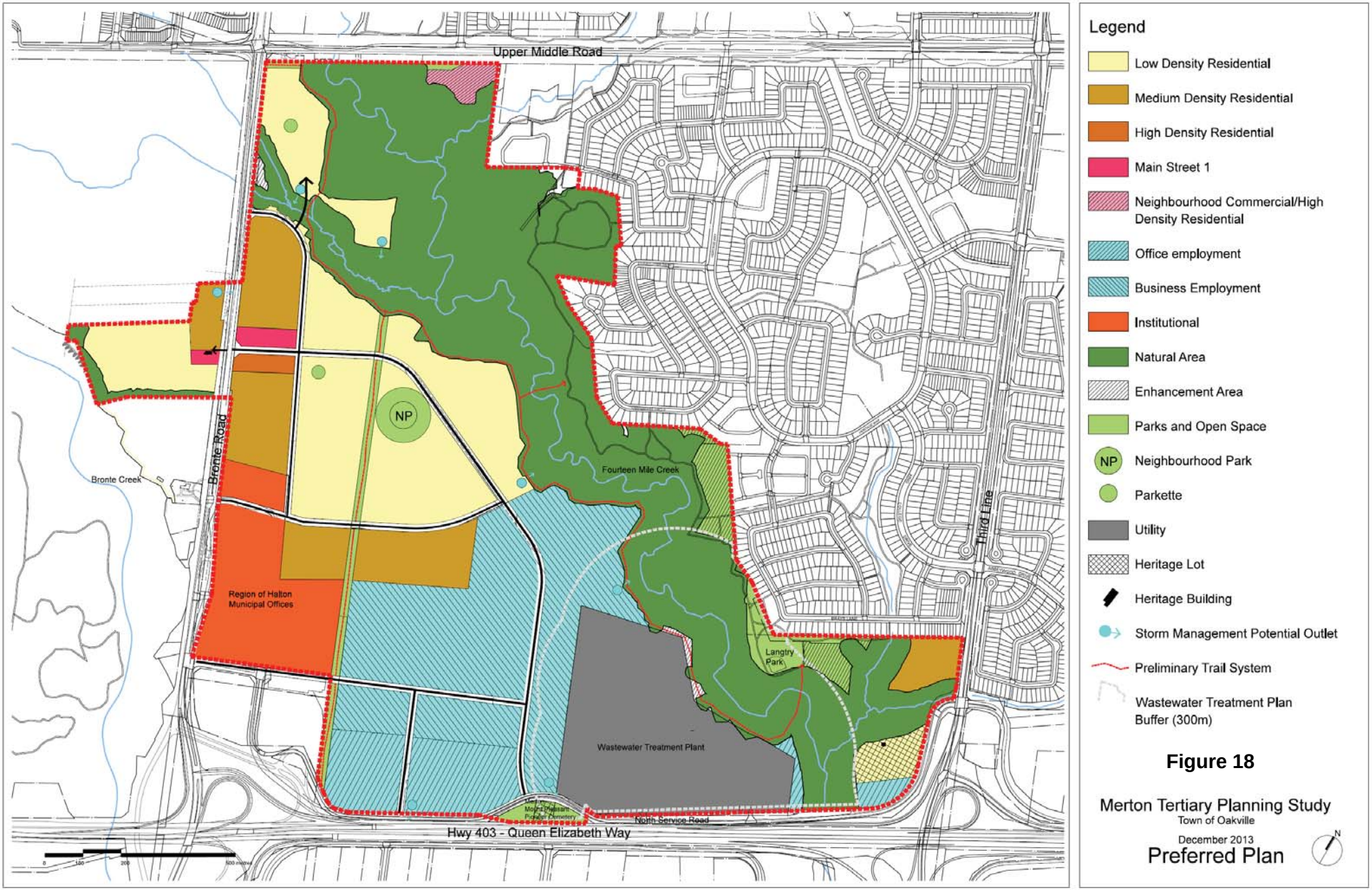


Figure 18

Merton Tertiary Planning Study
Town of Oakville
December 2013
Preferred Plan

DRAFT PLAN OF SUBDIVISION

PART OF LOTS 28, 29 AND 30
CONCESSION 2, SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TRAFALGAR)
TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

SCALE 1:2,000 METRIC
10 0 20 40 60 80 100 metres

N

Owner's Certificate

I hereby authorize Sorenson Gravely Lowes Planning Associates Inc.
to submit this plan for approval.

Saw Whet Golf Course Ltd. — April 14, 2015 DATE

Surveyor's Certificate

I hereby certify that the boundaries of the land to be subdivided as shown on this plan, and their relationship to the adjacent land are accurately and correctly shown.

J.D. Barnes Limited — April 14, 2015 DATE

Schedule of Land Use

	DESCRIPTION	LOTS / BLOCKS	AREA (ha.)	UNITS
1.	Residential (back-to-back)	1-10	0.99	104
2.	Residential (townhouse 7.5m)	11-27	2.06	80
3.	Residential (townhouse 8.1m)	28-35	1.31	45
4.	Residential (single - 10.4m)	36-78	1.32	43
5.	Residential (single - 11.60m)	79-282	7.08	204
6.	Residential (single - 12.80m)	283-389	4.35	107
7.	Residential (single - 13.72m)	390-434	2.10	45
8.	Residential (single - 15.24m)	435-513	4.70	79
9.	Residential (single - 18.30m)	514-555	3.30	42
10.	Residential Condo (single - 18.30m)	556-564	0.83	9
11.	Residential Condo (single - 20.0m)	565-566	0.32	2
12.	Main Street 1	567-568	1.62	
13.	Park	569-571	2.51	
14.	Storm Water Management Facility	572	3.53	
15.	Walkway/Servicing Access	573-576	0.09	
16.	Easement	577	0.24	
17.	Road Right-of-way	NA	12.12	
18.	Private Road Right-of-way & Common Element Areas	NA	0.32	
19.	Natural Heritage System	578-582	5.66	
20.	Open Space	583-584	0.06	
21.	Enhancement Area	585-594	0.58	
22.	0.3m Reserve	595-599	0.01	
TOTAL			55.10	760

TOTAL NUMBER OF UNITS: 760

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990,C.P.13

A. AS SHOWN
B. AS SHOWN
C. AS SHOWN
D. RESIDENTIAL, MIXED USE, PARK, STORMWATER MANAGEMENT, OPEN SPACE
E. AS SHOWN
F. AS SHOWN
G. AS SHOWN
H. MUNICIPAL WATER SUPPLY.
I. LOAM
J. AS SHOWN
K. ALL SERVICES AS REQUIRED
L. AS SHOWN

Revisions	DATE	INITIAL
Internal Draft Plan Revisions	October 27, 2014	UMG
Internal Draft Plan Revisions	December 5, 2014	UMG
Internal Draft Plan Revisions	December 15, 2014	UMG
Internal Draft Plan Revisions	April 3, 2015	UMG

Date: April 14, 2015
File Name: 150414 Bronte Green SGL Draft Plan.dwg

SGL Planning & Design Inc.

The consistent approach for grading within the Subject Property reflects the intent to maintain existing topography as best as possible under post-development conditions, while achieving Town requirements for stormwater conveyance and use of storage within municipal right-of-ways.

The grading plan defines post-development drainage catchments, which have been formed based on logical boundaries defined by existing and future physical constraints, such as servicing/utility easements, natural heritage features, and existing property lines. The proposed grading plan will see the filling of Pond #7, in order to support the proposed development plan.

The proposed grading scheme can support the suggested LID measures evaluated in the hydrogeological study (Burnside, 2014), which includes:

Increasing topsoil depth and reducing lot grading in both private and public blocks under the proposed conceptual grading plan. The conceptual grading plan and associated major and minor storm conveyance systems can also support the implementation of perforated subdrains and/or underground infiltration trenches. Potential LID strategies are further discussed in Section 6.7.

The proposed grading scheme will support a staged approach to development and infrastructure investment, whereby stormwater facilities and sanitary and water service can be provided with each distinct phase of development.

6.4 Servicing

The Functional Servicing Report (FSR) prepared by DSEL (2015) details the preferred servicing strategy to support the wastewater collection requirements, water demands, storm drainage requirements, and stormwater management requirements for the planned development on the Subject Property. These details apply equally to the proposed development of the Subject Property.

The servicing strategies have been developed to demonstrate conformity with the Provincial Policy Statement (PPS), meet Town requirements, meet the requirements of other approval agencies (e.g., MOE, DFO, OMNR, and CH), and demonstrate good engineering practice for the protection of public safety, the environment, and sustainable operations.

Expanding the existing regional wastewater and water infrastructure is the preferred servicing solution. This option supports the planned development of a mixed-use community, is consistent with the applicable provincial and municipal policies for urban development, and minimizes negative environmental impacts. In terms of stormwater management, a treatment train approach is recommended for all land use options for the TPA, using best management practices for site controls, a dual drainage system, and a set of end-of-pipe stormwater management facilities that provide stormwater quality, quantity, and erosion control, where required.

6.5 Water Supply

The Subject Property is located within Zone O2 and Zone O3 of the Regional water supply system, supplied by the Burloak Water Purification Plant (WPP), the Burlington WPP and the Oakville WPP. The Kitchen Reservoir supplies Zone O3 locally and Zone O2 via the 600 mm transmission main on

Bronte Road. No improvements to the existing water infrastructure are necessary to service the planned development of the Subject Property.

The Subject Property will be serviced by a network of new local watermains designed in accordance with the current Region of Halton Design Criteria and MOE guidelines. Final watermain sizing will be completed at the detailed design stage based on the actual development characteristics.

6.6 Sanitary Collection System

Sanitary drainage from the Subject Property will be treated by the Mid-Halton Wastewater Treatment Plant (WWTP). The Subject Property will be serviced by a network of local gravity sewers designed in accordance with Region of Halton Design Criteria.

An existing 2400 mm diameter gravity sanitary sewer crosses the Subject Property diagonally from Bronte Road to the Mid-Halton North Pumping Station. This 2400 mm trunk will receive the sanitary drainage from the Subject Property. An upgrade to the Mid-Halton WWTP is currently underway to expand capacity from 75 MLD to 125 MLD. The expanded plant is anticipated to be operational in 2015, and is not a constraint to the development of the Subject Property.

There are no proposed sanitary service crossings of the proposed NHS.

6.7 Stormwater Management

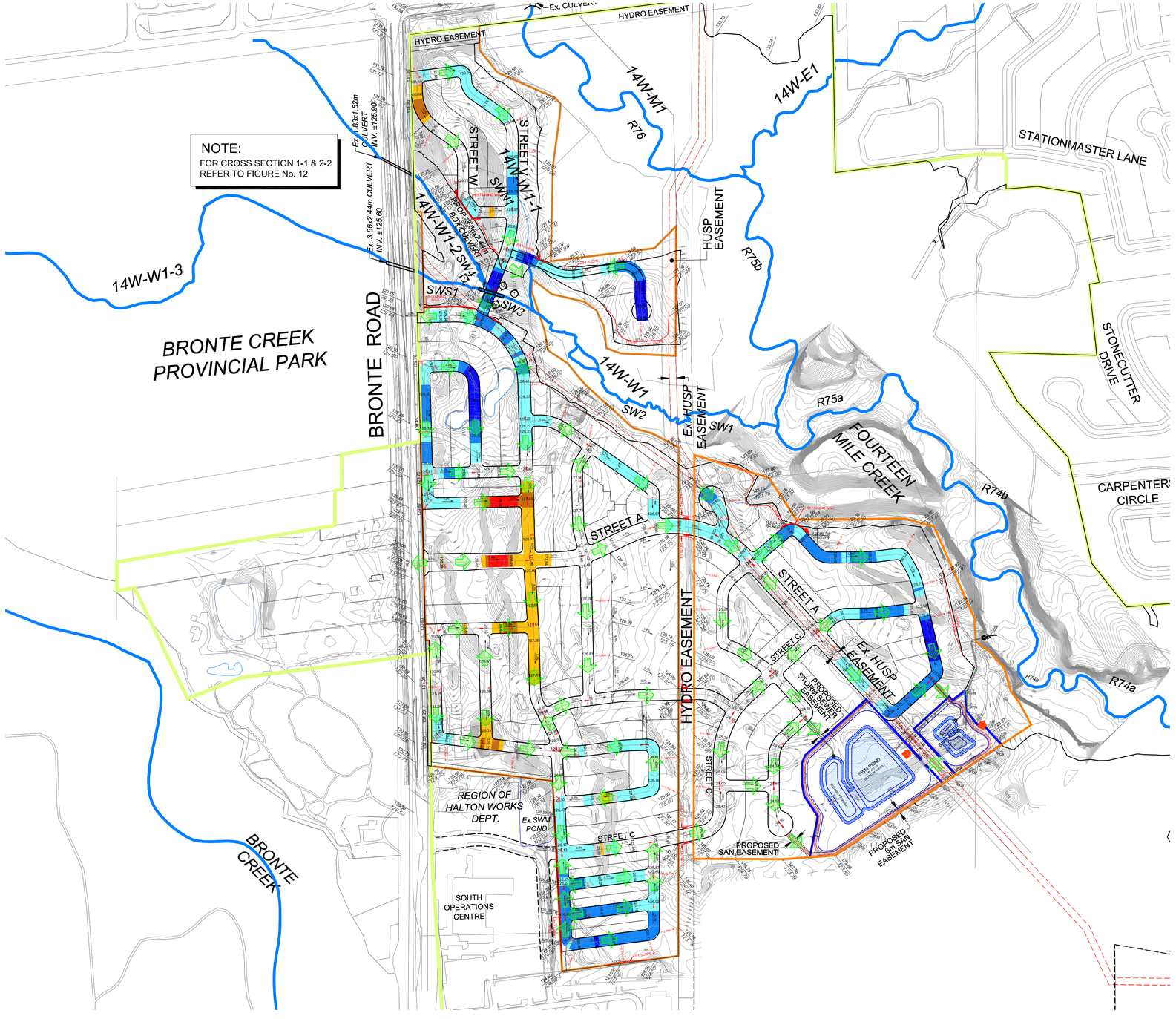
The proposed stormwater management plan for the Subject Property provides an integrated treatment train approach to stormwater management that is premised on providing control at the lot level and in conveyance (to the extent feasible), followed by end-of-pipe controls.

The following elements are to be provided within the Subject Property, according to the details set out in the FSR (DSEL, 2015):

- Rooftop storage, parking lot storage, and underground storage (where applicable);
- Surficial LID techniques such as increasing topsoil thickness, reducing lot grading, directing roof runoff to pervious areas, and disconnecting roof leaders;
- A dual drainage system, comprised of a minor system (underground storm sewers) and major system (overland flow routes) components; which are directed to,
- Extended detention wet ponds, or oil/grit separators combined with underground storage where the size and shape of the drainage parcel result in ponds not being practical, and
- Infiltration-based controls such as grassed swales, vegetated filter strips, infiltration trenches, etc.

Drainage areas within the Subject Property have been defined according the general grading plan described in **Section 6.3**.

The FSR (DSEL, 2015) sets out required stormwater controls for each catchment in order to govern the future detailed design of each stormwater management component. The FSR details target discharge rates and other design parameters (for example, stormwater pond requirements, where applicable), to meet the following criteria, as discussed in **Section 3.1.2**.



david schaeffer engineering ltd

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SAW-WHET GOLF COURSE

CONCEPTUAL GRADING PLAN

DATE:	JANUARY 2015
SCALE:	1:3000
PROJECT No.:	12-601
DRAWING:	1

- Monitored base flows shall be maintained at 20 L/s in the West Branch of Fourteen Mile Creek, and a calculated potential groundwater discharge of 2.5 x 10-4 m3/s (0.25 L/s), as detailed in the Hydrogeological Study by R.J. Burnside, will be maintained.
- Two extended detention wet ponds are proposed within the Fourteen Mile Creek catchment, in addition to two local end-of-pipe treatment systems consisting of oil/grit separators combined with underground storage.
- Local storm sewers will be provided, generally following the proposed road network, and will be designed in accordance with Town of Oakville guidelines to provide stormwater capture and conveyance for the proposed land uses.
- Quantity control is provided in each catchment to ensure that downstream flow rates and flood levels do not increase in Fourteen Mile Creek for the 1:2, 1:5, 1:10, 1:25, 1:50, 1:100, and the Regional Hurricane Hazel event. Existing flow rates and flood levels were derived from the Fourteen Mile Creek/ McCraney Creek Flood Management Alternative Assessment (AMEC, July 2013) and the associated calibrated PCSWMM model.
- The stormwater management system is designed to meet MOE Enhanced level of suspended solid removal before stormwater is discharged to Fourteen Mile Creek. This provides 80% average total suspended solids removal to ensure general water quality protection and protection of fish habitat in the receiving tributaries. This in accordance with the Ministry of Natural Resources *Draft Guidance for Development Activities in Redside Dace Protected Habitat* (OMNR, 2011).
- Annual surface water contributions are expected to increase between existing and proposed conditions, due to the increased imperviousness in most catchment areas. However, with the proposed stormwater management practices in place, average and peak flows remain generally similar under existing and proposed conditions.
- Bottom-draw pipes and other measures are proposed for the extended detention wet ponds, in order to mitigate against increases in temperature of outflows destined to Fourteen Mile Creek and its tributaries. This contributes to protection of Redside Dace habitat, as well as general fish habitat in Fourteen Mile Creek.
- The stormwater management system has been designed to control stormwater flows destined to Fourteen Mile Creek in order to maintain an appropriate level of stream bank and bed erosion that is supported by the geomorphology study (Parish Geomorphic, 2013). The proposed controls are extended detention of the runoff from the 25mm storm for 48 hours, and a two year release rate of 5 L/s/ha for all catchments. Controls were derived based on continuous simulation models for the post-development conditions using a set of sample wet, dry, and average years from the period between 1960 and 2003, and an associated cumulative erosion index analysis and a bed and bank erosion threshold exceedance analysis.

No storm sewers are proposed to cross the proposed NHS. However, there is a storm sewer outfall that will need to be constructed in the Fourteen Mile Creek valley to convey outflows from the proposed stormwater management facility. The specific alignment of this outfall and its specifications will be determined with input from Conservation Halton, along with appropriate mitigation measures, at the detailed design stage.

6.8 Roads

The main access road to the Subject Property will be from Bronte Road. The development will include two collector roads with 19 m and 20 m rights-of-way as per the Town of Oakville standards. A road is also proposed to cross Fourteen Mile Creek tributary 14W-W1 using a 5 x 2.44 m box culvert. The proposed box culvert is approximately 28 m long with a slope of 1.6%. The design will be further refined at the detailed design stage. For descriptive purposes, a drawing illustrating the conceptual crossing has been included in the EIS as **Figure 20**.

7. Impact Assessment & Mitigation

As outlined in the EIS Terms of Reference (**Appendix A**), the impact assessment and identification of corresponding mitigation measures are to be presented at two scales:

1. A high level impact assessment is to be applied to the overall TPA based on available background information and land use option plans, and
2. A more detailed site-specific impact assessment to be undertaken for individual properties in support of Draft Plans.

The impact assessment presented in this EIS includes the site-specific assessment for the Subject Property and adjacent lands.

The impact assessment and recommended mitigation measures related to the proposed development on the Subject Property have been based on:

- the most detailed level of information available related to biophysical resources based on primary and secondary data and analyses (as presented in **Section 4**);
- the findings of the constraint analyses (presented in **Section 5**) to identify sensitive and significant natural features and ecological functions that require protection to maintain the integrity and biodiversity of the natural heritage within the Study Area;
- the proposed NHS identified for the Subject Property (see **Figure 16**) developed to protect core areas and ecological linkages, and including specific areas identified for restoration and / or enhancement to strengthen the ecological integrity of identified core areas and linkages.

Mitigation is typically defined as, first, taking measures to avoid anticipated impacts, secondly, taking steps to counter anticipated and unavoidable impacts, and, lastly, taking steps to minimize unavoidable impacts.

One of the primary objectives followed in preparing this Draft Plan was to protect the NHS on the Subject Property and adjacent lands. This was achieved by directing development to those areas not constrained by environmentally sensitive or significant features and functions, because impact avoidance is the most effective approach for reducing the risk of future development adversely impacting the significant natural features and functions within and adjacent to the Subject Property. Consequently, the proposed Draft Plan (see **Figure 18** and **Figure 19**) has been designed around (a) the proposed NHS (see **Figure 16**) and (b) to respect the consolidated environmental constraints as

equivalent to the outer limit of the NHS (see **Figure 16** and **Figure 17**) to avoid directly impacting natural heritage features and functions.

As a result of this pre-emptive approach, the impact assessment presented below is focused primarily on addressing potential indirect impacts associated with the proposed development of the Subject Property.

The EIS Terms of Reference (**Appendix A**) provided very specific and explicit guidance with respect to the requirements of the impact assessment and recommended mitigation measures which were scoped in consultation with the Town, Region and Conservation Halton to address specific concerns and issues related to the Subject Property. The terms are listed below as follows:

(i) *Assess, quantify and predict potential impacts of the proposed development on the biophysical resources and ecological functions of the Study Area.*

(ii) *Generate a detailed matrix that clearly identifies, quantifies and predicts the development related impact source and its effect on the environment.*

(iii) *The matrix will identify the specific development activity, describe quantitatively and qualitatively the potential effect on environmental receptors (features and functions), and recommend mitigation measures and possible management and monitoring requirements to assess the net quantitative and qualitative effect on the environment.*

(iv) *Impacts related to site preparation and development will be assessed and described in terms of their short and long-term effects on the biophysical environment.*

(v) *An assessment of erosion potential in the entire Study Area and further downstream to a point where the catchment is a relatively small contribution to the greater system, and identification of stormwater management criteria as they relate to erosion control.*

(vi) *The identification of existing documented constraints in the entire Study Area as they relate to downstream capacity and flood risk, and the identification of stormwater management criteria as they relate to flood risk, as well as a detailed water balance for all retained natural heritage systems.*

(vii) *The establishment of stormwater management criteria in the entire Study Area as they relate to maintaining base flow, mitigating flood risk, mitigating erosion potential and meeting water quality objectives.*

(viii) *As the Town of Oakville has completed an update and calibration of the hydrologic model for Fourteen Mile Creek, the study will update the available existing hydrologic model for the entire Study Area to estimate existing and future flow rates, and ensure that the model updates are completed to the satisfaction of the Town, Region and Conservation Halton*

(ix) *Utilize existing targets established through previous or existing study, in conjunction with available existing conditions hydrologic models to establish water quality, quantity and erosion targets appropriate for the development and demonstrate that those targets will not result in negative downstream flooding or erosion impacts on both a continuous and event basis, recognizing that*

continuous modeling may occur in later iterations once more detailed system designs have been developed. This modeling shall consider the full range of design storm events, i.e. low flows, 1:2, 1:5, 1:10, 1:25, 1:50 and 1:100 and Hurricane Hazel, and a cumulative basis that considers duration and magnitude of erosion threshold exceedence. The erosion threshold should be verified in the field.

(x) Demonstrate how thermal warming of Fourteen Mile Creek from urban stormwater inputs will be mitigated.

(xi) Determine appropriate transportation crossing designs that will ensure no impediments to fish and wildlife passage up to and during a 25-year storm event. Appropriate transportation crossing designs shall also ensure continued natural fluvial geomorphological processes to occur without hardening of valley or stream corridors.

(xii) A range of mitigation measures that can be used to avoid or reduce development related impacts to natural heritage features and ecological functions on the Subject Property. Mitigation measures to be considered will include buffers, stormwater management, Low Impact Development (LID) measures to promote infiltration to address water balance deficits and as a measure to reduce end of pipe facilities and others.

(xiii) Summarize any residual impacts that cannot be avoided or mitigated.

(xiv) Identify, quantify and describe cumulative impacts of the proposed land use change in the Study Area on water quality, water quantity, hydrology, hydrogeological features and functions, aquatic and terrestrial features and functions and on fish and wildlife communities within the Study Area. Indicate how these impacts can be mitigated.

The information presented in the impact assessment matrix below (**Table 22**) is intended to address the terms listed above.

As with the other components of the EIS, an integrated multi-disciplinary approach has been applied to assessing the potential impacts of future urbanization of the Subject Property. This approach allows for assessment of some of the more complex biophysical relationships documented within the Subject Property and adjacent lands, such as relationships between ground and surface water resources in sustaining Redside Dace habitat in Fourteen Mile Creek and its tributaries.

To facilitate interpretation of the impact assessment, the matrix:

- identifies the specific development activity (impact source);
- describes the potential effect on environmental receptors (features and functions);
- recommends mitigation measures to address potential impacts; and
- describes the net effect on the biophysical environment.

The information presented in the matrix incorporates the key findings of the relevant and related technical studies and analyses as appropriate. However, the complete details are found in the cited technical studies not contained in this EIS, but provided under separate cover.

Table 22. Impact Assessment Matrix: Subject Property and Adjacent Lands

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
Geology	**Bedrock Geology**	Grading and Servicing	It is not anticipated that grading and servicing will be within the bedrock, therefore no impacts to bedrock resources are anticipated.	• None	Neutral
	Surficial Geology/ Physiography/ Topography	Site Preparation and Grading	The site is flat to gently rolling and overlain with a thin layer of glacial tills. Grading will modify the topography of the landscape and reconfigure the till deposits to accommodate servicing and transportation standards.	• A cut and fill balance should be maintained to the extent feasible. • Restrict or limit grading within the buffer zones and/or setbacks of the NHS features.	Neutral
Soils	**Topsoil**	Site Preparation and Grading	Topsoil resources can be lost during site preparation through mixing with sub soils and through wind and water erosion.	• Topsoil resources should be conserved by implementing BMP's such as proper separation, stockpiling and erosion control measures, and restoration to the site following construction. • Removal or offsite export of topsoil should be minimized.	Neutral
Air Quality	**Air**	Site Preparation and Grading	Potential creation of dust from construction.	Control of dust/debris during construction will be the responsibility of the Contractor and will be managed through construction specifications – for example, construction requirements may include the application of water to cleared and unpaved construction areas.	Neutral
Groundwater	**Groundwater Flows**	Grading, Servicing and Development	Grading and servicing may have localized impacts to the shallow water system. Grading and servicing is not anticipated to impact the deeper groundwater system as it will not be intersected. Impacts to the shallow system may include water table lowering and redirection of local groundwater flow patterns along service trenches.	• Shallow groundwater flow at the site roughly follows the natural surface topography. Site grading should attempt to follow the natural topography to minimize changes to the shallow groundwater flow patterns. • BMPs for servicing construction are required. • Use trench plugs or anti-seepage collars along installed services to prevent redirection of groundwater flows and water table lowering.	Neutral
	Groundwater Quality	Grading, Servicing and Development	Site preparation activities such as grading can increase the risk of erosion and sedimentation to the NHS. Under the post-development scenario, contaminants such as oil, sand, salt and other debris may also affect the water quality of surface runoff.	• Implement sediment and erosion control plans to ensure that sediments are contained on the site and do not enter the watercourses. • Runoff from roads and driveways will be directed to the stormwater management facilities for treatment. • Low Impact Development measures (discussed below) will only infiltrate "clean" runoff (e.g., from roofs) to ensure the groundwater is not impacted by oil, sand, road salts and other debris from roads and parking lots.	Neutral
	Ponds	Grading, Servicing and Development	There is one pond on the Subject Property (Pond #7). This pond has been as a landscaping feature. It is proposed that this pond will be removed to accommodate the proposed development. This has the potential to result in decreased storage (see Surface Water section below for mitigation measures). This pond is clay lined and therefore has very limited interaction with groundwater flow in the Study Area (Burnside, 2014).	On-site stormwater storage under post-development conditions will be increased from existing storage levels to account for the volume of water these ponds receive from direct precipitation and runoff for water supply. See below under Surface Water for further details.	Neutral
	Dewatering	Grading, Servicing and Development	Temporary dewatering is anticipated to be necessary to install services and construct stormwater management facilities. The dewatering is expected to be of a short term and as such, no long term impacts are anticipated from either a hydrogeological or geotechnical perspective.	• A dewatering management plan will be implemented by the Contractor. Groundwater infiltration into the temporary excavations will be controlled by the Contractor. Where dewatering is required, effluent shall be discharged in a way that prevents sedimentation to the watercourses. • If pumping rates exceeding 50,000 L/d, a Permit to Take Water (PTTW) will need to be obtained from the Ontario Ministry of the Environment (MOE) in accordance with provincial regulations prior to dewatering activities. A detailed groundwater management and monitoring plan will also be required in support of the PTTW application.	Insignificant
Surface Water	**Watercourses**	Grading, Servicing and Development	No watercourses are proposed to be removed for the proposed development.	Watercourses will be protected and mitigated with the measures outlined in the following sections.	Neutral
	Drainage	Grading, Servicing and Development	One drainage swale on the Subject Property (14W-W1-1) is proposed for removal. Potential disruption to existing drainage patterns on adjacent private properties.	• The water conveyed and infiltrated along the removed swale will be compensated for through a variety of proposed LID measures (see below) on site. • Cut-off swales are proposed along the boundaries of the site where required, to capture existing drainage. External drainage is included in the proposed stormwater conveyance system and is	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
				treated where required under the proposed stormwater management plan, as documented in the FSR (DSEL, 2015).	
	Watercourses	Grading, Servicing and Development	Uncontrolled erosion, sedimentation, and machine use (including potential spills) during construction could result in release of deleterious materials (fuel, oil, lubricant, etc.) into the watercourses, and/or degradation of water quality within the limits of construction and outlying areas.	An Erosion and Sedimentation Control Plan, Environmental Protection Plan and Spill Prevention and Control Plan shall be prepared at the detailed design stage. Control of erosion, sedimentation, and spills will be the responsibility of the Contractor and will be managed through construction specifications.	Insignificant
	Ponds	Grading, Servicing and Development	There is one pond on the Subject Property (Pond #7), which has been artificially constructed as a landscaping feature. The pond is proposed for removal, which has the potential to result in decreased storage on-site.	On-site stormwater storage under post-development conditions has been increased from existing storage levels to account for the introduction of impervious surfaces within the catchment. Storage has been designed so as to maintain pre-development flow rates to Fourteen Mile Creek under the 1:2, 1:5, 1:10, 1:25, 1:50 and 1:100 design storm events, as per the pre-development flow rates defined in the *Fourteen Mile Creek/ McCraney Creek Flood Management Alternative Assessment* (AMEC, July 2013) and associated calibrated PCSWMM model, and in the approved stormwater management study for the design of the existing Speers Road Trunk storm sewer system discharging to Bronte Creek.	Neutral
	Flows in Fourteen Mile Creek	Grading, Servicing and Development	Uncontrolled stormwater runoff could exacerbate flooding issues in Fourteen Mile Creek, especially given the planned introduction of impervious surfaces within the Subject Property. Increases in surface water runoff entering the creek in post-development conditions could negatively impact downstream infrastructure and property.	*The Fourteen Mile Creek/ McCraney Creek Flood Management Alternative Assessment* (AMEC, July 2013) and associated calibrated PCSWMM model quantify the existing flows and water levels in Fourteen Mile Creek and its tributaries under 1:2, 1:5, 1:10, 1:25, 1:50 and 1:100 storm events. This calibrated existing condition information was used to derive appropriate quantity control targets for stormwater management for the area within the TPA that is planned to drain to Fourteen Mile Creek. The FSR updates the Town's hydrologic model to reflect the anticipated post development condition. The updated model confirms that the proposed stormwater management plan for the TPA (featuring the construction of stormwater management ponds and other on site controls) is sufficient to maintain proposed conditions flows equal to or less than existing conditions flows in Fourteen Mile Creek at Queen Elizabeth Way, therefore confirming that the proposed development will not negatively impact downstream infrastructure and downstream flood levels.	Neutral
	Erosion	Grading, Servicing and Development	Uncontrolled stormwater runoff could exacerbate erosion in Fourteen Mile Creek given the planned introduction of impervious surfaces within the Subject Property.	The stormwater management facilities proposed in the FSR (DSEL, 2015) must be put in place before any development occurs within a catchment.	Neutral
	Surface Water Runoff	Grading, Servicing and Development	Stormwater runoff captured by the proposed stormwater infrastructure could exacerbate the transitional/adjustment erosion processes in Fourteen Mile Creek without appropriate quantity control.	Post-development stormwater runoff to be controlled and treated via stormwater management ponds and on-site controls. Outflows to be limited to the parameters set out in the ASP – specifically extended detention of the runoff from the 25mm storm for 48 hours, and 2 year release rate of 5L/s/ha in order to provide erosion protection. Simulation modeling using annual continuous rainfall data for a selection of representative dry, wet, and average years was completed for the proposed stormwater management plan in the FSR. An assessment of duration and magnitude of erosion threshold exceedence and cumulative erosion index has been completed by Parish Geomorphic (2013). The proposed stormwater management plan system is supported by the findings of the erosion assessment (DSEL, 2014).	Neutral
	Geomorphological Processes	Grading, Servicing and Development, Road and Servicing Crossing of Tributary 14W-W1, SWM Outfall	Grading and development will increase impervious surfaces which results in increased runoff. This can result in more frequent short duration high flow events, leading to increased erosion. There is a proposed road and servicing crossing of Tributary 14W-W1 that can potentially impact on the channel form and function, including stability. There is a SWM outfall proposed along the Fourteen Mile Creek valley. The construction and operation of this outfall can potentially impact on channel form and function, including stability.	• See point above related to Erosion. • Utilize established thresholds for determining appropriate release rates from the stormwater management ponds. • Impacts to tributary channel from the proposed road crossing can be mitigated by spanning the watercourse or utilizing an appropriately sized culvert. • Impacts of servicing crossings can be mitigated by tunneling under the features using trenchless construction. • The road crossing and SWM outfall will require site specific geomorphic assessments for appropriate design so as to avoid and minimize impacts.	Neutral
	Water Quality	Grading, Servicing and Development	Stormwater runoff captured by the proposed stormwater infrastructure could affect water quality in Fourteen Mile Creek if released without quality control.	The proposed end-of-pipe stormwater management facilities have been designed to treat stormwater according to Provincial and Town Approval water quality criteria. Stormwater Management Facilities must be put in place before any development occurs on-site.	Neutral
	Temperature	Grading, Servicing and Development	Stormwater runoff captured by the proposed stormwater infrastructure could affect water quality in Fourteen Mile Creek if released without thermal control.	• Thermal mitigation measures will be required for the stormwater management pond detailed design, such as: a reverse-graded pipe in a deep pool (to draw the cooler water from the deepest portions of the ponds), a high length to width ratio (to allow for effective shading with landscape material), and/or a buried storm outlet (to cool water via lower underground temperatures as compared to surface). The FSR recommends that some or all of these measures be carried through to detailed design to	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
				ensure that stormwater outflows are below the required 24°C for Redside Dace habitat protection. • Based on an *Evaluation of a Thermal Mitigation and Baseflow Augmentation System for Stormwater Ponds* (Toronto and Region Conservation, 2013) there is evidence to suggest that significant thermal benefits may be achieved by implementing the bottom-draw reverse slope outlet pipe to draw cooler water from deeper within the proposed ponds. In the referenced study, the recorded temperatures of outflows from the bottom-draw pipe at a depth of 1.5 m were in the range of 20°C to 24°C during the warmest months.	
Water Balance	**Site**	Grading and Development	Grading activities and general development may result in compaction of native soils and an increase in the overall imperviousness of the development area, thereby reducing surface water infiltration and increasing runoff which can potentially impact watercourses and other natural features. Based on the post-development water balance calculations for the proposed land use concept, with no mitigation the proposed development has the potential to reduce the infiltration volume on the Subject Property by approximately 57%.	• The infiltration deficit can be reduced by incorporating mitigation measures that direct roof runoff towards lawns, side and rear yard swales in low and medium density residential areas. • Infiltration potential can also be enhanced by increasing topsoil thickness. • BMPs for topsoil placement will be used to minimize compaction; Refer to Water Balance Analysis prepared by Burnside in Appendix F of the Saw-Whet FSR prepared by DSEL (2015) for additional details on LID measures and other water balancing recommendations.	Neutral
Feature Based Water Balance	**Fourteen Mile Creek and Tributaries**	Grading, Servicing and Development	It is important to ensure that the sources of water (groundwater and/or surface water) supporting natural features (watercourses, wetlands, fisheries) within the Study Area are maintained under the post-development environment. The natural feature that has been found to receive the most significant groundwater discharge is Tributary 14W1-W1. It is therefore important that surface water and groundwater contributions within the specific catchment area to this tributary is maintained as close as possible to the pre-development contributions, such that baseflow conditions can be maintained (as this is important to the fishery). The groundwater discharge contribution in this tributary was found to be limited at <0.5 L/s. A large portion of the catchment area to Tributary 14W-W1 is proposed for residential development. The total area of the Tributary 14W-W1 catchment within the Study Area is approximately 22 ha, and the wooded area was estimated from aerial photography to be approximately 7 ha. Based on these component values, the average pre-development infiltration volume is estimated to be approximately 27,000 m^3/year. Post-development water balance calculations were completed based on the proposed land use concept. These calculations assume no mitigation measures are in place, and show a potential decrease in infiltration volume of 11,000 m^3/year or 42%. Grading and development will introduce impervious surfaces that will increase overall runoff volumes and decrease infiltration within the catchment areas of features (i.e., tributaries to Fourteen Mile Creek). Decreases to infiltration can reduce baseflow contributions to these watercourses and impact fisheries through flow reductions and elevated water temperatures. Increased runoff and flows to the valleylands and downstream drainage features can result in erosion, water quality changes and flooding. Post-development drainage boundaries could also divert pre-development drainage areas to downstream catchments, changing the flow regime in the receiving watercourses or cutting-off the surface water runoff that sustains the existing watercourses in the Study Area.	It is recommended that LID measures be implemented to mitigate the infiltration deficit identified in Tributary 14W-W1**. To assess the potential effectiveness of LID measures, the water balance calculations were completed again, assuming the direction of the rear half of roof leaders to pervious areas and increased topsoil depth in the low and medium density residential blocks. These water balance calculations show that approximately 90% of the pre-development infiltration volumes in this catchment area can be maintained using these techniques. . • The infiltration deficit in Tributary 14W-W1 can be mitigated by incorporating mitigation measures that direct roof runoff towards lawns, side and rear yard swales in low and medium density residential areas. • Infiltration potential can also be enhanced by increasing topsoil thickness. Refer to Water Balance Analysis prepared by Burnside presented in Appendix F of the FSR prepared by DSEL (2015) for additional details on LID measures and other water balancing recommendations. • Cut-off swales are proposed along the boundaries of the site where required, to capture existing drainage. External drainage is included in the proposed stormwater conveyance system and is treated where required under the proposed stormwater management plan, as per the FSR.	Neutral
Natural Heritage System	**Linkages**	Grading, Servicing and Development	Development on the Subject Property will be restricted to areas that are entirely outside the proposed NHS with the exception of a road crossing of Tributary 14W-W1. Connectivity through the Fourteen Mile Creek valley corridor will be maintained as the development will be restricted to the tablelands. Connectivity between the Bronte Creek and 14 Mile Creek valley corridors will also be maintained and enhanced by naturalizing portions of the existing golf course along the Tributary 14W-W1-2 and 14W-W1-3 valleyland corridor. This valley corridor represents the only NHS linkage across Bronte Road between Upper Middle Road and the QEW. The proposed development will maintain this connection; however there is a potential that the proposed road crossing of this tributary valley further downstream could impair connectivity if not designed to facilitate wildlife passage.	• The proposed road crossing of Tributary 14W-W1 should be sized to accommodate wildlife passage. A culvert, equivalent to the dimensions of the one upstream Bronte Road should be utilized to maintain wildlife connectivity. • To encourage wildlife passage through the valley as a means of reducing the potential for vehicular impacts, the corridor should be fully naturalized and structures and/or fencing installed to direct fauna in to and out of the passages.	Neutral
	Woodlands	Grading, Servicing	All of the significant woodland features associated with the Subject Property are contained within the	Potential impacts to significant woodlands (and their 10 m buffers) within and adjacent to the Subject	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
		and Development	NHS and will be protected from development. Ecological buffers of 10 m will be applied to the dripline of the woodland vegetation. This will provide sufficient protection to the adjacent woodlands from any potential impacts related to future residential development. A small non-significant tableland woodlot (ELC Unit 9a) will be removed to accommodate the proposed development, resulting in the loss of 0.7 ha of woodland. No direct impacts to significant woodlands are anticipated from the proposed development, with the exception of potential impacts related to construction of a SWM outfall structure within the Fourteen Mile Creek valleylands which may require localized removal of woodland habitat. Under the post development condition, the significant woodlands will be abutted by low density residential land uses. There is a possibility that the woodland and valley may experience additional degradation due to residential encroachments including informal trail development, dumping of litter and yard waste, predation of wildlife by pets, noise and other stressors.	Property can be reduced by implementing the following impact avoidance and mitigation measures: • Naturalize buffers using native species; • Avoid directing runoff to gullies and rills along the valley edge; • Establish fencing and implement erosion and sediment control measures at limit of development in advance of site preparation activities; • Select location of SWM outfall to minimize impacts to wooded features and provide opportunities to remediate existing erosion problems in the valleylands; • Design SWM outfall to minimize their impacts to trees and forest vegetation; • Restore affected areas with native woody (and herbaceous) vegetation; • Design trail systems to minimize tree removals and avoid more sensitive (i.e., wet) areas; • Direct pedestrian traffic to formal trail systems with signs, markers, etc.; • Post signage to discourage encroachment activities; and • Distribute an information pamphlet to educate future homeowners. A minimum buffer of 10 m will be applied to all significant woodland features to protect the woodland habitats and functions. In locations where trails, utilities, infrastructure, SWM and / or LIDs overlap with buffers, the design of these elements should be complimentary to the buffer. The loss of trees from the removal of ELC Unit 9a can be compensated through tree planting in buffers and enhancement areas.	
	Wetlands	Grading, Servicing and Development	There are no significant wetlands on or adjacent to the Subject Property; however, there are a number of small wetlands, most of which are located within the NHS. Development is not proposed within the NHS with the exception of a proposed SWM outfall and a proposed road crossing of Tributary 14W-W1. Wetlands within the Fourteen Mile Creek valleylands will not be affected by development; however, there are wetland features associated with Tributary 14W-W1 that will be affected by a proposed road crossing. It is anticipated that there will be some minor displacement of wetland habitat along the edges of the tributary and that this impact will be localized to the footprint of the proposed road crossing. No impacts from servicing are anticipated as they will be installed under the tributary using trenchless construction methods. Indirect impacts to the wetlands could result from discharge of non-treated urban runoff to the wetland, road runoff and salt spray. There are several small wetland pockets and a pond external to the NHS on the tableland of the Subject Property, including a cattail marsh (ELC Unit 7), a willow thicket swamp (ELC Unit 30), and a shallow aquatic community (ELC Unit 6). These features are proposed for removal, which will result in the loss of 0.17 ha of wetland and approximately 0.3 ha of aquatic habitat in total.	The loss of wetland habitat resulting from the proposed road crossing can be reduced through design to minimize the footprint. The loss of this wetland habitat from the NHS can be mitigated by creating additional wetlands in the tributary valley presently occupied by golf course. Indirect impacts from runoff to the wetland can be mitigated through implementation of SWM and treatment of road runoff. Potential impacts to wetlands in the TPA can be reduced by implementing the following impact avoidance and mitigation measures: • Naturalize buffers using native species; • Avoid directing untreated runoff to the wetlands; • Establish fencing and implement erosion and sediment control measures at limit of development in advance of site preparation activities; • Restore affected areas with native vegetation; • Design trail systems to minimize wetland impact; • Direct pedestrian traffic to formal trail systems; • Post signage to discourage encroachment activities; and • Distribute an information pamphlet to educate future homeowners. A minimum buffer of 15 m should be applied to protected wetland features in the TPA. In locations where trails, utilities, infrastructure, SWM and LIDs overlap with wetland buffers, the design of these elements should be complimentary to the buffer. The specific buffer requirements should be determined through site-specific EISs. The loss of aquatic and wetlands habitat external to the NHS can be mitigated in part through creation of similar habitats within the NHS restoration/enhancement areas. Soil seed bank from ELC Unit 7 and willow shrubs from ELC Unit 30 should be transplanted to wetland or riparian restoration/enhancement areas in the NHS.	Neutral
	Watercourses	Grading, Servicing	*See Fish Habitat*	Apply a 30 m setback to all watercourses on and adjacent to the Subject Property.	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
		and Development			
	Valleylands	Grading, Servicing and Development	The Fourteen Mile Creek valleyland is situated just north of the Subject Property. Several tributaries to Fourteen Mile Creek traverse the Subject Property, including Tributary 14W-W1-1, 14W-W1-2, 14W-W2-3, and 14W-W1. The Fourteen Mile Creek valley and the valleylands associated with tributary 14W-W1, 14W-W1-2 and 14W-W1-3 are included in the proposed NHS. Tributary 14W-W1-1 is an ephemeral swale that traverses the existing golf course. It is not considered a valley feature and is proposed for removal to accommodate the proposed development. Development is not proposed within the Fourteen Mile Creek valley or the valleylands associated with tributary 14W-W1, 14W-W1-2 and 14W-W1-3, with the exception a SWM outfall structure and a proposed road crossing of Tributary 14W-W1.	Any portions of the valleylands affected by a SWM structure or road crossing will be restored. Valley landforms will be retained in their current form, to the greatest extent possible, and continue to provide valleyland functions.	Neutral
	Trees	Grading, Servicing and Development	Much of the Subject Property is utilized as golf course and consists of landscaped areas. It is anticipated that all trees situated within the areas to be developed will be removed with the exception of trees that can be integrated within park or buffer blocks, or in some cases rear lots of larger residences.	The loss of trees from the tableland portions of the site can be mitigated, over the long term, through replacement plantings. Such plantings could be accommodated on site within buffer and open space blocks, and within landscaping internal to the development. Tree preservation requirements will be addressed during the detailed design phase, including a Tree Preservation / Removal Plan.	Neutral
	Fish Habitat	Grading, Servicing and Development	Fish habitat has been identified in the Fourteen Mile Creek and Tributary 14W-W1. There are proposed works within 14W-W1 including a road and watermain crossing, discussed below. A stormwater outfall is also proposed for Fourteen Mile Creek. These proposed activities will require careful review at the detailed design stage to determine if they will impact fish and fish habitat. Grading, servicing and development of the site will occur adjacent to fish habitat. Appropriate setbacks of 30 m have been included for each of the watercourses but potential impacts may still occur to the watercourse based on the proposed activity as outlined below: **Grading:** • Decrease in baseflow to watercourse from dewatering for service installation, causing increase in stream temperatures and reduced flows, potentially impacting movement of sediments and nutrients, connectivity to downstream reaches, habitat conditions (pools, water depth), dissolved oxygen and access to overhanging vegetation. • Increase in erosion along stream banks and valleys and increased sedimentation into the watercourse from the removal of vegetation. This has the potential to impact fish habitat by reducing the spawning, rearing and feeding habitat. • Change in land drainage patterns, which may alter surface water inputs to watercourses impacting flows and water temperature. • Change in land drainage patterns, which may increase erosion along streambanks and valley walls from surface water runoff. • Change in habitat structure and cover from the removal of vegetation. **Servicing:** Installation of underground services has the potential to alter groundwater flows and pathways, which may reduce baseflow contribution to watercourses, resulting in thermal impacts and altered baseflows. Installation of underground services may require dewatering of groundwater which may result in reduced baseflow contributions and increase flows at discharge location. **Development:** Development will create impervious surfaces that will increase overall runoff volumes and decrease infiltration within the catchment areas of features (i.e., tributaries to Fourteen Mile Creek). Decreases to infiltration can reduce base flow contributions to these watercourses and impact fisheries through reduced flow and elevated temperatures. Increased runoff and flows to the valleylands and downstream drainage features can result in erosion and flooding.	Potential impacts to fish habitat can be reduced by implementing the following avoidance and mitigation measures: • Develop and implement an Erosion and Sediment control plan and spill protection plan during the detail design and ensure compliance during the construction and development phase. A multi barrier approach should be implemented (i.e. double row sediment fencing with staked strawbales in between. • Minimize non-essential vegetation clearing and grading, integrate a phasing workplan for grading and construction. • Stabilize soils that will be exposed for long periods of time and store stockpiled soil outside of the fish (Redside Dace) habitat. • During site preparation and construction ensure on-site surface water is properly managed and treated through the use of BMP and mitigation measures. • If dewatering is required to install the servicing, a PTTW must be obtained if daily takings are over 50,000 L/day. A mitigation plan will need to be developed to return the groundwater back to the watercourses, to augment baseflows and regulate temperature. • The resulting infiltration deficit can be reduced by incorporating mitigation measures that direct roof runoff towards lawns, side and rear yard swales in low and medium density residential areas. • Infiltration capacity of soils can be enhanced by increasing topsoil volumes. Refer to Water Balance Analysis prepared by Burnside (2015) for additional details on LID measures. • Develop a restoration and naturalization plan for Tributary 14W-W1 to provide shading to help regulate stream temperatures • The stormwater management facilities proposed in the FSR must be put in place before any development occurs within a catchment. • Mitigation measures for flood control, water quality, temperature impacts, and erosion are noted above under Surface Water.	Neutral
		SWM Facility and Storm Outfall	Two SWM facilities are proposed for the Subject Property which will discharge to Fourteen Mile Creek. Stormwater runoff captured by the proposed stormwater infrastructure could affect water quality in Fourteen Mile Creek and Bronte Creek if released without thermal control. There is also potential for	Mitigation measures for flood control, water quality, temperature impacts, and erosion are noted above under Surface Water. Any potential impacts to fish habitat will be mitigated by the implementation of BMP measures according	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
			increased erosion of the receiving waterbody at the discharge location. Impacts to water quality in the receiving waterbody may include increased total suspended solids (TSS), turbidity, nutrients, metals, thermal impacts and low dissolved oxygen inputs. Potential impacts related from the construction and of the SWM facilities includes: • Post-development, re-direction of surface water to SWM facility instead of natural infiltration may potentially alter hydraulic regime within Fourteen Mile Creek and tributaries • Potential interruption to groundwater flow from SWM facility liners • Redirection of surface water contributions to one discharge point instead of across the capture area may impact reaches upstream of the discharge location that received flow prior to development	to the specified level of habitat protection in the MOE SWMP Design Manual. This will include enhanced level of control provides protection for receiving watercourses with removal of 80% TSS over the average long-term. Outflows to be limited to the parameters set out in the ASP – specifically extended detention of the runoff from the 25mm storm for 48 hours, and 2 year release rate of 5L/s/ha in order to provide erosion protection (DSEL, 2014). Provide extended detention storage in SWM facility to minimize post-development impacts to receiving waterbody, including erosion and scouring of watercourse and to control flow rates.	
		Road and Servicing Crossing of Tributary 14W-W1	A road crossing and watermain crossing of Tributary 14W-W1 on the Subject Property are proposed within the valleylands. The road and watermain crossings are upstream of direct fish habitat. This may result in potential impacts including: • Restricted flows and impact to fish passage based on the type and size of crossing structure; • Reduced light penetration from the crossing structure; • Disruption of groundwater flow/upwelling into watercourse from installation of watermain and crossing structure; • Release of sediment into watercourse causing elevated TSS and turbidity in downstream reaches can affect fish by causing elevated stress levels, reduced feeding, loss of suitable spawning substrates, covering eggs and gill abrasion from the suspended particles; and • Removal of riparian vegetation may increase stream temperatures, removal of over-hanging vegetation and cover may impact feeding and refuge areas.	Loss of fish habitat is not anticipated from the construction of the road and watermain crossing on Tributary 14W-W1. • Limit vegetation removal where possible, and stabilize cleared areas to prevent surface water runoff and sedimentation into watercourse; • Develop and implement an Erosion and Sediment control plan to minimize risk of sedimentation into watercourse, complete regular inspections of control measures and repair when required; • Design road to cross over straight sections of the watercourse; • Span the watercourse and use open bottom culverts if possible; • Develop a Spill Prevention plan and ensure spill kits are kept on site; • Install watermain using trenchless crossing techniques; • Restore disturbed areas with native plants; and • Phase works so that road and watermain are constructed at same time. **If in-stream works required**: • Limit duration of in-water work; • Complete in-stream work within appropriate timing window and during periods of low flow and appropriate weather conditions (i.e. avoid wet, windy periods); • Complete works using isolation technique via dam and pump to maintain water flow downstream. Water should be re-directed to watercourse through a filter bag or via a vegetated area.	Neutral
Wildlife	**Birds**	Grading, Servicing and Development	The open land bird species found within the Subject Property are expected to undergo a moderate shift in species diversity and numbers with residential development. However, roughly the same number of species would be expected in the golf course area both pre- and post development, and species in both cases would be disturbance-tolerant species. For instance, one would expect fewer or no Savannah Sparrows, Song Sparrows and Eastern Kingbirds, but more Mourning Doves, N. Cardinals, Chipping Sparrows. All of the forest and edge species that occur within the forested valley are expected to remain subject to the usual annual variation.	• Undertake vegetation / tree clearing between August and April so as not to impact breeding birds and not contravene the *Migratory Birds Convention Act.* • Establish buffers and fencing at development limits adjacent to wooded valley to reduce human encroachments and predation by pets. • Post signage to keep pets and people out of the wooded valley feature (except where trails allow).	Neutral
	Reptiles	Grading, Servicing and Development	No significant reptile habitats (i.e. hibernacula, nesting sites) will be removed from the proposed NHS. The foraging and over-wintering habitat for Painted Turtle (in artificial pond on Subject Property outside the proposed NHS) will be removed to accommodate future development. There is one pond the Subject Property (Pond #7), which has been artificially constructed for the purposes of golf course irrigation and as a landscaping feature. The pond is proposed for removal, which has the potential to remove turtle habitat on-site. The majority of significant habitat used by snakes (forest and forest edges) will remain unaffected by the proposed development; however some foraging habitats adjacent to the forested valleylands will be	• Mitigation for the loss of possible turtle over-wintering sites in Pond #7 and any possible nesting sites can be provided in part through the construction of a new pond specifically designed to provide an equivalent level of habitat functions. • Impacts during pond removal can be mitigated by undertaking construction when turtles are least likely to be in the pond (late summer/early fall). During decommissioning of ponds, any reptiles encountered should be rescued and moved to safe suitable habitat on the Deerfield Property. • The appropriate wildlife handling permits will be obtained if necessary. • The proposed SWM Ponds can also be designed to provide additional habitat for turtles. • The loss of potential foraging habitats for snakes can be mitigated by retaining meadow and other types of habitats within woodland and creek buffer blocks. • It is recommended that an Amphibian and Reptile Protection be specifically addressed in the	Neutral

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
			partially removed for development.	Environmental Management Plan to be developed as part of the detailed design phase and as a Draft Plan approval condition that includes the specific details of the construction scheduling, permitting and relocation.	
	Amphibians	Grading, Servicing and Development	The single amphibian breeding site on the Subject Property is associated with an artificial dug pond which is outside the proposed NHS. This pond is proposed to be removed under the proposed development, which will result in a loss of amphibian production.	• Mitigation for the loss of a potential amphibian breeding site can be provided in part through the construction of a new pond specifically designed to provide an equivalent level of function. Proposed SWM Ponds will also likely provide additional habitat for some of the breeding amphibian species currently in the TPA. • Undertake pond removal when: a) amphibians are not breeding (late summer to end of February; however note turtle constrain mentioned above), and b) after any newly created amphibian ponds are built (thus the opportunity for movement to new pond is possible and transfer of amphibians is possible, if undertaken). • During decommissioning of ponds, any amphibians encountered will be rescued and moved to safe suitable habitat on the Deerfield Property. The appropriate wildlife handling permits will be obtained if necessary. • It is recommended that an Amphibian and Reptile Protection be specifically addressed in the Environmental Management Plan to be developed as part of the detailed design phase and as a Draft Plan approval condition that includes the specific details of the construction scheduling, permitting and relocation.	Neutral - Negative
	Mammals	Grading, Servicing and Development	All of the mammal species that are currently present on and adjacent to the Subject Property are urban tolerant species and expected to remain in the post development environment. Similar to the birds, it is anticipated there will be a slight shift in species assemblages toward a greater number of species that are more tolerant of urban environments. For example, Deer and Meadow Vole use is expected to decrease, while Raccoon and Striped Skunk populations could increase. Wildlife movement patterns in the general vicinity are expected to change as landscape resistance will increase as a result of development. It is expected that future wildlife movement will be more concentrated to the linkage corridors provided by the valleylands associated with Fourteen Mile Creek and is tributaries. While there may be fewer movement opportunities, the establishment of corridors will provide for safer passage across major roadways.	Enhance the function of existing linkage features as recommended in the EIS for Restoration/Enhancement Area 1.	Neutral
	Odonates and Lepidoptera	Grading, Servicing and Development	Odonates recorded on the Subject Property were primarily associated with the pond (ELC Unit 6) as well as the old field meadow (Unit 12) and portions of golf course ruff. Lepidoptera were mainly associated with old field Unit 12. The majority of the Odonate and Lepidoptera habitat will be removed to accommodate the proposed development.	Odonate and Lepidoptera habitat can be created in various locations on the Subject Property to mitigate for the proposed habitat loss: • SWM pond blocks and buffers to the NHS can be planted with native wildflowers to attract butterflies; • Proposed SWM ponds will likely provide habitat for odonate foraging; • In addition, a pond feature could be created in Enhancement area 1 and/or Enhancement Area 5 to replicate the function of ELC Unit 6 for odonate breeding and foraging.	Neutral
	Crayfish	Grading, Servicing and Development	No impacts are anticipated as there are no Chimney Crayfish recorded from the Subject Property.	None required	Neutral
Species at Risk	**Barn Swallow**	Grading, Servicing and Development	Barn Swallow has been confirmed to be nesting on two structures on the Saw-Whet property. These structures and some of their associated foraging habitat will be removed to accommodate the proposed development.	The removal of the Barn Swallow habitat will be mitigated through compensation (e.g., creation and installation of new nesting structures) in accordance with the *Endangered Species Act* and regulations pertaining to this species. This process will either be through the OMNR Registry, or through an Overall Benefit Permit 17(2)(c) permit both of which are regulatory processes under the Act (2007). Since 'overall benefit' is required under the Act, the Residual Effects are positive as they should yield a habitat net gain for this species.	Positive
	Redside Dace	Grading, Servicing and Development	Fourteen Mile Creek West Branch has been confirmed as occupied Redside Dace habitat, the lower reaches of 14W-W1 have been classified as Recovery Habitat, and 14W-W1 upstream of the golf path on the Subject Property is considered Contributing Habitat. There are proposed works within or adjacent to 14W-W1 including a road and watermain crossing, and	Mitigation measures will be implemented in accordance with the *Draft Guidance for Development Activities in Redside Dace Protected Habitat* (OMNR, 2011). Potential impacts to Redside Dace in the TPA and downstream reaches can be reduced by implementing the following measures: • Develop and implement an Erosion and Sediment control plan and spill protection plan during the	Neutral - Positive

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
			a storm outfall which are discussed below. The proposed road crossing will overlap with an area identified as Contributing Habitat for Redside Dace. All measures to avoid and mitigate impacts to the extent possible will be considered and implemented, as discussed in the recommended mitigation column. Grading, servicing and development of the site will occur adjacent to Recovery Habitat and are not anticipated to result is a direct impact. Appropriate development setbacks and buffers have been provided to each of the watercourses as described in Section 5.2 to protect Recovery Habitat. Potential indirect impacts to fish habitat that may result from the proposed development are outlined below: **Grading** • Potential decrease in baseflow from dewatering for service installation, causing increase in stream temperatures and reduced flows, potentially impacting movement of sediments and nutrients, connectivity to downstream reaches, habitat conditions (pools, water depth), dissolved oxygen and access to overhanging vegetation. • Potential increase in erosion along stream banks and valleys and increased sedimentation into the watercourse from the removal of vegetation. This can affect fish habitat by reducing the spawning, rearing and feeding habitat; • Changes to drainage patterns may alter the quantity and distribution of surface water inputs to watercourses, affecting flows, erosion rates and water temperatures; • Change in habitat structure and cover from the removal of vegetation. **Servicing:** Installation of underground services has the potential to alter groundwater flows and pathways, which may reduce baseflow contribution to watercourses, resulting in thermal impacts and altered baseflows. Installation of underground services may require dewatering of groundwater which may result in reduced baseflow contributions and increase flows at discharge location. **Development:** • Development is proposed adjacent to Fourteen Mile Creek and its tributaries. • Development will create impervious surfaces that will increase overall runoff volumes and decrease infiltration within the catchment areas of features (i.e., tributaries to Fourteen Mile Creek). • Decreases to infiltration can reduce base flow contributions to these watercourses and impact fisheries through reduced flow and elevated temperatures. • Increased runoff and flows to the valleylands and downstream drainage features can result in erosion and flooding. • Tributary 14W-W1 contributes some limited baseflow to the creek which regulates flow and temperature. These conditions provide suitable habitat for Redside Dace within downstream of the proposed development.	detail design and ensure compliance during the construction and development phase. A multi barrier approach should be implemented (i.e., double row sediment fencing with staked strawbales in between; • Minimize non-essential vegetation clearing and grading, and integrate a phasing workplan for grading and construction; • Stabilize soils that will be exposed for long periods of time and store stockpiled soil outside of the Redside Dace habitat; • During site preparation and construction ensure on-site surface water is properly managed and treated through the use of BMP and mitigation measures. If water is to be discharged to Redside Dace habitat, all plans must be approved by OMNR; • If dewatering is required to install the servicing, a PTTW must be obtained if daily takings are over 50,000 L/day. A mitigation plan will need to be developed to return the groundwater to the watercourses to augment baseflow and regulate temperature; • The resulting infiltration deficit can be reduced by incorporating mitigation measures that direct roof runoff towards lawns, side and rear yard swales in low and medium density residential areas; • Infiltration capacity of soils can be enhanced by increasing topsoil volumes. Refer to Water Balance Analysis prepared by Burnside (2015) for additional details on LID measures and other water balancing recommendations; • Develop a restoration and naturalization plan for the Redside Dace contributing habitat in Tributary 14W-W1 (Reaches, SW3, SWS1 and SW4) to provide shading to help regulate stream temperatures. Mitigation measures for flood control, water quality, temperature impacts, and erosion are noted above under Surface Water. Additionally, it is proposed that the riparian environment be enhanced through restoration and naturalization efforts proposed in this EIS. These proposed activities will serve to enhance the habitat and supporting functions for Redside Dace.	
		SWM Facility and Storm Outfall	Two SWM facilities are proposed for the Subject Property which will discharge to Fourteen Mile Creek. (DSEL, 2014). A SWM outfall is proposed along the southern side of the Fourteen Mile Creek valley. Direct connections from the SWM facilities to Redside Dace habitat may require a permit under the Act due to the potential for negative impacts. Potential impacts related from the construction and of the SWM facilities includes: • Stormwater runoff captured by the proposed stormwater infrastructure could affect water quality in Fourteen Mile Creek if released without thermal control. • Impacts to water quality in the receiving waterbody may include increased TSS, turbidity,	• Mitigation measures for flood control, water quality, temperature impacts, and erosion are noted above under Surface Water. In addition to the mitigation measures outlined above in Fish Habitat, the following mitigation measures will be implemented to protect Redside Dace and its habitat: • The SWM facility design will follow the criteria in the Stormwater Management and Design Manual (MOE, 2003) and the Draft Guidance for Development Activities in Redside Dace Protected Habitat (OMNR, 2011); • Thermal mitigation measures will be implemented as outlined under Surface Water. In addition best efforts to achieve discharge temperatures below 24°C and target a dissolved oxygen concentrations of at least 7 mg/L are necessary. A maximum discharge temperature of 22°C has been developed	Neutral - Positive

Category	Feature/Function	Proposed Activity	Potential Impacts	Recommended Mitigation	Residual Effects
			nutrients, metals, thermal impacts and low dissolved oxygen inputs. • There is also potential for increased erosion of the receiving waterbody at the discharge location. • Post-development - re-direction of surface water to SWM facility instead of natural infiltration may potentially alter hydrological cycle within Fourteen Mile Creek and tributaries • Potential interruption to groundwater flow from SWM facility liners • Redirection of surface water to one discharge point instead of several discharge locations may impact reaches upstream of the SWM outfall	for Tributary 14W-W1 and 24°C for Fourteen Mile Creek, and Tributary 14E to protect the receiving watercourses and fish populations (DSEL, 2014); • Implement BMPs including LID's and lot conveyance features; • Include site design to minimize surface water runoff including conserving natural features; • In addition if a 17(2)c permit is required to complete the works an overall benefit to Redside Dace will be achieved.	
		Road and Servicing Crossing of Tributary 14W-W1	A proposed road crossing and watermain crossing of Tributary 14W-W1 on the Subject Property is proposed within the valleylands. The proposed crossing will occur in the area identified as Contributing Habitat of Redside Dace. This may result in potential impacts including: **Grading, Road Crossing and Watermain Crossing** • Restricted flows and impact to fish passage based on the type and size of crossing structure; • Reduced light penetration from the crossing structure • Disruption of groundwater flow/upwelling into watercourse from installation of watermain and crossing structure • Release of sediment into watercourse causing elevated TSS and turbidity in downstream reaches can affect Redside Dace by impairing respiratory functions, reduced vision which affects their ability to feed, elevated stress levels, loss of suitable spawning substrates, covering eggs and gill abrasion from the suspended particles. TSS concentrations above 25 mg/L as well as the exposure duration will begin to impact Redside Dace by causing them to avoid areas, change breathing patterns and may lead to destruction of habitat and/or death. • Removal of riparian vegetation may increase stream temperatures, removal of over-hanging vegetation and cover may impact feeding and refuge areas	The following mitigation measures will be implemented to protect Redside Dace and its habitat in downstream reaches: • Limit vegetation removal where possible, and stabilize cleared areas to prevent surface water runoff and sedimentation into watercourse; • Develop and implement an Erosion and Sediment control plan to minimize risk of sedimentation into watercourse, complete regulator inspections of control measures and repair when required; • Design road to cross over straight sections of the watercourse; • Span the watercourse and use open bottom culverts if possible; • Develop a Spill Prevention plan and ensure spill kits are kept on site; • Install watermain using trenchless crossing techniques • Restore disturbed areas with native plants **If in-stream works are required:** • Limit duration of in-water work; • Complete in-stream work during periods of low flow and during appropriate weather conditions (i.e. avoid wet, windy periods); • Complete works using isolation technique via dam and pump to maintain water flow downstream. Water should be re-directed to watercourse through a filter bag or via a vegetated area; In addition, if a 17(2)c permit is required to complete the works an overall benefit to Redside Dace will be achieved.	Neutral - Positive

** Additional Information 1:

Tributary (Reach)	Peak Flow (m3/s)		Average Flow (m3/s)		Total Volume (1000 m3)		
	Pre	Post	Pre	Post	Pre	Post	Change
14W-W1 (SW-2)	4.1	3.801	0.006	0.008	105	135	+ 30%
14W (75A)	38.5	38.4	0.098	0.100	1640	1675	+2%
14W (73)	37.7	38.3	0.103	0.120	1730	2030	+ 17%
14 Main Branch (5b)	38.7	38.7	0.115	0.130	1930	2190	+13%

To ensure existing flow characteristics will be maintained in Fourteen Mile Creek under proposed conditions, a comparison of annual existing and proposed conditions for surface water contributions to Fourteen Mile Creek has been completed. Annual peak flows; average flows and total flow volumes related to surface runoff have been assessed for six selected years that are representative of wet, dry, and average years (1963, 1979, 1980, 1993, 1995 and 1997). Overall, there is an expected increase in the total volume in Fourteen Mile Creek and its tributaries between existing and proposed conditions, due to the increased imperviousness of the proposed development. Average and peak flows in the creek remain generally similar under existing and proposed conditions. Results are summarized in the table to the right.

8. Monitoring Program – Proposed Terms of Reference

Monitoring will be required to evaluate changes to the biophysical environment over time as the lands are urbanized and to verify that the proposed mitigation measures and environmental management systems have been implemented and are performing as designed.

Monitoring is proposed prior to development, during development and following development. The objective of pre-development monitoring is to establish baseline conditions. Monitoring during development is intended to verify that the design of the environmental management systems are in accordance with the recommendations of the EIS and FSR, and that the various mitigation measures and best management practices have been implemented and are performing their intended function (i.e., sediment and erosion control, naturalization plantings, SWM). Post-development monitoring is intended to evaluate compliance and ensure functionality of the overall system.

Terms of Reference for a monitoring program were previously included as part of the Merton Phase 2 EIS (Beacon Environmental, 2013) which examined the larger TPA. A variety of biophysical parameters were selected based on their ability to detect anticipated changes resulting from urbanization rather than general ecosystem monitoring. Targeted monitoring is generally considered more effective at yielding the necessary feedback to adaptively manage environmental systems.

The proposed Terms of Reference, presented in this EIS as **Table 23,** identify the suite of biophysical parameters to be monitored before, during and following development of the Subject Property. It is anticipated that the monitoring program will be implemented at the TPA scale, with some specialized monitoring at the site-specific scale.

Final Terms of Reference will be established through review and consultations with Conservation Halton and the Town of Oakville.

Table 23. Proposed Monitoring Framework

Ecosystem Component	Objective(s)/Rationale	Monitoring Parameter(s)	Monitoring Indicator(s)	Methods/Protocols/Analyses	Frequency & Duration			Comments
					Pre-Development	During Construction	Post-Development	
Groundwater Resources	To assess changes in the groundwater elevations and flow conditions	Groundwater Level	Groundwater elevations	Manual measurement in all on-site monitoring wells and continuous data logger readings at selected locations. Specific locations should be discussed with CH.	Monthly manual for 1 year, and quarterly thereafter. Hourly data logger readings for 1 to 2 years at selected locations.	To be determined in consultation with CH	To be determined in consultation with CH	
		Groundwater Flow Patterns	Groundwater elevations	Manual measurement in all on-site monitoring wells and continuous data logger readings at selected locations. Specific locations should be discussed with CH.	Monthly manual for 1 year, and quarterly thereafter. Hourly data logger readings for 1 to 2 years at selected locations.	To be determined in consultation with CH	To be determined in consultation with CH	
		Discharge/Baseflow	Surface water flow and groundwater levels	Manual measurement in drive-point piezometers installed along watercourse banks and continuous data logger readings at selected locations. Spot flow monitoring at representative locations along Fourteen Mile Creek and its tributaries.	Monthly for 1 year, and quarterly thereafter. Hourly data logger readings for 1 to 2 years at selected locations.	To be determined in consultation with CH	To be determined in consultation with CH	
			Temperature, Conductivity	Continuous data logger	Hourly for 1 to 2 years	To be determined in consultation with CH	To be determined in consultation with CH	
			Groundwater Seeps and Springs, groundwater indicators	Visual observations and identification of groundwater indicators	Seasonally for 2 years	Seasonally during construction	To be determined in consultation with CH	
	To assess groundwater quality as part of dewatering activities to ensure discharged water is within standards.	Groundwater Quality	Chemistry	Sampling and Laboratory Analyses – Parameters to be determined through discussions with MOE.	Once to establish baseline conditions.	To be determined in consultation with CH/MOE	To be determined in consultation with CH/MOE	
Surface Water Resources	To assess changes in water quantity as a result of urbanization.	Quantity	Flow Rates	Continuous data loggers	To be determined in consultation with CH	To be determined in consultation with CH	To be determined in consultation with CH	
			SWM Pond Water Levels	Read permanently installed staff gauge.	N/A	N/A	To be determined in consultation with CH	
	To assess changes in water quality as a result of urbanization.	Quality	Sediment	Confirm that MOE 'Enhanced' Protection is provided (at least 80% TSS removal)	Once to establish baseline condition	To be determined in consultation with CH	To be determined in consultation with CH	
	To confirm that ESC measures have been implemented and are performing as per specifications		Sediment and Erosion Controls	Regular Inspection	N/A	To be determined in consultation with CH	To be determined in consultation with CH	
Geomorphology (no channel design proposed)	To assess changes in channel morphology as a result of urbanization	General site conditions	Repeated, monumented photographs	Photographic record of site conditions from common view point	Once to establish baseline conditions		To be determined in consultation with CH	Timing of Monitoring: Summer/Fall (after Spring freshet). Same time each year
		Channel form	Cross-sectional Dimensions	Repeated measurement of control sections will quantify the percentage decrease/ increase in cross-sectional dimensions	Once to establish baseline conditions		To be determined in consultation with CH	Timing of Monitoring: Summer/Fall (after Spring freshet). Same time each year
		Bank erosion rates	Bank Erosion Rates	Erosion pins will be established at selected cross-sections. Repeated measurement of erosion pins will be undertaken to quantify erosion rates.	Once to establish baseline conditions		To be determined in consultation with CH	Timing of Monitoring: Summer/Fall (after Spring freshet). Same time each year
		Bed morphology	Long Profile	Repeated survey of bed morphology, in reference to a local benchmark	Once to establish baseline conditions		To be determined in consultation with CH	Timing of Monitoring: Summer/Fall (after Spring freshet). Same time each year
		Percentage of fines, D_{50}, D_{84}, Wolman pebble count	Substrate Composition	Channel substrate will be evaluated through a Wolman pebble count to determine the increase/decrease of the percentage of fines and D_{50}	Once to establish baseline conditions		To be determined in consultation with CH	Timing of Monitoring: Summer/Fall (after Spring freshet). Same time each year
Terrestrial Resources - Vegetation	To assess changes in the type and extent of natural cover in the TPA over the long	Natural Vegetation Cover	Type and extent of natural vegetation cover	Vegetation resources will be classified according to ELC standards. The area of each ELC vegetation type will be estimated using aerial	None – Completed	Every 5 years until 100% Build Out	To be determined in consultation with CH	

Ecosystem Component	Objective(s)/Rationale	Monitoring Parameter(s)	Monitoring Indicator(s)	Methods/Protocols/Analyses	Frequency & Duration			Comments
					Pre-Development	During Construction	Post-Development	
	term.			photography. GIS analyses will be used to compare changes in area over time.				
	To assess changes in floristic quality within the natural heritage system over time.		Floristic Quality	The floristic quality of vegetation communities within the natural heritage system will establish by undertaking a floristic quality assessment (FQA). These values can be compared over time to identify trends.	Once to establish baseline condition	Every 5 years until 100% Build Out	To be determined in consultation with CH	
	To assess changes in the distribution and abundance of invasive plant species over time.		Invasive Species	Vegetation surveys will identify populations of invasive species. The location of the species and their population densities will be mapped and described to facilitate comparison over the long-term with monitoring efforts.	Once to establish baseline condition	Every 5 years until 100% Build Out	To be determined in consultation with CH	
	To evaluate the effectiveness of the prescribed buffers in reducing encroachment related impacts to protected features within the natural heritage system.	Buffer Integrity	Human related disturbance	The interface between the development and natural heritage system will be fenced off and surveyed to document evidence of human disturbance. Observations will be categorized according to disturbance type, extent and magnitude of effect. A homeowner information pamphlet will be developed as a Draft Plan condition.	None	Annually until 100% Build Out	To be determined in consultation with CH	
			Condition of buffer plantings	Buffers will be planted and naturalized using native species. The condition of these plantings will be assessed using standard vegetation plots.	None	Annually until 100% Build Out	To be determined in consultation with CH	
Terrestrial Resources - Wildlife	To assess changes in the type and extent of breeding avian species over the long term.	Breeding bird species	Locations, number and abundance bird of species	Breeding bird surveys will be conducted both pre and post construction using standard protocols concerning weather and time of year (late May to early July), and twice per breeding season. All of the Subject Property will be covered (both developed and not developed areas) as will the adjacent 14 Mile Creek valley.	Ongoing	Annually until 100% Build Out	To be determined in consultation with CH	
	To assess the success and productivity of newly created ponds/wetlands	Amphibians/Turtles and condition of created habitats	Locations, number and abundance amphibian and turtle of species; success and condition of wetland plantings	Ponds/wetlands that are created will be monitored to ensure that the wetland vegetation present (whether planted or naturally grown) is appropriate. Amphibian populations will be monitored three times per year in years monitored. Turtle presence will be monitored twice per year in newly created ponds/wetlands. To follow Amphibian and Reptile Protection and Enhancement Plan.	None - Completed	Annually until 100% Build Out	To be determined in consultation with CH	
	To assess linkage functions of wildlife passages along Tributary 14W1 corridor.	Wildlife Movement	Wildlife utilization of culvert crossings at Bronte Road.	Install cameras at culvert crossings to estimate wildlife utilization (type, frequency)	Cameras will document wildlife movement, during the spring, summer and fall for 1 monitoring year	Annually until 100% Build Out	To be determined in consultation with CH	
Aquatic Resources	To assess changes to fish habitat.	Aquatic Habitat Quality	Stream Morphology, Instream and riparian habitat	OSAP will be used to characterize each feature and highlight any changes or degradation over time.	Once to establish baseline conditions	To be determined in consultation with CH, MOE and OMNR	To be determined in consultation with CH, MOE and OMNR	
	To assess the quality of the groundwater discharge into the receiving water body during the construction phase.	Fish and Redside Dace Habitat	Chemistry	Measurements of TSS to ensure water quality does not exceed 25 mg/L of total suspended solids, laboratory analysis.	Once to establish baseline conditions	To be determined in consultation with CH, MOE and OMNR	To be determined in consultation with CH, MOE and OMNR	
	To assess potential water temperature impacts to the receiving water body.	Fish and Redside Dace Habitat	Water temperature	Continuous temperature loggers will be installed upstream and downstream of the SWM outfall locations and at discharge points to ensure discharge temperature does not exceed 24°C.	Hourly data logger readings for 1 to 2 years prior to development.	To be determined in consultation with CH and OMNR	To be determined in consultation with CH and OMNR	
	To assess potential water quality impacts to the receiving water body from the SWM discharge.	Fish and Redside Dace Habitat	Chemistry	Sampling and Laboratory Analyses	Once to establish baseline conditions.	To be determined in consultation with CH, MOE and OMNR	To be determined in consultation with CH, MOE and OMNR	
	Discharge/Baseflows	Surface water flow	Continuous data logger readings at selected locations. Spot flow monitoring at representative locations along Fourteen Mile Creek and its tributaries.	Monthly for 1 year, and quarterly thereafter. Hourly data logger readings for 1 to 2 years at selected locations.	To be determined in consultation with CH	To be determined in consultation with CH	To be determined in consultation with CH	
	To assess impacts to groundwater seeps and springs.	Groundwater indicator plant species	Mapping of groundwater seeps and springs using indicator plant species including watercress,	To identify and map seepage areas using one or more of the following indicators: • Populations of seepage plant indicators such as	Monitoring is proposed to occur annually prior to construction.	Monitoring is proposed at 2 years intervals until 100% build-out.	Monitoring is proposed for 5 years following 100% build-out.	

Ecosystem Component	Objective(s)/Rationale	Monitoring Parameter(s)	Monitoring Indicator(s)	Methods/Protocols/Analyses	Frequency & Duration			Comments
					Pre-Development	During Construction	Post-Development	
			skunk cabbage and other indicators such as bubbling.	watercress (Nasturtium officinale), Rough-leaved Goldenrod (Solidago patula), and Canada Clearweed (Pilea pumila); • Presence of iron staining as indicated through red rust coloured soils along banks and stream beds; • Bank seepage Monitoring sites will be selected based on an initial survey. Monitoring will consist of documenting coordinates of sites, photographing the seepage area, and measuring the extent of seepage area and associated seepage vegetation. The limits of the seepage zones will be marked using pins to facilitate future comparisons. Monitoring will be undertaken in the spring when the groundwater table is typically higher or in the winter months if snow cover conditions are conducive to detection of ice free areas.				
	To assess impacts to Redside Dace and habitat from construction impacts	Site Conditions	Erosion and sediment control measures and quality of surface water runoff	Regular monitoring of erosion and sediment control measures and monitoring of surface water runoff	To establish baseline conditions	To be determined in consultation with CH and OMNR	To be determined in consultation with CH and OMNR	

9. Policy Compliance

A summary of federal, provincial and municipal environmental protection and planning policies and regulations applicable to the Subject Property were discussed in **Section 2**. An evaluation of how the preferred land use option for the Subject Property complies with the applicable environmental policies and legislation is summarized below in **Table 24**.

Table 24. Policy Compliance Assessment

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
Federal Fisheries Act (1985)	The watercourses within the Subject Property contain fish habitat. All watercourses and associated fish habitats within the Subject Property and the adjacent Fourteen Mile Creek will be protected through their inclusion in the proposed NHS, and through implementation of appropriate mitigation measures that ensure fish habitat is not impacted.	Yes
Endangered Species Act (2007)	Habitat for Redside Dace (endangered) and Barn Swallow (threatened) has been confirmed within the Study Area. The habitat of Redside Dace has been confirmed with OMNR and the limit of future development has been established outside the habitat for this species. Some elements of the development such as a proposed road crossing of Tributary 14W-W1 in Redside Dace contributing habitat and a stormwater outfall will need to be constructed within the habitat for this species. Appropriate mitigation measures have been identified and will be implemented to reduce potential impacts to the fishery. An *Endangered Species Act* permit will need to be obtained from OMNR to allow for development. Barn Swallow habitat will be removed from the Subject Property to accommodate the proposed development. Compensation for the removal of the habitat will be provided in accordance with *Endangered Species Act* regulations to the satisfaction of OMNR.	Yes (Subject to OMNR Permitting and Approval)
Parkway Belt West Plan (2008; 1978)	The Subject Property is not within the Parkway Belt West Plan; as such the PBWP policies do not apply to the Subject Property.	N/A
Greenbelt Plan (2005)	No portion of the Subject Property overlaps with the GBP area; as such the GBP policies do not apply to the Subject Property.	N/A
Provincial Policy Statement (2014) Section 2.1 – Natural Heritage		
1. Habitat for Threatened and Endangered Species	Habitat for endangered and threatened species has been identified on the Subject Property and is being addressed in conformity with the *Endangered Species Act* (see above).	Yes
2. Significant Valleylands	The valleylands associated with Fourteen Mile Creek and portions of their tributaries (14W-W1) are recognized in the EIS as representing significant valleylands. The limits of the proposed development have been established outside of the valleyland features and the established setbacks.	Yes

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
	Some elements of the development, such as a proposed road crossing of the upper reaches of Tributary 14W-W1 and a stormwater outfall, will need to be constructed within the valleylands. Appropriate mitigation measures such as setbacks and erosion control measures have been identified, and will need to be implemented to reduce potential impacts to the significant valleyland features as a result of accommodating essential infrastructure and servicing needs. No negative impacts are anticipated to the identified significant valleylands if protection and mitigation measures are implemented as recommended in this EIS.	
3. Significant Wetlands	There are no Provincially Significant Wetlands identified on the Subject Property or environs. Unevaluated wetlands associated with the Fourteen Mile Creek floodplain and valleylands within and outside the Subject Property could potentially be considered significant wetlands based on ROPA 38 Policy 276.5. Irrespective, these wetlands are entirely contained within the proposed NHS and will be protected from development. Some elements of the development, such as a proposed road crossing of Tributary 14W-W1 will need to be constructed within the valleylands and could potentially impact upon wetlands in the area. Appropriate mitigation measures such as compensation for wetland loss due to roadways, buffers and sediment and erosion controls have been recommended in the EIS to reduce potential impacts to these non-provincially significant wetland features as a result of accommodating essential infrastructure and servicing needs. No negative impacts are anticipated to the small wetlands associated with Tributary 14W-W1 if protection and mitigation measures are implemented as recommended in this EIS.	Yes
4. Significant Woodlands	Woodland features outside of but adjacent to the Subject Property and associated with the Fourteen Mile Creek valley system have been determined to satisfy the Region's criteria for significant woodlands. The limits of the significant woodlands have been confirmed with Region of Halton staff. All confirmed significant woodlands have been recognized as key features or core areas within the proposed NHS, and a 10 m buffer has been applied from the drip line of these features. The proposed plan limits development to areas outside the NHS. As such, significant woodlands will not be directly impacted by future development, with the exception of some localized areas where a stormwater outfall will need to be constructed. Appropriate mitigation measures such as restoration of affected areas have been recommended in the EIS to reduce potential impacts to significant woodland features as a result of accommodating essential servicing needs.	Yes

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
	No negative impacts are anticipated to the identified significant woodlands if protection and mitigation measures are implemented as recommended in this EIS.	
5. Significant Wildlife Habitat	No candidate significant wildlife habitats occur on the Subject Property. However, the EIS has found that there are several candidate significant wildlife habitat areas (i.e., mature forest communities, area-sensitive forest species habitat, and landbird stopover area) within the valleylands of the Fourteen Mile Creek adjacent to the Subject Property. These candidate significant wildlife habitats are entirely contained within the proposed NHS and will be protected from future development. Indirect development related impacts to significant wildlife habitats will be mitigated by implementing the recommendations provided in this EIS, including application of buffers and implementation of specific restoration/enhancement objectives. No negative impacts are anticipated to the identified significant wildlife habitat if protection and mitigation measures are implemented as recommended in this EIS.	Yes
6. Significant Areas of Natural and Scientific Interest	The Subject Property does not overlap directly with any earth or life science ANSIs. ANSIs in the vicinity of the Subject Property are confined to the Bronte Creek Valley and Bronte Creek Provincial Park.	N/A
7. Fish Habitat	See text above re: *Federal Fisheries Act*	Yes (Subject to OMNR/CH Permitting)
Provincial Policy Statement (2014) Section 2.2 - Water	This EIS has identified the presence of sensitive surface and groundwater features within the Subject Property. The EIS has protected these features by including them within a proposed NHS and has restricted development to areas outside the NHS. The proposed development has the potential to indirectly impact on the sensitive water features if such impacts are not mitigated. The EIS and companion technical studies have identified mitigation measures to be implemented to reduce impacts to sensitive surface water and groundwater features and their hydrologic functions.	Yes (Subject to OMNR/CH/MOE Permitting)
Provincial Policy Statement (2014) Section 2.3 – Natural Hazards	The natural hazards in the Study Area are entirely outside the Subject Property and within the floodplains of the Fourteen Mile Creek valley, and the immediate tributaries to Fourteen Mile Creek in the woodlands adjacent to the Subject Property. Development of the Subject Property will generally be confined to areas outside these hazards. However, components of the proposed development, such as the stormwater outfall and a proposed road crossing of Tributary 14W-W1, will overlap with these hazard areas. The EIS and companion studies have identified mitigation measures to ensure that existing natural hazards are not exacerbated and that any	Yes

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
	development undertaken in a hazard area is done so in accordance with appropriate regulations and design standards.	
Region of Halton Official Plan (2006)	The Region's Official Plan identifies all of the Subject Property as Urban Area except for ELC Unit 12 (the periodically farmed old field meadow), which is designated as Greenlands B because of its inclusion within the Fourteen Mile Creek valley ESA#12, along with the adjacent forested tablelands and valleylands of the Fourteen Mile Creek valley. The EIS has undertaken an exercise to refine the limits of the ESA boundaries based on criteria provided in Section 121 of the Official Plan to better establish which areas would be subject to the Greenlands A and B policies, and has determined that ELC Unit 12 does not meet the criteria for inclusion as ESA or Greenlands B, but that the adjacent forested tablelands and valleylands of the Fourteen Mile Creek valley, as well as a few additional areas would continue to qualify as Greenlands B. Under the proposed development, all development is kept outside of the confirmed Greenlands B areas, including associated setbacks and buffers, therefore no direct impacts are anticipated. Indirect development related impacts to the Greenlands B will be mitigated by implementing the recommendations provided in this EIS.	Yes
Regional Official Plan Amendment 38 - Natural Heritage System (based on November 28, 2014 Consolidation; partially under appeal before the OMB)	The proposed NHS identified in this EIS is largely outside of, but immediately adjacent to much of the Subject Property. The proposed NHS is consistent with ROPA 38 in that it: • is systems-based • is comprised of core areas (comparable to Key Features as in ROPA 38), linkages, buffers and enhancement areas, which are all components of the RNHS, and • In addition to protecting the full range of core areas within and adjacent to the Subject Property (i.e., significant valleylands, significant woodlands, significant wildlife habitat, fish habitat, as well as habitats for Threatened and Endangered species) it identifies protection and enhancement for watercourses and other wetlands. The proposed NHS associated with the Subject Property has been designed to protect and enhance existing natural areas associated within the Fourteen Mile Creek, and also contributes to enhancing the Region's NHS on a broader scale by identifying measures for improving connectivity between the Fourteen Mile and the Bronte Creek valley systems along Tributary 14W-W1. The boundaries of the RNHS have been refined (as per Policy 116.1) from those shown on Map 1 to ROPA 38 to: (a) more accurately reflect the boundaries of key features (called core areas in this EIS), (b) include key features associated with Tributary 14W-W1-2 not previously identified on Map 1, and (c) include additional areas on the Subject	Yes

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
	Property and within the broader TPA for restoration/enhancement.	
Livable Oakville (2010)	The comprehensive studies required by the Town's Official Plan prior to determining future land uses and policies, and proceeding with site specific EIS, were completed and submitted in 2013. More specific natural environment policies for the TPA have yet to be developed but are anticipated to remain similar to those contained in Livable Oakville. In preparing this EIS, much consideration was given to ensuring that the proposed land uses are in compliance with policies pertaining to environmental features and natural areas. Specifically: • Policy 16.1.7 requires protection of significant wetlands with buffers to be determined through the EIS process. None of the wetlands on the Subject Property are considered significant. Nevertheless, wetland resources on the Subject Property that were staked with CH have been identified for protection and a 15 m buffer has been applied. • Policy 16.1.8 requires that all regionally significant woodlands be protected and that a 10 m buffer be applied. All significant woodlands on the Subject Property have been identified with the Region, and their limits staked and surveyed. A 10 m buffer has been applied to the staked woodland limits for further protection. • Policy 16.1.9 requires protection of significant valleylands. The Subject Property does not directly overlap with any significant valleylands. All valleylands in the Study Area have been staked with CH, and the requisite 7.5 m setbacks to minor valleys (Fourteen Mile Creek and its tributaries) applied in accordance with this policy. These features, and their setbacks, have all been included in the proposed NHS. • Policy 16.1.10 requires protection of significant wildlife habitat. The EIS has undertaken a comprehensive assessment of the wildlife habitats and functions, and identified no candidate significant wildlife habitats on the Subject Property, but identified three types of candidate significant wildlife habitats within the Fourteen Mile Creek and Bronte Creek valleylands, which will be protected as part of the proposed NHS. • Policy 16.1.11 pertains to protection of ESAs in accordance with Regional Policies (see discussion in the preceding section). • The limit of development used to develop the proposed land use option is based on the proposed NHS boundary which is inclusive of all of significant natural features, and their associated setbacks and/or buffers, as well as some additional enhancement areas.	Yes
Conservation Halton (CH) Regulations	The Subject Property includes watercourses and contributing fish habitat, and is immediately adjacent to watercourses, recovery fish habitat, and valley hazard lands (i.e., floodplains, slopes), all subject to CH regulation. Within the Subject Property, CH regulation limits are confined to the valleylands associated with Fourteen Mile Creek and its tributaries. The EIS has identified with CH all features that would be subject to regulation, and the proposed development plan protects all regulated features and their functions within the NHS. Some elements of the development, such as a proposed road crossing	Yes (subject to CH permits)

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Compliance
	of Tributary 14W-W1 and a stormwater outfall, will need to be constructed within regulated areas and require CH permits. Appropriate mitigation measures have been identified and will need to be implemented to reduce potential impacts to the regulated features.	

10. Conclusions

This Environmental Impact Study (EIS) has been prepared in accordance with Terms of Reference established by the Town of Oakville, Region of Halton and Conservation Halton (see **Appendix A**) and represents a site specific study focusing on the Subject (Saw-Whet) Property within the broader Merton Tertiary Plan Area (TPA). This EIS draws heavily on the policy review, data collection and analyses previously completed for the broader Merton Phase 1 and 2 EIS; however the impact assessment and mitigation sections are site specific and related to the proposed Draft Plan and Functional Servicing Report for the Subject Property.

The information presented in this report is based on data derived from review of available background resources, field assessments, and analyses, and also incorporates relevant components of supporting technical studies prepared by other members of the Study Team (see **Table 1**). This EIS is intended to be read in conjunction with the companion technical studies, provided under separate cover.

In summary, this site specific EIS has:

- provided a comprehensive summary of federal, provincial, regional and local level environmental regulations and policies that govern land use planning and development within the Study Area;
- updated the existing knowledge base of biophysical resources and ecological functions within the Study Area by consolidating available background information and supplementing it with more detailed information and analyses from site-specific technical studies;
- identified the relative significance and sensitivities of natural heritage features and functions within the Study Area;
- undertaken an evaluation of the Fourteen Mile Creek Environmentally Sensitive Areas (ESAs) to more precisely define its boundaries based on current data and applicable criteria;
- identified physical and biological constraints to future development based on technical analyses, review and staking with the Region of Halton, Town of Oakville and Conservation Halton;
- identified opportunities within the Study Area to provide for enhanced protection of natural heritage resources and ecological functions, including mitigation of existing and anticipated impacts;

- applied a scientific, systems based approach to develop a proposed Natural Heritage System (NHS) for the Subject Property and adjacent lands comprised of core areas, linkages, buffers and restoration / enhancement areas;
- recommended limits to future development for use in the developing the proposed Draft Plan;
- described preliminary grading and servicing options;
- assessed and evaluated the potential impacts associated with the proposed Draft Plan;
- recommended measures for avoiding and/or mitigating potential impacts; and
- included terms of reference for a comprehensive monitoring framework to be applied to the site and broader Merton TPA.

The EIS has determined that the proposed Draft Plan will not adversely impact upon significant natural features or their ecological functions, or on the proposed NHS, provided that the recommended mitigation measures specified in this report (and in the companion technical studies) are appropriately implemented.

The proposed NHS encompasses all of the sensitive and significant natural heritage resources, functions and linkages present within the Study Area. Because the limits of future development under the proposed Draft Plan have been established outside the comprehensive constraint limits as well as outside the proposed NHS boundaries (with the exception of a crossing of Tributary 14W-W1 and several stormwater outlets) direct impacts to the NHS are avoided, and indirect impacts can be readily mitigated through implementation of recommended buffers, LIDs and BMPs.

From a natural heritage perspective, the proposed Draft Plan maintains and improves protection to the Redside Dace fishery, strengthens connectivity between the Fourteen Mile Creek and Bronte Creek valley systems, and maintains and enhances habitat for the full range of native plant and wildlife species identified in the Study Area.

In conclusion, it is the opinion of the Study Team that the proposed Draft Plan is in compliance with applicable environmental protection and planning policies at the provincial, regional and local levels.

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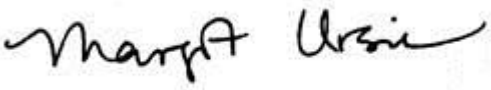

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Appendix A

EIS Terms of Reference

MERTON PLANNING STUDY (QEW/BRONTE ROAD)
TERMS OF REFERENCE
May 6, 2013

1. Introduction

The Town of Oakville requires a comprehensive study of the undeveloped lands generally located on the north side of the QEW between Bronte Road and Third Line. The Study will be facilitated by the Town and will consist of four components:

i) **Technical Reports** – A number of technical reports are to be completed as part of the study by a consulting team retained by the major landowners. These will include studies relating to natural heritage, servicing and infrastructure, transportation, noise, vibration, odour, archaeology and phasing. These terms of reference outline the scope and requirements of those studies.

ii) **Tertiary Plan** – Land Use alternatives will be developed by the landowners' consultants in consultation with Town Planning Staff and participating landowners within the Study Area, utilizing the Livable Oakville policies and schedules, and the initial constraint information from the Technical Reports. The relationship between the technical reports and land use assessment will be iterative with the technical reports informing the land use options in terms of development boundaries and constraints. The technical reports will then assess the implications of the options. The findings of the technical reports along with a policy review will lead to a preferred land use option and the Tertiary Plan. The Tertiary Plan will recommend the most appropriate land use designations and policies for the Study Area including policies that will set out what is required for the development of the area.

iii) **Peer Review** – The Town will retain a consultant(s) ("Peer Review Consultant(s)") to assist with the peer review of the required technical studies and Tertiary Plan. The Peer Review Consultant(s) will assist Town staff in the coordination of all internal Town comments and will also co-ordinate the review and comments from the Region, Conservation Halton and other applicable agencies.

iv) **Applications and Approvals** – The Tertiary Plan will be implemented through an amendment(s) to the Livable Oakville Plan and through applications for draft plan of subdivision approval. Individual development applications will be subject to a pre-consultation process and may be made concurrent with the Tertiary Planning Study process to inform and provide context to the technical reports and land use alternatives, recognizing that any such applications and/or updates to the technical studies if required may require amendment as the study progresses. The Town will use the technical reports, Tertiary Plan and peer review information to review the applications for Official Plan and Zoning By-law Amendments and Draft Plan(s) of Subdivision approval.

2. Description of the Study Area

The Study Area consists of approximately 234 gross hectares and is located north of the Queen Elizabeth Way (north of the North Service Road), east of Bronte Road (but including some parcels of land located on the west side of Bronte Road), south of Upper Middle Road and west of existing residentially developed lands west of Third Line.

The current land uses within the Study Area include:

- Saw Whet Golf Course and Deerfield Golf Course;
- Fourteen Mile Creek and natural heritage features associated with Bronte Creek;

- Ontario Hydro Right-of-Way;
- Office Employment and Institutional Uses (Region of Halton Offices and Halton Regional Police Headquarters);
- An existing designated heritage cemetery;
- The Mid-HaltonWastewater Treatment Plant, and
- Existing rural residential uses including a designated heritage property, located immediately west of Third Line, and two other listed properties.

The attached map shows the proposed Study Area land ownership and parcel sizes. The map also defines the lands referred to in these terms of reference as the "Saw Whet lands" and the "Third Line lands"

3. Background and Existing Planning Policy Framework

The Study Area lands are primarily designated *Parkway Belt* and *Private Open Space*. The *Parkway Belt* designation is proposed to be removed and replaced with an Urban Area and Natural Heritage System (NHS) designation as part of Regional Official Plan Amendment 38 (ROPA 38). ROPA 38 is currently under appeal at the Ontario Municipal Board. Furthermore, Infrastructure Ontario (IO), on behalf of the Ministry of Infrastructure, made applications in 2010 to MMAH for its Deerfield Golf Course, surplus Ministry of Transportation land and Third Line lands to be removed from the Parkway Belt West Plan. IO understands that the PBWP approvals for the Third Line lands are imminent. In 2011, IO undertook a planning study for the provincial lands within the Study Area, which assessed constraints and opportunities, which will inform the Tertiary Planning Study. IO has also undertaken extensive environmental, geotechnical, hydrogeological, archaeological, planning, heritage, and site servicing due diligence for the Third Line lands which will be used in the Technical Reports.

The *Private Open Space* designation, which comprises the Saw Whet golf course lands, are also identified as part of the "Residential Areas" on the Town's Urban Structure Schedule A1 and are currently designated Urban Area in the Region of Halton Official Plan.

In anticipation of the lifting of the Parkway Belt designation and the redevelopment of the Saw Whet Golf Course and other lands, the Town's Official Plan (Livable Oakville) contains a policy regarding further study necessary to determine the appropriate future detailed land uses for the area:

> *26.5 Other Areas for Further Study*
>
> *The following areas have been identified for potential future development and should be comprehensively studied to determine future land uses and policies:*
>
> *a) lands in the vicinity of the QEW and Bronte Road on the north side: and,*
> *b) lands in the vicinity of Highway 403 on the west side between Dundas Street and Upper Middle Road.*
>
> *The comprehensive studies for potential future development areas should address servicing and infrastructure needs, including a detailed transportation needs analysis, phasing of servicing and development, and appropriate land uses. Approvals for individual site development applications in these areas shall be considered premature until the necessary comprehensive studies are completed.*

The draft terms of reference for this Tertiary Planning Study responds to the Town's requirement for comprehensive studies to be completed prior to development proceeding.

The landowner-initiated studies will need to reflect the Town's mission to enhance its natural, cultural, social and economic environments by ensuring that environmental sustainability, cultural vibrancy, economic prosperity and social well-being are incorporated into growth and development decisions.

4. Landowner Interest and Responsibility

There are two major landowners within the Study Area, being Bronte Green Corporation and the Province of Ontario. Both have expressed an interest in proceeding with development applications and as noted have already undertaken background work and have completed some technical studies to support the development of their respective lands.

While the Town acknowledges the preference of the landowners to proceed immediately with their development applications, the Tertiary Planning Study is required to establish the appropriate land use designations and policies on a comprehensive basis, to guide and implement the proposed development rather than responding to individual requests (as is stated in the Livable Oakville policies, noted above). The Tertiary Planning Study will be facilitated by the Town. For clarity, individual landowners will be responsible for undertaking all required site-specific studies in support of development applications.

This Terms of Reference is intended to set out the overall study requirements and identify the technical studies and land use assessment to be undertaken collectively by the major landowners. The technical studies that are undertaken by the landowners as part of the Tertiary Planning Study will also be considered as meeting some of the complete application requirements for subsequent development applications depending on the level of work completed for the lands through the Study (i.e., a higher level of study being completed for Saw Whet and the Third Line lands).

In assessing site-specific development applications, the Town will review and use the information prepared during the Tertiary Planning Study, as well as its own information.

The Town recognizes that lands within the Study Area are characterized by varying ownership, policy contexts and development timeframes. The Town may consider the early approval of specific applications for the Saw Whet and Third Line lands, provided such applications can function independent of adjacent lands within the Study Area, are not reliant upon the implementation of yet to be delivered infrastructure and community servicing to develop, and do not contribute to unacceptable environmental or natural hazard impacts as a result of their early development.

It is recognized that not all landowners may want to or can participate in the study. For those landowners who choose not to participate, it is important to note that while their land uses will be assessed and determined as part of the Tertiary Planning Study, those landowners may be required to address servicing and infrastructure issues and costs separately, and may be required to undertake more detailed site-specific environmental impact studies as part of any site-specific planning application submission process for their lands.

5. Objectives of the Study

5.1 In addition to the goals and objectives of the Livable Oakville Plan, the following key objectives are to be followed in undertaking the study:

- Preserve, enhance and protect the town's and region's environmental features, biological communities, wildlife corridors, and natural heritage system, and review connecting east-west corridors between Environmental Study Assessment (ESA) 10 (Bronte Creek) and ESA 12 (Fourteen Mile Creek);
- Provide complete and sustainable communities with enhanced urban design, required community facilities and parkland;
- Determine appropriate integration and connection of new development, where possible, with the surrounding communities;
- Maintain a strong employment corridor along the Queen Elizabeth Way;
- Recognize the role and function of Bronte Road as a Major Arterial;
- Protect cultural heritage resources;
- Protect all natural hazards through policy and / or dedication to the municipality, and protect new and existing infrastructure from future flooding and erosion concerns;
- Provide a safe, efficient and accessible transportation system with choices in mobility to accommodate new growth;
- Provide cost-effective and coordinated infrastructure investment for new growth; and,
- Optimize use of existing infrastructure and public service facilities.
- Establish targets with respect to water quality parameters including the thermal regime for stormwater management effluents.
- Demonstrate a net benefit to the significant population of Redside Dace within the Study Area.

5.2 The key determinations of the study include:

- The determination of the most appropriate detailed land use designations for the Study Area;
- The determination of desirable population and employment yields;
- The recommendation of additional Official Plan policies for development implementation based on the recommended land use designations including proposed densities, use limitations, buffering, phasing and future application stage study requirements;
- The identification of a natural heritage system, environmentally sensitive areas, open space corridors, valley lands, woodlands, groundwater resources, and other natural features and functions;
- The identification of natural hazards;
- The establishment of appropriate buffers from existing and neighbouring land uses;
- The identification of Town facilities and park needs as well as potential school site needs;
- The determination and timing of services and infrastructure, including transportation improvements required for development within the Study Area;
- The recommendation and justification of an appropriate water management strategy addressing quantity, quality, erosion and water balance targets.
- The phasing / staging of services and development.

6. Study Process and Timing

The West District Team of the Current Planning and Heritage Section of the Town of Oakville Planning Services Department will facilitate the study process and provide Town input during key milestones in the

study process. The West District Team will be joined by technical staff from other Town Departments, as well as staff from the Region of Halton, the Ministry of Transportation, the Ministry of Natural Resources and Conservation Halton who will review and assist with the study. A Technical Advisory Group of town and agency staff, including the major landowner representatives and consultants will be established at the initial technical meeting. Bronte Green Corporation and their consultants will be responsible for preparing and submitting studies and plans for the review and input by the Technical Advisory Group and will participate in the technical review meetings by presenting the technical reports and findings and responding to input. Technical Advisory Group meetings are to be held on monthly basis and more frequently as required to meet study timelines. The details of the report formats and numbers of copies required will be established by the project team.

It is anticipated that the study will be completed in 2013.

The following chart illustrates the anticipated key steps and proposed timing in the study process. The proposed timing assumes all matters will be substantially addressed as required with the first submission and that there will be the concurrent submission of the technical studies with the Draft Plans of Subdivision for two of the properties (Saw Whet and the Third Line lands). The timing and completion of the study may be required to be adjusted to ensure there is adequate time to address issues as they arise and to ensure meaningful input and revisions to the studies and the Tertiary Plan. The timing may also be adjusted to address notification requirements and Council's schedule:

	Key Steps	**Timing**
1	Information Report to Planning and Development Council –Draft Terms of Reference	Q4 2012
2	Technical Advisory Group meeting to finalize Terms of Reference and establish meeting schedules	Q1 2013
3	Background Technical Studies completion and submission	Q1 2013
4	Review of Technical Study reports including Peer Review	Q1 2013
5	Technical Advisory Group meeting on Technical Studies	Q1 2013
6	Completion of monitoring works and data collection, and refinement and update to Technical Studies and Models accordingly	Q1 2013
7	Resubmission of updated Technical Studies	Q1 2013
8	Review of Updated Technical Studies and Peer Review	Q1 2013
9	Submission of Tertiary Plan Options and Criteria	Q2 2013
10	Development Application pre-consultation meeting(s) as applicable	Q2 2013
11	Meeting with Technical Advisory Group on Tertiary Plan Options and Criteria	Q2 2013
12	Public Information Meetings on the Tertiary Plan Options	Q2 2013
13	Review and Analysis of Tertiary Plan Options	Q2 2013
14	Completion of Final Technical Studies, Tertiary Plan Option Evaluation and Preferred Tertiary Plan	Q3 2013
15	Meeting with Technical Advisory Group on Final Technical Studies, Tertiary Plan Option Evaluation and Preferred Tertiary Plan	Q3 2013
16	Submission of Draft Plan / Development applications	Q3 2013
17	Completion of Recommended Official Plan Land Use Designations and Policies to Implement the Preferred Tertiary Plan (may include additional amendments for Saw Whet and Third Line Lands)	Q3 2013
18	Meeting with Technical Advisory Group on Recommended Policies for the Preferred Tertiary Plan	Q3 2013
19	Town Initiated Official Plan and Zoning By-law Amendment	Q3 2013

	Key Steps	Timing
	Submission(s)	
20	Statutory Public Meeting before Council on the Preferred Tertiary Plan	Q3 2013
21	Tertiary Plan refinements as applicable	Q3 2013
22	Public Information Meeting on Development Applications	Q3 2013
23	Development Application refinements as applicable	Q4 2013
24	Recommendation Report to Council with Official Plan Amendment to implement Tertiary Plan	Q4 2013
25	Statutory Public Meeting before Council on Development Applications	Q1 2014
26	Recommendation Report to Council on Official Plan and Zoning By-law Amendment(s), Draft Plan(s) of Subdivision and Subdivision Conditions for Development Applications (as applicable)	Q1 2014

7. Technical Studies and Reports Required

The following technical studies are required to be coordinated and completed by the landowners and peer reviewed by the Town and agencies. The technical studies will be completed at a Tertiary Plan level for the entire Study Area, unless otherwise noted. After completion of the technical studies, the Town, in conjunction with the Agencies and its peer reviewer, will review the findings of the technical studies and the preferred Tertiary Plan including any Draft Plan(s) of Subdivision and related submission requirements submitted by the landowners.

To the extent possible technical studies shall be integrated and coordinated to ensure that all impacts and mitigation measures are presented accurately and comprehensively.

Terms of reference for the peer review role and function will be provided in a separate appendix to these Terms of Reference and be completed by the Town with input from the Region and Conservation Halton.

In cases where technical studies have already been or are in the process of being undertaken by a landowner within the Study Area, the studies will be used to inform the Tertiary Planning Study and may also be used in support of site-specific development applications.

7.1 Environmental Impact Study

The Environmental Impact Study (EIS) shall be prepared in advance of development to include the components outlined below.

Section 3 of this document outlines the different planning context associated with the Saw Whet lands and the provincial Third Line lands, as compared to the remainder of the Study Area. Accordingly, the Saw Whet lands and the provincial Third Line lands will be developing on a timeline well ahead of the balance of the Study Area.

Further, the Saw Whet lands are generally contained within the Fourteen Mile Creek subwatershed (as illustrated on Figure 1).

The provincial Third Line lands are also separated from the remainder of the Study Area by the significant Fourteen Mile Creek and associated valley lands, so they have a somewhat unique geographic, environmental and servicing context from the remainder of the Study Area. It is noted that the Halton

Natural Areas Inventory (2006) recommended that these lands be evaluated for possible extension of Environmentally Sensitive Area #12.

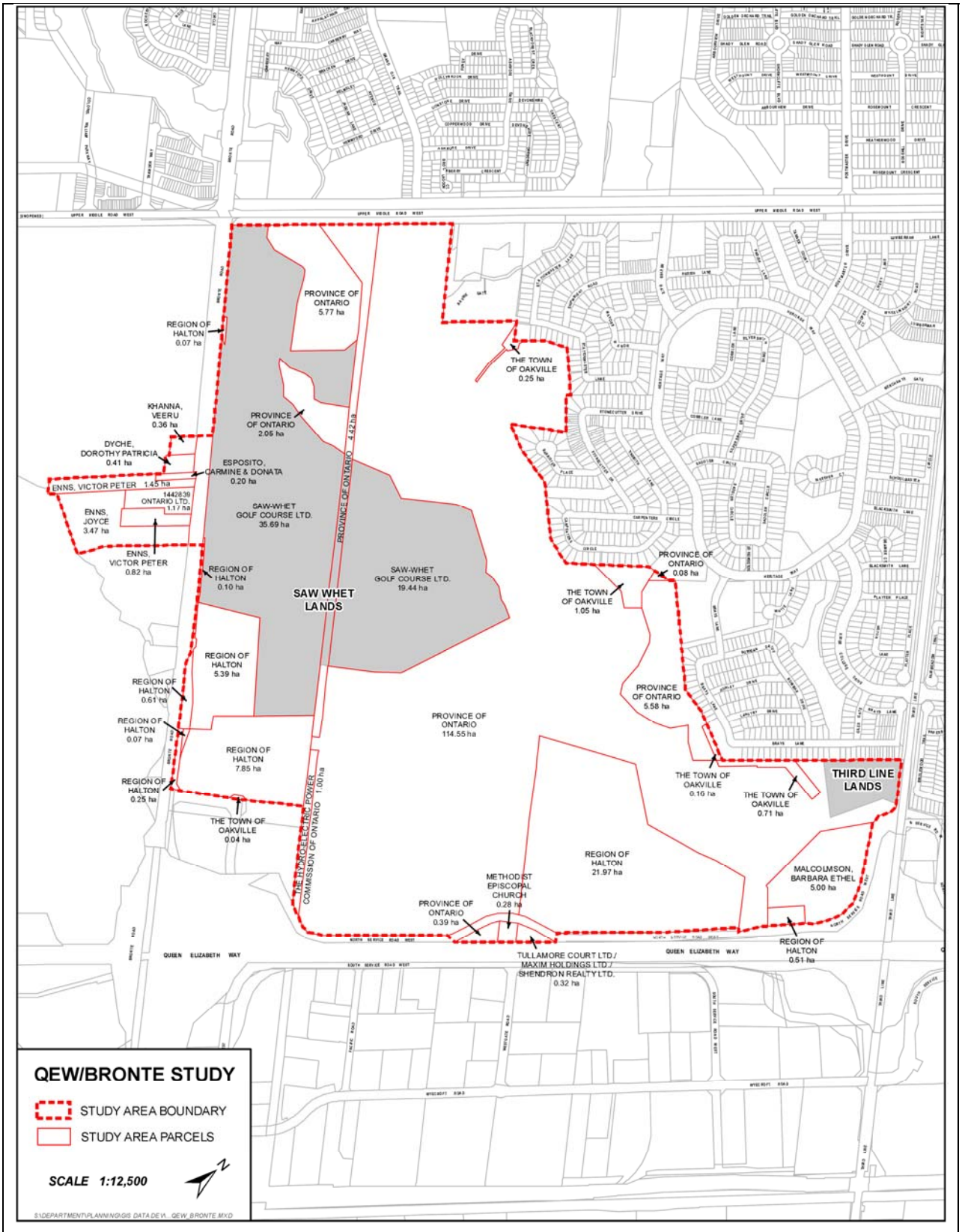

Figure 1 – Merton (QEW Bronte Road) Planning Study Area

In consideration of the foregoing, the EIS will include additional details for the Saw Whet lands and the provincial Third Line lands, inclusive of field data collected on site, and detailed stormwater management and servicing recommendations at a development application level of analysis. The remainder of the Study Area will be studied at a conceptual level to establish relevant constraints and parameters for future detailed study and field investigation.

The following categorizes the expected level of study for the Tertiary Plan Area, and the additional level of detail to be undertaken in support of a development application for each of the components of the EIS. Where the more detailed application level studies have already been undertaken or are in the process of being undertaken, they will be used to inform the Tertiary Planning Study. The EIS should be completed in keeping with Conservation Halton's *Environmental Impact Study Guidelines* and the Region of Halton's *Environmental Impact Assessment Guidelines*. Studies associated with Hazard Delineation must be completed in accordance with Provincial Guidelines, and Stormwater Management planning is to be completed in accordance with Town of Oakville, Halton Region and Ministry of the Environment requirements.

7.1.1 Policy Context

i) Undertake a review of applicable environmental planning policies at the federal, provincial, regional and local levels and describe how they govern land use planning within the Study Area and other regulatory requirements that may need to be considered prior to development of the property.

7.1.2 Characterization of Existing Conditions

The characterization of Existing Conditions will be undertaken at two levels. The first level is a higher-level characterization of the entire Study Area using information from published mapping, other studies completed in and around the Study Area and any site-specific work data that may be available. The second level of study is a more detailed characterization of the existing conditions based on site-specific fieldwork and monitoring of the Saw Whet and Third Line lands. The requirements for each level of study are described below.

Note: The decision for the need for site-specific fieldwork to supplement existing background information will be made through discussion between consultant/town/agency staff discipline specialists once the technical submissions for these matters have been presented and reviewed. Supplemental fieldwork may be required for example to assess erosion potential, erosion threshold limits.

a) Entire Study Area

Biophysical resources in the Study Area will be characterized with respect to physiography, topography, soils, bedrock geology, surficial geology, hydrogeology (groundwater), hydrology (surface water), fluvial geomorphology and natural heritage resources*. Further detail on the scope of these topics is provided as follows:

i) Characterization of the geology and hydrogeological conditions in the Study Area will include description of the regional hydrostratigraphy, local groundwater use, water quality and quantity, depth to water table, seasonal fluctuations of groundwater levels, interpreted groundwater flow directions, recharge and discharge conditions, and calculation of the overall water balance to quantify expected infiltration conditions within the Study Area based on existing land use in the Study Area. Watercourse observations and spot-flow measurements will be included, as well as any flows from contributing tributaries.

ii) Characterize the existing hydrological (surface water) conditions (water quality and quantity) in the Study Area using available calibrated model, to be provided by the Town of Oakville. The watershed scale hydrological model will need refinement within the study area to allow for generation of appropriate and comparable nodes at key outlet points from the study area. The refined model will be updated during late phase of the study to evaluate development impacts and the mitigation plan.

iii) Characterize the geomorphological condition of watercourses in the Study Area and downstream to a point where flow contributions and groundwater contributions from the Study Area are considered small relative to the greater drainage systems using background information and/or site-specific information where available. (10% is noted as an acceptable threshold; however, other measures could also be acceptable subject to agency approval). Geomorphological assessment of the watercourses will be undertaken to characterize watercourse conditions and sediment transport functions.

iv) Characterize existing natural heritage resources for the Study Area using available background information sources. Terrestrial, wetland and aquatic ecosystems in the Study Area should be classified using ELC to the finest level possible based on background information. Vegetation, wildlife and fisheries in the Study Area will be characterized using background information. Species status should be noted using current recognized lists [COSEWIC, SARO, NHIC S-Ranks and Halton Region NAI rankings.

v) A summary of significant biophysical resources within the Study Area will be provided, including descriptions of key hydrologic and natural heritage features and functions (i.e., discharge areas, populations of species at risk, significant wildlife habitat, linkages) and their role in the Natural Heritage System.

***Note:** Background information and data may be used for initial characterization, but may need to be supplemented with fieldwork.

b) Site-Specific - Saw Whet and Third Line lands

Site-specific technical investigations will be undertaken to confirm existing conditions and collect supplementary data to better characterize the site's physiography, topography, soils, bedrock geology, hydrogeology (groundwater), hydrology (surface water), fluvial geomorphology and natural heritage resources. Further detail on the scope of these topics is provided as follows:

i) As it specifically relates to the provincial Third Line lands, a separate terms of reference for the site-specific environmental study has been developed, once approved it will be used to define the site-specific studies for those lands.

ii) Geotechnical investigations including the drilling of subsurface boreholes will be undertaken to confirm and describe in greater detail the existing soil, surficial sediments and bedrock conditions of each site. These investigations will also determine slope stability.

iii) Additional site-specific geomorphic assessment may be required to support new infrastructure crossings of the Fourteen Mile Creek or its tributaries and the design of new infrastructure proposed within the meander belt.

iv) Hydrogeological investigations will be undertaken to confirm and describe in greater detail the hydrogeological conditions of each site. Shallow and deep monitoring wells will be installed to permit monitoring of groundwater levels, hydraulic conductivity testing and sampling for groundwater quality testing. The number of monitoring wells, hydraulic conductivity tests and water samples collected will be determined by the consultant to appropriately characterize the conditions. The groundwater level monitoring should be completed to confirm the depth to water table, seasonal variations, hydrostratigraphy and hydraulic gradients (recharge and discharge conditions) and these data will be used in conjunction with the regional information from the

Study Area to refine the groundwater flow directions and assess potential baseflow contributions to the local watercourses.

v) Surface water features will also be monitored to assess the potential for groundwater/surface water interactions (i.e., contributions to baseflow). This will involve the installation of drive-point piezometers in selected areas to permit monitoring of shallow groundwater levels and hydraulic gradients along watercourses, as well as spot-flow measurements recorded upstream and downstream of the subject site.

vi) Characterization of the surface water quality and groundwater quality within the subject area will be completed. The number of water samples, locations and list of parameters to be included in the analysis will be determined by the consultant based on site-specific conditions and concerns (e.g., known contamination sources from existing land use and sensitivity of the receiving stream). Parameters should include at a minimum basic ions as well as general water quality indicators such as pH, conductivity, temperature, dissolved oxygen, nitrate and phosphorous. Water quality parameters should be presented with regard to the provincial and federal water quality guidelines.

vii) Characterization of the existing natural heritage resources at the site will be completed by undertaking the following assessments:

a. Conduct field surveys to classify ecological features to the ecosite or ecoelement level using ELC protocols.
b. Classify watercourses according to the Ontario Stream Assessment Protocols and map aquatic habitat using MTO protocols.
c. Conduct three season floristic surveys (spring, summer, fall).
d. Conduct amphibian breeding surveys using Marsh Monitoring Program protocols.
e. Conduct breeding bird surveys on two occasions during the breeding season using transect method.*
f. Conduct incidental wildlife surveys as part of other surveys.
g. Conduct targeted surveys for butterflies and odonates in suitable habitats.
h. Conduct targeted surveys for reptiles (turtles and snakes).
i. Conduct targeted surveys for wintering owls on three occasions in suitable habitats.
j. Conduct targeted surveys for Species at Risk.

***Note:** The transect method is not in keeping with the standardized point count method. Agency staff will review any breeding bird data collected to date for adequacy in terms of dates, times and locations of field study. Any future breeding bird surveys will follow standardized survey methods.

viii) Document fish and benthic invertebrates using available background information.

ix) Document species status using current recognized lists [COSEWIC, SARO, NHIC S-Ranks and Halton Region NAI rankings].

x) Define the limits of the natural heritage system and natural features such as woodlands, valleylands and wetlands. Field verification of the natural features with agency staff to be undertaken at the time of a development application;

xi) Complete a tree inventory on the subject property according to Town of Oakville standards.

c) Site-specific - Bronte Creek catchment

i) Appropriate stormwater management criteria will be documented or determined, including:

a. confirmation of whether or not impacts from development may be accommodated by the existing drainage outlet without negatively impacting the stability of the valley wall, the conservation of land, water quality and fish habitat.

ii) If the existing drainage outlet cannot be maintained, a minor diversion could be considered.

iii) The need for any minor flow diversions to will be identified through the Tertiary Study, as well as the contribution this diversion would make to stormwater flows across the entire study area.

7.1.3 Evaluation of Existing Conditions

i) Provide an evaluation of the biophysical resources to determine their significance to and relationship to environmental policies at the provincial, regional and local level. The evaluation should consider those environmental policies related to natural heritage resources, surface and groundwater resources and natural hazards. These include the Natural Heritage, Water, and Natural Hazard policies of the Provincial Policy Statement (PPS), Greenlands and Water policies of the Region, and local Natural Areas policies.

ii) Slope Stability Assessment in accordance with the MNR's Technical Guidelines. The physical top of bank must also be staked by Conservation Halton staff.

iii) Hydrogeological Evaluation – identify areas of groundwater recharge, discharge and areas of high water table. Complete a water balance assessment based on the identified soil and groundwater conditions to quantify existing groundwater recharge conditions as well as the groundwater contributions to baseflow (discharge) to Fourteen Mile Creek from the Study Area. Identify suitable areas for groundwater recharge for the conceptual post-development land use conditions.

iv) Hydrological Analyses – Feature–based Water Balance Analysis, Hydrologic Model, Water Quality Assessment on an entire study area basis.

v) Geomorphic Assessment – Including two commonly applied assessment techniques, such as Rapid Steam Assessment Technique (RSAT), Rapid Geomorphic Assessment (RGA), Index of Stability (Simon & Downs).

vi) Base flows (ecological flow values) required to maintain water quality and existing ecological conditions.

vii) Undertake an evaluation of natural features within the Study Area to establish which areas satisfy Halton Region's Environmentally Sensitive Area criteria and provide recommendations for boundary modifications where necessary.

7.1.4 Identification of Constraints and Opportunities

The EIS will identify constraints and opportunities associated with the entire Study Area at a general level using available information. The constraints and opportunities will be refined at the site-specific level using a combination of the available background information and supplementary information collected through the site-specific technical investigations. Constraints and opportunities to be considered should include:

i) Natural heritage constraints in accordance with applicable Provincial, Regional, Town of Oakville and Conservation Halton policies and regulations. Natural heritage constraints to be considered include:
   a. Environmentally Sensitive Areas (ESA)
   b. Areas of Natural and Scientific Interest (ANSI)
   c. Significant Woodlands
   d. Significant Valleylands
   e. Wetlands & Watercourses
   f. Significant Wildlife Habitat
   g. Fish Habitat
   h. Habitats of Threatened and Endangered Species
   i. Natural Heritage System

ii) Hydrologic and hydrogeologic constraints and opportunities will be identified. This will involve identifying the local water resource systems, surface water features and functions, groundwater features and functions, construction considerations such as areas of high water table and

dewatering/depressurization requirements, and opportunities for increasing infiltration and minimizing stormwater runoff.

iii) Natural hazard constraints in accordance with applicable Provincial, Regional, Town of Oakville and Conservation Halton policies and regulations and technical guidelines. Natural hazard constraints to be considered include the following:
   a. Erosion hazards
   b. Flood hazards
   c. Flooding and erosion hazard limits to be determined in accordance with the Ministry of Natural Resources Guideline documents.

iv) Constraints to be classified as high, moderate or low based on their ecological functions.

v) Constraints to be mapped spatially.

vi) Opportunities for enhancement of natural heritage features and functions within the Study Areas should be identified. Opportunities to be considered include, but are not necessarily limited to the following:
   a. Tree preservation opportunities
   b. Watercourse enhancement through natural channel design (This approach will be acceptable provided no channel relocations are proposed as part of site development)
   c. Slope stabilization and erosion control
   d. Water quality improvements
      i. removal of online ponds subject to feature specific evaluation
      ii. restoration of in-stream cover
      iii. directing treated urban storm runoff where beneficial to the system
      iv. low impact development (LID)
   e. Natural Heritage System Enhancements
      i. Removal of litter and refuse from natural areas
      ii. Invasive species management
      iii. Habitat enhancement through vegetation management
      iv. Buffers
   f. Linkage Enhancements
      i. Wildlife corridor enhancement
      ii. Trail opportunities
      iii. Design road crossings of environmental features to accomodate pedestrian, wildlife and fish passage.

vii) Coordinate with the Transportation Study in establishing trails in an environmentally responsible manner, and identify areas where enhanced wildlife habitat connectivity (e.g., through the use of ecopassages) will be achieved.

7.1.5 Description of the Proposed Development

i) Description of the land use alternatives.
ii) Grading & Servicing Plans (see section7.2).
iii) Stormwater Management Plan (See Section7.2).
iv) Description of development related activities.
v) Development Schedule / Timeline.

7.1.6 Impact Assessment & Mitigation

As with the other EIS components, the EIS will assess impacts and mitigation based on the information available with a higher level of assessment being undertaken for the entire study area and/or the Saw Whet and Third Line lands. This work will include the following tasks:

i) Assess, quantify and predict potential impacts of the proposed development on the biophysical resources and ecological functions of the Study Area.

ii) Generate a detailed matrix that clearly identifies, quantifies and predicts the development related impact source and its effect on the environment.

iii) The matrix will identify the specific development activity, describe quantitatively and qualitatively the potential effect on environmental receptors (features and functions), and recommend mitigation measures and possible management and monitoring requirements to assess the net quantitative and qualitative effect on the environment.

iv) Impacts related to site preparation and development will be assessed and described in terms of their short and long-term effects on the biophysical environment.

v) An assessment of erosion potential in the entire Study Area and further downstream to a point where the catchment is a relatively small contribution to the greater system, and identification of stormwater management criteria as they relate to erosion control.

vi) The identification of existing documented constraints in the entire Study Area as they relate to downstream capacity and flood risk, and the identification of stormwater management criteria as they relate to flood risk, as well as a detailed water balance for all retained natural heritage systems.

vii) The establishment of stormwater management criteria in the entire Study Area as they relate to maintaining base flow, mitigating flood risk, mitigating erosion potential and meeting water quality objectives.

viii) As the Town of Oakville has completed an update and calibration of the hydrologic model for Fourteen Mile Creek, the study will update the available existing hydrologic model for the entire Study Area to estimate existing and future flow rates, and ensure that the model updates are completed to the satisfaction of the Town, Region and Conservation Halton.

ix) Utilize existing targets established through previous or existing study, in conjunction with available existing conditions hydrologic models to establish water quality, quantity and erosion targets appropriate for the development and demonstrate that those targets will not result in negative downstream flooding or erosion impacts on both a continuous and event basis, recognizing that continuous modeling may occur in later iterations once more detailed system designs have been developed. This modeling shall consider the full range of design storm events, i.e. low flows, 1:2, 1:5, 1:10, 1:25, 1:50 and 1:100 and Hurricane Hazel, and a cumulative basis that considers duration and magnitude of erosion threshold exceedence. The erosion threshold should be verified in the field.

x) Demonstrate how thermal warming of Fourteen Mile Creek from urban stormwater inputs will be mitigated.

xi) Determine appropriate transportation crossing designs that will ensure no impediments to fish and wildlife passage up to and during a 25-year storm event. Appropriate transportation crossing designs shall also ensure continued natural fluvial geomorphological processes to occur without hardening of valley or stream corridors.

xii) A range of mitigation measures that can be used to avoid or reduce development related impacts to natural heritage features and ecological functions on the subject property. Mitigation measures to be considered will include buffers, stormwater management, Low Impact Development (LID) measures to promote infiltration to address water balance deficits and as a measure to reduce end of pipe facilities and others.

xiii) Summarize any residual impacts that cannot be avoided or mitigated.

xiv) Identify, quantify and describe cumulative impacts of the proposed land use change in the Study Area on water quality, water quantity, hydrology, hydrogeological features and functions, aquatic and terrestrial features and functions and on fish and wildlife communities within the Study Area. Indicate how these impacts can be mitigated.

7.1.7 Monitoring

i) The EIS or concurrent document will include recommended terms of reference for a pre- and post-development monitoring program to evaluate changes to the biophysical and chemical environment of the Study Area and to evaluate compliance and performance of the environmental management strategies recommended through the various technical studies prepared in support of the Tertiary Plan and individual Draft Plans. The terms of reference will be prepared through consultations with the Region, Town and Conservation Halton. The post development monitoring program will be prepared in keeping with programs that have been prepared for other similar development areas in the vicinity.

ii) Baseline and post-development monitoring, including baseline groundwater level and quality monitoring, will consider a variety of biophysical parameters within the Study Area and for some period of time following complete build out of the area. The purpose of this monitoring is to evaluate changes to relevant components of the biophysical and chemical environment. As background studies are completed, the agreed upon value-added parameters that would potentially require monitoring, including quantifiable potential impacts, would be better understood and the detailed program established at that time. The location and distribution of the monitors across the study area, water quality parameters and timing of data collection should be sufficient for site characterization and potential impact monitoring.

7.1.7 Peer Review

The Environmental Impact Study will be peer reviewed by a consultant to be retained by the Town of Oakville.

7.2 Area Servicing Plan and Functional Servicing Study

The Area Servicing Plan (ASP) and Functional Servicing Study (FSS) address municipal servicing, and a Stormwater Management Report will provide an analysis of the most appropriate means of servicing the Study Area, and the timing of service installations.

As with the EIS portion of the technical studies, the servicing analysis is divided into two levels of study as outlined below. An Area Servicing Plan (ASP) level of detail will be completed for the Tertiary Study Area, with additional Functional Servicing Study details being completed in support of site-specific development applications as required. As a starting point, these reports must cross-reference natural heritage constraints (including buffers) as identified in the EIS.

7.2.1 Area Servicing Plan

Water Servicing:

Evaluation of Existing Water System:

- Outline of existing water system and pressure zones within the Study Area and the impact the new development will have on these.
- Outline the improvements and upgrades required to the existing water system infrastructure to accommodate development in this Study Area.

Proposed Water System:

- A preliminary servicing plan should be provided that shows the trunk watermain system that will be required within this Study Area. Should the trunk cross any valley systems,

geomorphic input should be provided with respect to anticipated future downcutting and planform adjustment.

- A skeletal watermain modeling analysis is to be provided of the proposed watermain system within this Study Area and this analysis is to provide preliminary sizing of watermains, expected static pressures and fire flows. The analysis is to be in accordance with Halton Region standards, based on the network model provided by Halton Region.
- The watermain analysis will also address the phasing of the development within the Study Area.
- The study will review opportunities for system redundancies and watermain looping within the Study Area.
- The study is to review land and easement requirements for Development Charge (DC) watermain infrastructure.
- The cost and timing of DC watermain infrastructure, sensitive to phasing, is to be addressed in the study.
- Identify all DC projects that may potentially require a Municipal Class EA when project specific details are better defined.

<u>Wastewater Servicing:</u>

Evaluation of Existing Wastewater System:

- Outline the existing wastewater system and drainage areas within the Study Area.
- Determine any downstream constraints in the existing wastewater system such as pump stations, pipe capacity and plant capacity.
- Determine the improvements required in the existing wastewater system based on the development of the Study Area and identify the triggers for these improvements.

Proposed Wastewater System:

- Provide a preliminary servicing plan that shows the proposed trunk wastewater system required to service this Study Area. Should the trunk cross any valley systems, geomorphic input should be provided with respect to anticipated future downcutting and planform adjustment.
- Provide external and internal drainage area plans and preliminary design sheets for major trunk sewers, and related conceptual sizing calculations.
- The wastewater analysis will also address the impact of phasing of the development on within the Study Area.
- The study should review the size and locations of pump station infrastructure, including alternative to pumping station infrastructure, and address potential overflows and environmental impacts, if required.
- Preliminary Plan and Profile drawings are to be provided for DC trunk wastewater mains based on preliminary grades.
- The study is to review land and easement requirements for DC wastewater infrastructure.
- The cost and timing of DC wastewater infrastructure, sensitive to phasing, will be addressed in the study.
- Identify all DC projects that may potentially require a Municipal Class EA when project specific details are better defined.

Stormwater Management:

- A Stormwater Management analysis that demonstrates an understanding of existing conditions including the hydrologic requirements of natural features and watercourses, which will be retained. Note: Should the Tertiary Study or individual development applications propose the elimination or re-alignment of an existing riverine corridor (regulated or otherwise) additional study may be required. In that case, the Town and agencies should be contacted for a more detailed terms of reference.
- Outline how the proposed development will be serviced in such a way as to meet the stormwater management targets with respect to quantity, quality and erosion control. Conceptual plans showing grading of the proposed facilities, and updated hydrologic modeling will be required.
- Outline the existing stormwater drainage systems that are part of the Regional road network.
- At a conceptual level, determine the impact of stormwater drainage from the development area to existing and planned Regional roadways, including potential impact upon existing and planned stormwater drainage systems within a Regional roadway, including mitigation.
- At a conceptual level, determine the feasibility and benefit of incorporating existing and future drainage from Regional roadways into development area stormwater management infrastructure.
- Identify the potential for any upgrades or improvements necessary to the stormwater drainage systems on Regional roadways including culverts, ditches, storm sewers, etc.
- Use of stormwater management designs that will consider at source controls and Low Impact Development techniques wherever feasible to reduce erosion potential, mitigate thermal impacts of urbanization on Redside Dace populations in Fourteen Mile Creek and to maintain groundwater contributions to baseflows in Fourteen Mile Creek.

7.2.2 Functional Servicing Study

In addition to the detail in Section 7.2.1, the Saw Whet and the Third Line lands will be studied and assessed to a functional servicing level of study. The Functional Servicing Study will expand on the general concepts outlined in the Area Servicing Plan in support of a site-specific development application, as outlined below. This study must be coordinated with the EIS and address the following:

- A detailed Water Pressure Network Analysis for the development lands will be completed to advise how the area can be serviced in accordance with Town, Region and Provincial standards, and in keeping the ASP recommendations;
- Identification of constraints as well as water looping strategies to accommodate phased development of the development site;
- Calculation of estimated sanitary flows from the future development area with a view to servicing the area with gravity sanitary sewers where possible, in accordance with the recommendations of the ASP;
- A determination of the role of groundwater in the Study Area, how development impacts groundwater, and the role of groundwater in the watershed;
- In consultation with the Town, Halton Region and Conservation Halton staff, develop alternative stormwater management strategies where feasible, which will include practices such as at-source infiltration, end of pipe stormwater management facilities, water quality swales and trunk sewers;
- The FSS will respect constraints imposed by the natural heritage system;

- Preparation of preliminary grading plans for the development area
- Preparation of preliminary storm sewer network for the development area, including drainage area plans and storm trunk sizing
- Provide a recommended stormwater management strategy that will summarize the criteria, identify the type and approximate size/location of recommended facilities, and prescribe phasing requirements; consideration of the feasibility of Low Impact Development measures (LID) will be among the alternatives;

7.2.3 Peer Review

The Area Servicing Plan and Functional Servicing Study will be peer reviewed by a consultant to be retained by the Town of Oakville, with the opportunity for additional review and comment by Halton Region.

7.3 Transportation Study

The Transportation Study will provide an understanding of transportation issues associated with the development of the Tertiary Plan options. The assessment will determine the need for any improvements to the adjacent and nearby transportation system in order to maintain a satisfactory level of service, an acceptable level of safety and the appropriate access provisions for the proposed development to the satisfaction of the Ministry of Transportation, Region of Halton and Town of Oakville. The study will be coordinated with the EIS with respect to maintaining and, if possible, enhancing wildlife habitat connectivity, in addition to environmental considerations around trails, with due consideration for the Town of Oakville and Halton Region Transportation Master Plans. A Tertiary Plan level review of the above will be undertaken for the Study Area, as outlined below:

- Identify the existing transportation network and opportunities and constraints,;
- Confirm the components of the proposed development uses such as the road network and land uses, as well as development staging, if appropriate;
- Review and document the existing and future background traffic operations at the Study Area intersections;
- Develop the vehicular and transit trip generation associated with the proposed development and assign new vehicular site traffic to the study intersections;
- Forecast future background and total traffic volumes for the appropriate horizon periods and peak hours, and document the operations;

A more detailed functional study will be undertaken for the Saw Whet lands and any additional lands with active applications during the study timeframe. Future additional Transportation Study analyses may be required at the time of development application on the remaining lands within the Study Area. In particular, the detailed study will:

- Identify any mitigating measures such as turn lanes or road/intersection improvements, etc. and timing of implementation will be identified, if any;
- Review the number and locations of all the access points, the requirements for exclusive turning lanes, and sight distance requirements at access / intersection locations;
- Review the spacing and operations of the external intersections along adjacent roadways and internal intersections within the subject lands;
- Conduct signal warrant analysis to determine whether signalized traffic control will be required at the proposed site access intersections;
- Review pedestrian connectivity and prepare a Pedestrian Circulation Plan to illustrate the pedestrian network (i.e. including pedestrian crossing facilities, walkway, sidewalks, multi-use

pathways and critical points for potential vehicle-pedestrian conflicts) within the Study Area, with emphasis on protecting the natural heritage system
- Review potential operational and safety issues (for all road users including auto, transit, pedestrian and cyclist) for the total future traffic conditions;
- Review potential impacts on transit usage and services (routes and frequency) within the Study Area for the interim and ultimate conditions and identify any required improvements, modifications and mitigative measures. Also, identify the locations for new bus stops, as well as the required type;
- Review and comment on the cycling connectivity within the Study Area.
- New roads and connections should consider the location of natural hazards, and must be located in accordance with Conservation Halton's policies.

The Transportation Study will be peer reviewed by a consultant to be retained by the Town of Oakville.

7.4 Stage 1 Archaeological Assessment

A Stage 1 Archaeological Assessment is required for the Study Area. All work is to be carried out in accordance with the provisions of the Ontario Heritage Act, R.S.O. 1990, by a qualified archaeologist licensed by the Ontario Ministry of Tourism, Culture and Sport. In addition, all archaeological work will comply with the technical guidelines for archaeological resource assessment prepared by the Province of Ontario.

The primary objective of the Stage 1 archaeological assessment is to determine whether a property or Study Area has any potential for archaeological resources. The Stage 1 assessment will:

- Determine if there are any registered and/or unregistered archaeological sites, or other significant features such as portage routes, on or in close proximity to the subject lands;
- Examine a number of different criteria including distance to water, soil drainage, presence of significant topographical features, and proximity to historically significant transportation routes and areas of early Euro-Canadian settlement; and,
- Identify any areas of archaeological potential located on the lands, which represent concerns for Stage 2 field survey.

This information will form the basis for recommendations concerning which sections of the Study Area, if any, will require a Stage 2 Archaeological Assessment as part of the development application process.

The Archaeological Assessment(s) will be peer reviewed by a consultant to be retained by the Town of Oakville.

7.5 Noise and Odour Studies

The noise and odour studies will provide an understanding of:

- The impacts of the surroundings on the proposed development area, including road traffic noise sources, and noise from existing uses located within the Study Area (i.e., the Mid-Halton Wastewater Treatment Plant and existing employment uses); and,
- The impacts of the development of the Study Area on itself (i.e., the impact of noise associated with various land uses proposed for the Study Area on other land uses proposed for the area).

The noise and odour studies will be prepared at a Tertiary Plan level of detail based on the Ministry of Environment Guidelines, including LU-131 Guidelines for Stationary Noise Sources. This level of detail will provide a comprehensive noise impact assessment, which will:

- identify land use restrictions for sensitive land uses;
- identify the land use implications for potential new noise sources in the Study Area;
- input into the assessment of land use options;
- identify generalized noise mitigation/abatement requirements; and
- set out further noise and odour study requirements at the draft plan of subdivision / site plan approval stage.

A follow up more detailed noise and odour studies will be undertaken for the Saw Whet lands and any additional lands with active applications during the study timeframe addressing the study requirements emanating from the overview study.

The Noise and Odour Studies will be peer reviewed by a consultant to be retained by the Town of Oakville.

8.0 Tertiary Plan

The process leading up to the development of the Tertiary Plan will identify up to three land use options based on the technical reports. The land use options considered shall also include and consider plans submitted by one or more of the landowners. The land use options shall identify parks and school needs, vehicular and active transportation connectivity and assess varying residential housing forms and densities/heights and a range of employment opportunities.

Input from the technical review along with an assessment of Provincial, Regional and Town policies, including a review of the Town's current growth management policies, its employment and commercial land supply (without conducting a needs assessment), intensification targets, heritage and other Livable Oakville policies will be used to evaluate the land use options for the Study Area.

A set of evaluation criteria incorporating these matters will be developed to evaluate the land use options. The evaluation criteria will be reviewed with and confirmed by Town staff prior the evaluation of the land use options.

The final Tertiary Plan (preferred land use alternative) will recommend the appropriate land use designations and policies as well as associated infrastructure and community servicing needs.

A public open house will be held to present the existing conditions, land use options and preferred option to the public. The final technical study reports and Tertiary Plan will be presented to Council.

The Tertiary Plan will be peer reviewed by a consultant to be retained by the Town of Oakville.

9.0 Documentation to be Referenced and Referred to:

Low Impact Development Stormwater Management Planning and Design Guide. Toronto and Region Conservation Authority and Credit Valley Conservation Authority. 2010.

Draft Guidance for Development Activities in Redside Dace Protected Habitat. Ontario Ministry of Natural Resources. February 2011.

Ontario Provincial Policy Statement. Ontario Ministry of Municipal Affairs and Housing, 2005.

Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement. Ontario Ministry of Natural Resources.

Erosion and Sediment Control Guideline for Urban Construction. Greater Golden Horseshoe Conservation Authorities. December 2006.

Water Balance Guidelines for the Protection of Natural Features. Dec. 2011. http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/Water%20Balance%20for%20the%20Protection%20of%20Natural%20Features%20Guideline%20.pdf

Ontario Stream Assessment Protocol. Ontario Ministry of Natural Resources.

Conservation Halton Long Term Environmental Monitoring Annual Reports for Urban Creeks.

Conservation Halton Environmental Impact Study Guidelines. 2005.

Conservation Halton Landscaping and Tree Preservation Guidelines. April 2010.

Understanding Natural Hazards, Ministry of Natural Resources, 2001

Technical Guide – River & Stream Systems: Flooding Hazard Limit, Ministry of Natural Resources & Watershed Science Centre, 2002

Technical Guide – River & Stream Systems: Erosion Hazard Limit, Ministry of Natural Resources & Watershed Science Centre, 2002

Appendix B

ELC Data Cards

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sandhot		POLYGON: (1)	
SURVEYOR(S): DW	DATE: July 2, 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Frapenn > Jugnig > Ulrubra >
2	SUB-CANOPY	3	3	Frapenn > Rhacath >
3	UNDERSTOREY	4	3	Rhacath >
4	GRD. LAYER	5	4	allpeti > genurba > rhacath > pairsey

HT CODES: 1 = >25 m 2 = 10<HT< 25 m 3 = 2<HT< 10 m 4 = 1<HT< 2 m 5 = 0.5<HT< 1 m 6 = 0.2<HT< 0.5 m 7 = HT< 0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:		BA:

SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	N	> 50
STANDING SNAGS:	R	< 10	R	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	R	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G= 999
MOISTURE: 3	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE:	FO
COMMUNITY SERIES: Deciduous Forest	CODE:	FOD
ECOSITE: Fresh - Moist Deciduous Forest	CODE:	FOD7
VEGETATION TYPE: Fresh - Moist Ash Lowland Deciduous Forest	CODE:	FOD7-2
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

Soil - 75%, short thick ribbon, moderate-strong cast

disturbed, hard soil

prism Frapenn ☒ :: (14)

most of the large trees 15-20 cm. in southern part

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Frapenn	A				
Jugnig	O				
Ulrubra	R				
syvulg		R			
vitrip				O	
lontata				O	
pairsey			O		
rhacath		A	A		

SPECIES CODE	LAYER 1	2	3	4	COLL
genurba				A	
allpeti				A	
geurobe				O	
A-lute				O	
erianny				R	
poapra1				O	
lathirs				O	
gulapar				R	
solalti				O	
phaarun				O	
Elacglom				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Wheat		POLYGON: 2		
SURVEYOR(S): DW		DATE: 2 July 2012	UTME	
START	END		UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☑ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☐ SURFICIAL DEP.		☐ CLIFF	☐ TREED	☐ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☑ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☑ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	4	4	grasses solalt.ciravc Solcan spp

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT 1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 ≤ CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:					BA:
SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50	
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50	
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50	

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE: CU	
COMMUNITY SERIES: Cultural Meadow	CODE: CUM	
ECOSITE: Mineral Cultural Meadow	CODE: CUM1	
VEGETATION TYPE: Dry-Moist Cultural Meadow	CODE: CUM1-1	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

soil >50% sand, mod-strong coarse, short thick ribbon, g @ 70cm, hardpan @ 80cm
- taken in low lying area dominated by agrstol
ribbon of phragm along drainage.

monarch

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Pinpenn					
Solpeab					
rhoath					
rubpsm					
Betpap					
viblant					
thuocc					
Hedcom					
chrtrph					
Quemac					
ribpsm					
Picgla					
pingra					
Solcan					
osmcla					
osmcin					
Sorsit					
astpuh					
Verthap					
achmil					
linvul					
equarv					
arclapp					
aspcap					
lotpsm					
sirvul					
lacsen					
fusfat					

SPECIES CODE	LAYER 1	2	3	4	COLL
Poapra					
Elyrep					
corsne					
elyrep					
Solalti					
phaaru					
dryfil					
Ser vulg					
rumcri					
hypper					
Elyrep					
Poapra					
Lotcor					
chrleu					
astsim					
Poapra					
Lotcor					
agrstol					
Fesrub					
vicsep					
rudhir					
tri hyb					
plavul					
hor jub					
melalb					
rosacif					
cun cyb					
gnacan					

Poapra Elyrep corsne elyrep Solalti phaaru dryfil Ser vulg rumcri hypper Elyrep Poapra Lotcor chrleu astsim Poapra Lotcor agrstol Fesrub vicsep rudhir tri hyb plavul hor jub melalb rosacif cun cyb gnacan

Odocoileus

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Whet	POLYGON: 3	
SURVEYOR(S): DW	DATE: 2 July 2012	UTME
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☑ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☑ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☑ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	Quemac > Ulmame
2	SUB-CANOPY	3	4	Rhoalt > Cra-spp
3	UNDERSTOREY	4	2	Rhoalt
4	GRD. LAYER	5	3	Rhoalt parinse Vitrip

HT CODES: 1 = >25 m 2 = 10<HT< 25 m 3 = 2<HT< 10 m 4 = 1<HT< 2 m 5 = 0.5<HT< 1 m 6 = 0.2<HT< 0.5 m 7 = HT< 0.2 m

CVR CODES: 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	R	10 - 24	R	25 - 50	N	> 50
STANDING SNAGS:	0	< 10	N	10 - 24	N	25 - 50	N	> 50
DEADFALL / LOGS:	0	< 10	N	10 - 24	N	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER	X	YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE: CU	
COMMUNITY SERIES: Cultural Thicket	CODE: CUT	
ECOSITE: Mineral Cultural Thicket	CODE:	
VEGETATION TYPE: Buckthorn Cultural Thicket	CODE: CUT1	
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Rhacath		A		A	
Cra-spp		A			
Ulmame	R				
Quemac	R				
Ostvir		R			

SPECIES CODE	LAYER 1	2	3	4	COLL.
Parinse				8	
Vitrip				8	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sawhet		POLYGON: 4	
	SURVEYOR(S): DW	DATE: 4 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☑ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☑ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☑ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☑ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	frapenn
2	SUB-CANOPY	3	2	salbebb vibopul
3	UNDERSTOREY			
4	GRD. LAYER	5	4	phaarun

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:					BA:
SIZE CLASS ANALYSIS:		< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:		< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:		< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Marsh		CODE: MA
COMMUNITY SERIES: Meadow Marsh		CODE: MAM
ECOSITE: Mineral Meadow Marsh		CODE: MAM2
VEGETATION TYPE: Reed Canary Grass Mineral Meadow Marsh		CODE: MAM2-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

cottontail

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
frapenn	R					phaarun				D	
salbebb		O				solalt				O	
juglnigr	R					antlonc				O	
vibopul		O				dapfull				O	
						inexhell				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sawwhet		POLYGON: 5	
	SURVEYOR(S): DW	DATE: 2 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☑ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	Trapenn = Poptrem
2	SUB-CANOPY	3	2	Salbebb > Rhacath
3	UNDERSTOREY	4	4	Phraust
4	GRD. LAYER	5	3	astlanc agrstol phraum solalt

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:								BA:
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Marsh		CODE: MA
COMMUNITY SERIES: Meadow Marsh		CODE: MAM
ECOSITE: Mineral Meadow Marsh		CODE: MAM2
VEGETATION TYPE: Common Reed Mineral Meadow Marsh		CODE: MAM2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Salbebb		D			
Trapenn	R				
Poptrem	R				

SPECIES CODE	LAYER 1	2	3	4	COLL.
phraust				A	
scivali				O	
epipaw				O	
astlanc				O	
phraum				O	
agrstol				O	
lytsali				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Saw Whet		POLYGON: 6	
	SURVEYOR(S): DW	DATE: 2 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☑ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☑ POND ☐ RIVER ☐ STREAM ☑ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			☑ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	4	1	typlati
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	7	3	cerdeme >> potnata

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR < 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:				BA:
SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	Shallow Water	CODE: SA
COMMUNITY SERIES:	Submerged Shallow Aquatic	CODE: SAS
ECOSITE:	Submerged Shallow Aquatic	CODE: SAS1
VEGETATION TYPE:	Central Submerged Shallow Aquatic	CODE: SAS1
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

narrow band of mannweg along edge

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
						cerdeme					
						potnata					
						Carvulp					
						junddll					
						sciatro					
						typlati					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Saw Whet		POLYGON: 7	
	SURVEYOR(S): DW	DATE 2 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☑ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☑ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☑ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	trapenn
2	SUB-CANOPY			
3	UNDERSTOREY	4	4	Typlati > typanger
4	GRD. LAYER	5	3	agrstol astlane

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:					BA:
SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50	
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50	
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50	

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 15	G= 999
MOISTURE: 6	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Marsh	CODE: MA
COMMUNITY SERIES: Shallow Marsh	CODE: MAS
ECOSITE: Mineral Shallow Marsh	CODE:
VEGETATION TYPE: Cattail Mineral Shallow Marsh	CODE: MAS2-1
INCLUSION	CODE:
COMPLEX	CODE:

Notes:

Soil: Auger to 20cm then to dry & hard, >50% sand, g @ 15cm

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
trapenn	R				

SPECIES CODE	LAYER 1	2	3	4	COLL.
agrstol				A	
astlane				O	
solalti				O	
lytsali				O	
typlati			A		
typanger			A		
epipan				R	
crane				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sawtooth | POLYGON: 1 a+b
SURVEYOR(S): DW | DATE: 2 July 2012 | UTME
START | END | UTMZ | UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION
					☑ Hedgerow

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	3	Quemac2 > Crapenn1
2	SUB-CANOPY	3	3	rhacath1, Cra.spp2, Crapenn1, Quemac4
3	UNDERSTOREY	4	3	Cor sto2, Cor tom2, Rubidu2, rhacath1
4	GRD. LAYER	5	3	All pet1, rhacath1, Quemac1, Parvir1

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT 1 m 6 = 0.2<HT<0.5m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	R > 50
STANDING SNAGS:	R	< 10	R	10 - 24	N	25 - 50	N > 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	R	25 - 50	N > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	Cultural	CODE: CUL
COMMUNITY SERIES:		CODE:
ECOSITE:		CODE:
VEGETATION TYPE:	Deciduous Hedgerow	CODE: H
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

dense buckthorn

ELC PLANT SPECIES LIST

SITE:
POLYGON:
DATE:
SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
rhacath		O			
Cra.sp		O			
Crapenn		A			
rhacath		A			
Quemac	A				
Quemac	R				
Ground (Sb)					
Cor sto					
Cor tom					
Rubidu					
rosblan					

SPECIES CODE	LAYER 1	2	3	4	COLL.
Ph/prat					
Rvirgat					
Potrec					
Faraca					
Aruspi					
Parvir					
Edalta					
allpet					
Geiurba					
Eurlute					
Verurt					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sawhat		POLYGON: 8C	
	SURVEYOR(S): DW	DATE		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☑ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Fraxinus > Pinsylv >> Ulmus
2	SUB-CANOPY	3	4	Rhacanth Fraxinus Cont.
3	UNDERSTOREY	4	3	corfolia rhacanth >>
4	GRD. LAYER	5	1	allpeti

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	R	25 - 50	N	> 50
STANDING SNAGS:	O	< 10	R	10 - 24	N	25 - 50	N	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	✓	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION

COMMUNITY CLASS: Cultural	CODE: cu
COMMUNITY SERIES:	CODE:
ECOSITE:	CODE:
VEGETATION TYPE: Hedgerow	CODE: H
INCLUSION	CODE:
COMPLEX	CODE:

Notes:

dense underbrush
Buckthorn

sparse ground covers
chickadee

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
Fraxinus						allpeti				R	
Pinsylv											
Ulmus											

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sand Wet.		POLYGON: 9	
SURVEYOR(S): DW	DATE: 2 July 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☑ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☑ TREED	☑ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Fraxpen > Quemac Querub
2	SUB-CANOPY	3	4	Rhacath > Acegla >> Ulmame
3	UNDERSTOREY	4	4	rhacath
4	GRD. LAYER	5	3	rubpub Callreti > parvise Lycenobe

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:	O	< 10	A	10 - 24	A	25 - 50	O	> 50
STANDING SNAGS:	O	< 10		10 - 24	R	25 - 50	R	> 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	R	25 - 50	R	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL		DEPTH TO MOTTLES / GLEY	g = 20	G= 999	
MOISTURE: 6		DEPTH OF ORGANICS:	8		(cm)
HOMOGENEOUS / VARIABLE		DEPTH TO BEDROCK:	999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE:	FO
COMMUNITY SERIES: Deciduous Forest	CODE:	FOD
ECOSITE: Fresh-Moist Deciduous Forest	CODE:	FOD7
VEGETATION TYPE: Fresh-Moist Green Ash Forest	CODE:	FOD7-2
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes: Plot 2: WP 596

Frax. ☒: 0 Soil - ~50% sand, strong coarse, thick stone ... gley 2 zone

younger trees to the north

little herbaceous layer

Plot 1. Frax ☐ WP 591. Quemac: DBH 12-18 Dead:

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
Fraxpen	A	O				glysm				R	
Pinstr	V					Callreti				O	
Acegla	R					parvise				O	
Quemac	O					Lycenobe				O	
Querub	O										
Cornst	R	R									
Ulmame		O									
cortoen											
rhacath											

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Saw Whet		POLYGON: 96	
	SURVEYOR(S): DJ	DATE: 2 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Fraseni
2	SUB-CANOPY	3	4	Rhoath > Ulmer
3	UNDERSTOREY	4	3	Rhoath
4	GRD. LAYER	5	3	rhoath > Fraseni > allpeti

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	N	> 50
STANDING SNAGS:	O	< 10	O	10 - 24	N	25 - 50	N	> 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	R	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 15	G= 999
MOISTURE: 6	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Forest		CODE: FO
COMMUNITY SERIES: Deciduous Forest		CODE: FOD
ECOSITE: Fresh-Moist Deciduous Forest		CODE: FOD7
VEGETATION TYPE: Fresh-Moist Ash Deciduous Forest		CODE: FOD7-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
fraseni	A			O		allpeti				O	
Ulmer		O				pruvulg				R	
vitrupa		O				gemurba				R	
rhoath		A	A								

Soils <50% sand, mod cast, short thick ribbon, g@ 15cm

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sam Wait		POLYGON: 10	
	SURVEYOR(S): DW	DATE: 28 Sept 2012	UTME	
	START	END	UTME	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	3	Quemoor >> Carovat
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	4	5	grasses > Skalti > astnova

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:		< 10		10 - 24	A	25 - 50		> 50
STANDING SNAGS:	N	< 10	N	10 - 24	N	25 - 50	N	> 50
DEADFALL / LOGS:	N	< 10	N	10 - 24	N	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	✓	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE: CU
COMMUNITY SERIES:	CODE:
ECOSITE:	CODE:
VEGETATION TYPE: Hedgerow	CODE: H
INCLUSION	CODE:
COMPLEX	CODE:

Notes:

by power lines - Hedrow.

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Quemoor	A				
crat. sp		R			
rhoanthy		R			
Carovat	R				

SPECIES CODE	LAYER 1	2	3	4	COLL.
astnova					
Skalti					
grasses					
dogfall					
astnova					
Tarotti					
gravel					
astlanc					
albeti					
phlprat					
Poprat					

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sawbwheat		POLYGON: 11		
SURVEYOR(S): DW	DATE: 11 July 2012		UTME	
START	END: 12 Sept 2012		UTMN	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☑ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☑ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☐ TREED	☑ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☑ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	2	Fraxinus > Pinus
2	SUB-CANOPY	3	4	Rhamnus > Cra-spp > Malus
3	UNDERSTOREY	4	3	rhamnus > cornus > Fraxinus
4	GRD. LAYER	5	3	rhamnus > cirsium > graminoids

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:	A	< 10	O	10 - 24	R	25 - 50	N	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G= 999	
MOISTURE: 2	DEPTH OF ORGANICS:	0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE: CU	
COMMUNITY SERIES: Cultural Thicket	CODE: CUT	
ECOSITE: Mineral Cultural Thicket	CODE: CUT1	
VEGETATION TYPE: Buckthorn Cultural Thicket	CODE: CUT1	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

ELC — PLANT SPECIES LIST

SITE: Sawbwheat
POLYGON: 11
DATE: 11 July 12
SURVEYOR(S): DW

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Fraxinus	O				
Rhamnus		O			
Malus		O			
Cornus sp		O			
Rubus	R				
rhamnus		A			
Vitis				O	
Cornus			O		
rhamnus			A		

SPECIES CODE	LAYER 1	2	3	4	COLL.
cirsium				O	
Prunus				O	
del pet				O	
Prunus				O	
Rhamnus				O	
graminoids				O	

Forbs - Clay loam. buckthorn w/ Ash regen.

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Wheat		POLYGON: 12		
SURVEYOR(S):	DATE: 11 July 2012		UTME	
START	END		UTMN	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☑ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☑ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☑ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	Populus > Shrub
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	5	4	Shrubs > Asteraceae / grasses > Rosa Fallax

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: Cl	DEPTH TO MOTTLES / GLEY	g = 999	G= 999		
MOISTURE: 2	DEPTH OF ORGANICS: 0			(cm)	
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:			(cm)	

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: cultural	CODE: C	
COMMUNITY SERIES: cultural meadow	CODE: CM	
ECOSITE:	CODE: CM1	
VEGETATION TYPE: Dry-Moist Old field meadow	CODE: CM1-1	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Salix					
Symphoricarpos					
Cirsium					
Verbascum					
Lactuca					
Populus					
Elaeagnus					
Crataegus					
Cornus					
Asteraceae					
Agropyron					
Poa pratensis					
Bromus inermis					
Taraxacum					
Galium					
Viola					
Agrostis					
Phleum pratense					
Solidago canadensis					
Prunus virginiana				1R	

SPECIES CODE	LAYER 1	2	3	4	COLL.
Trifolium					
Rosa woodsii					
Rosa acicularis					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sand Wharf		POLYGON: 13	
SURVEYOR(S): DW	DATE 11 July 2012		UTME
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
		☐ TALUS		☑ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☑ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Pasy/V > Populus
2	SUB-CANOPY	3	4	Rhamnus > Viburnum = Populus Ulmus
3	UNDERSTOREY	4	2	Rhamnus > Viburnum = Ulmus Ostrya Prunus
4	GRD. LAYER	5	2	Rhamnus circinata Fraxinus

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	N	> 50
STANDING SNAGS:	O	< 10	R	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	A	< 10	A	10 - 24	O	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G = 999	
MOISTURE: 2	DEPTH OF ORGANICS: 0			(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:			(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE:	C
COMMUNITY SERIES: Cultural Plantation	CODE:	CP
ECOSITE: Conifer Plantation	CODE:	CP3
VEGETATION TYPE: Scotch Pine Coniferous Plantation	CODE:	CP3-3
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Pasy/V	A				
Rhacath		A	O	R	
Popem	O				
Populus		R			
Ulmam		O			
Acemar	R				
Fraamer		O			
Rhacath		R			
Pinsyl			O		
Lonmac			O		
Ulmspp		O		O	

SPECIES CODE	LAYER 1	2	3	4	COLL
Genroba				O	
Ribcyn				O	R
Glystr				R	
Lonmac				O	
Antspp				O	
Dryexp				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sarwhet		POLYGON: 14	
	SURVEYOR(S): DW	DATE: 11 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☑ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☑ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☑ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	5	4	phaarum > carvulp > juneffu > agrgiga

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:					BA:
SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50	
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50	
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50	

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL 6	DEPTH TO MOTTLES / GLEY	g = 25	G= 999
MOISTURE:	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Marsh		CODE: MA
COMMUNITY SERIES: Meadow Marsh		CODE: MAM
ECOSITE: Mineral Meadow Marsh		CODE: MAM2
VEGETATION TYPE: Reed Canary Grass Mineral Meadow Marsh		CODE: MAM2-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
phaarum				A							
agrgig				A							
carvulp				O							
juneffu				O							
leftsali				O							
carbebb				O							
juncdugl				O							
solaltic				O							
dipfull				O							
astlane				O							

WP 385
386

Pic 1978

ephemeral drainage

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sawbwet | POLYGON: 15

SURVEYOR(S): DW | DATE: 11 July 2011 | UTME

START | END | UTMZ | UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☑ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Acesasa > fraxnex > Ostvir > Pinstr
2	SUB-CANOPY	3	3	Acesasa > Ostvir
3	UNDERSTOREY	4	3	Fraxnex > Pinstr
4	GRD. LAYER	5	3	Fraxnex > Allpet > Galaro

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	O > 50
STANDING SNAGS:	R	< 10	O	10 - 24	R	25 - 50	R > 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	O	25 - 50	R > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = ???	G = ???	
MOISTURE: ?	DEPTH OF ORGANICS:	???		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	???		(cm)

COMMUNITY CLASSIFICATION:

		CODE:
COMMUNITY CLASS:	Forest	FO
COMMUNITY SERIES:	Deciduous Forest	FOD
ECOSITE:	Dry-Fresh Sugar Maple Forest	FOD5
VEGETATION TYPE:	Dry-Fresh Sugar Maple-White Ash Deciduous Forest	FOD5-8
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

hard soil. difficult to auger

Several Snags w/ large woodpecker holes

Acesasa ☐

fraxnex ⁝

Dead ·

Pinstr ⁝

few dead trees w/ woodpecker holes

chipmunk

ELC — PLANT SPECIES LIST

SITE:

POLYGON:

DATE:

SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Acesasa	A				
Amearbor	O				
Ostvir	O				
Fagsyl	O				
Ulaam	O				
Rhocat		O	D		
Viburac	O				
Amearbor	O				
Pinstr	O				
Fraxnex	O				
Betpap	O				
Fraxnex	O		O		
rbrubr			R		
prunvi			O		

SPECIES CODE	LAYER 1	2	3	4	COLL
allpet				O	
rubrada				O	
carpens				O	
papsp.				O	
pinstr				O	
antspp				O	
cirlute				O	
gamwilda				O	
desnuda				O	
fragvir				R	
galapar				R	
carpens				O	
antspp				O	
podpelt				O	
lonjapo				O	
rhatadi				O	
fraamer				R	
hesmatr				O	
ranscel				R	
solflex				O	
polacro				R	
amlpatu				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sam Lunt		POLYGON: 16a	
	SURVEYOR(S): DW	DATE: 11 July 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☑ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☑ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY	3	4	Cortoma > vitrupa > Poptrem
4	GRD. LAYER	4	5	Solalt > ascsyr > phaam

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G= 999
MOISTURE: 2	DEPTH OF ORGANICS: 0 (cm)		
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999 (cm)		

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Cultural		CODE: CW
COMMUNITY SERIES: Cultural Thicket		CODE: CWT1
ECOSITE: Mineral Cultural Thicket		CODE:
VEGETATION TYPE: Grey Dogwood Cultural Thicket		CODE: CWTH4
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

very dense

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Poptrem			O		
Phacath			O		
vitrupa			O		
Cortoma			D		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Solalt					
~~Phacath~~					
ascsyr					
phaam					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Sam Wheat		POLYGON: 16b	
	SURVEYOR(S): DW	DATE: 13 Sept 2012		UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☑ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☑ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☑ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☑ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	Poptren
2	SUB-CANOPY			
3	UNDERSTOREY	4	4	Cortoma ruballe
4	GRD. LAYER	4	5	Solalti, eutgram, grasses, asters

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT 1 m 6 = 0.2<HT<0.5 m 7 = HT≤0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:								BA:
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	Cultural	CODE: CU
COMMUNITY SERIES:	Cultural Thicket	CODE: CUT
ECOSITE:	Mineral Cultural Thicket	CODE: CUT1
VEGETATION TYPE:	Gray Dogwood Thicket	CODE: CUT1-4
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Poptren	R				
ruballe			O		
Cortoma			A		

SPECIES CODE	LAYER 1	2	3	4	COLL.
asters				O	
solalti				A	
eutgram				O	
vitaest			R		
grasses				A	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Swamp West		POLYGON: 17	
SURVEYOR(S): DW	DATE: 11 July 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Fraxnig >> Acesac = Cerori?
2	SUB-CANOPY	3	3	Rhacath > Crataegus spp. >> Malpum
3	UNDERSTOREY	4	4	Rhacath > Cornam
4	GRD. LAYER	5	3	Allpet > Rhacath > Mosses > geuvir

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 ≤ CVR < 60% 4 = CVR ≥ 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	R	25 - 50	N > 50
STANDING SNAGS:	R	< 10	R	10 - 24	R	25 - 50	N > 50
DEADFALL / LOGS:	A	< 10	R	10 - 24	R	25 - 50	R > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G = 999	
MOISTURE: 2	DEPTH OF ORGANICS: 0			(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999			(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE:	FO
COMMUNITY SERIES: Deciduous Forest	CODE:	FOD
ECOSITE: Dry-Fresh Deciduous Forest	CODE:	FOD4
VEGETATION TYPE: Dry-Fresh Talltree Ash Deciduous Forest	CODE:	FOD4-2
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

young forest, successional disturbed, low diversity

dbh mostly 15-20cm

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Rhacath		A			
Fraxnig	A				
Malpum		O			
Acesac	O				
Cornam					
Crataegus spp.	R	O			
Cerori					

SPECIES CODE	LAYER 1	2	3	4	COLL.
Allpet				A	
geuvir				O	

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sunwhet		POLYGON: 18	
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☑ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☑ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☑ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	Fraxinus Quercus
2	SUB-CANOPY			
3	UNDERSTOREY	4	3	Viburnum rubus Acer ostrya
4	GRD. LAYER	4	4	Solidi aster Rosa Poa Typha

HT CODES: 1 = >25 m 2 = 10<HT< 25 m 3 = 2<HT< 10 m 4 = 1<HT≤ 2 m 5 = 0.5<HT< 1 m 6 = 0.2<HT< 0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	Cultural	CODE: W
COMMUNITY SERIES:	Cultural Thicket	CODE: WT
ECOSITE:	Mineral Cultural Thicket	CODE: WT1
VEGETATION TYPE:	Raspberry Cultural Thicket	CODE: WT1-5
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

valley slope + bottomland

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Quercus					
Acer					
Ostrya					
Viburnum					
Rubus					
Typha					

SPECIES CODE	LAYER 1	2	3	4	COLL.
Solidi					
Rosa					
Poa					

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sandy Inlet | POLYGON: N 19

SURVEYOR(S) | DATE 11 July 2012 Sept 13 2012 | UTME

START | END | UTMZ | UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☑ GRAMINOID	☑ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☑ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	Tropenn Poptrem Saldisc
2	SUB-CANOPY			
3	UNDERSTOREY	4	1	Cyrfasc Typlatx
4	GRD. LAYER	4	4	Phaarn Solulm Symlaevx

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION: | BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SiC	DEPTH TO MOTTLES / GLEY	g = 10	G= 60	
MOISTURE: ☑	DEPTH OF ORGANICS: 0			(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:			(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Marsh	CODE: MA	
COMMUNITY SERIES: Meadow Marsh	CODE: MAM	
ECOSITE: Mineral Meadow Marsh	CODE: MAM2	
VEGETATION TYPE: Reed Canary Grass Mineral Meadow Marsh	CODE: MAM2-2	
☐ INCLUSION	CODE:	
☐ COMPLEX	CODE:	

Notes:

water table 260 cm

portions with organics ~60 cm deep

pockets of seepage

WP #37

mostly mineral SiC

green frogs along creek

portion trending towards CUM1

ELC — PLANT SPECIES LIST

SITE:

POLYGON:

DATE:

SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Tropenn	R				
Poptrem	R				
Saldisc	R				
Salbebb	R				
Lecmyr				O	
Mitpan				O	
Agrstol				O	
Typlatx				O	
Solulm				O	
Symlaev				O	
Cyrfasc		R			
Rubpar				R	

SPECIES CODE	LAYER 1	2	3	4	COLL.
Phaarn				A	
Eriangu				O	
Lyssalx				A	
Solalt				A	
Eriang				O	
Typlatx				O	
Echarn				O	
Pussalx				R	
Elyrep				R	
Mitpan				O	
Epifur				O	
Nasoff				O	
Myolax				O	
Solalt				O	
Agrstol				O	
Alnrug				R	
Cyrfasc				R	
Lemmin				O	
Veralt				O	
Lecmyr				O	
Bidcer				O	
Myoscor				O	
Agrstol				O	
Astlaev				O	
Astpuni				O	
Impcap				O	
Onoseny				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Whet		POLYGON: 20	
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
☐ OPEN WATER		☐ ROLL. UPLAND	☐ OPEN	☐ BRYOPHYTE	☐ FEN
☐ SHALLOW WATER		☐ CLIFF	☐ SHRUB	☑ DECIDUOUS	☐ BOG
☑ SURFICIAL DEP.		☐ TALUS	☑ TREED	☐ CONIFEROUS	☐ BARREN
☐ BEDROCK		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Acesac > Frapen > Ulmam > Acesp
2	SUB-CANOPY			
3	UNDERSTOREY	4	4	Rhaf > Lonbid > Ostvir > Viblan
4	GRD. LAYER	5	4	Parqui > Mitdip > Acesac seedl > Actpac

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES: 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	D	10 - 24	R	25 - 50	N > 50
STANDING SNAGS:	R	< 10	R	10 - 24	R	25 - 50	R > 50
DEADFALL / LOGS:	A	< 10	A	10 - 24	R	25 - 50	R > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 80	G= 999
MOISTURE: 3	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / ~~VARIABLE~~	DEPTH TO BEDROCK: 999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: forest	CODE: FO	
COMMUNITY SERIES: Deciduous Forest	CODE: FOD	
ECOSITE: Fresh - Moist Sugar Maple	CODE: FOD6	
VEGETATION TYPE: Fresh - Moist Sugar Maple - Ash Deciduous Forest	CODE: FOD6-1	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

young tree

Soils - >50% weak - mod coarse, short ribbons @ 80

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Acesac	A				
Frapen	O				
Ulmam	O				
Acesp	O				
Rhaf			R		
Viblan			R		
Lonbid			R		
Actpac			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
hemmyr				O	
allpeti				O	
Parqui			R	O	
astlate				O	
geruba				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Snowheart		POLYGON: 21	
SURVEYOR(S): DUD	DATE: 13 Sept 2012		UTME
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	4	Acesasa, Pruseros Betpapy2 Fragramy
2 SUB-CANOPY	3	4	Acesasa >> Ostrvirg
3 UNDERSTOREY	4	2	Ribacyuth Pruvirg corform
4 GRD. LAYER	5	2	all peti Sol flex

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	O	> 50
STANDING SNAGS:	O	< 10	R	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24	R	25 - 50	R	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE	X	MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: FO
COMMUNITY SERIES: Deciduous Forest	CODE: FOD
ECOSITE: Dry-Fresh Sugar Maple Deciduous	CODE: FOD5
VEGETATION TYPE: Dry-Fresh Sugar Maple-Birch Deciduous Forest	CODE: FOD5-10
INCLUSION	CODE:
COMPLEX	CODE:

Notes:

Some very old sugar maple on slope
little groundcover

ELC PLANT SPECIES LIST

SITE:
POLYGON:
DATE:
SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	1	2	3	4	COLL.
Betpapy	O				
Pruseros	O				
Quermacr	O				
Fraamer	O				
Acesasa	A				
Ostrvirg	O				
Fragrand	O				
Tsugcana	O				
Pinustro	O				
Tiliamer	O				
corform			O		
Ribcyuth			O		
Pruvirg			O		
viburnum			R		
Sol flex				O	
all peti				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Whet		POLYGON: 22	
SURVEYOR(S): DW	DATE: 9 Aug 2012		UTME
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☑ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Acesasa >> Querrubr > Caryovat Fraxamer
2	SUB-CANOPY	3	3	Acesasa Caryovat Ostvirg
3	UNDERSTOREY	4	2	Prunvirg Fraxamer Acesasa Rhamcath
4	GRD. LAYER	5	1	Veroffi Allipeti Carpens Thaldioc

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	R	> 50
STANDING SNAGS:	R	< 10	R	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24	R	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE	X	MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SiC	DEPTH TO MOTTLES / GLEY	g = 999	G = 999
MOISTURE: 2	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: FO
COMMUNITY SERIES: Deciduous Forest	CODE: FOD
ECOSITE: Dry-Fresh Sugar Maple	CODE: FOD5
VEGETATION TYPE: Dry-Fresh Sugar Maple Deciduous Forest	CODE: FOD5-1
INCLUSION	CODE:
COMPLEX	CODE:

Notes:

Sparse ground covers.

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Saw Whet		POLYGON: 23
	SURVEYOR(S): DW	DATE: 9 Aug 2012	UTME
	START	END	UTMZ / UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☑ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	4	Salxrub > Fragemm > Acenegn
2 SUB-CANOPY	3	2	Fragemm > Acesasa > Ulmame
3 UNDERSTOREY	4	2	Rubidme ribamer pruvirg
4 GRD. LAYER	4	4	Allpeti glehede hesmatr solalti

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m
CVR CODES: 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:				BA:
SIZE CLASS ANALYSIS:	A < 10	A 10 - 24	A 25 - 50	O > 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	✓ MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SiCL	DEPTH TO MOTTLES / GLEY	g = 50	G= 999
MOISTURE: 4	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: Fo
COMMUNITY SERIES: Deciduous Forest	CODE: FoD
ECOSITE: Fresh-Moist Lowland FoD	CODE: FoD7
VEGETATION TYPE: Fresh-Moist Willow Lowland Deciduous Forest	CODE: FOD7-3
INCLUSION	CODE: FOD6-5
COMPLEX Jewelweed Mineral Meadow Marsh	CODE: MAM2-9

Notes:

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.	SPECIES CODE	LAYER 1	2	3	4	COLL.
Salxrub	A					equarve				O	
Acesasa	R					pilea				R	
Fragemm	O					impcapl				O	
Acesani	R					lotsali?				O	
Ulmame	O					allpeti				A	
Acenegn	O					astlanc				O	
Tilamer	O					phaarun				O	
Morus		R				glystri				O	
						lapcana				R	
						leeviry				R	
						euppert				R	
						bidfron				R	
						arctium				O	
						passati				O	
						solalti				O	
						verurti				O	
						solaiga?				O	
						Viola				O	
						pdumpe?				O	
						erlute?				O	
						plamajo				O	
fusfort?				O		hesmatr				A	
torjapo?				R		pruvulg				O	
pruvirg			O			[illegible]				O	
ribagro?			O			oxastri				R	
rubidme			O			alliaria?				R	
ribamer			O			pensedo				R	
rosmult			O								

ELC
COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sunwhet			POLYGON: 24		
SURVEYOR(S): DW		DATE: 13 Sept		UTME	
START	END		UTMZ	UTMN	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☑ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☑ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☑ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☑ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☑ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	5	4	phaarun > epi-spp > lytsali > typlati

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR < 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:								BA:	
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50	
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50	
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50	

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	Marsh	CODE: MA
COMMUNITY SERIES:	Meadow Marsh	CODE: MAM
ECOSITE:	Mineral Meadow Marsh	CODE: MAM2
VEGETATION TYPE:	Reed Canary grass mineral Meadow Marsh	CODE: MAM2-2
INCLUSION		CODE: MAM3-2
COMPLEX		CODE:

Notes:

partially [illegible] soils

seepage at base of slope

Similar to 19

ELC
PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	LAYER 2	LAYER 3	LAYER 4	COLL.

SPECIES CODE	LAYER 1	LAYER 2	LAYER 3	LAYER 4	COLL.
myosp[illegible]				O	
phaarun				A	
solidule				O	
typlati				O	
lytsali				O	
epihirs				A	
eupmacu				O	
sciatro				O	
epipana				O	
solalti				O	
nasoffi				O	
lemminu				R	
gly[illegible]					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sun Wheat | POLYGON: 25
SURVEYOR(S): DW | DATE: 13 / Sept 2012 | UTME
START | END | UTMZ | UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	3	Frapen > Acerpen > Ulmamer
2	SUB-CANOPY	3	4	Rhamcath > Cort-sp > Frapen > Ulmamer
3	UNDERSTOREY	4	4	Corsepun > Cor-sp > Frapen
4	GRD. LAYER	5	4	all Poth ant late solidi cervir

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 5<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	N	> 50
STANDING SNAGS:	O	< 10	O	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24	O	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: FO	
COMMUNITY SERIES: Deciduous Forest	CODE: FOD	
ECOSITE: Fresh-Moist Deciduous Forest	CODE: FOD7	
VEGETATION TYPE: Fresh-Moist Green Ash Deciduous Forest	CODE: FOD7-2	
INCLUSION: Conifer Plantation	CODE: CUP3	
COMPLEX: Cultural Thicket	CODE: CUT1	

Notes:

disturbed
dense understory
open canopy

cottontail

hand soil - CC

ELC PLANT SPECIES LIST

SITE:
POLYGON:
DATE:
SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Ulmamer	O				
Cort-sp		A			
Cruatth		A			
Frapen	A				
Acerpen	R				
Pinstro	R				
Corsepun		O			
Querbor	R				
Rhamcath					
Betpapy	R				
vitriparia				O	
rosacmir			O		
rubspec			O		
corfem			O		
ribsylv			R		
Fallopia					

SPECIES CODE	LAYER 1	2	3	4	COLL
alpeth				A	
fraviv				O	
negacer				A	
antlate				D	
hiecyn				R	
solcan				A	
geirobe				O	
rhustadi				O	
urtdioi				R	
galtri				O	
agrgrae				O	
chealb				O	
antlate					
fraviv				O	
vernuti				O	
poapra				O	

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sandyhook		POLYGON: 26 a+b		
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME		
START	END	UTMZ	UTMN	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☑ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☑ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☐ TABLELAND	☑ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☐ TREED	☐ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☑ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	Fraxinus > Salix > Acer negundo
2	SUB-CANOPY			
3	UNDERSTOREY	4	1	rubus > vitis
4	GRD. LAYER	4	4	Solidago > Poa > Lythrum > Impatiens > Acer

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:		BA:

SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	Cultural	CODE: CU
COMMUNITY SERIES:	Cultural Meadow	CODE: CUM
ECOSITE:	Mineral Cultural Meadow	CODE: CUM1
VEGETATION TYPE:	Dry - Most old Field Meadow.	CODE: CUM1-1
INCLUSION		CODE:
COMPLEX	Reed Canary Grass Marsh	CODE: MAM2-2

Notes:

Flood plain meadow

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Fraxinus	R				
Salix	R				
Acer negundo	R				
rubus			R		
vitis			R		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Solidago				A	
impatiens				A	
Phalaris				A	
Lythrum				A	
Typha				O	
Phragmites				A	
Cornus				O	
Impatiens				O	
Asclepias				O	
Impatiens				O	
Poa				O	
Rubus				R	
Mimulus				R	
Poa				O	
Erianna				O	
Verbena				R	
Hypericum				R	
Acer negundo				R	
Arctium				O	

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sunshut			POLYGON: 27	
SURVEYOR(S): DW		DATE: 13 Sept 2012	UTME	
START	END		UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☐ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☑ TREED	☐ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☑ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Pinstro >> Acesus Fraxam
2	SUB-CANOPY	3	3	Acesus Fraxam
3	UNDERSTOREY	4	2	Sprang Rhacat
4	GRD. LAYER	5	1	All pla Lonxal Trendr gaulth

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 0.5<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:	
SIZE CLASS ANALYSIS:	A	< 10	O	10 - 24	A	25 - 50	O	> 50
STANDING SNAGS:	R	< 10	O	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	O	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE	☑	MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SiC	DEPTH TO MOTTLES / GLEY	g = 999	G= 999	
MOISTURE: 2	DEPTH OF ORGANICS: 0			(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999			(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest		CODE: FO
COMMUNITY SERIES: Conifer Forest		CODE: FOC
ECOSITE: Dry-Fresh Pine Forest		CODE: FOC1
VEGETATION TYPE: Dry-Fresh White Pine Forest		CODE: FOC1-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

White pine w/ Sugar maple regen from: Pinstro ☒ ☐ Fraxam ☐ ☐
Acesus ☐ ☐ Lard: ☐ ☐

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Pinstro	D				
Acesusa	R				
Fraxam	R		O		
Betpapy	R				
strath			O		
Vitrip			R		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Allpla				O	
gaulth				R	
Lonxal				R	
gaustr				O	
Rhoacat				O	
carlati				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Wheat			POLYGON: 28	
SURVEYOR(S): DW		DATE: 13 Sept 2012		UTME
START	END		UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☑ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
SITE		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
☐ OPEN WATER		☐ TALUS	COVER	☐ CONIFEROUS	☐ BARREN
☐ SHALLOW WATER		☐ CREVICE / CAVE		☐ MIXED	☑ MEADOW
☑ SURFICIAL DEP.		☐ ALVAR	☑ OPEN		☐ PRAIRIE
☐ BEDROCK		☐ ROCKLAND	☐ SHRUB		☐ THICKET
		☐ BEACH / BAR	☐ TREED		☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	1	Fragemn = Saldisc
2	SUB-CANOPY			
3	UNDERSTOREY	4	2	Cortom rubidme rhoath corstol
4	GRD. LAYER	5	4	Solalti Phragaus agrstol dogcan

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural	CODE: CU	
COMMUNITY SERIES: Cultural Meadow	CODE: CUM	
ECOSITE: Mineral CUM	CODE: CUM1	
VEGETATION TYPE: Dry - Moist old field Meadow	CODE: CUM1-1	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

Rhsoffi in creek bed WP535 sediment

Soil: <5% sand, stony cast, moderately sticky + slimy, thick 2-5cm gc 30cm Ribbons

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Fragemn	R				
Saldisc	R				
Cortom			O		
vitrip				O	
corstol			R		
rubidme			O		
rhoath			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
lotcor				O	
Phagau				O	
Solalti				A	
Poasem				O	
rosoffi				O	
arcalp				O	
agrstol				O	
alopra				O	
dogcan				O	
vicamo				O	
dipmun				O	
vervir				O	
cirarv				O	
juncbal				O	
leorug				O	
empnig				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Swan Lake | POLYGON: 29
SURVEYOR(S): | DATE: 13 Sept 2012 | UTME:
START: | END: | UTMZ: | UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☑ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☐ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☑ TREED	☑ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	4	Rhamnus >> Populus tremuloides Betula papyrifera
2	SUB-CANOPY	3	U	Rhamnus > Crataegus spp
3	UNDERSTOREY	4	U	Rhamnus > Cornus sericea
4	GRD. LAYER	5	3	Fragaria > all pet. rhamnus geum

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION: BA:

SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	D	25 - 50	N	> 50
STANDING SNAGS:	R	< 10	R	10 - 24	N	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	R	10 - 24	N	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G= 999	
MOISTURE: L	DEPTH OF ORGANICS:	0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest		CODE: FO
COMMUNITY SERIES: Deciduous Forest		CODE: FOD
ECOSITE: Dry-Fresh Deciduous Forest		CODE: FOD4
VEGETATION TYPE: Dry-Fresh White Ash Deciduous Forest		CODE: FOD4-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

WP 536 eroded gully

Soils – very hard - clay loam
similar to 11, but more trees.

ELC PLANT SPECIES LIST

SITE:
POLYGON:
DATE:
SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Rhamnus	A				
rhamnth		A	A	A	
Cnat. sp		A			
Betpapy	R				
Poptrem	R				
fragvesa	R				
vitrip				O	
Cor sp			D		

SPECIES CODE	LAYER 1	2	3	4	COLL.
georot				O	
alfpet				O	
rhamaln				O	
georob				O	
fragvesa					
oxasta				O	
oxasta				R	
agrgyp				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Saw Wheet		POLYGON: 29 30
	SURVEYOR(S): DW	DATE 2 July 2012	UTME
	START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☑ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☐ ABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☑ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION

SITE	COVER
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK	☐ OPEN ☑ SHRUB ☐ TREED

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	Salxpub
2	SUB-CANOPY	3	4	Salbebb Salvitpyr >> Quemac
3	UNDERSTOREY	4	4	Salbebb = rubidme = Cal betem = vitpyr
4	GRD. LAYER	5	4	phaarun >>

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT 1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR < 25% 3= 25 < CVR < 60% 4= CVR > 60%

STAND COMPOSITION:		BA:

SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SCL	DEPTH TO MOTTLES / GLEY	g = 10	G= 999
MOISTURE: 6	DEPTH OF ORGANICS:	0	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	999	(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Swamp	CODE:	SW
COMMUNITY SERIES: Thicket Swamp	CODE:	SWT
ECOSITE: Mineral Thicket Swamp	CODE:	SWT2
VEGETATION TYPE: Willow Mineral Thicket Swamp	CODE:	SWT2-2
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

Sals - sandy thick + very shrubby, g @ 10 cm, moderate coast

ELC PLANT SPECIES LIST	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Salbebb	R				
Quemac		R			
Rogcem			R		
Vl					
Salbebb		A	B		
rubidme			B		
Carbem			B		

SPECIES CODE	LAYER 1	2	3	4	COLL.
phaarun				D	
vitpyr		O	O		
edhlsba				R	
eutlang				O	
Shalix				O	
ascsyr				R	
Carpal				O	
Salpet				A	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Saw Mill		POLYGON: 31	
SURVEYOR(S):	DATE: 13 Sept 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☑ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☑ SHRUB
☑ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	3	4	Rhus typh > Popten
2	SUB-CANOPY			
3	UNDERSTOREY	4	3	Rhus typh > Rubus idae
4	GRD. LAYER	5	4	Solid sp > grasses > all petti

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:		BA:

SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 999	G= 999
MOISTURE:	DEPTH OF ORGANICS: 0		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: 999		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Cultural		CODE: CU
COMMUNITY SERIES: Cultural Thicket		CODE: CUT
ECOSITE: Mineral Cultural Thicket		CODE: CUT
VEGETATION TYPE: Sumac Cultural Thicket		CODE: CUT[1-1]
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

Soils very hard under prevailing drought

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Rhustyph	A				
Popten	O				
Cirvul	R				
Rosspp	R				
Juncaer	R				
Urtdio			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Solid sp				A	
grasssp				A	
allpetti				O	

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sandshot			POLYGON: 3	
SURVEYOR(S): DW		DATE		UTME
START	END		UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	**COVER**	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☑ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☑ TREED	☑ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE ([>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO])
1	CANOPY	3	4	Rhustyph
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER	5	4	overgrown turf >> Solidago hirsuta

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2 m

CVR CODES 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50	> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	Cultural	CODE: W
COMMUNITY SERIES:	Cultural Thicket	CODE: WT
ECOSITE:	Mineral Cultural Thicket	CODE: WT1
VEGETATION TYPE:	Sumac Cultural Thicket	CODE: WT1-1
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL
Rhustyph	A				

SPECIES CODE	LAYER 1	2	3	4	COLL
Solhirs				5	
grass				A	
Rumacet				O	
Lysthyr				O	
Rubhis				O	
Daucar				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sawwhet		POLYGON: 32 a+b	
SURVEYOR(S): DA	DATE: 13 Sept 2012		UTME
START	END	UTMZ	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☑ MINERAL SOIL ☐ PARENT MIN ☐ ACIDIC BEDRK ☐ BASIC BEDRK ☐ CARB. BEDRK	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☑ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☑ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☑ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☑ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☑ TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	4	Acesasa > Faggran = Ostvirg > Fraamer
2 SUB-CANOPY	3	4	Acesasa Ostvirg Faggran
3 UNDERSTOREY	9	2	Acesasa Prunvirg
4 GRD. LAYER	6	1	allpeti acesasa rhusradi

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT 1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	O	> 50
STANDING SNAGS:	O	< 10	R	10 - 24	R	25 - 50	O	> 50
DEADFALL / LOGS:	A	< 10	O	10 - 24	R	25 - 50	R	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE .		PIONEER		YOUNG		MID-AGE	X	MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: FO
COMMUNITY SERIES: Deciduous Forest	CODE: FOD
ECOSITE: Dry-Fresh Sugar Maple FOD	CODE: FOD5
VEGETATION TYPE: Dry-Fresh Sugar Maple - Beech Deciduous Forest	CODE: FOD5-2
INCLUSION	CODE:
COMPLEX	CODE:

Notes:
WP538 - gully cause by tile drain outlet
hard soils - CL
wood pecker holes in logs

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Acesasa	A	A	O	R	
Ostvirg	O	O			
Pinstro	O				
Betpapy	O				
Tilamer	O				
Prunsero	O				
Carcord	O				
Faggran	O				
Vibacer	O	O			
Betalle	R				
Quercus	O				
Prunsero					
Prunvirg			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
allpeti				R	
rhusradi				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Sawtooth		POLYGON: 33	
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☑ TABLELAND		☐ LICHEN	☐ SWAMP
SITE		☐ ROLL. UPLAND	**COVER**	☐ BRYOPHYTE	☐ FEN
☐ OPEN WATER		☐ CLIFF	☐ OPEN	☐ DECIDUOUS	☐ BOG
☐ SHALLOW WATER		☐ TALUS	☐ SHRUB	☑ CONIFEROUS	☐ BARREN
☑ SURFICIAL DEP.		☐ CREVICE / CAVE	☑ TREED	☐ MIXED	☐ MEADOW
☐ BEDROCK		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Pinstr >> Fraame > Ulvame
2	SUB-CANOPY			
3	UNDERSTOREY	4	3	Fraame > Corsto = Chaant
4	GRD. LAYER	5	2	Alspe = Thuocc > Taxbre > Arcuva

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 5<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:						BA:	
SIZE CLASS ANALYSIS:	A	< 10	O	10 - 24	A	25 - 50	N	> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:	O	< 10	R	10 - 24	N	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE	X	MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE: FO	
COMMUNITY SERIES: Conifer Forest	CODE: FOC	
ECOSITE: Dry-Fresh Pine Conifer Forest	CODE: FOC1	
VEGETATION TYPE: Dry-Fresh White Pine Con. Forest	CODE: FOC1-2	
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

possibly planted - not obvious

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Pinstr	D				
Pruvir	R				
Fraame	R				
Ulvame	R				
Rubspe					
Corsto					
Fraame					

SPECIES CODE	LAYER 1	2	3	4	COLL.
Rhyrad				O	
Alspe				A	
Thuocc				O	
Taxbre				O	
Geospe				O	
Dryint				O	
Asttri				O	
Arcuva				O	
Vervir				O	

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Southeast		POLYGON: 34	
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME	
START	END	UTMZ	UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☐ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (»» MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Thuja > Ostrya > Acer = Tilia
2	SUB-CANOPY	3	3	Thuja > Acer = Acer > Ulmus
3	UNDERSTOREY	3	2	Rhamnus > Thuja
4	GRD. LAYER	5	4	Rubus all forbs, ferns, aster

HT CODES: 1 = >25 m 2 = 10<HT< 25 m 3 = 2<HT< 10 m 4 = 1<HT< 2 m 5 = 0.5<HT< 1 m 6 = 0.2<HT< 0.5 m 7 = HT< 0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O/R	25 - 50	N	> 50
STANDING SNAGS:	N	< 10	N	10 - 24	N/R	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24	R	25 - 50	N	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest		CODE: FO
COMMUNITY SERIES: Deciduous Forest		CODE: FOD
ECOSITE: Fresh - Moist Lowland	FOD	CODE: FOD7
VEGETATION TYPE: Fresh - Moist Ash Lowland Deciduous Forest		CODE: FOD7-2
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

Hand soils

ELC — PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Acesac	R				
Ostvir		O			
Cornus					
Ulmam	A	O	O		
Tilame					
Acesac	O	O			
Cratsp		O			
Carlac		O			
Thuocc			D		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Fraxam				O	
Fraxsp				R	
Acerne				O	
Magvir				O	
Aralia				O	
Solflex				O	
Rosaca				R	
Euonym				R	
Rhamno				O	
Londer				O	
Lonmic				O	
Viburn				O	
Vitsp. Hardwood				R	
Osmcla				R	
Solalt				O	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Southbrook | POLYGON: 55

SURVEYOR(S): DW | DATE: 13 Sep 2012 | UTME

START | END | UTMZ | UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☑ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☑ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☐ TERRACE		☐ GRAMINOID	☐ STREAM
SITE	☐ BASIC BEDRK	☐ VALLEY SLOPE	COVER	☐ FORB	☐ MARSH
☐ OPEN WATER	☐ CARB. BEDRK	☐ TABLELAND	☐ OPEN	☐ LICHEN	☐ SWAMP
☐ SHALLOW WATER		☐ ROLL. UPLAND	☐ SHRUB	☐ BRYOPHYTE	☐ FEN
☑ SURFICIAL DEP.		☐ CLIFF	☑ TREED	☑ DECIDUOUS	☐ BOG
☐ BEDROCK		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☑ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Fraxpen Salxnig Acesac Acesac
2	SUB-CANOPY	3	3	Acesac Rhoaro Fraxpen
3	UNDERSTOREY	4	2	Fraxpen Rhoaro
4	GRD. LAYER	5	4	Parvir alliga hesmar astlat

HT CODES: 1 = >25 m 2 = 10<HT< 25 m 3 = 2<HT< 10 m 4 = 1<HT<2 m 5 = 0.5<HT 1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	O	> 50
STANDING SNAGS:	R	< 10	R	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	A	< 10	A	10 - 24	O	25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	Forest	CODE: FO
COMMUNITY SERIES:	Deciduous Forest	CODE: FOD
ECOSITE:	Fresh Moist Sugar Maple FOD	CODE: FOD6-1
VEGETATION TYPE:	Fresh-Moist Sugar Maple - Ash Deciduous Forest	CODE: FOD6-1
INCLUSION		CODE:
COMPLEX		CODE:

Notes:

grass Acesac!! Salxnig!!
Fraxpen!
Grd!
dead!!

ELC PLANT SPECIES LIST

SITE:

POLYGON:

DATE:

SURVEYOR(S):

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Acesac	R	A			
Elaumb	R				
Acesac	O	O			
Salxnig	O				
Fraxpen	A	O	O		
Ulmamer	R	R			
rhoaro			O		
Hesmar					

SPECIES CODE	LAYER 1	2	3	4	COLL.
astlat				O	
parvir				O	
hesmar				O	
rhoaro				O	
Solalt				O	
allpet				O	
aegvir				O	
urtdio				O	
Parvir				O	

Soil - ~10cm CL over gravel

disturbed floodplain.

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Swamp/wet		POLYGON: 36
SURVEYOR(S): DW	DATE: 13 Sept 2012	UTME
START	END	UTMZ / UTMN

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☑ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☑ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☑ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN	☐ BOTTOMLAND		☐ FLOATING-LVD	☐ RIVER
	☐ ACIDIC BEDRK	☑ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK	☑ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☑ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☑ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☑ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	Acesac > Querub > Tilame > Querub
2	SUB-CANOPY	3	3	Ostvir, Faggra, Querub, Acesac
3	UNDERSTOREY	4	3	Corvir, Fraame, acesac, Rhacat
4	GRD. LAYER	5	3	Rubpub, acesac, Corsto, Solfle

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR ≤ 10% 2 = 10 < CVR ≤ 25% 3 = 25 < CVR ≤ 60% 4 = CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	O > 50
STANDING SNAGS:	R	< 10	R	10 - 24	N	25 - 50	N > 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: SiC	DEPTH TO MOTTLES / GLEY	g = 999	G = 999
MOISTURE: 2	DEPTH OF ORGANICS: 999		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS: Forest	CODE:	FO
COMMUNITY SERIES: Deciduous Forest	CODE:	FOD
ECOSITE: Dry-Fresh Sugar Maple FOD	CODE:	FOD5
VEGETATION TYPE: Dry Fresh Sugar Maple - Oak Deciduous Forest	CODE:	FOD5-3
INCLUSION	CODE:	
COMPLEX	CODE:	

Notes:

Acesac T.
Querub T.
Ostvir
Dead

Steep slope

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Acesac	R				
Fagsyl	A	O	O		
Ostvir		O			
Querub	A	O			
Querub	O				
Tilame	O				
Pinstr	O				
Fagsyl	O	O			
Tsucan	O				
Fraame			O		
Corvir			O		
Rhacat			O		
Corsto			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Solfle				O	
Solcas				O	
Faveuc				R	
Athfil				O	
Cornes				O	
Allpsk				O	
Mairace				O	
Athdia				O	

Appendix C

List of Vascular Plants Recorded in Tertiary Planning Area

Appendix C

List of Vascular Plants Recorded in Study Area

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
ACERACEAE (Maple Family)	*Acer negundo*	Manitoba Maple	√	√	√			S5	
	Acer nigrum	Black Maple		√	√			S4?	
	Acer platanoides	Norway Maple	√	√	√			SNA	
	Acer rubrum	Red Maple		√	√			S5	
	Acer saccharinum	Silver Maple			√			S5	
	Acer saccharum var. *saccharum*	Sugar Maple	√	√	√			S5	
	Acer spicatum	Mountain Maple			√			S5	
	Acer X *freemanii*	Freeman's Maple			√			S5	
ALISMATACEAE (Water-plantain Family)	*Alisma plantago-aquatica*	Broad-leaved Water-plantain		√	√			S5	
ANACARDIACEAE (Sumac Family)	*Rhus hirta*	Staghorn Sumac	√	√	√			S5	
	Toxicodendron radicans ssp. *negundo*	Poison Ivy			√			S5	
	Toxicodendron rhydbergii	Western Poison Ivy	√					S5	
APIACEAE	*Cicuta maculata*	Spotted Water-hemlock		√	√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
(Carrot Family)									
	Daucus carota	Queen Anne's Lace	√	√	√			SNA	
	Heracleum maximum	Cow-parsnip			√			S5	HU
	Osmorhiza sp	Sweet-cicely Species		√					
	Pastinaca sativa	Wild Parsnip	√	√	√			SNA	
	Torilis japonica	Erect Hedge-parsley		√				SNA	
APOCYNACEAE (Dogbane Family)	*Apocynum androsaemifolium ssp. androsaemifolium*	Spreading Dogbane			√			S5	
	Apocynum sp	Dogbane Species			√				
	Vinca minor	Periwinkle			√			SNA	
ARACEAE (Arum Family)	*Arisaema triphyllum* ssp. *triphyllum*	Jack-in-the-pulpit		√	√			S5	
ARALIACEAE (Ginseng Family)	*Aralia nudicaulis*	Wild Sarsaparilla			√			S5	
	Aralia racemosa ssp. *racemosa*	American Spikenard			√			S5	
ARISTOLOCHIACEAE (Birthwort Family)	*Asarum canadense*	Wild Ginger			√			S5	
ASCLEPIADACEAE (Milkweed Family)	*Asclepias incarnata* ssp. *incarnata*	Swamp Milkweed			√			S5	
	Asclepias syriaca	Common Milkweed	√	√	√			S5	
	Cynanchum nigrum	Black Swallow-wort			√			SNA	

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ASTERACEAE (Aster family)	*Achillea millefolium* var. *occidentalis*	Wooly Yarrow	√	√	√			S5	
	Ambrosia artemisiifolia	Annual Ragweed	√		√			S5	
	Antennaria neglecta	Field Pussytoes			√			S5	
	Antennaria parlinii ssp. *fallax*	Hairy Pussytoes			√			S5	
	Arctium lappa	Greater Burdock	√	√	√			SNA	
	Arctium minus	Lesser Burdock	√	√	√			SNA	
	Aster ericoides var. *ericoides*	Heath Aster	√		√			S5	
	Aster puniceus var. *puniceus*	Purple-stemmed Aster		√				S5	
	Bidens frondosa	Devil's Beggar's Ticks		√				S5	
	Bidens tripartita	European Beggar's Ticks			√			S5	
	Bidens vulgata	Tall Bur-marigold	√					S5	HU
	Carduus nutans ssp. *nutans*	Musk Thistle			√			SNA	
	Cichorium intybus	Chicory	√		√			SNA	
	Cirsium arvense	Creeping Thistle	√	√	√			SNA	
	Cirsium vulgare	Bull Thistle	√	√	√			SNA	
	Conyza canadensis	Fleabane	√					S5	
	Cosmos bipinnatus	Garden Cosmos			√			SNA	
	Erechtites hieracifolia	Fireweed			√			S5	HU
	Erigeron annuus	White-top Fleabane	√	√	√			S5	
	Erigeron philadelphicus var. *philadelphicus*	Philadelphia Fleabane	√	√	√			S5	
	Erigeron strigosus	Daisy Fleabane			√			S5	

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	Eupatorium maculatum var. *maculatum*	Spotted Joe-pye Weed		√	√			S5	
	Eupatorium perfoliatum	Common Boneset		√				S5	
	Eurybia macrophylla	Large-leaved Aster			√			S5	
	Euthamia graminifolia	Grass-leaved Goldenrod	√	√	√			S5	
	Hieracium aurantiacum	Orange Hawkweed			√			SNA	
	Hieracium caespitosum	Field Hawkweed			√			SNA	
	Hieracium praealtum	Tall King Devil			√			SNA	
	Hieracium venosum	Rattlesnake Hawkweed			√			S2	
	Inula helenium	Elecampane	√	√	√			SNA	
	Lactuca serriola	Prickly Lettuce	√		√			SNA	
	Lapsana communis	Common Nipplewort			√			SNA	
	Leucanthemum vulgare	Oxeye Daisy	√	√	√			SNA	
	Matricaria discoidea	Pineapple-weed			√			SNA	
	Onopordum acanthium	Scotch Thistle			√			SNA	
	Prenanthes alba	White Rattlesnake-root			√			S5	
	Prenanthes altissima	Tall Rattlesnake-root			√			S5	
	Rudbeckia hirta	Black-eyed Susan	√					S5	
	Solidago arguta var. *arguta*	Sharp-leaved Goldenrod			√			S3	HR
	Solidago caesia	Bluestem Goldenrod		√	√			S5	
	Solidago canadensis	Canada Goldenrod			√			S5	
	Solidago canadensis var. *scabra*	Tall Goldenrod	√	√	√			S5	
	Solidago flexicaulis	Broad-leaved Goldenrod		√	√			S5	

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	Solidago gigantea	Smooth Goldenrod		√				S5	HU
	Solidago juncea	Early Goldenrod			√			S5	HU
	Solidago nemoralis var. *nemoralis*	Field Goldenrod			√			S5	
	Solidago patula	Rough-leaved Goldenrod			√			S5	HU
	Symphyotrichum cordifolium	Heart-leaved Aster			√			S5	
	Symphyotrichum lanceolatum ssp. lanceolatum	Panicled Aster	√	√	√			S5	
	Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	√	√				S5	
	Symphyotrichum novae-angliae	New England Aster	√	√	√			S5	
	Tanacetum vulgare	Common Tansy			√			SNA	
	Taraxacum officinale	Common Dandelion	√	√	√			SNA	
	Tragopogon pratensis ssp. *pratensis*	Meadow Goat's-beard			√			SNA	
	Tripleurospermum perforata	Scentless Mayweed	√					SNA	
	Tussilago farfara	Colt's Foot	√	√	√			SNA	
BALSAMINACEAE (Balsam Family)	*Impatiens capensis*	Spotted Jewel-weed		√	√			S5	
BERBERIDACEAE (Barberry Family)	*Berberis vulgaris*	European Barberry			√			SNA	
	Caulophyllum thalictroides	Blue Cohosh			√			S5	H?
	Podophyllum peltatum	May Apple		√	√			S5	
BETULACEAE (Birch Family)	*Alnus glutinosa*	European Black Alder			√			SNA	

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	Betula alleghaniensis	Yellow Birch		√				S5	
	Betula papyrifera	Paper Birch	√	√	√			S5	
	Carpinus caroliniana ssp. *virginiana*	American Hornbeam		√	√			S5	
	Ostrya virginiana	Eastern Hop-hornbeam		√	√			S5	
BORAGINACEAE (Borage Family)	*Cynoglossum officinale*	Hound's-tongue			√			SNA	
	Echium vulgare	Common Viper's-bugloss			√			SNA	
	Hackelia virginiana	Virginia Stickseed		√				S5	
	Lithospermum officinale	European Gromwell			√			SNA	
	Myosotis laxa	Small Forget-me-not		√	√			S5	
	Myosotis scorpioides	True Forget-me-not		√				SNA	
BRASSICACEAE (Mustard Family)	*Alliaria petiolata*	Garlic Mustard	√	√	√			SNA	
	Barbarea vulgaris	Yellow Rocket	√	√	√			SNA	
	Brassica rapa	Bird's Rape			√			SNA	
	Hesperis matronalis	Dame's Rocket	√	√	√			SNA	
	Rorippa microphylla	One-row Watercress			√			SNA	
	Rorippa nasturtium-aquaticum	True Watercress		√	√			SNA	
	Rorippa sylvestris	Creeping Yellow-cress			√			SNA	
	Thlaspi arvense	Field Penny-cress			√			SNA	
CAMPANULACEAE	*Campanula rapunculoides*	Creeping Bellflower			√			SNA	

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(Bellflower Family)									
CAPRIFOLIACEAE (Honeysuckle Family)	*Diervilla lonicera*	Northern Bush-honeysuckle			√			S5	
	Lonicera dioica	Glaucous Honeysuckle			√			S5	
	Lonicera morrowii	Morrow's Honeysuckle			√			SNA	
	Lonicera tatarica	Tartarian Honeysuckle	√	√	√			SNA	
	Sambucus nigra ssp. *canadensis*	Common Elderberry			√			S5	
	Sambucus racemosa var. *racemosa*	Red-berried Elder			√			S5	
	Symphoricarpos albus	Snowberry			√			S5	
	Triosteum aurantiacum	Horse Gentian		√				S5	
	Viburnum acerifolium	Maple-leaf Viburnum			√			S5	
	Viburnum dentatum var. *lucidum (V. recognitum)*	Southern Arrow-wood			√			S4	HR
	Viburnum lantana	Wayfaring-tree	√					SNA	
	Viburnum lentago	Nannyberry			√			S5	
	Viburnum opulus	Guelder-rose Viburnum	√	√	√			SNA	
	Viburnum rafinesquianum	Downy Arrow-wood			√			S5	
CARYOPHYLLACEAE (Pink Family)	*Cerastium fontanum*	Common Mouse-ear Chickweed			√			SNA	
	Dianthus armeria	Deptford-pink			√			SNA	
CELASTRACEAE (Bittersweet Family)	*Celastrus scandens*	Climbing Bittersweet			√			S5	

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	Euonymus obovata	Running Strawberry-bush			√			S5	
CERATOPHYLLACEAE (Hornwort Family)	*Ceratophyllum demersum*	Common Hornwort	√		√			S5	HU
CLUSIACEAE (St. John's-wort Family)	*Hypericum perforatum*	St. John's-wort	√	√	√			SNA	
CONVOLVULACEAE (Morning Glory Family)	*Convolvulus arvensis*	Field Bindweed			√			SNA	
CORNACEAE (Dogwood Family)	*Cornus alternifolia*	Alternate-leaf Dogwood		√	√			S5	
	Cornus amomum	Silky Dogwood			√			S5	
	Cornus florida	Flowering Dogwood			√	END	END	S4	HU
	Cornus racemosa	Gray Dogwood	√	√	√			S5	
	Cornus rugosa	Round-leaved Dogwood			√			S5	
	Cornus sericea ssp. *sericea*	Red-osier Dogwood	√	√	√			S5	
CUCURBITACEAE (Cucumber Family)	*Echinocystis lobata*	Wild Mock-cucumber	√	√	√			S5	
CUPRESSACEAE (Cypress Family)	*Juniperus virginiana* var. *virginiana*	Red Cedar			√			S5	HU
	Thuja occidentalis	Northern White Cedar	√	√	√			S5	

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CYPERACEAE (Sedge Family)	*Carex albursina*	White Bear Sedge			√			S5	
	Carex alopecoidea	Foxtail Sedge			√			S5	
	Carex bebbii	Bebb's Sedge	√					S5	
	Carex blanda	Woodland Sedge			√			S5	
	Carex cristatella	Crested Sedge			√			S5	
	Carex gracilescens	Slender Sedge			√			S3	HU
	Carex hystericina	Porcupine Sedge		√	√			S5	
	Carex pellita	Woolly Sedge			√			S5	HU
	Carex pensylvanica	Pennsylvania Sedge		√	√			S5	
	Carex rosea	Rosy Sedge			√			S5	
	Carex stipata	Stalk-grain Sedge			√			S5	
	Carex vulpinoidea	Fox Sedge	√		√			S5	
	Eleocharis erythropoda	Bald Spikerush			√			S5	
	Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	√					S5	
	Scirpus atrovirens	Green Bulrush	√	√	√			S5	
DIPSACACEAE (Teasel Family)	*Dipsacus fullonum* ssp. *sylvestris*	Common Teasel	√	√	√			SNA	
	Dipsacus laciniatus	Cut-leaf Teasel			√			SNA	
DRYOPTERIDACEAE (Wood Fern Family)	*Athyrium filix-femina* var. *angustum*	Lady-fern			√			S5	
	Dryopteris carthusiana	Spinulose Wood Fern	√	√	√			S5	

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	Dryopteris intermedia	Evergreen Wood Fern			√			S5	
	Dryopteris marginalis	Marginal Wood Fern			√			S5	
	Dryopteris sp	Wood Fern Species			√				
	Onoclea sensibilis	Sensitive Fern		√	√			S5	
	Polystichum acrostichoides	Christmas Fern		√				S5	
EQUISETACEAE (Horsetail Family)	*Equisetum arvense*	Field Horsetail	√	√	√			S5	
ERICACEAE (Heath Family)	*Vaccinium angustifolium*	Late Lowbush Blueberry			√			S5	HU
EUPHORBIACEAE (Spurge Family)	*Euphorbia esula*	Leafy Spurge			√			SNA	
	Euphorbia sp	Spurge Species			√				
FABACEAE (Legume Family)	*Coronilla varia*	Crown-vetch		√	√			SNA	
	Gleditsia triacanthos	Honey Locust	√					S2	
	Lotus corniculatus	Bird's-foot Trefoil	√	√	√			SN	
	Medicago lupulina	Black Medic	√		√			SNA	
	Melilotus alba	White Sweet Clover	√	√	√			SNA	
	Melilotus officinalis	Yellow Sweet Clover			√			SNA	
	Robinia pseudo-acacia	Black Locust	√	√	√			SNA	
	Trifolium campestre	Low Hop Clover			√			SNA	

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	Trifolium hybridum ssp. *elegans*	Alsike Clover	√		√			SNA	
	Trifolium pratense	Red Clover	√	√	√			SNA	
	Trifolium repens	White Clover	√	√	√			SNA	
	Vicia americana	American Purple Vetch			√			S5	
	Vicia cracca	Tufted Vetch	√	√	√			SNA	
	Vicia sativa	Common Vetch			√			SNA	
	Vicia tetrasperma	Lentil Vetch	√		√			SNA	
FAGACEAE (Beech Family)	*Fagus grandifolia*	American Beech		√	√			S5	
	Quercus alba	White Oak		√	√			S5	
	Quercus macrocarpa	Bur Oak	√	√	√			S5	
	Quercus rubra	Northern Red Oak	√	√	√			S5	
	Quercus velutina	Black Oak			√			S4	HU
GERANIACEAE (Geranium Family)	*Geranium maculatum*	Wild Geranium		√	√			S5	
	Geranium robertianum	Herb-robert	√	√	√			SNA 5	
GROSSULARIACEAE (Gooseberry Family)	*Ribes americanum*	Wild Black Currant		√				S5	
	Ribes cynosbati	Prickly Gooseberry		√	√			S5	
	Ribes rubrum	Northern Red Currant	√	√	√			SNA	

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HAMAMELIDACEAE (Witch-hazel Family)	*Hamamelis virginiana*	American Witch-hazel			√			S5	
HIPPOCASTANACEAE (Horse-chestnut Family)	*Aesculus hippocastanum*	Horse-chestnut			√			SNA	
HYDROPHYLLACEAE (Waterleaf Family)	*Hydrophyllum virginianum*	Virginia Waterleaf		√	√			S5	
IRIDACEAE (Iris Family)	*Iris versicolor*	Blueflag			√			S5	HR
JUGLANDACEAE (Walnut Family)	*Carya cordiformis*	Bitternut Hickory		√	√			S5	
	Carya glabra	Pignut Hickory			√			S3	HR
	Carya ovata var. *ovata*	Shagbark Hickory	√	√	√			S5	
	Juglans nigra	Black Walnut	√	√	√			S4	
JUNCACEAE (Rush Family)	*Juncus dudleyi*	Dudley's Rush	√					S5	
	Juncus effusus ssp. *solutus*	Soft Rush	√		√			S5	
	Juncus tenuis	Slender Rush			√			S5	
LAMIACEAE (Mint Family)	*Glechoma hederacea*	Ground Ivy	√	√	√			SNA	
	Leonurus cardiaca ssp. *cardiaca*	Common Motherwort	√	√	√			SNA	

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	Lycopus americanus	American Bugleweed			√			S5	
	Mentha arvensis	Corn Mint			√			S5	
	Nepeta cataria	Catnip			√			SNA	
	Prunella vulgaris ssp. *lanceolata*	Self-heal	√	√	√			S5	
LEMNACEAE (Duckweed Family)	*Lemna minor*	Lesser Duckweed	√	√	√			S5	
LILIACEAE (Lily Family)	*Allium canadense* var. canadense	Wild Garlic			√			S5	HU
	Allium tricoccum	Wild Leek			√			S5	
	Asparagus officinalis	Asparagus			√			SNA	
	Convallaria majalis	European Lily-of-the-valley			√			SNA	
	Erythronium albidum	White Trout Lily	√		√			S4	HU
	Erythronium americanum ssp. *americanum*	Yellow Trout-lily		√	√			S5	
	Lilium michiganense	Michigan Lily			√			S5	
	Maianthemum canadense	Wild-lily-of-the-valley			√			S5	
	Maianthemum racemosum ssp. racemosum	False Solomon's Seal		√	√			S5	
	Polygonatum pubescens	Downy Solomon's Seal			√			S5	
	Trillium erectum	Red Trillium			√			S5	
	Trillium grandiflorum	White Trillium		√	√			S5	
LYTHRACEAE (Loosestrife Family)	*Lythrum salicaria*	Slender-spike Loosestrife	√	√	√			SNA	

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MALVACEAE (Mallow Family)	*Malva neglecta*	Cheeses	√					SNA	
MENISPERMACEAE (Moonseed Family)	*Menispermum canadense*	Canada Moonseed			√			S4	
MORACEAE (Mulberry Family)	*Morus alba*	White Mulberry		√	√			SNA	
OLEACEAE (Olive Family)	*Fraxinus americana*	White Ash	√	√	√			S5	
	Fraxinus pennsylvanica	Green Ash	√	√	√			S5	
	Ligustrum vulgare	European Privet	√	√	√			SNA	
	Syringa vulgaris	Common Lilac	√		√			SNA	
ONAGRACEAE (Evening Primrose Family)	*Circaea lutetiana* ssp. *canadensis*	Enchanter's Nightshade	√	√	√			S5	
	Epilobium ciliatum ssp. *ciliatum*	Hairy Willow-herb		√				S5	
	Epilobium hirsutum	Great-hairy Willow-herb		√	√			SNA	
	Epilobium parviflorum	Small-flower Willow-herb	√	√				SNA	
	Oenothera biennis	Common Evening-primrose			√			S5	
	Oenothera parviflora	Northern Evening-primrose			√			S5?	
ORCHIDACEAE (Orchid Family)	*Epipactis helleborine*	Eastern Helleborine			√			SNA	

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	Galearis spectabilis	Showy Orchis			√			S4	HU
OROBANCHACEAE (Broomrape Family)	*Epifagus virginiana*	Beechdrops			√			S5	
OXALIDACEAE (Wood Sorrel Family)	*Oxalis stricta*	Upright Yellow Wood Sorrel	√	√	√			S5	
PAPAVERACEAE (Poppy Family)	*Chelidonium majus*	Greater Celadine			√			SNA	
	Sanguinaria canadensis	Bloodroot			√			S5	
PINACEAE (Pine Family)	*Picea abies*	Norway Spruce			√			SNA	
	Picea glauca	White Spruce	√					S5	
	Picea pungens	Colorado Spruce	√		√			SNA	
	Pinus strobus	Eastern White Pine		√	√			S5	
	Pinus sylvestris	Scotch Pine	√	√	√			SNA	
	Tsuga canadensis	Eastern Hemlock		√	√			S5	
PLANTAGINACEAE (Plantain Family)	*Plantago lanceolata*	English Plantain			√			SNA	
	Plantago major	Nipple-seed Plantain	√	√	√			SNA	
	Plantago rugelii	Black-seed Plantain			√			S5	
POACEAE	*Agrostis gigantea*	Redtop	√	√	√			SNA	

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(Grass Family)									
	Agrostis stolonifera	Spreading Bentgrass	√					S5	
	Bromus inermis ssp. *inermis*	Smooth Brome	√	√	√			SNA	
	Dactylis glomerata	Orchard Grass	√	√	√			SNA	
	Glyceria striata	Fowl Manna Grass	√	√				S5	
	Hordeum jubatum ssp. *jubatum*	Fox-tail Barley	√					SNA	
	Leersia oryzoides	Rice Cutgrass		√	√			S5	
	Leersia virginica	White Cutgrass		√				S4	
	Lolium perenne	Perennial Ryegrass	√					SNA	
	Lolium pratense	Meadow Fescue	√					SNA	
	Panicum capillare	Old Panic Grass	√					S5	
	Phalaris arundinacea	Reed Canary Grass	√	√	√			S5	
	Phleum pratense	Timothy	√	√	√			SNA	
	Phragmites australis	Common Reed	√		√			S5	
	Poa alsodes	Grove Meadow Grass			√			S4	HU
	Poa pratensis ssp. *pratensis*	Kentucky Bluegrass	√	√	√			S5	
POLYGALACEAE (Milkwort Family)	*Polygala paucifolia*	Gay-wing Milkwort			√			S5	HU
POLYGONACEAE (Smartweed Family)	*Polygonum convolvulus*	Black Bindweed			√			SNA	
	Polygonum cuspidatum	Japanese Knotweed			√			SNA	
	Polygonum lapathifolium	Dock-leaf Smartweed			√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
	Polygonum persicaria	Lady's Thumb	√		√			SNA	
	Rumex acetosella ssp. *acetosella*	Sheep Sorrel			√			SNA	
	Rumex crispus	Curly Dock	√	√	√			SNA	
	Rumex obtusifolius ssp. *obtusifolius*	Bitter Dock			√			SNA	
PORTULACACEAE (Purslane Family)	*Claytonia virginica*	Narrow-leaved Spring Beauty			√			S5	
POTAMOGETONACEAE (Pondweed Family)	*Potamogeton natans*	Floating Pondweed	√					S5	HR
	Poamogeton sp.	Pondweed species			√				
PRIMULACEAE (Primrose Family)	*Lysimachia ciliata*	Fringed Loosestrife		√	√			S5	
	Lysimachia nummularia	Moneywort		√				SNA	
PYROLACEAE (Wintergreen Family)	*Pyrola elliptica*	Shinleaf			√			S5	
RANUNCULACEAE (Buttercup Family)	*Actaea pachypoda*	White Baneberry			√			S5	
	Actaea rubra	Red Baneberry			√			S5	
	Anemone acutiloba	Sharp-lobed Hepatica			√			S5	
	Anemone canadensis	Canada Anemone			√			S5	
	Anemone quinquefolia var. *quinquefolia*	Wood Anemone			√			S5	
	Aquilegia canadensis	Wild Columbine			√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
	Caltha palustris	Marsh Marigold		√	√			S5	
	Clematis virginiana	Virginia Virgin-bower		√				S5	
	Ranunculus acris	Tall Buttercup	√	√	√			SNA	
	Ranunculus sceleratus var. *multifidus*	Cursed Crowfoot		√				SU	
	Thalictrum dioicum	Early Meadow-rue		√	√			S5	
	Thalictrum pubescens	Tall Meadow-rue			√			S5	
RHAMNACEAE (Buckthorn Family)	*Frangula alnus*	Glossy Buckthorn		√	√			SNA	
	Rhamnus cathartica	Common Buckthorn	√	√	√			SNA	
ROSACEAE (Rose Family)	*Agrimonia gryposepala*	Tall Hairy Agrimony		√	√			S5	
	Amelanchier arborea	Downy Serviceberry			√			S5	
	Amelanchier sp	Serviceberry Species			√				
	Crataegus chrysocarpa	Fineberry Hawthorn			√			S5	HU
	Crataegus dilatata (formly C. conspecta)	Eggert's Hawthorn			√			S2	HR
	Crataegus macracantha	Large-thorned Hawthorn	√					S5	HU
	Crataegus macrosperma	Variable Hawthorn	√	√	√			S5	HU
	Crataegus magniflora	Hawthorn	√						
	Crataegus monogyna	English Hawthorn			√			SNA	
	Crataegus pruinosa	Waxy-fruited Hawthorn	√					S4?	
	Crataegus punctata	Dotted Hawthorn	√					S5	
	Crataegus schuettei	Schuette's Hawthorn	√	√	√			S4	HU

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
	Crataegus sp	Hawthorn Species	√	√	√				
	Crataegus succulenta	Fleshy Hawthorn			√			S4S5	
	Fragaria vesca ssp. americana	Woodland Strawberry		√	√			S5	
	Fragaria virginiana	Virginia Strawberry	√	√	√			S5	
	Geum aleppicum	Yellow Avens	√		√			S5	
	Geum canadense	White Avens			√			S5	
	Geum urbanum	Clover-root	√	√	√			SNA	
	Malus pumila	Common Apple	√	√	√			SNA	
	Potentilla recta	Sulphur Cinquefoil	√		√			SNA	
	Potentilla simplex	Old-field Cinquefoil			√			S5	
	Prunus americana	American Plum			√			S4	HR
	Prunus avium	Sweet Cherry			√			SNA	
	Prunus mahaleb	Perfumed Cherry			√			SNA	
	Prunus nigra	Canada Plum			√			S4	HU
	Prunus serotina	Wild Black Cherry		√	√			S5	
	Prunus virginiana var. *virginiana*	Choke Cherry	√	√	√			S5	
	Pyrus communis	Common Pear		√	√			SNA	
	Rosa blanda	Smooth Rose	√		√			S5	
	Rosa carolina	Carolina Rose			√			S4	
	Rosa eglantaria	Sweetbrier Rose			√			SNA	
	Rosa multiflora	Rambler Rose	√	√	√			SNA	
	Rubus allegheniensis	Allegheny Blackberry		√	√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
	Rubus idaeus ssp. *strigosus*	Wild Red Raspberry	√	√	√			S5	
	Rubus occidentalis	Black Raspberry		√	√			S5	
	Rubus odoratus	Purple-flowering Raspberry			√			S5	
	Rubus pubescens	Dwarf Raspberry		√	√			S5	
	Waldseinia fragarioides	Barren Strawberry			√			S5	
RUBIACEAE (Bedstraw Family)	*Galium aparine*	Cleavers	√	√	√			S5	
	Galium asprellum	Rough Bedstraw	√		√			S5	
	Galium triflorum	Sweet-scent Bedstraw			√			S5	
SALICACEAE (Willow Family)	*Populus alba*	White Poplar			√			SNA	
	Populus balsamifera ssp. *balsamifera*	Balsam Poplar			√			S5	
	Populus deltoides ssp. *deltoides*	Eastern Cottonwood			√			S5	
	Populus tremuloides	Quaking Aspen	√	√	√			S5	
	Poplus X canadensis	Carolina Poplar	√					SNA	
	Salix alba	White Willow			√			SNA	
	Salix amygdaloides	Peach-leaved Willow			√			S5	
	Salix bebbiana	Bebb's Willow	√	√	√			S5	
	Salix discolor	Pussy Willow		√	√			S5	
	Salix fragilis	Crack Willow			√			SNA	
	Salix nigra	Black Willow			√			S4?	HU
	Salix petiolaris	Meadow Willow			√			S5	
	Salix X rubens	Reddish Willow	√	√				SNA	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
SANTALACEAE (Sandalwood Family)	*Comandra umbellata*	Umbellate Bastard Toad-flax			√			S5	HU
SAXIFRAGACEAE (Saxifrage Family)	*Penthorum sedoides*	Ditch-stonecrop		√				S5	HU
SCROPHULARIACEAE (Figwort Family)	*Chelone glabra*	Turtlehead		√	√			S5	
	Linaria vulgaris	Butter-and-eggs	√	√	√			SNA	
	Mimulus ringens	Square-stem Monkey-flower		√				S5	HU
	Scrophularia marilandica	Carpenter's Square Figwort		√				S4	HU
	Verbascum thapsus	Common Mullein	√	√	√			SNA	
	Veronica officinalis	Common Speedwell	√	√	√			SNA	
	Veronica serpyllifolia ssp. *serpyllifolia*	Thyme-leaved Speedwell	√		√			SNA	
SMILACACEAE (Greenbrier Family)	*Smilax herbacea*	Smooth Herbaceous Greenbrier			√			S4	
	Smilax tamnoides	Hispid Greenbrier			√			S4	
SOLANACEAE (Nightshade Family)	*Solanum dulcamara*	Climbing Nightshade	√	√	√			SNA	
THELYPTERIDACEAE (Fern Family)	*Thelypteris palustris* var. *pubescens*	Marsh Fern		√	√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
TILIACEAE (Linden Family)	*Tilia americana*	American Basswood		√	√			S5	
TYPHACEAE (Cattail Family)	*Typha angustifolia*	Narrow-leaved Cattail	√	√	√			S5	
	Typha latifolia	Broad-leaf Cattail	√		√			S5	
ULMACEAE (Elm Family)	*Ulmus americana*	American Elm	√	√	√			S5	
	Ulmus rubra	Slippery Elm			√			S5	
URTICACEAE (Nettle Family)	*Boehmeria cylindrica*	False Nettle			√			S5	
	Laportea canadensis	Wood Nettle		√				S5	
	Pilea pumila	Canada Clearweed			√			S5	
	Pilea sp	Clearweed Species		√					
	Urtica dioica ssp. *dioica*	Stinging Nettle			√			SNA	
	Urtica dioica ssp. *gracilis*	Slender Stinging Nettle			√			S5	
VERBENACEAE (Vervain Family)	*Verbena hastata*	Blue Vervain		√	√			S5	
	Verbena urticifolia	White Vervain	√	√	√			S5	
VIOLACEAE (Violet Family)	*Viola affinis*	Lecontes Violet			√			S4	HU
	Viola pubescens	Downy Yellow Violet			√			S5	

Family	Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[6]	COSSARO[7]	S-Rank[8]	Halton Status[9]
	Viola sp	Violet Species		√					
VITACEAE (Grape Family)	*Parthenocissus vitacea*	Thicket Creeper	√	√	√			S5	
	Vitis aestivalis	Summer Grape		√				S4	HU
	Vitis riparia	Riverbank Grape	√	√	√			S5	

Key

[1] Observed on Saw-Whet property during field investigations conducted by Beacon Environmental in 2012 and 2013. √ = present

[2] Observed on lands within tertiary plan area adjacent to Saw-Whet property during field investigations conducted by Beacon Environmental in 2012. √= present

[3] Observed within Fourteen Mile Creek valley (ESA 12) during previous inventories (Source: Conservation Halton natural heritage database, 2012). √ = present

[4] COSEWIC (Committee on the Status of Endangered Wildlife in Canada). **END** = Endangered

[5] COSARO (Committee on the Status of Species at Risk in Ontario). **END** = Endangered

[6] S-Rank (Provincial Status - NHIC) **S1** = critically imperilled; **S2** = imperilled; **S3** = vulnerable; **S4** = apparently secure; **S5** = secure; **SNA**= Not Applicable, the species is not a suitable target for conservation activities, exotic/introduced.

[7] Halton (Regional Status - Crins et al, 2006). **HU** – Uncommon; **HR** – Rare; **H?** – Status uncertain; requires further review

Appendix D

List of Rare and Uncommon Plants Recorded in the Study Area

Appendix D

List of Rare and Uncommon Plants Recorded in the Study Area

Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[4]	COSSARO[5]	S-Rank[6]	Halton[7]
Allium canadense var. *canadense*	Wild Garlic			√			S5	HU
Bidens vulgata	Tall Bur-marigold	√					S5	HU
Carex gracilescens	Slender Sedge			√			S3	HU
Carex pellita (formerly *C.lanuginosa*)	Woolly Sedge			√			S5	HU
Carya glabra	Pignut Hickory			√			S3	HR
Ceratophyllum demersum	Common Hornwort	√					S5	HU
Comandra umbellata	Umbellate Bastard Toad-flax			√			S5	HU
Cornus florida	Flowering Dogwood			√	END	END	S2?	HU
Crataegus chrysocarpa	Fireberry Hawthorn			√			S5	HU
*Crataegus dilatata (*formly *C. conspecta)*	Eggert's Hawthorn			√			S2	HR
Crataegus macracantha	Long-thorned Hawthorn	√		√			S5	HU
Crataegus macrosperma	Variable Hawthorn	√		√			S5	HU
Crataegus schuettei	Schuette's Hawthorn	√		√			S4	HU
Crataegus succulenta	Fleshy Hawthorn			√			S4S5	HU
Erechtites hieracifolia	Fireweed			√			S5	HU
Erythronium albidum	White Trout Lily	√		√			S4	HU
Galearis spectabilis	Showy Orchis			√			S4	HU
Heracleum maximum	Cow-parsnip			√			S5	HU

Scientific Name	Common Name	Saw-Whet Property[1]	Saw-Whet Adjacent Lands[2]	14-Mile Creek ESA[3]	COSEWIC[4]	COSSARO[5]	S-Rank[6]	Halton[7]
Iris versicolor	Blueflag			√			S5	HR
Juniperus virginiana var. *virginiana*	Red Cedar			√			S5	HU
Mimulus ringens	Square-stem Monkey-flower		√				S5	HU
Penthorum sedoides	Ditch-stonecrop		√				S5	HU
Poa alsodes	Grove Meadow Grass			√			S4	HU
Polygala paucifolia	Gaywings			√			S5	HU
Potamogeton natans	Floating Pondweed	√					S5	HR
Prunus americana	American Plum			√			S4	HR
Prunus nigra	Canada Plum			√			S4	HU
Quercus velutina	Black Oak			√			S4	HU
Salix nigra	Black Willow			√			S4?	HU
Scrophularia marilandica	Carpenter's Square Figwort		√				S4	HU
Solidago arguta var. *arguta*	Sharp-leaved Goldenrod			√			S3	HR
Solidago patula	Rough-leaved Goldenrod			√			S5	HU
Vaccinium angustifolium	Late Lowbush Blueberry			√			S5	HU
Viburnum dentatum var. *lucidum*	Southern Arrow-wood			√			S4	HR
Viola affinis	Lecontes Violet			√			S4?	HU
Vitis aestivalis	Summer Grape		√				S4	HU

Key
[1] Observed on Saw-Whet property during field investigations conducted by Beacon Environmental in 2012 and 2013. √ = present
[2] Observed on lands adjacent to Saw-Whet property during field investigations conducted by Beacon Environmental in 2012. √= present
[3] Previously observed within the TPA, primarily in the Fourteen Mile Creek valley (ESA 12) (Source: Conservation Halton natural heritage database, 2012). √ = present
[4] COSEWIC (Committee on the Status of Endangered Wildlife in Canada). **END** = Endangered
[5] COSARO (Committee on the Status of Species at Risk in Ontario). **END** = Endangered
[6] S-Rank (Provincial Status - NHIC). **S2** = imperilled; **S3** = vulnerable; **S4** = apparently secure; **S5** = secure; **SE** = exotic/introduced.
[7] Halton (Regional Status - Crins et al, 2006). **HU** – Uncommon; **HR** – Rare

Appendix E

List of Breeding Birds Recorded in the Study Area

Appendix E

List of Breeding Birds Recorded in the Study Area

Common Name	Scientific Name	Status					Approximate Number of Breeding Birds (#) or Presence (X, B)					
							Older References		Recent Studies			
		COSEWIC (national) a	Species at Risk in Ontario Listing a	Provincial breeding season SRANK b	Halton Region Status d	Area-sensitive (OMNR) c	14 Mile Creek Valley (1986) e	TPA - Conservation Halton Data f	Saw-Whet Property Golf Course 2012 g	Saw-Whet Property Golf Course 2013 g	Adjacent to Saw-Whet property in 14 Mile Creek Valley 2012 g	14 Mile Creek Valley 2013 g
Green Heron	*Butorides virescens*			S4	U		X	X				1
Canada Goose	*Branta canadensis*			S5			X			1		
Mallard	*Anas platyrhynchos*			S5			X	X		2		1
Cooper's Hawk	*Accipiter cooperi*			S4	U	A		X				
Red-tailed Hawk	*Buteo jamaicensis*			S5			X	X		1		1
Ruffed Grouse	*Bonasa umbellus*			S4			X					
Killdeer	*Charadrius vociferus*			S5			X	X	1	3		
Spotted Sandpiper	*Actitis macularia*			S5			X		1			
American Woodcock	*Scolopax minor*			S4			X	X				
Mourning Dove	*Zenaida macroura*			S5				X	3	4		
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S5	U		X					
Cuckoo sp.	*Coccyzus sp.*			-								1
Great Horned Owl	*Bubo virginianus*			S4			X					1
Eastern Screech-Owl	*Megascops asio*			S4			E					
Long-eared Owl	*Asio otus*			S4	R		X					
Ruby-throated Hummingbird	*Archilochus colubris*			S5				X				
Belted Kingfisher	*Ceryle alcyon*			S4			X	X				1
Red-headed Woodpecker	*Melanerpes erythrocephalus*	THR	SC	S4	R		E					
Downy Woodpecker	*Picoides pubescens*			S5			X	X	1	2		
Hairy Woodpecker	*Picoides villosus*			S5		A		X			1	2
Northern Flicker	*Colaptes auratus*			S4			X	X		1		1

Common Name	Scientific Name	Status					Approximate Number of Breeding Birds (#) or Presence (X, B)					
							Older References		Recent Studies			
		COSEWIC (national) a	Species at Risk in Ontario Listing a	Provincial breeding season SRANK b	Halton Region Status d	Area-sensitive (OMNR) c	14 Mile Creek Valley (1986) e	TPA - Conservation Halton Data f	Saw-Whet Property Golf Course 2012 g	Saw-Whet Property Golf Course 2013 g	Adjacent to Saw-Whet property in 14 Mile Creek Valley 2012 g	14 Mile Creek Valley 2013 g
Pileated Woodpecker	*Dryocopus pileatus*			S5	U	A	E					1
Eastern Wood-Pewee	*Contopus virens*	SC		S4			X	X			1	2
Alder Flycatcher	*Empidonax alnorum*			S5							1	
Willow Flycatcher	*Empidonax traillii*			S5	U					1	1	
Least Flycatcher	*Empidonax minimus*			S4	U	A	X					
Eastern Phoebe	*Sayornis phoebe*			S5			X	X				
Great Crested Flycatcher	*Myiarchus crinitus*			S4			X	X		1		2
Eastern Kingbird	*Tyrannus tyrannus*			S4			X	X	5	7		
N. Rough-winged Swallow	*Stelgidopteryx serripennis*			S4	U			X				
Barn Swallow	*Hirundo rustica*	THR	THR	S4			X	X	2	3-7		
Blue Jay	*Cyanocitta cristata*			S5			X	X		1	1	7
American Crow	*Corvus brachyrhynchos*			S5			X	X				
Black-capped Chickadee	*Poecile atricapillus*			S5			X	X	8	2		8
Red-breasted Nuthatch	*Sitta canadensis*			S5		A						1
White-breasted Nuthatch	*Sitta carolinensis*			S5		A	X	X				1
Brown Creeper	*Certhia americana*			S5	U	A	X					
House Wren	*Troglodytes aedon*			S5				X	2	3	1	4
Wood Thrush	*Hylocichla mustelina*	THR		S4			X	X				
American Robin	*Turdus migratorius*			S5			X	X	5	27		13
Gray Catbird	*Dumetella carolinensis*			S4			X	X		2	1	2
Brown Thrasher	*Toxostoma rufum*			S4			X					1
Cedar Waxwing	*Bombycilla cedrorum*			S5			X	X		5		2
European Starling	*Sturnus vulgaris*			SE			X	X	2	11		1
Blue-headed Vireo	*Vireo solitarius*			S5	U	A	X					
Warbling Vireo	*Vireo gilvus*			S5			X	X	3	2	1	
Red-eyed Vireo	*Vireo olivaceus*			S5			X	X				6
Yellow Warbler	*Dendroica petechia*			S5			X	X	2	3		
Black-throated Green Warbler	*Dendroica virens*			S5		A						1

Common Name	Scientific Name	Status					Approximate Number of Breeding Birds (#) or Presence (X, B)					
							Older References		Recent Studies			
		COSEWIC (national) a	Species at Risk in Ontario Listing a	Provincial breeding season SRANK b	Halton Region Status d	Area-sensitive (OMNR) c	14 Mile Creek Valley (1986) e	TPA - Conservation Halton Data f	Saw-Whet Property Golf Course 2012 g	Saw-Whet Property Golf Course 2013 g	Adjacent to Saw-Whet property in 14 Mile Creek Valley 2012 g	14 Mile Creek Valley 2013 g
Pine Warbler	*Dendroica pinus*			S5	U	A					1	1
Black-and-white Warbler	*Mniotilta varia*			S5	U	A	X					
Mourning Warbler	*Oporornis philadelphia*			S4	U			X				
Common Yellowthroat	*Geothlyphis trichas*			S5			X	X				1
Scarlet Tanager	*Piranga olivacea*			S4		A	X					1
Northern Cardinal	*Cardinalis cardinalis*			S5			X	X	1	2		7
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4			X				1	2
Indigo Bunting	*Passerina cyanea*			S4			X	X	1	1	1	2
Chipping Sparrow	*Spizella passerina*			S5			X	X	4	5		
Field Sparrow	*Spizella pusilla*			S4			X	X				
Savannah Sparrow	*Passerculus sandwichensis*			S4		A	X	X	2	1		
Song Sparrow	*Melospiza melodia*			S5			X	X	18	11		13
Red-winged Blackbird	*Agelaius phoeniceus*			S4			X	X	8	7		
Eastern Meadowlark	*Sturnella magna*	THR	THR	S4		A	X					
Common Grackle	*Quiscalus quiscula*			S5			X	X		2		8
Brown-headed Cowbird	*Molothrus ater*			S5			X	X		4		1
Orchard Oriole	*Icterus spurius*			S4	R		X	X		1		
Baltimore Oriole	*Icterus galbula*			S4				X	2	3		3
House Finch	*Carpodacus mexicanus*			SE				X	3	1		
Purple Finch	*Carpodacus purpureus*			S4	U		X					
American Goldfinch	*Cardeulis tristis*			S5			X	X	3	4		4
House Sparrow	*Passer domesticus*			SE					1	2		

KEY

[a] COSEWIC = Committee on the Status of Endangered Wildlife in Canada
[a] Species at Risk in Ontario List as designated by COSSARO (Committee on the Status of Species at Risk in Ontario)
END = Endangered, THR = Threatened, SC = Special Concern
[b] SRANK (from Natural Heritage Information Centre) for breeding status if:
S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure)

SZB (breeding migrants or vagrants) and SR (reported as breeding, but no persuasive documentation).
SE (exotic, i.e. non-native)

[c] Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p. plus appendices.
[d] Halton Region Status from Halton Natural Areas Inventory, 2006, Volume 2. Species Checklists. Status not shown for Abundant and Common species; U= Uncommon, R = Rare
[e] Axon et al. 1987. A Bio-physical Inventory of the Fourteen Mile Creek Valley (ESA No. 12) Oakville (observations 1986); E = Earlier record (i.e. cited in Axon, but not observed)
[f] Records provided by Conservation Halton; sources are Halton Natural Areas Inventory (July 2004) and McIlveen (2004; observations June 1992 and July 1993); Geomatics 1993 excluded (see text)
[g] Beacon Environmental Field Work Conducted On: May 30th, 31st and June 23rd, 24th, 2012; May 30 and June 25, 2013

Appendix F

List of Wintering Birds Recorded from the Study Area

Appendix F

List of Wintering Birds Recorded from the Saw-Whet Property and Fourteen Mile Creek Valley

Common Name	Scientific Name	Locations and Dates					
		Saw-Whet Golf Course			Parts of 14 Mile Creek Valley		
		Dec-21-2012	Jan-29-2013	Feb-21-2013	Dec-21-2012	Jan-29-2013	Feb-21-2013
Mourning Dove	*Zenaida macroura*	2					
Belted Kingfisher	*Ceryle alcyon*						1
Downy Woodpecker	*Picoides pubescens*	1			1	2	
Hairy Woodpecker	*Picoides villosus*				1		
Pileated Woodpecker	*Dryocopus pileatus*				1		1
Blue Jay	*Cyanocitta cristata*	1	2		1	2	1
American Crow	*Corvus brachyrhynchos*						2
Black-capped Chickadee	*Poecile atricapillus*		1		11	2	2
White-breasted Nuthatch	*Sitta carolinensis*				1		1
American Robin	*Turdus migratorius*	30 a*	1		31 a*	1	3
European Starling	*Sturnus vulgaris*	3	1				
Northern Cardinal	*Cardinalis cardinalis*				3		2
American Tree Sparrow	*Spizella arborea*		3			5	4
Dark-eyed Junco	*Junco hyemalis*	1					2
House Finch	*Carpodacus mexicanus*						6
American Goldfinch	*Cardeulis tristis*	1					2
House Sparrow	*Passer domesticus*	3					

Field Work Conducted On: Dec. 21, 2012, Jan. 29, 2013, and Feb. 21, 2013. In the winter of 2013-2014 two additional species were observed: Red-breasted Nuthatch *Sitta canadensis* and Red-tailed Hawk *Buteo jamaicensis*.
a* = flock of American Robin was in both the golf course and adjacent valley lands

Appendix G

List of Non-avian Wildlife Recorded in the Study Area

Appendix G

List of Non-avian Wildlife Recorded in the Study Area

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Mammals									
Beaver	Castor canadensis	14 Mile Creek Valley		S5	Common	Beacon Env.		May 31 2013	Dam on 14 Mile Creek
Eastern Chipmunk	Tamias striatus			S5	Common	Geomatics 1993			
Eastern Chipmunk	Tamias striatus	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Eastern Chipmunk	Tamias striatus	14 Mile Creek Valley		S5	Common	Beacon Environmental		June 25 2013	
Eastern Cottontail	Sylvilagus floridanus			S5	Common	Geomatics 1993			
Eastern Cottontail	Sylvilagus floridanus			S5	Common	NRSI, 2012			
Eastern Cottontail	Sylvilagus floridanus	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Eastern Cottontail	Sylvilagus floridanus	14 Mile Creek Valley NAI#12		S5	Common	Halton NAI		17/06/2003	
Eastern Cottontail	Sylvilagus floridanus	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Eastern	Sylvilagus	Saw-Whet		S5	Common	Beacon		June 25 2013	4

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Cottontail	floridanus	Property				Environmental			
Coyote	Canis latrans	Saw-Whet Property		S5	Common	Beacon Environmental	12	June 25 2013	1
Gray Squirrel	Sciurus carolinensis			S5	Common	Geomatics 1993			
Gray Squirrel	Sciurus carolinensis	14 Mile Creek Valley		S5	Common	Beacon Environmental		June 25 2013	
Muskrat	Ondatra zibethicus			S5	Common	Geomatics 1993			
Raccoon	Procyon lotor			S5	Common	Geomatics 1993			
Raccoon	Procyon lotor	14 Mile Creek Valleys		S5	Common	Halton NAI		08/07/2004	
Raccoon	Procyon lotor	14 Mile Creek Valley NAI#12		S5	Common	Halton NAI		17/06/2003	
Raccoon	Procyon lotor	14 Mile Creek Valley NAI#12		S5	Common	Halton NAI		18/06/2003	
Raccoon	Procyon lotor	14 Mile Creek Valley		S5	Common	Beacon Environmental		June 25 2013	
Red Fox	Vulpes vulpes			S5	Common	Geomatics 1993			
Red Squirrel	Tamiasciurus hudsonicus			S5	Common	Geomatics 1993			
Striped Skunk	Mephitis mephitis			S5	Common	Geomatics 1993			
White-tailed Deer	Odocoileus virginianus			S5	Common	Geomatics 1993			
White-tailed Deer	Odocoileus virginianus	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
White-tailed Deer	Odocoileus virginianus	14 Mile Creek Valley NAI#12		S5	Common	Halton NAI		18/06/2003	
White-tailed Deer	Odocoileus virginianus	14 Mile Creek Valley		S5	Common	Beacon Environmental		spring and summer 2012	
Woodchuck	Marmota monax	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Woodchuck	Marmota monax			S5	Common	Geomatics 1993			
Reptiles									
Brownsnake	Storeria dekayi			S5	Common	Geomatics 1993			
Brownsnake	Storeria dekayi	Saw-Whet		S5	Common	Beacon Environmental		May 24 2013	2
Eastern Garter Snake	Thamnophis sirtalis sirtalis			S5	Abundant	Geomatics 1993			
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Fourteen Mile Creek Valley		S5	Abundant	McIlveen 2004			
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Saw-Whet Property		S5	Abundant	Beacon Environmental			
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Third Line Property		S5	Abundant	NRSI, 2012			
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Saw-Whet		S5	Abundant	Beacon Environmental	12	May 24 2013	1
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Saw-Whet		S5	Abundant	Beacon Environmental	12	June 7 2013	1
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Saw-Whet		S5	Abundant	Beacon Environmental	12	June 21 2013	1
Eastern Garter Snake	Thamnophis sirtalis sirtalis	Saw-Whet		S5	Abundant	Beacon Environmental	12	Sept 17 2013	1
Eastern Milksnake	Lampropeltis triangulum		SC	S3	Common	GSP Group 2011			

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Eastern Milksnake	Lampropeltis triangulum	Saw-Whet	SC	S3	Common	Beacon Environmental	12	May 24 2013	1
Eastern Milksnake	Lampropeltis triangulum	Saw-Whet	SC	S3	Common	Beacon Environmental	12	June 7 2013	1
Eastern Milksnake	Lampropeltis triangulum	Saw-Whet	SC	S3	Common	Beacon Environmental	12	June 11 2013	1
Red-bellied Snake	Storeria occipitomaculata	Saw-Whet		S5	Common	Beacon Environmental	12	May 24 2013	2
Red-bellied Snake	Storeria occipitomaculata	Saw-Whet		S5	Common	Beacon Environmental	12	June 7 2013	2
Red-bellied Snake	Storeria occipitomaculata	Saw-Whet		S5	Common	Beacon Environmental	12	June 11 2013	2
Midland Painted Turtle	Chrysemys picta	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Midland Painted Turtle	Chrysemys picta	Saw-Whet		S5	Common	Beacon Environmental	Pond 7	June 21, 2013	Several
Midland Painted Turtle	Chrysemys picta	Saw-Whet		S5	Common	Beacon Environmental	Pond 7	November 6, 2013	Several
Snapping Turtle	Chelydra serpentina		SC	S3	Common	Geomatics 1993			
Amphibians									
Bullfrog	Rana catesbeiana			S4	Uncommon	Geomatics 1993			
Eastern American Toad	Bufo americanus americanus			S5	Abundant	Geomatics 1993			
Eastern American Toad	Bufo americanus americanus	Fourteen Mile Creek Valley		S5	Abundant	Beacon Environmental			
Gray Treefrog	Hyla versicolor	Saw-Whet		S5	Abundant	Beacon Environmental	Pond 7	June 11 2013	7
Green Frog	Rana clamitans	Saw-Whet Property		S5	Abundant	Beacon Environmental	Unit 6	23-Jun-12	3
Green Frog	Rana clamitans	Saw-Whet		S5	Abundant	Beacon	Unit 6	19-Jun-12	13

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
		Property				Environmental			
Green Frog	Rana clamitans			S5	Abundant	Geomatics 1993			
Green Frog	Rana clamitans	14 Mile Creek Valley		S5	Abundant	Halton NAI		08/07/2004	
Green Frog	Rana clamitans	Deerfield		S5	Abundant	NSRI , 2013	Pond 2 or 3	May 30 2013	1
Green Frog	Rana clamitans	Deerfield		S5	Abundant	NSRI , 2013	Pond 2and /or 3	June 12 2013	3
Green Frog	Rana clamitans	Deerfield		S5	Abundant	NSRI , 2013	Pond 4	May 30 2013	1
Green Frog	Rana clamitans	14 Mile Creek Valley		S5	Abundant	Beacon Environmental		September 13, 2012	
Northern Leopard Frog	Rana pipiens			S5	Abundant	Geomatics 1993			
Northern Redback Salamander	Plethodon cinereus			S5	Common	Geomatics 1993			
Spring Peeper	Pseudacris crucifer crucifer			S5	Abundant	Geomatics 1993			
Spring Peeper	Pseudacris crucifer	Saw-Whet Property		S5	Abundant	Beacon Environmental		08-May-12	4
Spring Peeper	Pseudacris crucifer	14 Mile Creek valley		S5	Abundant	Beacon Environmental		April 17 and May 6 2013	3
Spring Peeper	Pseudacris crucifer	Saw-Whet		S5	Abundant	Beacon Environmental	14W-W1 tributary	April 17 and May 6 2013	1
Spring Peeper	Pseudacris crucifer	Saw-Whet		S5	Abundant	Beacon Environmental	Pond 7	April 17 and May 6 2013	4/3
Spring Peeper	Pseudacris crucifer	Region of Halton property		S5	Abundant	Beacon Environmental	44	April 17 and May 6 2013	Chorus
Spring Peeper	Pseudacris crucifer	14 Mile Creek valley		S5	Abundant	Beacon Environmental		May 6 2013	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Spring Peeper	Pseudacris crucifer	Saw-Whet		S5	Abundant	Beacon Environmental	14W-W1 tributary	May 6 2013	
Spring Peeper	Pseudacris crucifer	Saw-Whet		S5	Abundant	Beacon Environmental	Pond 7	May 6 2013	
Spring Peeper	Pseudacris crucifer	Region of Halton property		S5	Abundant	Beacon Environmental	44	May 6 2013	
Wood Frog	Rana sylvatica			S5	Common	Geomatics 1993			
Dragonflies and Damselflies									
'Blue' Darner sp.	Aeshna sp.	Saw-Whet Property		-	-	Beacon Environmental	Unit 12	Sept. 10, 2012	3
'Red' Saddlebags sp.	Tramea sp. (likely T. onusta)	Saw-Whet Property		SNA	-	Beacon Environmental	Unit 12	Sept. 10, 2012	1 Male, 1 Female
Black Saddlebags	Tramea lacerata	Saw-Whet Property		S4	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	(>25)
Black Saddlebags	Tramea lacerate	Saw-Whet Property		S4	Common	Beacon Environmental		spring and summer 2012	
Blue Dasher	Pachydiplax longipennis	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Common Green Darner	Anax junius	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	(>40)
Common Green Darner	Anax junius	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Common Whitetail	Plathemis lydia	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	1 Male, 1 Female
Common Whitetail	Plathemis lydia	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Dot-tailed Whiteface	Leucorrhinia intacta	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Eastern Forktail	Ischnura verticalis	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 6	Sept. 10, 2012	1 Male
Ebony	Calopteryx	Saw-Whet		S5	Common	Beacon		spring and	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Jewelwing	maculata	Property				Environmental		summer 2012	
Familiar Bluet	Enallagma civile	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	(>30)
Four-spotted Skimmer	Libellula quadrimaculata	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Bluet sp.	Enellagma sp.	Saw-Whet				Beacon Environmental	Pond 7	Sept 10 2013	5
Common Green Darner	Anax junius	Saw-Whet		S5	Common	Beacon Environmental	Pond 7, golf course and 12	Sept 10 2013	7
Mosaic Darner	Aeshna sp.	Saw-Whet				Beacon Environmental	Roughs and 12	Sept 10 2013	8
Twelve-Spotted Skimmer	Libellula pulchella	Saw-Whet		S5	Common	Beacon Environmental	Pond 7 and golf course	Sept 10 2013	3
White-faced Meadowhawk	Sympetrum obtrusum	Saw-Whet		S5	Common	Beacon Environmental	Pond 7 and golf course	Sept 10 2013	11
Band-winged Meadowhawk	Sympetrum semicinctum	Saw-Whet		S4	Uncommon	Beacon Environmental	Pond 7	Sept 10 2013	2
Common Whitetail	Plathemis lydia	Saw-Whet		S5	Common	Beacon Environmental	Pond 7	Sept 10 2013	6
Black Saddlebags	Tamea lacerata	Saw-Whet		S4	Common	Beacon Environmental	Pond 7 and golf course	Sept 10 2013	5
Chalk-fronted Corporal	Ladona julia	Saw-Whet		S5	Common	Beacon Environmental	Pond 7	Sept 10 2013	2
Ruby Meadowhawk	Sympetrum rubicundulum	Saw-Whet		S5	Common?	Beacon Environmental		2013	
Blue Dasher	Pachydiplax longipennis	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Common Whitetail	Plathemis lydia	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Eastern	Ischnura verticalis	14 Mile		S5	Common	Halton NAI		08/07/2004	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Forktail		Creek Valley							
Ebony Jewelwing	Calopteryx maculata	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Familiar Bluet	Enallagma civile	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Green Darner	Anax junius	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Northern Bluet	Enallagma cyathigerum	14 Mile Creek Valley		S4	Rare	Halton NAI		08/07/2004	
Widow Skimmer	Libellula luctuosa	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Black Saddlebags	Tramea lacerata	Saw-Whet Property		S4	Common	Beacon Environmental		Jun 5, July 5, Aug 1 and Aug 19 2014	29
Carolina Saddlebags	Tramea Carolina	Saw-Whet		SNA	Common?	Beacon Environmental		Jun 15, 2014	2
'Red' Saddlebags sp.	Tramea sp. (likely T. onusta)	Saw-Whet Property		SNA	Common?	Beacon Environmental		Jul 5 and Aug 19, 2014	2
Blue Dasher	Pachydiplax longipennis	Saw-Whet Property		S5	Common	Beacon Environmental		July 5, Aug 1 and Aug 19 2014	6
Dot-tailed Whiteface	Leucorrhinia intacta	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, 2014	1
Eastern Forktail	Ischnura verticalis	Saw-Whet Property		S5	Common	Beacon Environmental		June 15, July 5, Aug 1 and Aug 19 2014	59
Ebony	Calopteryx	Saw-Whet		S5	Common	Beacon		June 15, July	24

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Jewelwing	maculata	Property				Environmental		5, Aug 1 2014	
Azure Bluet	Enallagma aspersum	Saw-Whet		S3	Rare	Beacon Environmental	2b, 8c, 6,22a	Jun 15, Jul 15, Aug 1 and	64
Familiar Bluet	Enallagma civile	Saw-Whet Property		S5	Common	Beacon Environmental		June 15, July 5, Aug 1 and Aug 19 2014	105
Northern Bluet	Enallagma annexum	Saw-Whet		S5	Rare	Beacon Environmental		Jun 15 and Aug 19, 2014	10
Skimming Bluet	Enallagma geminatum	Saw-Whet		S4	Rare	Beacon Environmental	22a, 16a, 6, 2h	Jul 5, 2014	7
Bluet sp.	Enallagma sp.	Saw-Whet		-	Common?	Beacon Environmental		Aug 1 and Aug 19, 2014	64
Four-spotted Skimmer	Libellula quadrimaculata	Saw-Whet Property		S5	Common	Beacon Environmental		Jul 5, 2014	1
Painted Skimmer	Libellula semifasciata	Saw-Whet		S2	Rare	Beacon Environmental	12, 2b, 2n	Jun 15, 2014	9
Twelve-Spotted Skimmer	Libellula pulchella	Saw-Whet		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	23
Widow Skimmer	Libellula luctuosa	Saw-Whet		S5	Common	Beacon Environmental		Jul 5, Aug 1 and Aug 19, 2014	23
Common Green Darner	Anax junius	Saw-Whet		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	314
Autumn Meadowhawk	Sympetrum semicinctum	Saw-Whet		S5	Uncommon	Beacon Environmental		Aug 19, 2014	2
Band-winged Meadowhawk	Sympetrum semicinctum	Saw-Whet		S4	Uncommon	Beacon Environmental		Jul 5, Aug 1 and Aug 19, 2014	3
Meadowhawk sp	Sympetrum sp.	Saw-Whet		-	Common?	Beacon Environmental		Jun 15, Aug 1 and Aug 19, 2014	8
White-faced	Sympetrum	Saw-Whet		S5	Common	Beacon		Aug 19, 2014	4

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Meadowhawk	obtrusum					Environmental			
Common Whitetail	Plathemis lydia	Saw-Whet		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	36
Slender Spreadwing	Lestes rectangularis	Saw-Whet		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	126
Spotted Spreadwing	Lestes congener	Saw-Whet		S5	Uncommon	Beacon Environmental		Aug 19, 2014	33
Violet Dancer	Argia fumipennis violacea	Saw-Whet		S5	Uncommon	Beacon Environmental		Aug 1, 2014	1
Fragile Forktail	Ischnura posita	Saw-Whet		S4	Rare	Beacon Environmental	6	Jun 15, and Aug 1, 2014	4
Lance-tipped Darner	Aeshna constricta	Saw-Whet		S5	Common	Beacon Environmental		Aug 19, 2014	1
Shadow Darner	Aeshna umbrosa	Saw-Whet		S5	Uncommon	Beacon Environmental		Aug 19, 2014	6
Aeshna Darner sp.	Aeshna sp.	Saw-Whet		-	Common?	Beacon Environmental		Aug 19, 2014	7
Unicorn Clubtail	Arigomphus villosipes	Saw-Whet		S2,S3	Uncommon	Beacon Environmental		Jun 15, 2014	2
Clubtail sp	Arigomphus sp.	Saw-Whet		-	Common?	Beacon Environmental		Aug 1, 2014	1
Gomphus sp.	Gomphus sp.	Saw-Whet		-	Common?	Beacon Environmental		Jun 15, 2014	1
Common Baskettail	Epitheca cynosura	Saw-Whet		S5	Uncommon	Beacon Environmental		Jun 15, 2014	3
Halloween Pennant	Celithemis eponina	Saw-Whet		S4	Rare	Beacon Environmental	2b	Aug 1, 2014	2
Eastern Pondhawk	Erythemis simplicicollis	Saw-Whet		S5	Common	Beacon Environmental		Jul 5 and Aug 1, 2014	10
Spot-winged Glider	Pantala hymenaea	Saw-Whet		S4	Rare	Beacon Environmental	12	Jul 5, 2014	2
Eastern	Perithemis tenera	Saw-Whet		S4	Uncommon	Beacon		Jul 5 and Aug	59

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Amberwing						Environmental		1, 2014	
Butterflies									
Banded Hairstreak	Satyrium calanus	14 Mile Creek Valley		S4	Common	Halton NAI		08/07/2004	
Banded Hairstreak	Satyrium calanus	Fourteen Mile Creek Valley		S4	Common	McIlveen 2004		17/07/1993	
Black Swallowtail	Papilio polyxenes	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Cabbage White	Pieris rapae	Saw-Whet Property		SE	Common	Beacon Environmental	All areas	Sept. 10, 2012	(10+)
Cabbage White	Pieris rapae	14 Mile Creek Valley		SE	Common	Halton NAI		08/07/2004	
Cabbage White	Pieris rapae	Fourteen Mile Creek Valley		SE	Common	McIlveen 2004		28/06/1992	
Cabbage White	Pieris rapae	Fourteen Mile Creek Valley		SE	Common	McIlveen 2004		17/07/1993	
Common Buckeye	Junonia coenia	Saw-Whet Property		SZB	Rare	Beacon Environmental	Unit 12	Sept. 10, 2012	1
Common Ringlet	Coenonympha tullia	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Common Sulphur	Colias philodice	Fourteen Mile Creek Valley		S5	Common	McIlveen 2004		17/07/1993	
Common Wood Nymph	Cercyonis pegala	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Common Wood Nymph	Cercyonis pegala	Fourteen Mile Creek Valley		S5	Common	McIlveen 2004		17/07/1993	
Common/Clouded Sulphur	Colias philodice	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	2
Crescent sp.	Phyciodes sp.	Saw-Whet Property		-	-	Beacon Environmental	Unit 12	Sept. 10, 2012	5
Eastern Tiger Swallowtail	Papilio glaucus	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
European Skipper	Thymelicus lineola	14 Mile Creek Valley		SE	Common	Halton NAI		08/07/2004	
European Skipper	Thymelicus lineola	Fourteen Mile Creek Valley		SE	Common	McIlveen 2004		28/06/1992	
European Skipper	Thymelicus lineola	Fourteen Mile Creek Valley		SE	Common	McIlveen 2004		17/07/1993	
Fiery Skipper	Hylephila phyleus	Saw-Whet Property		SZB	Rare	Beacon Environmental	Unit 12	Sept. 10, 2012	2
Least Skipper	Ancyloxypha numitor	Saw-Whet Property		S5	Common	Beacon Environmental		Sept. 10, 2012	2
Little Glassywing	Pompeius verna	14 Mile Creek Valley		S3S4	Common	Halton NAI		08/07/2004	
Little Wood Satyr	Megisto cymela	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Monarch	Danaus plexipus	Saw-Whet Property	SC	S4	Common	Beacon Environmental	Units 6 and 12	Sept. 10, 2012	8
Monarch	Danaus plexippus	Saw-Whet Property	SC	S4	Common	Beacon Environmental		spring and summer 2012	
Monarch	Danaus plexippus	Fourteen Mile Creek	SC	S4	Common	McIlveen 2004		17/07/1993	

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
		Valley							
Northern Pearly Eye	Enodia anthedon	14 Mile Creek Valley		S4	Common	Halton NAI		08/07/2004	
Northern Pearly Eye	Enodia anthedon	Fourteen Mile Creek Valley		S4	Common	McIlveen 2004		17/07/1993	
Orange (Northern) Crescent	Phyciodes cocyta	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	1 Male, 1 Female
Orange (Northern) Crescent	Phyciodes cocyta	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Orange Sulphur	Colias eurytheme	Saw-Whet Property		S5	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	2
Orange Sulphur	Colias eurytheme	Fourteen Mile Creek Valley		S5	Common	McIlveen 2004		17/07/1993	
Pearl Crescent	Phyciodes tharos	Saw-Whet Property		-	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	1 Female
Question Mark	Polygonia interrogationis	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Question Mark	Polygonia interrogationis	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Red Admiral	Vanessa atalanta	Saw-Whet Property		SZB	Common	Beacon Environmental	Unit 12	Sept. 10, 2012	1
Red-spotted Purple	Limenitis arthemis astyanax	14 Mile Creek Valley		S5	Common	Halton NAI		08/07/2004	
Viceroy	Limenitis archippus	Saw-Whet Property		S5	Common	Beacon Environmental		spring and summer 2012	
Wild Indigo Duskywing	Erynnis baptisiae	Saw-Whet Property		S4	Rare	Beacon Environmental	Unit 12	Sept. 10, 2012	1

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
Black Swallowtail	Papilio polyxenes	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	29
Giant Swallowtail	Papilio cresphontes	Saw-Whet Property		S4	Rare	Beacon Environmental	2h	Aug 19, 2014	1
Eastern Tiger Swallowtail	Pterourus glaucus	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	4
Clouded Sulphur	Colias philodice	Saw-Whet Property		S5	Common?	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	138
Orange Sulphur	Colias eurytheme	Saw-Whet Property		S5	Common	Beacon Environmental		Aug 1 and Aug 19, 2014	37
Cabbage White	Pieris rapae	Saw-Whet Property		SNA	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	290
Banded Hairstreak	Satyrium calamus	Saw-Whet Property		S4	Common	Beacon Environmental		Jun 15, Jul 5, and Aug 1 2014	7
Eastern Pine Elfin	Callophrys niphon	Saw-Whet Property		S5	Uncommon	Beacon Environmental		Jun 15, and Jul 5, 2014	2
Eastern Tailed Blue	Cupido comyntas	Saw-Whet Property		S5	Common	Beacon Environmental		Jul 5, Aug 1 and Aug 19, 2014	6
Summer Azure	Celastrina neglecta	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	32
Monarch	Danaus plexippus	Saw-Whet Property		S2N,S4B	Common	Beacon Environmental		Jul 5, Aug 1 and Aug 19, 2014	22
Red-spotted Purple	Limenitis arthemis astyanax	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, and Aug 19, 2014	6
Viceroy	Limenitis	Saw-Whet		S5	Common	Beacon		Jun 15, Jul 5,	9

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
	archippus	Property				Environmental		Aug 1 and Aug 19, 2014	
Fritillary sp.	Speyeria sp.	Saw-Whet Property		n/a	-	Beacon Environmental		Aug 1 , 2014	4
Red Admiral	Vanessa atalanta	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, and Aug 1 , 2014	6
Mourning Cloak	Nymphalis antiopa	Saw-Whet Property		S5	Common	Beacon Environmental		Jul 5, and Aug 1 , 2014	2
Question Mark	Polygonia interrrogationis	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, and Aug 1 , 2014	2
Crescent sp.	Phyciodes sp.	Saw-Whet Property		n/a	-	Beacon Environmental		Aug 1 , 2014	9
Common Ringlet	Coenonympha tullia	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Aug 1 and Aug 19, 2014	162
Little Wood-Satyr	Megisto cymela	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, and Jul 5, 2014	50
Common Wood-Nymph	Cercyonis pegala	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	48
Silver-spotted Skipper	Epargyreus clarus	Saw-Whet Property		S4	Common	Beacon Environmental		Aug 1 , 2014	1
Juvenal's Duskywing	Erynnis juvenalis	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, 2014	2
Wild Indigo Duskywing	Erynnis baptisiae	Saw-Whet Property		S4	Rare	Beacon Environmental	2b, 18, 12	Jul 5, Aug 1 and Aug 19, 2014	25
Least Skipper	Ancyloxypha numitor	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5, Aug 1 and Aug 19, 2014	24
European Skipper	Thymelicus lineola	Saw-Whet Property		SNA	Common	Beacon Environmental		Jun 15, and Jul 5, 2014	48
Peck's Skipper	Polites peckius	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, Jul 5 and Aug 19,	8

Common Name	Scientific Name	Location[1]	Species at Risk[2]	S-Rank[3]	Halton Status[4]	Source	ELC Unit/ Pond #	Date	Approximate Numbers Observed
								2014	
Tawny-edged Skipper	Polites themistocles	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15, and Jul 5, 2014	2
Delaware Skipper	Anatrytone logan	Saw-Whet Property		S4	Common	Beacon Environmental		Jul 5, 2014	1
Hobomok Skipper	Poanes hobomok	Saw-Whet Property		S5	Common	Beacon Environmental		Jun 15 2014	1

[1] Sections highlighted are from Conservation Halton records (sources as indicated); where location is not noted, the record is presumed to be from within somewhere within the TPA, which may or may not be within the Saw-Whet property; Saw-Whet/Saw-Whet Property = Saw-Whet Golf Course property;
[2] Species at Risk in Ontario List as designated by COSSARO (Committee on the Status of Species at Risk in Ontario): END = Endangered, THR = Threatened, SC = Special Concern
[3] provincial SRANK (from Natural Heritage Information Centre): S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure); SE (exotic, i.e. non-native), SZB (Breeding migrants/vagrants), SNA (Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
[4] Halton Region Status from Halton Natural Areas Inventory, 2006, Volume 2. Species Checklists

Appendix H

Wildlife Survey Details

Appendix H

Time of Day and Weather Conditions for Wildlife Surveys

Surveyed Taxa, Area (Surveyor)	**Survey Date**	**Time of Day** (Start time, or start and finish time)	**Weather** (Temperature at start, Cloud Cover, Wind (Beaufort Scale or as given), Other)
Amphibians			
Saw-Whet and Fourteen Mile Creek ESA (Beacon Environmental)	May 8 2012	After sunset	12ºC, clear, no wind
	June 9 2012	21:50 - 23:15	27ºC
	April 17 2013	20:15	7ºC, no precipitation
	May 6 2013	17:00	15ºC, 10%, 0
	June 11 2013	17:30	20ºC, 80%, 1-2
Reptiles			
Saw-Whet and Fourteen Mile Creek ESA (Beacon Environmental)	May 6 2013	20:00	15ºC, no precipitation
	May 24 2013	16:00	16ºC, no precipitation
	June 7 2013	10:15	18ºC, 10%, 1, no precipitation
	June 12 2013	20:00	20ºC, no precipitation
	June 21 2013	-	-
	July 8 2013	10:00	20ºC, no precipitation
	Sept 5 2013	17:00	15ºC, no precipitation
	Sept 10 2013	11:45-14:10	27-31ºC, 60%, 2-3, no precipitation
	Sept 17 2013	17:00	12ºC, no precipitation
Breeding Birds			
Saw-Whet and Fourteen Mile Creek ESA (Beacon Environmental)	May 30 2012	5:30 - 11:00	18ºC, 10%, 1

Surveyed Taxa, Area (Surveyor)	**Survey Date**	**Time of Day** (Start time, or start and finish time)	**Weather** (Temperature at start, Cloud Cover, Wind (Beaufort Scale or as given), Other)
	May 31 2012	6:30 - 8:30	14ºC, 20%, 2
	June 23 2012	5:15 - 8:45	17ºC, 40%, 0
	June 24 2012	5:30 - 8:30	20ºC, 0%, 0
	May 30 2013	6:10 - 10:30	18ºC, 10%, 0-1, no precipitation
	June 25 2013	5:50 - 9:15	21-24ºC, 10%, 0-1, no precipitation
Wintering Birds and Owl Roost Survey			
Saw-Whet and Fourteen Mile Creek ESA (Beacon Environmental)	December 21 2012	8:45 - 10:30	3ºC, 100%, 0, light wet snow at 9:15, no snow cover
	January 29 2013	8:45 – 10:30	0ºC, 100%, 0, light rain 9:30, heavy rain 10:15, 3-4 cm depth compacted snow
	February 21 2013	10:00 – 12:30	-8ºC, 5%, 2-3, >10 cm depth compacted snow, in woods additional 0.5 cm powder
	January 10, 2014	10:00 – 11:45	-1ºC, 0% with haze, 0, 20-30 cm depth compacted snow, with 2 cm fresh snow
	February 13 2014	9:30 – 11:40	-11ºC, 5-50%, 0, 40-50 cm depth snow including 20 cm top powder
	March 21 2014	12:00 – 1:30	0ºC, 0%, 1, snow cover 75%, 10-30 cm depth hard packed in woods; less on golf course
Lepidoptera and Odonates			
Saw-Whet property (Beacon Environmental)	May 30 2012	5:30 - 11:00	18ºC, 10%, 1
	June 23 2012	5:15 - 8:45	17ºC, 40%, 0
	Sept 10 2012	10:30 – 12:15	>15 ºC, 60%, low wind, no precipitation
	Sept 10 2013	11:45 - 14:10	27-31ºC, 60%, 2-3, no precipitation
	June 15 2014	10:00-16:00	20-22ºC, 0%, 1-2, no precipitation
	July 5 2014	9:30-16:15	20-27ºC, 0%, 2, no precipitation
	August 1 2014	9:40-15:50	22-27ºC, 20%, 1, no precipitation
	August 19 2014	10:00-16:00	21-23ºC, 10%, 1-2, no precipitation

Appendix I

Aquatic Photo Log

Photo <1>.
Tributary 14W-W1-3 culvert under Bronte Road (Aug, 2012).

Photo <2>.
Tributary 14W-W1-2 culvert under Bronte Road (Aug, 2012).

Photo <3>.
View of Tributary 14W-W1-1 facing south (March, 2012).

Photo <4>.
View of culvert along golf cart path downstream of confluence 14W-W1-2 and 14W-W1-3 (March, 2012).

Photo <5>.
View of Tributary 14W-W1 facing upstream from golf course path (June, 2013)

Photo <6>.
View of old culvert downstream of golf cart path in Tributary 14W-W1 (Aug, 2012).

Photo <7>.
Downstream reach of 14W-W1 flowing through forest, downstream of Saw-Whet (Aug, 2012).

Photo <8>.
View of 14W-W1 in wetland feature prior to confluence with Fourteen Mile Creek West Branch (Aug, 2012).