



1200 King Road Environmental Impact Assessment (EIA)

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Volumes 1 and 2

Prepared For:

Penta Properties Inc.
4480 Paletta Court
Burlington, Ontario
L7L 5R2

Prepared By:

Savanta Inc.
37 Bellevue Terrace
St. Catharines, Ontario
L2S 1P4

File No. 6378



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1.0 INTRODUCTION

1.1 Background

Savanta Inc. (Savanta) was engaged by Penta Properties Inc (Penta) to identify and to characterize environmental features, functions and linkages associated with their Burlington lands at 1200 King Road. These Penta lands (hereafter referred to as the Subject Lands) are approximately 49.17 ha (121.55 acres) in size and are located at 1200 King Road; they consist of Part lots 2 to 6, Concession 1, in the City of Burlington. The Subject Lands are generally bound by Highway 403 to the north, the Aldershot GO Station lands to the west, King Road to the east and the Canadian National Railway (CNR) lands to the south (Figure 1, Appendix A).

In June 2009, the City of Burlington and Penta (under the corporate name Paletta International Corporation) agreed to Minutes of Settlement intended to resolve ongoing differences with respect to several parcels of land owned by Penta. While the City of Burlington and Penta agreed to various land use designations for 1200 King Road, they also agreed that all facilities (including roads and crossings), the extent of designations and zoning and potential constraints to development would be subject to verification. More detailed information regarding this planning history and the conceptual land use plan derived from the Minutes of Settlement are provided in the Planning Justification Report (Metropolitan 2014b).

The Subject Lands, while privately owned, include some lands that have been identified within City of Burlington as part of the Aldershot GO Mobility Hub and for the extension of the South Service Road. That verification assessment would also assist in the review of the proposed South Service Road, (identified in the Burlington OP to provide access between King Road and Waterdown Road).

This EIA has been prepared to meet the requirements of that verification step; to document and assess natural features and associated functions on the Subject Lands, to determine potential constraints to development and, where development planning is more advanced, to identify potential impacts associated with proposed development. This report will inform the planning process, including servicing discussions and assessments that are being led by Penta and other members of the consulting study team (i.e. Metropolitan Consulting Inc., Parish Geomorphic Ltd., Terra-Dynamics Consulting Inc., and Soil-Mat Engineers & Consultants Ltd.).

This reporting has been informed by discussions with various agencies, including efforts to develop an acceptable Terms of Reference (ToR) for this work. While a final ToR was not agreed upon, discussions around the ToR informed the determination of the relevant study area, methods and intentions of this exercise. Background materials and the recently completed *City of Burlington Official Plan Review: Mobility Hubs Opportunities and Constraints Study* (Brook McIlroy/ARUP 2014), have also contributed to the completion of this assignment.

This report includes:

- A summary of the methods, schedule and results of data collection;
- Interpretations of the significance and sensitivity of natural features and associated ecological functions on the Subject Lands;
- A summary of the development plan proposed for portions of the Subject Lands;
- A summary of the predicted impacts and recommended mitigation measures of the proposed development;

- Commentary and input regarding applicable natural heritage legislation, policies and guidelines; and
- A summary of key information that will inform ongoing development and the Aldershot GO mobility hub discussions and planning.

1.2 Areas Defined For Technical Study (Study Areas)

Two Study Areas have been defined for purposes of this ecological/natural heritage study: Aquatic Ecology and Terrestrial Ecology Study Areas. The aquatic program also draws upon engineering work completed by Metropolitan Consulting Inc. (Metropolitan) and fluvial geomorphology work completed by Parish Geomorphic Ltd (Parish). Those companion, consulting reports should be read in conjunction with this ecological assessment.

Aquatic Ecology Study Area:

The Aquatic Ecology Study Area addresses portions of three watersheds including a relatively small segment of Grindstone Creek, as well as the Falcon Creek and Indian Creek watersheds. Three tributaries are mapped within the Subject Lands, each flowing in a north to south direction: Grindstone Creek, Falcon Creek and Indian Creek. The Grindstone Creek tributary is located along the western boundary of the Subject Lands; the Falcon Creek tributary is located in the central portion and the Indian Creek tributary runs in a north south direction almost perpendicular to the eastern boundary of the Subject Lands (Figure 2, Appendix A).

These watercourses have been assessed upstream and downstream of the Subject Lands to more fully understand the characteristics of the aquatic habitat on these lands (i.e., degree of connectivity, presence of barriers, character and quality of habitat).

Terrestrial Ecology Study Area:

The Subject Lands (including about 120m of adjacent lands, where access was permitted), the CNR right-of-way and lands associated with Grove Park, to the south of the Subject Lands (noted for the potential/historic presence of remnants of rare prairie and savannah communities) were evaluated as input to this reporting, with an emphasis on the development of a detailed understanding of the specific Penta-owned Subject Lands.

Open field/agricultural lands that consist of cultivated and largely disturbed areas dominate the Subject Lands. The western portion of the Subject Lands consists mainly of shrubs dominated by regenerating cultural communities of meadows, woodlands and buckthorn-dominated thickets. A small man made dugout pond is located near the center of the treed and shrub thicket areas.

1.3 Purpose of the Study

A number of natural features occur on or adjacent to the Subject Lands. The pertinent planning analysis related to the Subject Lands is included in the Planning Justification Report (Metropolitan 2014b). That report addresses the planning regime, including reference to the PPS, the Parkway Belt West Plan, the Region of Halton Official Plan, the City of Burlington Official Plan, and the City of Burlington Zoning By-law. Metropolitan have provided descriptions of existing and proposed land use in the Subject Lands and have determined planning compliance with these various planning documents.

The completion of this EIA has been triggered by development proposed, in proximity to the Natural Heritage System, as defined on Map 1G in the Regional Official Plan (ROPA 38).

Reference has been made to the Regional EIA Guidelines dated 2005 as well as the most recent version, posted on the Region's website in 2014.

This work considers applicable provincial, conservation authority, regional and local municipal requirements and policies including reference to the natural heritage policies of the PPS and associated Provincial guidance contained in the Natural Heritage Reference Manual (NHRM 2010). This EIA describes ecological conditions as input to development planning work being completed by Penta in association with discussions with the City of Burlington as well as potential impacts associated with development. Included within this work is the identification of a recommended NHS limit, which will address the conservation of important natural features and associated ecological functions.

The following are specific aquatic and terrestrial ecology goals and objectives identified through discussions with the City, Region and Conservation Halton:

Aquatic Resources Goal

- *Maintain, protect and, where feasible, restore/enhance i) aquatic habitat, ii) aquatic biota, iv) sediment transport regime, and v) fish passage/longitudinal habitat connectivity.*

Terrestrial Resources Goals:

- *Maintain, protect and, where feasible, restore/enhance all significant natural heritage features and functions and habitat (i.e. features exhibiting important attributes and functions).*
- *Maintain biodiversity.*
- *Based on a review of the form and function of on-site features, examine opportunities to enhance remnant isolated habitat blocks through re-connection or other appropriate measures as feasible.*
- *Maintain and enhance where feasible natural linkages within and beyond the property boundaries.*

2.0 STUDY APPROACH

2.1 Background Information

The Subject Lands and broadened Study Areas have been the subject of several technical studies over the past decade or more. These background materials and other standard sources of information (e.g., representative sources listed below; complete listing provided in section 10 of this EIA), were accessed and reviewed for the preparation of this report, including:

- Federal and Provincial Species at Risk current websites;
- Natural Heritage Information Centre (Rare Species and Communities);
- Halton Natural Areas Inventory (2006);
- Grindstone Creek Watershed Study (1998);
- Grindstone Creek Subwatershed Study (1995);

- Waterdown Urban Expansion Subwatershed Study (1996);
- South Waterdown Subwatershed Study (2006);
- North Shore Watershed Study (2006);
- Hamilton Harbour and Watershed Fisheries Management Plan (2010);
- Halton Region background studies and data;
- MNR Fishdot data; and
- Various provincial wildlife atlases (i.e. amphibians, reptiles, breeding birds, mammals).

2.2 Field Investigations

The Subject Lands (and Study Areas) were investigated in 2010, 2011 and early 2013 by several technical specialists. The specific surveys and survey dates are summarized in Table 1 below; additional details are available in Table 5 in Volume 2 to this report. These surveys followed standard survey methods and the staff engaged in the work are experienced in both the general and specialized work performed; *curricula vitae* for all technical staff engaged in this project are provided in Volume 2.

Dates and purposes of the fieldwork, as protocol information, are summarized in Table 1 below and are discussed in following sections of the report.

Table 1 Summary of Natural Heritage Field Work

SURVEY DATE	FIELD WORK TYPE	SURVEY PROTOCOL	INVESTIGATOR(S)
2010 SURVEYS			
April 14 May 19 June 28	Amphibian Call Count Surveys	Bird Studies Canada Marsh Monitoring Program protocol was utilized for frog/toad surveys on the Subject Lands	McCrae Zoladeski Geddes
May 7, 27 July 30 October 1	ELC classification and plant inventory	Ecological Land Classification for Southern Ontario	Zoladeski
April 20	Site reconnaissance and aquatic habitat surveys	General survey of property, woodlands, pond and streams; spring runoff investigation of watercourses.	Zoladeski, McRae, Zimic, Geddes
June 30 July 27	Odonate and Lepidoptera Surveys	Surveys were conducted on warm	Kerling, Vickruck*

August 25		sunny days; specimens are collected by hand or by using sweep nets.	
April 20	Spring Owl and Raptor Bird Survey	Surveys conducted to search for owls, raptors and stick nests.	McRae
May 19	Nocturnal Owl survey	Survey conducted between 6:30 and 11:30 pm; recorded playback used to survey for Eastern Screech Owl	McRae
June 10 July 3	Breeding Bird Surveys	Area search and point counts according to the Ontario Breeding Bird Atlas (OBBA) protocols	McRae
2011 SURVEYS			
March 7	Winter Wildlife Surveys including winter raptors.	Wildlife surveys were conducted at selected transects throughout the study area; 12-24 hours after fresh snowfall	McRae
May 4, 27 June 26	Amphibian Call Count Survey	Bird Studies Canada Marsh Monitoring Program protocol was utilized for frog/toad surveys on the Subject Lands	Buckton, Geddes, Zimic, Zoladeski
June 10	Odonate and Lepidoptera Surveys	Surveys were conducted on warm sunny days; specimens are collected by hand or by using sweep nets.	Kerling*
2013 SURVEYS			
May 8	ELC classification and plant inventory verification	Ecological Land Classification for Southern Ontario	Zoladeski

TABLE 1 NOTES:

- *Surveys completed by specialists with Entomogen Inc, as subconsultants to Savanta Inc.
- ** Curricula vitae of Savanta staff are included in Volume 2.

Insect surveys were conducted on warm, sunny, near windless days when possible. Specimens were collected by hand or using sweep nets. Type specimens were collected, and photographs were taken for identification purposes. The timing of the first 2010 surveys (June 30) prompted the addition of an earlier 2010 survey to ensure early emergent species were recorded (i.e.,

species that emerge in late May and early June, and have already mated and completed their adult life). All species observed are apparently secure (uncommon but not rare) or secure based on the Natural Heritage Information Centre rankings.

Aquatic habitat surveys were completed for all on-site aquatic features including tributaries of Grindstone Creek, Falcon Creek and Indian Creek, as well as the dugout pond feature in the west central portion of the Subject Lands. Benthic invertebrate studies were carried out on March 21, 2012.

This reporting has been informed by discussions with various agencies including efforts to develop an acceptable Terms of Reference (ToR) for this work. While a final ToR was not agreed upon, discussions around the ToR informed the determination of the relevant study area, methods and intentions of this exercise

A consultation meeting was held with the City, Conservation Halton (CH) and the Region of Halton on November 25, 2011. The purpose of this meeting was to discuss modifications to the ToR and initiate dialogue regarding the study area and fieldwork scope. Based on these discussions the ToR were amended and circulated for review – they have not been approved.

3.0 SUBJECT LANDS CHARACTERIZATION

3.1 Physical Baseline Conditions

3.1.1 Hydrology

The Subject Lands are located within three sub-watersheds: Indian Creek, Falcon Creek and Grindstone Creek. A Functional Servicing/Stormwater Management Report (FSR), was prepared by Metropolitan Consulting Incorporated (MCI) for the Subject Lands in January of 2014, and the results of this study are summarized in the paragraphs that follow.

Indian Creek originates north of the Subject Lands as two tributaries. After both tributaries cross under Highway 403, they converges into one channel at the north end of the Subject Lands and a single flows in a north to south direction parallel to King Road. As it leaves the Subject Lands Indian Creek has been reconstructed at the southern property boundary of the Subject Lands, turning eastward towards King Road where it crosses beneath the CNR tracks via an aqueduct constructed by the City as part of the King Road Grade Separation. Indian Creek eventually discharges into Burlington Bay through a series of pipes (Metropolitan 2014a).

Falcon Creek flows through the central portion of the Subject Lands in a north to south direction via a well-defined ravine valley from Highway 403 to the CNR tracks. South of the tracks, Falcon Creek continues through urbanized areas, with many sections of the creek extending through lengthy submerged culverts before eventually out-letting into Burlington Bay (Metropolitan 2014a).

Three tributaries of Grindstone Creek cross under Highway 403 on the west side of the Penta lands. These tributaries join downstream of Highway 403 and flow west towards the main branch of Grindstone Creek west of Waterdown Road. Immediately north of the Aldershot GO Station, Grindstone Creek has been reconstructed utilizing a natural channel design as part of the Waterdown road interchange work. The most easterly branch of the creek splits to flow south into a pond on the Subject Lands. While a flow path has been mapped as discharging

from the south end of the pond into a shallow ditch along the CNR tracks, active flow in this regard has not been observed during any site visits (Metropolitan 2014a).

3.1.2 Physiography and Soils

According to the hydrogeological investigations completed by Terra-Dynamics Consulting Inc. the Subject Lands are situated on a 7 to 11 m layer consisting of a mixture of low permeability silty clay and clayey glacial till (Halton Till). Discontinuous lenses of silt and sandy silt were encountered within the Glacial Lake Iroquois ridge. Paleozoic rocks beneath the Subject Lands are composed of red shale from the Queenston Formation from the Upper Ordovician Era. Beneath the site it is greater than 120 m and forms an extensive low permeability aquitard. (Terra-Dynamics, August 2014)

3.2 Biological Baseline Conditions

In a general sense, the Subject Lands occur in the northern reaches of the Carolinian or Deciduous Forest Zone; an area that is characterized by a warmer climate and supporting plant species more typical of southern areas. In this broad zone, dominant associations on upland clay and silt areas were maple-beech-elm-basswood and butternut-sweet chestnut-white ash-black cherry. Most lowland areas were dominated by single species such as white cedar, willow, tamarack, alder, red or silver maple, or black ash (Rowe 1972).

Botanical investigations were carried out following an air photo interpretation of the Subject Lands, which produced a preliminary mapping of potential vegetation types. During the field survey, these types were identified, sampled and revised, if necessary, using the sampling protocol of the Ecosystem Land Classification (ELC) for Southern Ontario (Lee et al. 1998). Species names generally follow the nomenclature of Flora Ontario (University of Guelph, FOIBIS website).

The Subject Lands can be distinctly divided into an eastern, open field/agricultural half, and a western treed/shrub thickets half (Figure 2, Appendix A). The open fields are cultivated/disturbed and according to historic air photo interpretation, much of the western half of the Subject Lands has been historically farmed, and as such this area now consists primarily of regenerating cultural communities of meadows, woodlands and buckthorn-dominated thickets. A small man made dugout pond is located near the centre of this wooded area. A section near the expanding Aldershot GO station has been disturbed by the construction of a highway ramp.

Community SWT2-4 a Buttonbush Mineral Thicket Swamp is designated as a provincially vulnerable vegetation community (S3, G4). Vegetation communities associated with the Subject Lands area shown on Figure 2 (Appendix A). In addition more specific vegetation community information follows. Vegetation types not listed in the ELC manual are flagged with an asterisk in Section 3.2.1 of this report.

3.2.1 Vegetation Communities

The vegetation characteristics were assessed using the Ecological Land Classification system (ELC), the recommended standard for the province (Lee et al., 1996). The provincial status of

plant species is based on Newmaster et al. (1998), with updates from databases of the Natural Heritage Information Centre (NHIC, 2008).

Table 2 below provides a detailed description of vegetation communities located on the Subject Lands.

Table 2 Vegetation Community Descriptions

UNIT	DESCRIPTION	SRANK/GRANK (Provincial/Glob al Ranks)
FOREST (FOD)		
Deciduous Forest (FOD)		
FOD5-3 Dry-Fresh Sugar Maple-Oak Deciduous Forest	This more mature wooded community is confined to the creek valley and adjacent tableland. Sugar maple is present with red and white oak, and with more limited ironwood, white elm, red maple, black cherry, bitternut hickory and beech. Despite being surrounded by buckthorn thickets, there are relatively few exotics in the herb layer, where the main species are large-leaved aster, Pennsylvania sedge, may-apple, blue-stem goldenrod, garlic mustard and jack-in-the-pulpit. This community contains one butternut (<i>Juglans cinera</i>) which is located at the bottom of a slope (Figure 2, Appendix A)	S5/G?
FOD7-2 Fresh-Moist Ash Lowland Deciduous Forest	This type occurs at two main areas, the first (as two patches) in the vicinity of the pond, the second as a narrow unit at the east end of the Subject Lands, where it is intermixed with green ash swamp inclusions. At the first area, green ash occurs in association with Manitoba maple, bitternut hickory, shagbark hickory and black cherry. In the moderately well developed shrub layer grow common buckthorn and hawthorn. The ground is heavily infested with garlic mustard, alongside native yellow avens. The second area is a floristically poor community where the understory is dominated by exotics - common buckthorn in the shrub layer and garlic mustard in the herb layer. The inclusions of green ash swamp are more impoverished, being simply composed of an ash tree layer and a buckthorn shrub layer with virtually no herb cover.	N/A
Swamp (SW)		
UNIT	DESCRIPTION	
Swamp (SW)		
Deciduous Swamp (SWD)		
SWD2-2 Green Ash Mineral Deciduous	Generally, a young to medium-age community of green ash in the tree canopy and understory	S5/G?

Swamp	layers (except for a small area to the east of the pond which is mature and exhibits seasonal ponding and very little herbaceous ground cover). Common buckthorn and grey dogwood are the main shrub species. Ground cover is poorly developed in the spring and summer, until the fall when calico aster becomes dominant.	
SWT2-4 Buttonbush Mineral Thicket Swamp	A small patch found on the north shore of the pond, with a few buttonbush shrubs growing elsewhere along the shoreline. The community is a typical entanglement of the tall dominant buttonbush, with water-pepper in the herb layer.	S3/G4
Cultural (CU)		
UNIT	DESCRIPTION	
Cultural (CU)		
Cultural Woodland (CUW)		
CUW Deciduous Cultural Woodland	These are associations of semi-open treed areas composed of various species; for example black walnut, ash, oak or maple. Ground cover is usually reminiscent of old-field meadows.	N/A
Cultural Thicket (CUT)		
CUT1-1 Sumac Cultural Thicket	A small unit representing this type occurs at the eastern edge of the treed/shrub block. Beneath an almost continuous cover of sumac grow Tartarian honeysuckle, grey dogwood, red raspberry, hawthorn, common buckthorn, and the herbs: tall goldenrod, calico aster, Kentucky bluegrass, garlic mustard and burdock.	N/A
CUT1-7* Buckthorn Cultural Thicket	This is the main thicket cover type on the Subject Lands. Common buckthorn occurs in association with hawthorn and grey dogwood, the latter forming a medium layer. Ground herb cover is variously developed, being sparse in denser, shaded areas and thicker in open spaces between shrub clusters, where it is usually composed of tall goldenrod, St. John's-wort, ox-eye daisy, yarrow, New England aster and wild carrot.	N/A
CUT Cultural Thicket	A generic type of various minor shrub associations, usually occurring in complex with other cultural types. Dominants include grey dogwood, common buckthorn or red raspberry.	N/A
Cultural Meadow		
CUM1-1 Dry-Fresh Old Field Cultural Meadow	These are variously composed meadows, including both native wildflowers of weedy predisposition and exotics; for example tall goldenrod, awnless brome, tall oat grass, Canada thistle and tufted vetch.	N/A

*Denotes a type not listed in Southern Ontario ELC Guide

3.2.2 Vascular Plants

The identification of potentially sensitive plant species is based on an assignment of a coefficient of conservatism value (CC) to each native species in southern Ontario (Oldham et al. 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on species' tolerance of disturbance and fidelity to a specific habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

A total of 175 species of vascular plants were recorded from the Subject Lands (Table 1, Volume 2). Of that number, 99 (or 57%) species are native, and 76 (or 43%) species are exotic. The majority of the native species are found in the natural habitats, mostly in the forested block.

Ninety-four, or 96%, of the native species are ranked S5 (Secure – common, widespread and abundant in Ontario), with three species, or 3%, ranked S4 (Apparently Secure – uncommon, but not rare in Ontario).

The S4 species observed are:

- Black Walnut (*Juglans nigra*) – occasional in open woodland edges;
- Hoary Vervain (*Verbena stricta*) – local in ditches in the eastern open area; and
- Tall Manna Grass (*Glyceria grandis*), an S4S5 species – local in the vicinity of the buttonbush thicket.

The regionally (Halton) uncommon plants included:

- Virginia Stickweed (*Hackelia virginiana*) – local in FOD5-3 and FOD7-2 units;
- Purple-veined Willow-herb (*Epilobium coloratum*) – occasional in ditches in the eastern open area;
- Pale Smartweed (*Polygonum lapathifolium*) – common along FOD7-2/SWD2-2 forest edge;
- Round-lobed Hepatica (*Anemone americana*) – local in unit FOD5-3;
- Old-field Cinquefoil (*Potentilla simplex*) – rare in unit FOD5-3;

The one S3 (Vulnerable in Ontario) species, butternut (*Juglans cinerea*), is also Endangered, in the province and nationally. A description of the health and location of the two Butternut specimens that were originally found on the Subject Lands (one has since died and fallen) is provided below and illustrated on Figure 2 (Volume 1):

- At the bottom of slope in unit FOD5-3: a large tree, 75 cm diameter at breast height. The tree was severely cankered at the base of the trunk, with live canopy at 50% when first located in 2010. When located in the spring of 2013, this specimen was found dead and on the ground.
- On the boundary of units FOD5-3 and FOD7-2: diameter at breast height 22 cm. Little canker at base (5%), one buttress root affected (bark peeled off, blackened, inner wood exposed). Middle part stem appeared to be healthy. Crown 50% live (on 8 May, 2013), but lower half of crown dead. Overall health: moderate.

No other nationally or provincially rare or endangered species were recorded from the Subject Lands.

3.2.3 Breeding Birds

Breeding birds and winter raptors were surveyed on the Subject Lands through several means including formal point count surveys (methodology in accordance with the Ontario Breeding Bird Atlas (OBBA, 2001), targeted searches for elusive and nocturnal species using recorded song playback, and through incidental observations collected in the course of other field work. Survey dates specific to each year are provided in Table 1. This approach addressed the main breeding period for most species.

In 2010 and 2011, a total of 65 bird species were observed within the Subject Lands. The complete list of birds and their status appears in Table 2 (Volume 2) and formal point count locations are provided on Figure 4 (Volume 1). Species names follow the AOU Check-list of North American Birds, 7th edition (1998) and its supplements. For each species, the Natural Heritage Information Centre (NHIC, 2014) database and SARO list were reviewed to consider the probability of occurrence and to determine federal and provincial status. The bird diversity and numbers were low given the size and nature of the habitat within the Subject Lands. It is reasonable to expect that the presence of high volume transportation corridors (e.g., Highway 403 to the north and associated traffic noise) and the relative isolation and fragmentation of these natural areas (e.g., affected by the GO Station, rail line, highway and the Hydro substation development) are negatively affecting faunal diversity and productivity. Numerous existing studies have identified the impacts of traffic noise on the breeding success of songbirds.

Of the 65 species observed within the Subject Lands 41 are either confirmed or probable breeders and an additional four species are possible breeders. Other species observed are considered to be migrants, winter visitors or non-breeding summer visitors.

A single Chimney Swift (provincially threatened) was observed flying over King Road on June 10 and July 3, 2010. There is no suitable nesting habitat for this species within the Subject Lands and this bird is presumed to be foraging over the King Road area and nesting somewhere to the east where numerous buildings with chimneys exist. Chimney Swift feed on insects and can be found in a variety of habitats, including near water bodies and wetlands, rural and wooded areas, and cities and towns where insects are abundant. Foraging habitat is present within the natural features of the Subject Lands, and there appears to be significant foraging areas of suitable habitat outside of, and adjacent to, the Subject Lands. Chimney Swifts historically nested in the trunks of large, hollow trees, and occasionally on cave walls or in rocky crevices. This species is now, most often associated with urban and suburban areas and primarily use house chimneys as nesting sites (COSEWIC, 2007).

Small numbers of Barn Swallow (provincially threatened) were seen on several occasions hunting over the large, disturbed eastern field closer to King Road. There is no suitable nesting habitat for this species (cliffs, structures) on the Subject Lands and it is presumed to be nesting around the rail yard, some 200 metres from the limits of the Subject Lands. Similar to the foraging habitat of Chimney Swifts, foraging habitat is present within the Subject Lands, and there appears to be significant foraging areas of suitable habitat outside of, and adjacent to, the Subject Lands.

3.2.4 Amphibians

Calling amphibian surveys were completed at locations defined through air photo interpretation of vegetation communities, and ground observations including where tributaries crossed roads (Figure 3, Volume 1). Surveys were conducted at night, in accordance with Environment

Canada's Marsh Monitoring Program (2004). All locations were surveyed three times (April, May, and June) during optimal weather conditions (low wind levels, no heavy rain). Where noise from plane, road traffic and/or train was present, monitoring did not begin until there was a quiet period. All calls heard within the Subject Lands were recorded as well as any incidental call observations on adjacent lands.

The purpose of the investigation was to establish relative importance of amphibian breeding sites within the Subject Lands by recording breeding calls, incidental visual species observations, and other habitat details observed. The provincial and global status of species identified on the Subject Lands was referenced in the Natural Heritage Information Centre (NHIC, 2013) database.

A total of 2 frog species and 1 toad species were observed calling from the Subject Lands (Table 3, Volume 2). According to the Natural Heritage Information Centre (NHIC, 2014), all species are considered provincially and globally common (S5, G5).

Since amphibians are sensitive to environmental disturbance and pollution, they are good indicator species for determining high quality habitat. Lower numbers of individuals may be indicative of suboptimal breeding sites, even though some species may still make an attempt to call at these sites. According to the MMP a 'chorus' of calling frogs or toads occurs "when there are so many males of one species calling that all the calls sound like they are overlapping and continuous", making it difficult to reasonably count or estimate. No choruses were heard within the Subject Lands.

Unlike frog species, the American Toad is known to be more highly adaptable species, more tolerable to disturbance and is found in many different habitats (anywhere there is abundant moisture and insects). Unlike most species of frogs, this toad is often found in and along watercourses and wetlands. Low numbers (1-3 individuals) of American Toads were heard calling at Location 1 on the Subject Lands (Figure 3, Volume 1).

Low numbers (1 to 3 individuals) of Green Frogs were recorded at 2 locations within the Subject Lands. Green frogs were heard calling within the pond in the central portion of the Subject Lands, and along Falcon Creek at the south boundary of the Subject Lands. Green Frogs require permanent water features as their tadpoles require overwintering habitat.

Gray Treefrogs were heard calling in low to moderate numbers (1 to 10 individuals) at 2 locations within the Subject Lands. Treefrogs were heard calling within the central pond and seasonally flooded low areas within a farmer's field at the west side of the Subject Lands (Figure 3, Volume 1). This species also requires permanent water to breed.

Amphibians typically breed in standing water and then use surrounding natural features (forest, wetlands and fields) for the rest of the season. All species require specific habitat in order to breed successfully. It appears as though the low numbers of calling individuals is due to a lack of habitat, likely a result of anthropogenic disturbance and inadequate hydro-periods in wetland features throughout the Subject Lands.

3.2.5 Snow Tracking Wildlife Survey

Savanta completed winter wildlife field surveys to establish the presence/absence and relative importance of winter wildlife habitat within the Subject Lands. Wildlife tracks, trails, signs, species observations, and other significant habitat details were recorded.

Winter wildlife surveys were conducted along transects throughout the Subject Lands, depicted in Figure 5 (Volume 1). Transect locations were determined through air photo interpretation of vegetation communities, and ground observations and were distributed across the Subject Lands to ensure that the ecological variability was adequately sampled. Surveys were concentrated along existing access routes, trails, forest edges, hedgerows, and streams, as long as habitat was safely accessible by snowshoes.

Wildlife tracks were recorded within 2-3 m on either side of each transect and all other evidence or “signs” of wildlife (scat, browse, nests, etc.) were recorded. ‘Trails’ can be defined as numerous tracks that are difficult to discern from one another, which creates a trail system. In many cases, trails are used by many different wildlife species. The Significant Wildlife Habitat Technical Guide (OMNR 2000) as well as the RISC (Resources Inventory Standards Committee) species inventory methods manual provided guidance documents for the survey. The provincial and global status of species identified on the Subject Lands was referenced on the Natural Heritage Information Centre (NHIC, 2014) database. When possible, fieldwork was conducted at least 12-24 hrs after moderate (less than 15 cm accumulation in 24 hrs) snowfall. Fieldwork was conducted 24-48 hrs after larger snow events (greater than 15 cm accumulation in 24 hrs).

Nine species of native mammals were recorded on the Subject Lands (Table 4, Volume 2). In addition, what appeared to be an abandoned fox or coyote den was located. Results from the winter snow tracking survey, including transect locations and species observed, can be found in Figure 5 (Volume 1). All species are considered provincially and globally common (S5/G5), except for one provincially uncommon S4 species, Mink. This species is regionally common in Halton (Dwyer, 2006).

Deer were the most frequently encountered mammal observed within the Subject Lands, and winter track surveys revealed use for feeding and sleeping primarily in the wooded areas dominated by Buckthorn (Location T1, T3, T4 and T5 of Figure 5 (Volume 1)). Deer were also observed to use the fields located within the eastern section of the Subject Lands (Location T7 and T8, Figure 5 (Volume 1)). Eastern Gray Squirrel was also common in the mature forest areas, as were White-footed/Deer mice (Location T3, T4 and T5 (Figure 5, Volume 1)). A single concentration of Meadow Vole sign was found in the northwest corner of the field located within the eastern half of the property (Location T8 (Figure 5, Volume1)).

Old evidence of beaver was observed at the dug out pond, however no sign of current activity was found. In addition, mink tracks were found near the pond (Location T2, Figure 5, Appendix A), and weasel tracks were also noted along the ditch near the east end of the field (Location T7, Figure 5 in Volume 1).

Wildlife movement patterns within the Subject Lands appeared to be concentrated along the woodlot edges and along the Indian Creek watercourse channel (T7, Figure 5, Volume 1). In addition the existing dug out pond appeared to provide some limited wildlife usage (T2, Figure 5, Volume 1).

3.2.6 Other Wildlife

Two species of reptiles were observed in the pond located in the western end of the Subject Lands: Midland Painted Turtle and Common Snapping Turtle.

Two Snapping Turtles were observed within the man made pond area on the Subject Lands on three separate occasions. Snapping Turtle (*Chelydra serpentina*) is designated both provincially and federally as a Special Concern species. Snapping Turtles prefer shallow water habitats with soft mud and leaf litter to hide under. Nesting season occurs from early to mid summer and females travel overland in search of suitable nesting sites usually in gravelly or sandy areas around streams. Snapping Turtles will also use man-made structures as nest sites including the gravel shoulders of roads, dams and aggregate pits (OMNR, 2009). Although this species is widespread and still abundant in some areas, its life history (late maturity, longevity, low recruitment and lack of density-dependent responses), and its dependence on long warm summers to complete incubation successfully make it susceptible to anthropogenic threats (COSEWIC, 2008).

Midland Painted Turtle (*Chrysemys picta marginata*) is common, widespread and abundant in both Ontario and Canada (S5, G5T5).

A single Big Brown Bat (*Eptesicus fuscus*) was observed flying over the pond on the Subject Lands in the daylight hours on May 19, 2010. Big Brown Bat is common, widespread and abundant in both Ontario and Canada (S5, G5). Fauna observed within the Subject Lands are provided in Table 3 (Volume 2).

3.2.7 Insects

Insect surveys were conducted on the Subject Lands in both 2010 and 2011. Surveys were conducted on warm, sunny, near windless days. Specimens were collected by hand or using sweep nets. Type specimens were collected, and photographs were taken for identification purposes.

A total of 47 species of Lepidoptera and Odonate insect species were observed on the Subject Lands in 2010 and 2011 (Table 3, Volume 2). No nationally or provincially endangered or threatened insects were encountered on the Subject Lands (NHIC, 2013). One special concern species (Monarch) was observed on the Subject Lands. All other species observed are considered apparently secure (S4, uncommon but not rare) or secure (S5) in Ontario (NHIC, 2013).

At a more local level, the following five species observed are identified as rare according to Halton Region's checklists (2006b, 2006c) and the Toronto Entomological Society:

1. Canada Darner – *Aeshna canadensis* (S5, locally uncommon);
2. Wandering Glider – *Pantala flavescens* (S4, locally uncommon);
3. Monarch Butterflies – *Danaus plexippus* (S4B, S2N, common);
4. Common Baskettail – *Epithea cynosura* (S5, locally uncommon);
5. Northern Spreadwing – *Lestes disjunctus* (S5, locally rare).

A full list of Lepidoptera and Odonates observed on the Subject Lands is provided in Volume 2.

3.2.8 Benthic Invertebrates

Benthic invertebrate surveys were conducted, by specialists from Entomogen Inc., (Entomogen) on the Subject Lands, on March 21, 2012. Samples were taken from five sites: three within the

Subject lands and two reference sites located upstream of the Subject lands on Grindstone and Falcon Creeks. Benthic sampling locations are illustrated on Figure 6 (Volume 1). Samples were taken using the methodology recommended in the Ontario Benthos Biomonitoring Network (OBBN) Protocol Manual. Travelling kick and sweep sampling was conducted using “D” framed kick nets (500 µm). One sample was collected from each site. Specimens were initially preserved in 95% ethanol (to obtain a dilution of approximately 70-80%) and transferred to fresh 70% ethanol once in the lab.

Samples were sorted under magnification using a dissecting microscope. Picked individuals were identified to a mix of Classes, Orders, and Families in accordance with the Ministry of the Environment Rapid Bioassessment Levels and enumerated. A total of 30 different taxa were observed across the five sites. Benthic invertebrate sampling results are provided in Table 4 (Volume 2).

3.2.9 Fisheries and Aquatic Habitat

Tributaries of three subwatersheds are found on the Subject Lands; Grindstone Creek in the west portion of the lands, Falcon Creek in the central portion of the lands and Indian Creek in the east portion of the Subject Lands. Each of the tributaries was examined during spring runoff conditions on April 20, 2010. Surveys consisted of walking each tributary and assessing key aquatic habitat features. Sufficient background information pertaining to the fish community in each system was obtained from the North Shore Watershed Study. No electrofishing or species surveys were deemed necessary nor were they completed.

3.2.9.1 Grindstone Creek Tributary

A short tributary within the Grindstone Creek watershed is present in the western portion of the Subject Lands. The entire tributary network actually consists of the drainage from 3 separate tributaries located to the north of the Highway 403 corridor, all of which flow through separate culverts beneath Highway 403. The easternmost culvert discharges minor flow, which continues southward and splits off to feed the man made dugout pond. The two western culverts produce flow that continues westerly towards the Aldershot GO station. During the 2010 surveys, the Grindstone Creek channel had been cleared and altered as part of ongoing construction associated with the Highway 403 on-ramp from the GO station. At this location, the creek is generally a slow flowing feature, with considerable accumulations of silt and organic matter along its length.

Base mapping shows a small tributary extending from the easternmost culvert to the dugout pond, and then continuing southerly through an apparent discharge channel towards the CN Rail line. Based on field observations, a small discharge channel is present on the south side of the pond, however it dissipates rather quickly into an open cultural meadow area. It appears that, in times of pond overflow discharge, flows likely pool in a smaller depressed area on the south side of the pond and evaporate or otherwise dissipate within the meadow area, with no evidence of a flow path (i.e. no defined swale or depressed vegetation) observed during spring runoff conditions. Flows have not been observed during any visits to the site for various surveys.

Upstream of the dugout pond, the watercourse is a very slow flowing feature that winds gently through a wooded area. The channel is approximately 30 cm wide and flows are very shallow (5 cm -10 cm deep) with considerable deposits of silt and organic debris. A large school of small goldfish was noted at the outlet of the westernmost Highway 403 culvert, however no fish were observed elsewhere along the channel. It is likely that the goldfish were flushed down from larger ponds to the north of Highway 403.

3.2.9.2 Falcon Creek Tributary

The Falcon Creek Tributary arises north of the Highway 403 corridor and enters the Subject Lands through a large 4.5 m wide box culvert under the highway. The channel is deeply incised as it cuts through the bank area immediately downstream of Highway 403, and continues as a well-defined creek channel through a wooded ravine valley. The channel is fairly wide throughout much of the ravine, reaching up to 4 m to 5 m wide in some locations. Bankfull depths of the channel at the bottom of the ravine reach 1 m to 1.5 m, while the baseflow wetted width of the watercourse is on average 1 m to 1.5 m within the 4 m to 5 m wide channel. The creek exhibits a pool / riffle morphology. Bottom substrates range from large rounded cobble and fractured shale bed fragments in swifter flowing areas such as riffles, with finer gravels and smaller fragments of fractured shale dropping out at pool entry points. Finer sediments are also present in pool bottoms.

Considerable bank erosion is present along the ravine length, with evidence of slumping banks and exposed steep bank faces noted throughout. The channel appears to be actively eroding, as evidenced by the over-widened channel and eroding banks. Large woody debris is present in many locations along the channel, much of it the result of trees that have toppled when eroding banks have given way. The woody debris provides good cover habitat for resident stream fish.

Nearing the CNR, the ravine relief decreases and the channel winds through a flatter floodplain environment. The channel appears similar to that in the ravine area, however the substrate changes slightly to be comprised of a large amount sand, with a small amount of cobble present, predominantly in point bar deposition areas.

At the CNR, a gabion drop structure is present where Falcon Creek reaches the property line. A deep plunge pool exists at the downstream end of the gabion structure, from which flow discharges and flows easterly along the tracks for a short distance. Flows then enter a culvert of considerable length that extends underneath the entire CNR track area, and discharge into an open channel that flows through a residential area to the south of the tracks.

Fish were noted throughout the channel on the Subject Lands, with schools of cyprinids noted in various pools along the length surveyed. Two constructed nesting areas, likely of creek chub, were noted near the Highway 403 culvert.

3.2.9.3 Indian Creek Tributary

A western branch of Indian Creek is present on the eastern portion of the Subject Lands. This tributary rises to the north of Highway 403, and flows appear to be generated primarily by a large storm pond located to the north of the North Service Road. The Indian Creek tributary

appears to have been altered in the past, as it consists of a straight channel extending north to south through the Subject Lands and has the appearance of a typical v-shaped municipal or agricultural drain.

The channel is lined with cattail, however a flow channel is evident and supported flows during 2010 surveys. The flow channel is approximately 0.75 m in width, contained within an overall bankfull width of 3 m to 4 m. Erosion and channel incision is also evident, exposing clay banks in various locations along its length. Substrates are primarily fine sediments generated from the erosion of the clay bank soils, however hardpan clay is also present in areas exhibiting swifter flows.

Fish were not observed during the surveys, however the watercourse would be considered fish habitat as it, at a minimum, conveys flows and nutrients to downstream habitat areas.

3.3 Assessment of Significance and Sensitivity

The most recent PPS was issued under Section 3 of the Planning Act. It came into effect on April 30, 2014 and it replaces the PPS issued March 1, 2005. The PPS provides direction on matters of provincial interest related to land use planning and development. It "...supports a comprehensive, integrated and long-term approach to planning..." The PPS is to be read in its entirety and land use planners and decision-makers need to consider all relevant policies and how they work together.

This EIA addresses those policies that are specific to Natural Heritage (section 2.1) with some reference to other policies with relevance to Natural Heritage and impact assessment considerations and areas of overlap (e.g., those related to Efficient and Resilient Development and Land Use Patterns, section 1.1; Sewage, Water and Stormwater, section 1.6.6; Water, section 2.2; Natural Hazards, section 3.1).

Section 2.1, Natural Heritage policies have been modified in the current version of the PPS to include greater attention to NHS planning, coastal wetlands and have been modified to ensure a level of harmonization and coordination across other pertinent legislation (e.g., sections 2.1.6 and 2.1.7; Federal Fisheries Act and the Provincial Endangered Species Act, 2007)

Five types of significant natural heritage features are defined in the PPS, as follows:

- Significant Wetlands and Significant Coastal Wetlands;
- Significant Woodlands;
- Significant Valleylands;
- Significant Wildlife Habitat; and
- Significant Areas of Natural and Scientific Interest ("ANSIs").

Development and site alteration shall not be permitted in Significant Wetlands, or in Significant Coastal Wetlands. Development and site alteration shall not be permitted in: Significant Woodlands, Significant Valleylands, Significant Wildlife Habitat or Significant ANSIs, unless it is demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Development and site alteration shall not be permitted in two other significant natural heritage features, the Habitat of Endangered and Threatened species or in Fish Habitat, except in accordance with provincial and federal requirements.

A number of these elements appear to occur within and/or immediately adjacent to the Subject Lands. Falcon Creek, Grindstone Creek and Indian Creek contain Fish Habitat and the reach of Falcon's Creek associated with the Subject Lands reasonably meets criteria suggested for Significant Valleyland definition. Significant Wildlife Habitat, and Significant Woodlands are located on and/or adjacent to the Subject Lands. Each of these elements is described in detail in the following sections and is depicted on Figure 7 (Volume 1).

3.3.1 Significant Wetlands

The Ministry of Natural Resources is responsible for identifying and mapping significant wetlands. MNR's database was consulted and natural heritage features (i.e., Significant Wetlands, deer wintering areas, woodlands). The wetland communities on the Subject Lands are not part of a Significant Wetland. The closest, mapped Significant Wetland, the RBG-Hendrie Valley-Lambs Hollow Wetland, is approximately 2 km to the southwest of the Subject Lands.

3.3.2 The Habitat of Endangered or Threatened Species

The following listed threatened or endangered species were observed on the Subject Lands: Chimney Swift (*Chaetura pelagica*); Butternut (*Juglans cinerea*); and Barn Swallow (*Hirundo rustica*).

A single Chimney Swift (Threatened) was observed flying over King Road on two occasions June 10 and July 3, 2010. There is no suitable nesting habitat for this species within the Subject Lands and it is presumed to be nesting somewhere to the east of King Road where numerous buildings with chimneys exist. Though some foraging habitat is present within the natural features of the Subject Lands, there appears to be significant areas of suitable foraging habitat outside of, and adjacent to, the Subject Lands.

Small numbers of Barn Swallow (Threatened) were seen on several occasions foraging overhead of the large disturbed field closer to King Road. There is no suitable nesting habitat for this species (bridges, barns, sheds, etc.) on the Subject Lands and it is likely to be nesting outside of the Subject Lands (e.g., around the rail yard). Similar to the Chimney Swift, there appears to be significant areas of suitable foraging habitat outside of, and adjacent to, the Subject Lands.

Two Butternut trees (Endangered in Ontario) were originally observed within the Subject Lands (Figure 2, Volume 1), although one has since died and has fallen:

- At the bottom of the slope in vegetation community unit FOD5-3 - this tree was found dead and on the ground during spring 2013 surveys; and
- On the boundary between community FOD5-3 and FOD7-2.

Figure 2 (Volume 1) depicts the location of the individual Butternut tree along with a habitat zone of about 25 m around the trunk of the tree.

The Butternut Health Assessment field protocol and accompanying retainable tree analysis tool is relied upon to assess each specimen for degree of canker damage (i.e. to live crown, root flare, bole) to determine whether the specimen is retainable.

Recent amendments (O. Reg. 176/13) to the Endangered Species Act (ESA, 2007) O. Reg. 242/08 provide three distinct Butternut definitions (subsection (2)):

Category 1 tree – the butternut tree is affected by butternut canker to such an advanced degree that retaining the tree would not support the protection or recovery of butternut trees in the area in which the tree is located.

Category 2 tree – the butternut tree is not affected by butternut canker or the butternut tree is affected by butternut canker but the degree to which it is affected is not too advanced and retaining the tree could support the protection or recovery of butternut trees in the area in which the tree is located.

Category 3 tree – the butternut tree may be useful in determining sources of resistance to butternut canker. O. Reg. 176/13, s. 14.

Retainable Butternut trees (Category 2) are protected and cannot be removed without a Ministry confirmation or permit under the Endangered Species Act 2007. Non-retainable trees (Category 1) are not protected and can be removed provided there are no municipal bylaws or other legislation (e.g. Migratory Birds Convention Act, 1994) prohibiting this..

3.3.3 Fish Habitat

All of the watercourses, Grindstone Creek, Falcon Creek and Indian Creek support fish habitat as defined under the Federal Fisheries Act (Figure 7, Volume 1). Grindstone Creek was noted to contain goldfish at one of the culverts, however these were likely flushed down from pond areas to the north of Highway 403. Regardless, their presence is an indication that other species could be flushed downstream as well. Falcon Creek supports direct habitat for fish, as noted by the presence of many cyprinids throughout the length surveyed. Indian Creek, in all likelihood, supports direct habitat as well, although no fish were observed at the time of the surveys. At a minimum, it would provide indirect or contributing habitat by conveying flows to downstream habitat areas and therefore is deemed fish habitat under the definitions of the Federal Fisheries Act.

3.3.4 Significant Woodlands

The Region of Halton and the Province of Ontario both provide methods and criteria for the determination of significant woodlands. Regional criteria are identified as part of the Region of Halton Official Plan (i.e., ROPA 38 provides the current criteria; that ROPA is under appeal).

At a regional scale, the Halton Region Official Plan (2006) defines Significant Woodland as a woodland 0.5 ha or larger as determined through a Watershed Management Plan, a Subwatershed Study or a site specific Environmental Impact Assessment to meet one or more of the four criteria listed below. Further technical information regarding the Regional Criteria is contained in a rationale and methodology piece (Gartner Lee Ltd, 2002).

ROPA 38 (adopted by Council December 15, 2009) defines significant woodlands to meet one or more of the 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; and/or,
- The Woodland is wholly or partially within 50 m of a major creek or certain headwater creek or within 150 m of the Escarpment Brow.

A review of Figure 2 (Volume 1) and all ELC communities defined as woodland (i.e., FOD, SWD) reveals that there are two congregations of woodland ELC units, one patch in the west and the other in the east. In total these units are about 18.6 ha in size. The west patch (including minor extensions outside of the Subject Lands is about 7.6 ha in size, while the eastern patch is about 11 ha in size. Those wooded areas both meet the Region's minimum patch size for significance in the urban area. Other cultural woodlands and cultural thickets that range in size from 0.3 to 2.25 ha on the Subject Lands provide some ecological functions associated with woodlands, albeit at a more limited scale. Most of these areas are dominated by thicket and would not meet the standard and accepted definition of woodland (i.e., as per ROPA 38).

Portions of each of those woodland ELC patches are also within 50 m of creeks (Grindstone tributary – west patch; Falcon Creek – east patch). It is unlikely that the minor Grindstone tributary would meet a reasonable definition of major creek, whereas Falcon Creek with larger, wooded valley would be deemed a major creek.

The woodlands have a generally linear configuration with a large amount of edge. Many of the intervening ELC units are successional and disturbed in nature, adding to the influence of forest edge conditions. The western patch has a very small interior patch (< 0.5 ha), based upon a 100 m from edge delineation. The importance of this minor interior function in these wooded habitats is expected to be marginal.

The location of these wooded patches in immediate proximity to one of Ontario's busiest 400 series highways also limits the functionality of these patches for songbirds. The body of scientific literature supports the premise that areas such as these that are exposed to high volumes of auto traffic and associated noise volumes are negatively impacted in terms of the viability of breeding populations of many bird species.

Areas determined to meet the Significant Woodland Definition on the Subject Lands are depicted on Figure 7 (Volume 1).

3.3.5 Significant Valleylands

The NHRM (OMNR 2010) provides a series of recommended criteria for the definition as Significant valleylands. A review of those criteria suggests of the three tributary systems on the

Subject Lands, only Falcon Creek may merit consideration as candidate Significant Valleyland. That tributary exists as a well-defined creek channel through a wooded ravine valley. While not large enough to demonstrate landform prominence, the degree of naturalness on the Subject Lands is high and it performs important conveyance functions.

The channel is fairly wide throughout much of the ravine, reaching up to 4 m to 5 m wide in some locations. Bankfull depths of the channel at the bottom of the ravine reach 1 m to 1.5 m, while the baseflow wetted width of the watercourse is on average 1 m to 1.5 m within the 4 m to 5 m wide channel. The creek exhibits a pool / riffle morphology. The valley slopes are described as inherently stable, and the background geotechnical work (Soil-Mat Engineers & Consultants Ltd 2014) notes that development “uphill” of the physical crest/Top of Stable Slope would have no impact on the valley slopes from a geotechnical perspective.

Areas determined to meet Significant Valleyland Designation within the Subject Lands are depicted on Figure 7 in Volume 1.

3.3.6 Significant Areas of Natural and Scientific Interest

The Sassafras-Waterdown Woods Life Science Area of Natural and Scientific Interest (ANSI) is the closest ANSI to the Subject Lands – it occurs north west of the Subject Lands, north of Highway 403 (Figure 7, Volume 1).

Sassafras Woods is 136 ha in size and has about 14 ha of forest interior. It is connected to the adjacent Waterdown Escarpment Woods and is part of the significant escarpment corridor. Sassafras Woods is the best remaining example of Niagara-Escarpment shale-slope upland forests in the Niagara Escarpment biophysical section. It provides high representation of drier oak upland forests and moderate representation of dry-to-moist broadleaf valley forests. The Sassafras Woods/Waterdown Escarpment Woods also provide the best biophysical representation of bedrock plain, escarpment rim, talus and shale slope on a south facing escarpment feature (Varga, 1985). Sassafras Woods is also the closest Environmentally Sensitive Area to the Subject Lands (ESA 4).

3.3.7 Significant Wildlife Habitat (SWH)

The OMNR (2012) draft Eco-regional criteria do not address these two species as they were listed as Special Concern after the release of the draft criteria. Figure 7 illustrates where SWH is expected to occur for these species, based upon an interpretation of habitat requirements and OMNR criteria for similar species. The Ministry of Natural Resources defines wildlife habitat as significant where it is: ecologically important in terms of features, functions, representation or amount, and contributes to the quality and diversity of an identifiable geographic area or Natural Heritage System (OMNR, 2000). The Natural Heritage Reference Manual (NHMR; OMNR, 2010) provides additional guidance regarding the interpretation of this aspect of the PPS. The Province has also released draft guidance regarding the definition of SWH in Eco-region 7E (OMNR, 2012). Those draft criteria have been considered in this report.

According to the NHRM (OMNR, 2010), and draft eco-regional criteria (OMNR, 2012) significant wildlife habitat can be considered under the following four categories:

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitats for Wildlife;
- Habitats for Species of Conservation Concern, and;
- Animal Movement Corridors.

Examples (candidate or known) of the first three categories occur on and adjacent to the Subject Lands. The fourth category, Animal Movement Corridors is not satisfied by the Subject Lands. Natural areas are relatively disconnected by Highway 403 to the north, the Aldershot Go Station and tracks to the west and south, existing roadways (both to the east and west) and commercial developments and the Hydro substation to the east. No specialized groups are dependent upon the habitats assessed for movement (i.e., absence of significant amphibian breeding habitat). The focus on these lands for the establishment of a major mobility hub will further diminish this existing, limited function.

The first three components (listed below) are discussed in the following text.

Seasonal Concentration Areas of Animals

- Colonial Nesting Breeding Birds
- Turtle Wintering Habitat

Rare Vegetation Communities or Specialized Habitats for Wildlife

- Buttonbush Mineral Thicket Swamp (S3)

Habitats for Species of Conservation Concern

- Eastern Wood-Pewee Habitat
- Wood Thrush Habitat
- Snapping Turtle Habitat
- Monarch Butterfly Habitat

Habitats of Seasonal Concentration of Animals:

The draft provincial criterion for colonially nesting breeding birds relates to the presence of one or more active nests of list of species, which includes Green Heron. Four individual Green Herons were observed in July 2010 at the central man made pond and are a probable family unit that likely nested in the adjacent thicket swamp / deciduous swamp (SWT2-4/SWD2-2). The nest was not located or confirmed. The OMNR (2000) Significant Wildlife Habitat Technical Guide states that significant sites should contain 10 or more Green Heron nests. Significant wildlife habitat is discussed further in Section 3.3.7.

Within the Subject Lands: Turtle wintering areas are also expected to meet draft provincial criteria. Turtle wintering habitat consists of ponds that contain deep waters (generally 2m or more) and mud substrates. Water must be deep enough to ensure that the water does not freeze through, and mud substrates are necessary to allow turtles to bury themselves in the bottom of the pond to hibernate. Over-winter habitats include permanent water bodies, large wetlands, bogs or fens, and streams with flowing water throughout the hibernation period. The draft criteria for turtle wintering areas in eco-region 7E requires a minimum of 5 Midland Painted Turtles or 1 Snapping Turtle using swamp, marsh, fen, bog or open aquatic habitats with adequate dissolved oxygen content (OMNR, 2012).

Two Snapping Turtles and 45 Midland Painted Turtles were observed, on April 19, 2010, in the dug out pond located in the western end of the Subject Lands. Snapping Turtle was also observed during two subsequent surveys on the Subject Lands. The pond is considered to be confirmed SWH (Figure 7, Volume 1). The pond is surrounded by deciduous swamp, swamp thicket, cultural woodland and cultural thicket.

Although unconfirmed, it is also possible that turtle nesting sites may be located within close proximity of the overwintering pond (described previously). Snapping turtles will migrate between habitats up to 6.0 km in waters and generally 0.5 km overland and in some instances turtles will move up to 1 km overland (COSEWIC, 2008). Nesting sites are generally located close to water in sunny areas (often south-oriented exposure) with suitable digging substrate of loose sand or gravel. The draft criteria for turtle nesting areas in eco-region 7E requires nesting evidence of a minimum of 5 Midland Painted Turtles or 1 Snapping Turtle or 1 Northern Map Turtle in suitable habitat. The nest, itself, plus a radius of 30-100m of suitable habitat around the nest are considered turtle nesting significant wildlife habitat (nests along provincial or regional road shoulders or embankments are not considered SWH).

A 100m zone around the pond is flagged as potential nesting habitat. Travel routes of Snapping Turtles from the water/wetland to the nest site are also considered to be significant wildlife habitat. Additional investigations could define nesting areas with greater precision.

Rare Vegetation Communities and Specialized Habitat For Wildlife

The NHRM (OMNR 2010) defines specialized habitats as those that provide for species with highly specific habitat requirements; areas with exceptionally high species diversity or community diversity; and areas that provide habitat that greatly enhances species' survival. The draft eco-regional criteria for area 7E define significant, provincially rare vegetation communities (S1 – S3). The Buttonbush Mineral Thicket Swamp (S3) would qualify as a rare vegetation community and as SWH, however, given its small size (i.e., approximately 0.15 ha), it has been determined to be candidate SWH, unlikely to play a key role in enhancing the species' survival.

Habitat For Species of Conservation Concern (Excluding Endangered and Threatened Species)

Two bird species of conservation concern (both Special Concern provincially and federally) - Eastern Wood-Pewee and Wood Thrush were observed within the Subject Lands. Low numbers of Eastern Wood-Pewee (2 individuals) were confirmed to be breeding in the mature woodlot community FOD5-3 associated with the Falcon Creek valley. A single Wood Thrush was identified to be a probable breeder as it was observed to be singing in suitable habitat within the Subject Lands. Wood thrush relies upon mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. (OMNR, 2014). The ELC units FOD7-2 and FOD5-3 along Falcon Creek meet SWH requirements for these species.

Species of conservation concern on the Subject Lands also include Snapping Turtle (S3, G5) and Monarch Butterfly (S2N/S4B, G5).

Two Snapping Turtles were observed in the man made dug out pond located in the western end of the Subject Lands. This species is addressed above in relation to Habitats of Seasonal Concentration of Animals.

Monarch butterfly individuals were observed on the Subject Lands. Draft criteria for migratory butterfly stop over areas in eco-region 7E require areas meeting a minimum of 10 ha of a combination of field and forest habitat within 5 km of Lakes Ontario and Erie, and if suitable, are defined as candidate SWH. The draft provincial criteria note that candidate SWH should not include disturbed, fields/meadows, rather, less disturbed fields with an abundance of preferred nectar plants along with woodland edge providing shelter are requirements for this habitat.

The Subject Lands are situated about 2.5 km from the Lake Ontario shoreline and include a mix of field and woodland edge habitat. The fields, which occupy the eastern extent of the Subject Lands are disturbed and/or are farmed. Smaller pockets of field scattered throughout the Subject Lands would not meet the minimum recommended 10 ha habitat area. This component of candidate SWH is not met by the Subject Lands.

4.0 NATURAL HERITAGE FEATURES DISCUSSION

4.1 Natural Heritage System

Figure 7 (Volume 1) illustrates those components of the PPS Natural Heritage policies that are met by the Subject Lands, and in some cases, by adjacent lands. These features include:

- Significant Woodlands;
- Significant Valleylands;
- Significant Wildlife Habitat;
- Habitat of Endangered and Threatened species; and
- Fish Habitat.

Of these components, only Fish Habitat and Significant Woodlands occur in lands planned for future residential development and subject to an impact assessment in this report (i.e., those lands east of the Falcon Creek valley). The remaining Natural Heritage components occur west of these development lands in areas identified as “future development” (Blocks 1 and 2 on the draft plan; Penta Properties Inc., 2014), subject to further planning efforts (e.g., as per Brook McIlroy/Arup 2014).

Beyond an impact assessment of development proposed east of Falcon Creek, this report also provides some guidance as input to the consideration of future development west of Falcon Creek (e.g., South Service Road, Mobility Hub and associated developments). This input is provided in terms of relative development constraint areas, as opposed to an impact assessment in response to specific development proposals. Section 4.2 provides an overview of those constraint areas, and implications to and recommendations to address development.

The NHS defined in ROPA 38, seems to reflect the presence of regional storm floodlines (as depicted on Figure 11 in the accompanying FSR SWM report (Metropolitan 2014a). Refinements to the NHS limits would appropriately reflect proposed and then adopted channel

block limits. These should be subject to a site visit with the conservation authority to confirm proposed development limits.

4.2 Constraint Areas

Based on field investigations completed, analyses of data collected and upon a review of applicable environmental legislation pertinent to the Subject Lands; one of three constraint levels has been assigned to areas within the Subject Lands. The general constraint levels are meant to provide guidance to the formulation of development plans for areas including and west of Falcon Creek on the Subject Lands.

- High – natural features and associated functions declared generally non-developable (i.e., Significant Wetlands, and Habitat of Endangered and Threatened Species/Fish Habitat except in accordance with provincial and federal requirements).
- Moderate – natural features and associated functions that include other elements of the natural heritage policies of the PPS where development may be permitted subject to meeting the no negative impact test (e.g., Significant Woodlands, Significant Wildlife Habitat, Significant Valleylands).
- Low – Minor natural areas with limited and localized functions
- None – All areas of active agricultural lands and disturbed areas with limited to no ecological functions.

4.2.1 High Constraint Areas

Areas of high constraint that would automatically preclude development (except in accordance with provincial and federal requirements):

- Significant Wetlands;
- Habitat of Endangered Species and Threatened Species; and/or
- Fish Habitat.

No Significant Wetlands occur within the Subject Lands or Study Area. The closest is, the RBG-Hendrie Valley-Lambs Hollow Wetland, approximately 2 km to the southwest of the Subject Lands.

One endangered plant species (Butternut) was observed on the Subject Lands. This occurrence is subject to a regulation (Ontario Regulation 242/08), under the *Endangered Species Act, 2007*.

Two Threatened bird species were observed foraging over the Subject Lands: Chimney Swift and Barn Swallow. Breeding was not confirmed for either species on the Subject Lands. Suitable nesting habitat is not present in the Subject Lands but is expected to occur in the Study Areas (within human made structures such as suitable chimneys, and sheds/barns).

All of the watercourses, Grindstone Creek, Falcon Creek and Indian Creek support fish habitat as defined under the Federal Fisheries Act.

4.2.2 Moderate Constraint Areas

Natural features and associated functions that include other elements of the natural heritage policies of the PPS where development may be permitted subject to meeting the no negative impact test are considered within this category. The degree of development potential varies and will be subject to discussions with regulatory agencies and municipalities. The negative impact test, generally tested through an EIA process would need to be applied to specific development proposals within these lands.

The moderate constraint areas include:

- Significant Areas of Natural and Scientific Interest;
- Significant Woodlands;
- Significant Valleylands; and
- Significant Wildlife Habitat (confirmed as per draft Provincial criteria).

Areas of moderate constraint are illustrated on Figure 8 (Volume 1).

4.2.3 Low Constraint to Potential Moderate Constraint

One are of Low Constraint to Potential Moderate Constraint is depicted on Figure 8, (Volume 1). These are candidate (i.e., not confirmed) Significant Wildlife Habitat, including an area about 100m wide around the pond, which may provide turtle nesting habitat. This preliminary delineation reflects the potential occurrence of Significant Wildlife Habitat.

4.2.4 Low Constraint Areas

Areas of low constraint support limited ecological functions and are generally less sensitive to impact and are more resilient. These are features that can be more readily replicated elsewhere on the landscape subject to mitigation and compensation planning.

Low constraint areas may include, for example:

- Minor drainage features and depressed areas; and
- Cultural thickets and woodlands.

Areas of low constraint are illustrated on Figure 8 (Volume 1).

4.2.5 Areas of No Constraint

These are defined as relatively unconstrained areas of existing features and land uses with little existing natural functions. They can include the following:

- Active agricultural lands;
- Disturbed lands; and
- Existing urban and transportation uses.

Alterations within these low constraint areas are generally permitted under typical land development scenarios, in some instances with mitigation measures.

Areas of no constraint are illustrated on Figure 8 (Volume 1).

These constraint levels are intended to inform development and infrastructure planning activities underway that affect the Subject Lands and assess the development proposed as part of this EIA.

5.0 DESCRIPTION OF PROPOSED DEVELOPMENT PLAN

5.1 Minutes of Settlement

Paletta International Corporation had appealed OPA 3, OPA 55, OPA 59, OPA 73 and other OPA and zoning matters, and further, has reached an agreement [Minutes of Settlement (MOS), June 2, 2009] with the City of Burlington and the Regional Municipality of Halton. Among the matters settled was an agreement on the nature of the development and the processes to be engaged for the development of 1200 King Road (Metropolitan 2014).

Proposed development is detailed for lands east of the Falcon Creek valley. The Draft Plan (Penta Properties Inc. 2014) generally reflects the development concept agreed-upon in the Minutes of Settlement. The zoning has been previously approved and will be adjusted to reflect the more precise lot boundaries and the final location of the service road. The development plan is described in more detail in Section 5.2 below.

5.2 Proposed Development Plan

The proposed development plan for the Subject Lands is provided in Volume 1, Figure 9. East of Falcon Creek a 25-lot subdivision is proposed for employment purposes. The proposed Plan of Subdivision includes mixed uses, a business corridor, and employment commercial lots. An entertainment commercial facility is proposed in Block 3 and two stormwater management ponds are proposed in Blocks 4 and 6.

The Subject Lands west of Falcon Creek have been identified in the MOS as a “Study Area” which will consider the possibility of the appropriateness of a ‘mobility hub’ including the range of permitted uses as well as the extent of natural heritage features. Currently, four mobility Hubs are being considered by the City of Burlington with initial reviews being undertaken with the view to incorporation into the Official Plan. Once general policies are established, it is anticipated that further site-specific studies and plans will be undertaken.

Although the Subject Lands including and west of Falcon Creek are not the subject of the application for development at this time (development impacts not specifically assessed in this EIA). The land identified as a Mobility Hub has been considered in this report in terms of existing natural and other environmental features, to provide some natural heritage guidance regarding the extent of developable area within and west of Falcon Creek, and as input to the alignment of the proposed extension of the South Service Road. This guidance is addressed in Section 8 of this report and in the companion reports associated with this development

application (see those reports listed in section 6.0 below). Those reports should be reviewed along with this EIA.

6.0 IMPACT ASSESSMENT, AVOIDANCE AND MITIGATION MEASURES

This impact assessment is presented based upon a review of the development plan presented by Penta along with information regarding proposed servicing and grading and other technical reports prepared by the Penta consulting team for the Subject Lands. A summary of these reports is provided in the bulleted list below.

- Draft Plan, Penta Properties Inc. 2014;
- 1200 King Road Functional Servicing and Stormwater Management Report (FSR) prepared by Metropolitan Consulting Inc., January 2014;
- 1200 King Road Hydrogeological and Hydrological Assessment prepared by Terra-Dynamics Consulting Inc., August 21, 2014;
- 1200 King Road Property – Fluvial Geomorphology Characterization and Recommendations prepared by Parish Geomorph, August 2014; and
- Slope Study, Falcon Creek, Indian Creek and Grindstone Creeks, 1200 King Road, prepared by Soil-Mat Engineers and Consultants, January 2014.

Baseline data collected for the Subject Lands in 2010, 2011 and 2013 have been considered in terms of potential affects on the natural heritage features and functions associated with the Subject Lands. Consideration has been given to pre-construction, construction and post-construction impacts and mitigation measures are identified to avoid and minimize potential negative effects. Opportunities for restoration and enhancement are also discussed.

This impact assessment addresses potential direct and indirect impacts for the lands east of Falcon Creek. Additional comments and guidance are offered regarding the proposed extension of the South Service Road and the Mobility Hub development, in Section 8 of this report. The discussion in Section 8 can be used to help to determine the recommended extent of developable area in the areas proposed for the Mobility Hub and associated developments. Until a defined development is identified, this information is to be considered guidance. Once specific developments are proposed, they should be tested against elements of natural heritage, as per the PPS (2014). The proposed Draft Plan is depicted on Figure 9 (Volume 1), to guide this EIA work for lands east of Falcon Creek (i.e., those that are specifically addressed within this EIA, and for which, development details are available).

The range of possible impacts from a proposed land development application can generally be divided into these two categories: direct impacts are normally associated with the physical removal or alteration of natural features that could occur based upon a land use application, and indirect impacts may be changes or impacts (these could be minor or major) to less visible functions or avenues that could cause negative impacts to natural heritage features over time.

Discussion with respect to predicted direct and indirect impacts on the Subject Lands east and of Falcon Creek are provided along with recommendations for proposed mitigation and enhancement opportunities. Refer to Figure 10 (Volume 1) for an overlay of the proposed site plan over natural heritage constraints present with the Subject Lands.

6.1 Predicted Direct Effects

Habitat of Endangered and Threatened Species:

Two Threatened bird species were observed foraging over the Subject Lands, east of Falcon Creek: Chimney Swift and Barn Swallow. Breeding was not confirmed for these species in the Subject Lands. Suitable breeding habitat is not present in the Subject Lands but is expected to occur in the Study Areas (within human made structures such as suitable chimneys, and sheds/barns). Breeding locations for these species were not confirmed outside the Subject Lands and significant habitat is not mapped. Though foraging habitat for both species is present within the natural features of the Subject Lands, there appears to be significant areas of suitable foraging habitat outside of, and adjacent to, the Subject Lands. No negative impacts are predicted for Barn Swallow or Chimney Swift.

Fish Habitat

Predicting potential effects on Fish Habitat also rely upon an understanding of potential effects on the hydrogeological and hydrological systems present.

The hydrogeological assessment study carried out by Terra-Dynamics (January, 2014) indicates that watercourses on the Subject Lands are primarily surface water fed. A summary of Terra-Dynamics' findings related to detailed impact assessment considerations east of Falcon Creek are provided below.

The silty clay and clay-based till deposits form an aquitard resulting in "flashy" surface water runoff conditions. The overburden deposits overlie shale bedrock, which is both laterally extensive and thick. On the eastern sections of the proposed development, the overburden deposits slowly recharge the bedrock with an average linear groundwater velocity that is less than 2.0 cm/year.

Flow in the creeks has little to no influence from groundwater sources within the proposed development area of the site. A total of 4 to 5 meters of low permeability clay-based deposits are located beneath Indian and Falcon Creeks, which are in turn underlain by approximately 120 meters of low permeability shale of the Queenston Formation. Groundwater flow in the clay-based overburden deposits is generally southward towards Hamilton Harbour and localized groundwater flow at very slow velocities of approximately 4 cm/year occurs towards both Indian and Falcon Creeks (Terra-Dynamics, 2014).

A comparison of pre- and post-development water balance calculations carried out by Terra-Dynamics shows that the impervious surfaces of the development within the footprint of the proposed development should have a negligible impact on the function of Indian and Falcon Creeks. Approximately 20,000 m³/year of groundwater recharge will be diverted as runoff to a stormwater retention pond that will act as a recharge zone to the underlying bedrock aquifer.

On a regional scale, the diversion of 20,000 m³/year of groundwater recharge could result in a decrease of approximately 0.64 Litres/sec of recharge to the shale bedrock aquitard and subsequently Hamilton Harbour and Lake Ontario. This loss of recharge value would be considered a negligible amount on a regional scale.

Indian Creek Fish Habitat

The proposed South Service Road extension will cross Indian Creek. Based on an a fluvial geomorphology study (Parish Geomorphic 2014) a minimum 11 m crossing is recommended for Indian Creek to accommodate three times the new bankful width. The bankful width of the creek is approximately 3.6 m, and therefore the proposed crossing width is more than adequate to accommodate the flow channel of Indian Creek to allow for unimpeded fish access.

Indian Creek has a history of flooding and related issues along King Road. A natural channel design was completed by AMEC for the City of Burlington to resolve the flooding issues. AMEC's design includes realigning the creek south of the Subject Lands and designing the aqueduct structure using natural channel design in order to cross King Road in conjunction with the CNR Grade Separation Project. AMEC's design also included a preliminary conceptual natural channel design of Indian Creek, which is relied upon and provided on the proposed development plan for the Subject Lands (Figure 9, Volume 1).

The length of Indian Creek on the Subject Lands will be the subject of detailed natural channel design work, and based on the work from AMEC's preliminary design to address current flooding on site in conjunction with the proposed development. The newly designed channel will be contained within a 30 m wide corridor with a buffer setback of 7.5 m.

Indian Creek is currently described as a straight ditched channel with limited meanders and narrow riparian zones. The proposed natural channel re-alignment will be designed to incorporate natural elements to improve habitat diversity with the creation of riffle areas and increased meanders resulting in greater channel length and net increase to habitat present. In addition the two existing undersized culverts will be removed and replaced with a clear span crossing removing existing barriers to fish movement. Overall, the riparian corridor will be widened and can be enhanced with plantings to increase habitat present for a number of species including fish, small mammals, reptiles, amphibians and birds.

Other Direct Effects:

Development east of the Falcon Creek valley is proposed to occur in low constraint areas that consist primarily of agricultural and cultural communities. Minor encroachments into woodland (community FOD7-2) and wetland (community SWD2-2), will occur as of the result of Lot 27 and Block 3 of the proposed development plan (Figure 8, Volume 1). The proposed development plan will result in the removal of a small (0.4 ha in size) extension of significant woodland (SWD2-2), removal of this minor unit is not anticipated to the impact the ecological functions associated with the larger blocks of significant woodland located to the west. In addition, the edge of woodland FOD5-3 will be affected by development within the rear lots that will result in the removal of some trees that are in conflict with building envelopes and infrastructure.

The development form can be designed to include building envelope allocations to minimize tree removal. Important woodland functions (i.e. interior woodland habitat) associated with the larger woodland blocks including and to the west of Falcon Creek will be retained. The retention

of the wetland community, or portions thereof will depend upon additional hydrologic considerations. This work should be completed in response to more detailed site planning for proposed Lot 27 and Block 3.

In addition a hedgerow (1.8 ha in size) located along the south-eastern boundary of the Subject Lands will be removed as a result of the proposed development. This hedgerow which is aligned in both an east to west direction (along the southern limit of the Subject Lands) and a north to south direction (located immediately west of King Road) is described as a poor quality feature composed of young green ash and buckthorn. The north-south arm of the hedgerow that runs immediately parallel to and west of King Road is also subjected to ongoing disturbance from the road (e.g., dumping).

Proposed Watermain Connections

Five watermain location options are presented in the proposed development plan for the Subject Lands. Detailed assessment of the impact of the watermain crossing will be carried out once a finalized location has been accepted for the Subject Lands. However, based on an ecological assessment of the features present within the Subject Lands it is clear that servicing aligned with the proposed roads would minimize any additional disruption to natural features and associated functions.

6.2 Predicted Indirect Impacts

The proposed development in the principally open and already disturbed eastern areas of the Subject Lands (i.e., agricultural lands, meadows, cultural vegetation communities), will limit the potential for direct and/or cumulative effects. Potential indirect impacts and resultant effects may include:

- Noise, vibration and lighting and potential effects on wildlife behaviour and/or reproductive success (i.e., during construction and post development);
- Localized micro-drainage changes that could cause localized ponding and inundation of rooting systems;
- Introduction of non-native plant species in the disturbed margins of the developed footprint, displacing some native flora;
- Stress/dieback of retained vegetation along developed edges (root impact contaminants, sediment); and
- Impacts on wildlife and plant populations associated with anticipated increased human and pet impacts on retained natural areas.

6.3 Recommended Measures to Avoid and Mitigate Potential Effects

The mitigation measures recommended for this proposed development on the eastern portions of the Subject Lands are listed in the bulleted points below. Some of these will also be relevant and applicable to the western lands that are the subject of Mobility Hub planning.

- Implement erosion control measures to protect the existing creeks as per the recommendations provided by Parish (Parish Geomorphic 2014) at the detailed design stage.
- Implement the water balance objectives for groundwater and surface water run-off established in the Hydrogeology Study (Terra-Dynamics 2014) at the detailed design stage.
- Implement slope stability measures recommendations (Soil-Mat Engineers & Consultants Ltd, 2014) during final design and construction phase for the Subject Lands including the following: Limiting the use construction machinery near slope edges; Erecting slit fencing along slope edges; Restricting the placement of soil and fill over slope edges; Directing drainage away from slope edges; and, Maintaining and replacing vegetation along slope edges.
- Implement a 7.5 m buffer along newly designed Indian Creek channel corridor.
- Implement specialized mitigation measures where localized effects are predicted (e.g., along wooded features edges in proximity to development and lot lines);
- Consider the implementation of selected non-infiltration based Low Impact Development (LID) techniques to maintain surface water inputs into the natural features present on the Subject Lands;
- Introduce native vegetation barrier plantings (i.e. raspberry) in areas of higher accessibility to deter human intrusion into natural areas;
- Establish silt fencing or plywood hoarding around the driplines of individual trees where retention is feasible, and along exposed woodland edges where encroachments occur and buffer setbacks are not feasible (south service road and lot development encroachment associated with vegetation communities FOD7-2 and SWD2-2); and
- Construct crossings during time periods that respect fisheries timing windows. In-water works should avoid the period between April 1 and June 30 of any given year.

The extent to which construction will affect the edge conditions can be limited by the implementation of the following measures:

- Locate and flag development limits prior to construction;

- Pre-construction erection of erosion and sedimentation control fencing along confirmed protection edges and specific trees (at outer limit of dripline) for proposed retention along the woodland edge closest to the development;
- Appropriate pre-construction briefing of site workers to advise regarding the sensitivity of the development edge conditions; and
- Meet tree retention areas at existing grade (i.e. feathered grades from development edges).

Light and noise effects on wildlife

Light can be a concern where it is directed towards a variety of natural features and functions. Primary sources for “new light” will be from road lighting. In particular, the use of larger light standards can be problematic by allowing light penetration into forested blocks, which could inhibit or affect wildlife use. The placement of rear lots or public parks close to natural areas can also introduce unwanted lighting.

To minimize light being directed into the adjacent ecological features, outdoor common area lighting should be located and directed away from the retained wooded areas. Public pathways should be discouraged in proximity to retained natural areas. Finally, to minimize impacts on birds, direct upward light should be eliminated, spill light minimized and all lighting sources should illuminate only non-reflective surfaces (e.g., City of Toronto Green Development Standard, 2007).

6.4 Potential for Enhancements and Ecological Benefits

There are some limited opportunities for enhancements of natural features within the Subject Lands.

Enhancement is recommended within the re-aligned channel proposed for Indian Creek. Based on wildlife tracking studies wildlife movement patterns within the Subject Lands appeared to be concentrated along the Indian Creek (Figure 5, Volume 1). The natural channel and riparian corridor can be designed to include a diversity of habitats for differing species by incorporating the following design features:

- Shallow online wet meadow pools for use by amphibians and turtles;
- Placement of large boulders and woody debris along watercourse channel edge for use as a resting, hiding and perching area for a variety of wildlife including birds, small mammals, turtles and amphibians; and
- Placement of raptor poles along watercourse channel riparian corridor for use by raptors and birds.

In addition, attempts can be made to incorporate grassy edges into the landscaping associated with the newly created Indian Creek channel and the SWM blocks to provide habitat for birds that rely on field habitats that will largely be removed from eastern half of the Subject Lands.

Enhanced road crossings that will allow for wildlife movement/passage can be integrated into the final design for the Subject Lands for Indian Creek. Crossing designs can include provisions for flood-free access to the crossing, fluvial geomorphology through the crossing, wildlife movement under low flow bank-full conditions, planting, and fencing, wing-walls or curbs to direct wildlife movements (amphibians, reptiles, waterfowl and small mammals).

7.0 PREDICTED NET EFFECTS AND MONITORING

The work completed to date provides a baseline condition assessment from which to make predictions of the effects of development on the natural heritage features and associated functions on the Subject Lands.

With the impacts predicted and the successful implementation of the mitigation measures noted in section 6, the following would be the net effects from the proposed development on the lands east of Falcon Creek.

Predicted Net Effects:

- Removal of portions of unevaluated wetland areas and/or affects on features and associated functions of unevaluated wetlands;
- Removal of localized areas of woodland, concentrated in woodland areas defined as providing lower quality environmental functions (i.e., along woodland edges);
- Potential localized tree health decline over time with scattered individual trees retained within treed building envelopes;
- Potential impacts on breeding birds due to woodland edge intrusions and indirect affects of human intrusions and south service road; and
- Limited potential effects on watercourses based on success of mitigation measures proposed (buffer setbacks, Bioretention LID planning and SWM design).

Mitigation monitoring may be required, although it is intended for development proposals that may result in more significant impacts.

8.0 NATURAL HERITAGE GUIDANCE – MOBILITY HUB LANDS

As described in Section 5 of this EIA the lands including and west of the Falcon Creek valley have been identified in the MOS as a “Study Area” for future consideration as a potential “mobility hub” area by the City of Burlington. Natural features have been assessed and ranked in accordance to relative importance within the Subject Lands and the local and regional landscape to inform the proposed mobility hub development consideration including and west of the Falcon Creek valley.

This section of the report provides natural heritage guidance for those lands. As no specific development proposal are under review, this section of the report should be used as technical input to the determination of developable lands and as input to the design of the Mobility Hub. This guidance is provided in terms of a review of natural heritage features and functions in these western areas along with some initial input regarding potential impacts, mitigation and enhancement measures. These materials and proposed, specific development plans for the Falcon Creek valley and lands to the west will be the subject of updated EIA analysis and reporting.

Natural Heritage Feature Discussion and Guidance

Fish Habitat:

Falcon Creek

Alternative locations for the crossing at Falcon Creek were considered and reviewed on site with the Penta consulting team and these alternatives were assessed by Metropolitan, Parish and Savanta based on environmental constraints, creek meander configuration, road and crossing configuration and the topography. A 17 m wide span bridge is proposed for the crossing of Falcon Creek and as such no direct impacts to fish habitat are anticipated.

Grindstone Creek

The proposed south service road will cross Grindstone Creek. Fluvial studies (Parish Geomorphic 2014) have recommended that the crossing be designed to a minimum width of 5 meters to ensure channel form is maintained throughout the structure. A 15 m wide buffer is proposed along Grindstone Creek.

Habitat of Endangered and Threatened Species:

The one remaining Butternut tree observed west of Falcon Creek at the boundary between woodland communities FOD7-2 and FOD5-3 will not be directly impacted with the proposed south service road. A 20 m buffer is recommended around the existing Butternut tree, assuming it is found to be alive in 2015.

Significant Valleylands:

Falcon Creek has been identified in this report as possessing the characteristics that would meet the definition of Significant Valleyland. A Slope Study of Falcon, Grindstone and Indian Creek was carried out by Soil-Mat for the Subject Lands (January, 2014) to determine the stable top of slope associated with Falcon Creek. A 7.5 m buffer setback will be maintained from the

worst hazard (Regional floodplain, meander belt (Parish Geomorphic) and stable top of bank (Soil-Mat) along the valley associated with Falcon Creek. Metropolitan has identified a 15m setback, for the Grindstone Creek tributaries.

Parish has recommended that Falcon Creek be crossed by the proposed South Service Road using a 17 m clear span structure (Metropolitan 2014a). The construction of the bridge abutments associated with the crossing of Falcon Creek will encroach into the valley on both sides of the creek. Local disturbance to the valley will be minimized as much as possible during the construction of the abutments. The Falcon Creek Significant valleyland is expected to remain relatively intact in a developed setting.

Significant Wildlife Habitat (SWH):

Three areas located west of Falcon Creek, are deemed to meet standard and accepted criteria for SWH under the PPS as well as some areas defined as SWH under the draft eco-regional criteria posted by MNR for comment in 2012.

- Seasonal concentration areas for animals – turtle wintering area for Snapping turtle and Midland Painted turtle in the dug pond;
- Colonial nesting breeding bird habitat for Green Heron associated with community SWD2-2 located adjacent to the dug pond; and
- Habitat for species of Concern – Snapping turtle observed in the dug pond, Eastern Wood Pewee (within FOD5-3) and Wood Thrush (FOD5-3/FOD7-2).

The proposed South Service Road extension has been proposed along an alignment to avoid the dug pond and to minimize impacts on the more mature and SWH areas of woodland features FOD5-3 and FOD7-2. Additional hydrologic considerations will ensure that pre and post development hydrologic conditions are maintained for both the dug pond and wetland communities (SWD2-2 and SWT2-4). The viability of the SWH in a post development setting should consider the importance of:

- Connecting the dug pond with adjacent natural areas to limit fragmentation and isolation;
- Maintaining some or all of community SWD2-2 to optimize remaining habitat for Green Heron and related pond dependent wildlife (this will require nest location confirmation and the determination of optimal habitat size for this species);
- Maintaining some or all of woodland communities FOD5-3 and FOD7-2 to optimize residual habitat for Eastern Wood-pewee and Wood Thrush (this will require nest location confirmation and the determination of optimal habitat size for this species).

The construction of the proposed South Service Road west of Falcon Creek will result in the removal of trees in woodland communities FOD7-2 and FOD5-3. These deciduous woodlands are linked to the riparian corridor associated with the Falcon Creek valley and tableland area and are also directly linked to the deciduous forest areas along the CNR, which will continue to provide an existing corridor for wildlife movement in an east to west direction across the Subject Lands. The road right of way is expected to be 20 m wide with 3.5 m of additional clearing on either side of the easement for grading activities. The road location has been identified by Metropolitan to avoid the more mature woodland areas (FOD5-3) associated with the Falcon

Creek valley and adjacent tablelands and the small buttonbush swamp vegetation community SWT2-4. Metropolitan also addressed road alignment input related to fluvial geomorphic aspects (Parish Geomorphic 2014) in the determination of a refined alignment.

Having said that, the proposed Mobility Hub is expected to include a concentration of transportation, residential and commercial activities at relatively high densities. The concentrated nature of the proposed hub may result in pressures that will negatively affect the ongoing viability of aspects of identified SWH. Impact assessment work will need to consider a range of proven and novel approaches to mitigate for these potential effects.

9.0 CONCLUDING REMARKS

This EIA Report discusses the natural heritage features and associated functions found on, and adjacent to, the Subject Lands, with specific reference to lands east of the Falcon Creek valley, where development proposals have been advanced. It assesses the potential direct and indirect impacts of the proposed development of these lands. The Subject Lands including and west of the Falcon Creek valley have been assessed in detail. These lands are the subject of ongoing land use planning exercises, related to the proposed Aldershot GO Mobility Hub. Given that specific development plans have not advanced for these western lands, a formal impact assessment has not been completed within this report. Rather, this report provides natural heritage guidance as input to those planning exercises. Once development is specifically defined, a more detailed impact assessment can be completed for those lands..

The Subject Lands contain natural forest communities, warmwater fisheries (Falcon Creek, Indian Creek and Grindstone Creek), and the presence of Special Concern species as well as provincially and locally rare flora and fauna. Habitat of Endangered and Threatened Species, Fish Habitat, Significant Valleylands, and areas of Significant Woodland and Significant Wildlife Habitat occur on the Subject Lands.

The eastern portions of the Subject Lands, subject to this detailed EIA work includes Fish Habitat associated with Indian Creek. The other features and associated functions mentioned above, relate to the more western lands that are the subject of land use planning related to the Mobility Hub.

Generally, direct impacts associated with the proposed development will be limited, given that development is proposed in primarily agricultural and cultural areas within the Subject Lands. Indirect effects are discussed in relation to the potential for:

- Construction related impacts on natural features and edge conditions;
- Changes in wetland conditions associated with catchment alterations;
- Potential impacts on aquatic conditions and fish habitat; and

- Potential impacts on listed species and those considered rare at more regional and local scales.

Some minor intrusions woodland and swamp communities will result from proposed development along the western edge of the Falcon Creek valley. These localized edge impacts can be mitigated with appropriate construction techniques (fencing, plywood hoarding) and tree retention plans. The wetland community requires additional hydrologic considerations to determine any special mitigation measures required to retain the feature.

Opportunities exist to create new and to restore existing degraded tributary/riparian conditions associated with the proposed Indian Creek channel realignment to ensure the development receives an overall environmental benefit. These opportunities should be considered, planned and designed to optimize outcomes on a subwatershed scale.

Report Prepared by:

SAVANTA INC.



Tom Hilditch
President & CEO



Antonette Zimic
Project Manager



Sean Geddes
Senior Aquatic Ecologist

10.0 REFERENCES

Bird Studies Canada (BSC), Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2001-2005. Ontario Breeding Bird Atlas Website. <http://www.birdsontario.org/atlas/atlasmain.html/>.

Brook McIlroy/ARUP, 2014. City of Burlington Official Plan Review: Mobility Hubs Opportunities and Constraints Study. Final Report, May 2014.

Bruce A. Brown Associates Limited, 2011. Phase 1 Environmental Site Evaluation, 1200 King Road, Burlington, Ontario, January 26, 2011. Project 10*3552.

Bryant, M.A., M.A. Fleming, M.S. Tant and S.S. Varga. 1977. Biological Documentation of Natural Features in Regional Municipality of Halton. Ontario Ministry of the Environment. 74 pp.

Chapman, L.J. and D.F. Putnam. 1984. The physiography of southern Ontario, 3rd Edition. Ontario Geological Survey, Special Volume 2. Accompanied by Map P. 2715 (coloured), scale 1:600,000.

City of Burlington. 2008. Official Plan. Planning Department. Accessed online at cms.burlington.ca (Text and Maps Updated December 2013; <http://cms.burlington.ca/Page846.aspx#.VFUVMEuDT1p>

City of Burlington, 2008. Burlington Intensification Study: Preliminary 2031 Residential and Employment Intensification Estimates. Council date; February 25, 2008; PL-1/08.

City of Burlington, 2014. Official Plan Review: Transmittal of Mobility Hubs Opportunities and Constraints Study. June 9, 2014, Council date; PB-54-14.

COSEWIC. 2003. COSEWIC assessment and status report on the Butternut *Juglans cinerea* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 32 pp.

COSEWIC 2007. Species at Risk Registry. Available online: <http://www.sararegistry.gc.ca/>.

Ecologistics Ltd. 1977. A Hydrogeological Study of Environmentally Sensitive Areas in the Region of Halton. 2 vols. Report prepared for the Halton Region Conservation Authority. [ESA 1-7, 10, 12, 17-23; hydrogeology; soils]

Endangered Species Act, 2007. Ontario Regulation 242/08. Accessed online www.e-laws.gov.on.ca

Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Ltd., Markham, Ontario.

FGCA. 2005. Information on Butternut and the Butternut Canker in Canada. Forest Gene Conservation Association. Available online:

<http://www.fgca.net/conservation/sar/Butternut.aspx/>.

Gartner Lee Limited. 2002. Final Report: Rationale and Methodology for Determining Significant Woodlands in the Regional Municipality of Halton (Halton Region Draft Technical Background Paper #6). Prepared for: The Regional Municipality of Halton, GLL 21-472, April 2002.

Geomatics International Inc. 1995. Regional Municipality of Halton Environmentally Sensitive Area Study 1995. Prepared for The Regional Municipality of Halton. 323pp.

Geomatics International Inc. 1993. Environmentally Sensitive Area Study. Addendum Report - Phase 2. Prepared for the Regional Municipality of Halton, Planning and Development Department.

Geomatics International. 1991. Environmentally Sensitive Area Study. Addendum Report. Prepared for the Regional Municipality of Halton Planning and Development Department.

Gillespie, J.E., and R.E. Wicklund. 1971. The Soils of Halton County. Soil Research Institute, Canada Department of Agriculture, Guelph, Ontario. Report No. 43 of the Ontario Soil Survey.

Goodschalk, H.G., J.V. Jalava, M.J. Oldham and J.L. Ripley. 1997. Natural Heritage Resources of Ontario: Bibliography of Life Science Areas of Natural and Scientific Interest in Ecological Site Regions 6E and 7E, Southern Ontario. First Edition. Ontario Ministry of Natural Resources, Natural Heritage Information Centre, Peterborough. 156pp. + 3 Maps.

Halton Region Conservation Authority. 2006. Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document. April 27, 2006.

Halton Region Conservation Authority (CH). 1998. Grindstone Creek Watershed Aquatic Habitat Inventory and Assessment. Appendix 3.

Hamilton Naturalists' Club. 1993. Hamilton-Wentworth Natural Areas Inventory. A.E. Heagy (ed.). Volume II: Site Summaries.

Kaiser, J. 1984. Overview of Forest Stand Composition in Halton ESA's. Regional Municipality of Halton. [ESA 1-38; flora; vegetation] *

Kaiser, J. 1983. Native and exotic plant species in Ontario: a numerical synopsis. Plant Press 1:25-26.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological land classification for Southwestern Ontario: first approximation and its application. Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.

Metropolitan Consulting Inc., 2014a. Functional Servicing and Stormwater Management Report, 1200 King Road, January 2014.

Metropolitan Consulting Inc., 2014b. Planning Justification Report, 1200 King Road, City of Burlington. January 26, 2014.

Natural Heritage Information Centre (NHIC). 2013. Provincial status of plants, wildlife and vegetation communities database. <http://www.mnr.gov.on.ca/MNR/nhic/nhic.html>. OMNR, Peterborough.

Newmaster, S.G., A. Lehela, P.W.C Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario plant list. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, ON, Forest Research Information Paper No. 123. 550 pp. + appendices.

Oldham, M.J. 1993. Distribution and status of the vascular plants of Southwestern Ontario. Draft. Aylmer District, Ontario Ministry of Natural Resources. 149 pp.

Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch Wildlife Section. Science Development and Transfer Branch Southcentral Sciences Section.

Ontario Ministry of Natural Resources. 2010. Natural Heritage Reference Manual for Policy 2.3 of the Provincial Policy Statement, Ontario Ministry of Natural Resources 245pp.

Ontario Ministry of Natural Resources. 2010. Recovery Strategy, Peregrine Falcon. Accessed online at www.omnr.gov.ca.

Ontario Ministry of Natural Resources. 2012. SWH Ecoregion 7E Criterion Schedule, Draft, EBR 011-5740.

Ontario Odonata Atlas. 2005. Natural Heritage Information Center, Ontario Ministry of Natural Resources. <http://www.mnr.gov.on.ca/MNR/nhic/odonates/ohs.html> (updated 15-02-2005).

Ostry, M.E., Mielke, M.E. and D.D. Skilling. 1994. Butternut Strategies for Managing a Threatened Tree. Gen. Tech. Rep. NC—165. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 7p.

Parish Geomorphic, 2014. 1200 King Road Property – Phase 1 Characterization Report – Fluvial Geomorphology Component. August 2014. Reference 01-13-44.

Penta Properties Inc., 2014. Draft Plan of Subdivision, January 16, 2014.

Region of Halton . 2006. Halton Region Official Plan. Planning Department . Accessed online at www.halton.ca

Region of Halton. 1995. Halton Region Official Plan. Planning Department.

Region of Halton 2005a. Environmentally Sensitive Areas Consolidation Report, April 2005.

Region of Halton, 2005b. Halton Region Environmental Impact Assessment Guidelines, July 13, 2005. Halton Region Council Approved July 13, 2005.

Region of Halton, 2009. Amendment No. 38 to the Regional Plan (2006). Official Plan for the Halton Plan Area, Regional Municipality of Halton. December 16, 2009, As Adopted by Regional Council (Print version date: December 18, 2009). Aside: Referred to as ROPA 38.

Region of Halton, 2014. Environmental Impact Assessment Guidelines, Regional Official Plan Guidelines. Version 1.0 | (This version of the Environmental Impact Assessment Guidelines was brought before the Inter-Municipal Liaison Committee on June 18 2014 through Report No. IMLC01-14)

Riley, J., J.V. Jalava and S. Varga. 1996. Ecological Survey of the Niagara Escarpment Volumes 1 and 2.

Rowe, J.S. 1972. Forest Regions of Canada. Department of the Environment. Canadian Forestry Service. Publication No. 300

Shultz, J. 2003. Conservation Assessment for Butternut or White Walnut (*Juglans cinerea*).

Soil-Mat Engineers & Consultants Ltd., 2014. Slope Study, Falcon Creek, Indian Creek and Grindstone Creek, 1200 King Road, Burlington, Ontario. January 14, 2014. Project No: SM 135134-G.

Stantec, 2004. Environmental Study Report, Waterdown Road / Highway 403 Interchange Study. December 2004.

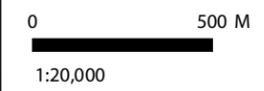
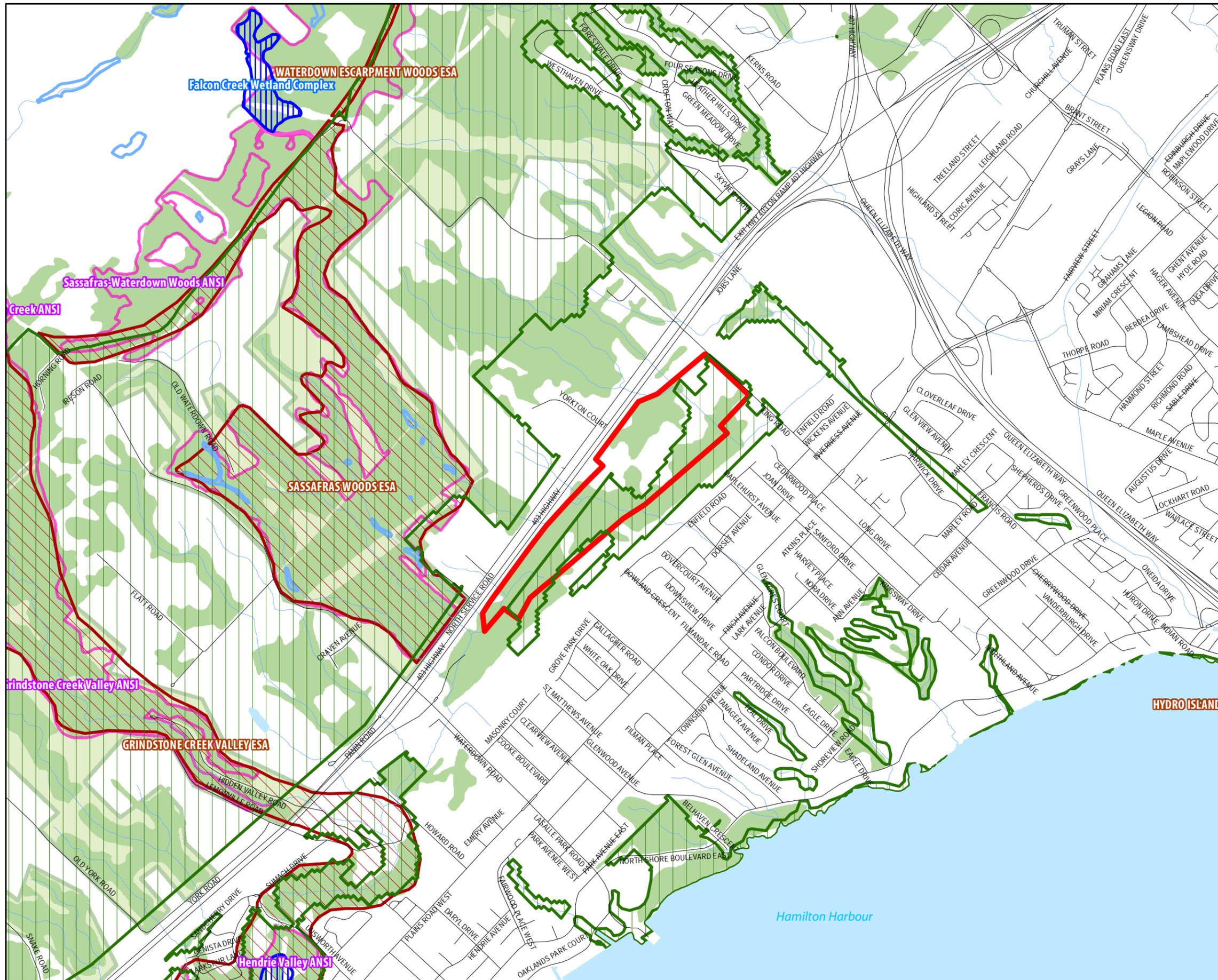
Terra-Dynamics Consulting Inc., 2014. 1200 King Road, Hydrogeological and Hydrological Assessment, Burlington, ON. Draft Report, August 21, 2014.

USDA Forest Service, Eastern Region. 76pp.

Varga, S., D. Leadbeater, J. Webber, J. Kaiser, B. Crins, J. Kamstra, D. Banville, E. Ashley, G. Miller, C. Kingsley, C. Jacobsen, K. Mewa, L. Tebby, E. Mosley and E. Zajc. 2000. Distribution and Status of the Vascular Plants of the Greater Toronto Area. OMNR, Aurora

VOLUME 1

Figures



- Subject Lands
- ANSI (MNR LIO)
- ESA (MNR LIO)
- Greenbelt Natural Heritage System
- Halton NHS (Map 1G, 2009))
- Watercourse (MNR LIO)
- Waterbody (MNR LIO)
- Woodland (MNR LIO)
- Wetland (MNR LIO)**
- Evaluated-Other
- Evaluated-Provincial
- Not evaluated per OWES

Paletta King Road

Figure 1
Location of Subject Lands and
Ecological Considerations





ELC Legend

FOREST

- FOD5-3 Dry-Fresh Sugar Maple-Oak Deciduous Forest
- FOD7-2 Fresh-Moist Ash Lowland Deciduous Forest

SWAMP

- SWD2-2 Green Ash Mineral Deciduous Swamp
- SWT2-4 Buttonbush Mineral Thicket Swamp

CULTURAL

- CUT1-1 Sumac Cultural Thicket
- CUT1-7* Buckthorn Cultural Thicket
- CUW Deciduous Cultural Woodland
- CUT Cultural Thicket
- CUM1-1 Dry-Fresh Old Field Cultural Meadow

- P Pond

**Denotes a type not listed in Southern Ontario ELC Guide*

- Property boundary
- Butternuts
- Stream
- Ecological land classification

Paletta King Road

**Figure 2
Ecological Land
Classification**

DRAFT - PRIVILEGED & CONFIDENTIAL

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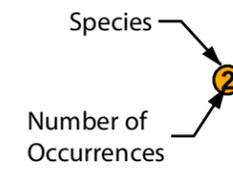


Property boundary

Amphibian call stations (2010, 2011)

Species

- American Toad
- ▲ Gray Tree Frog
- Green Frog



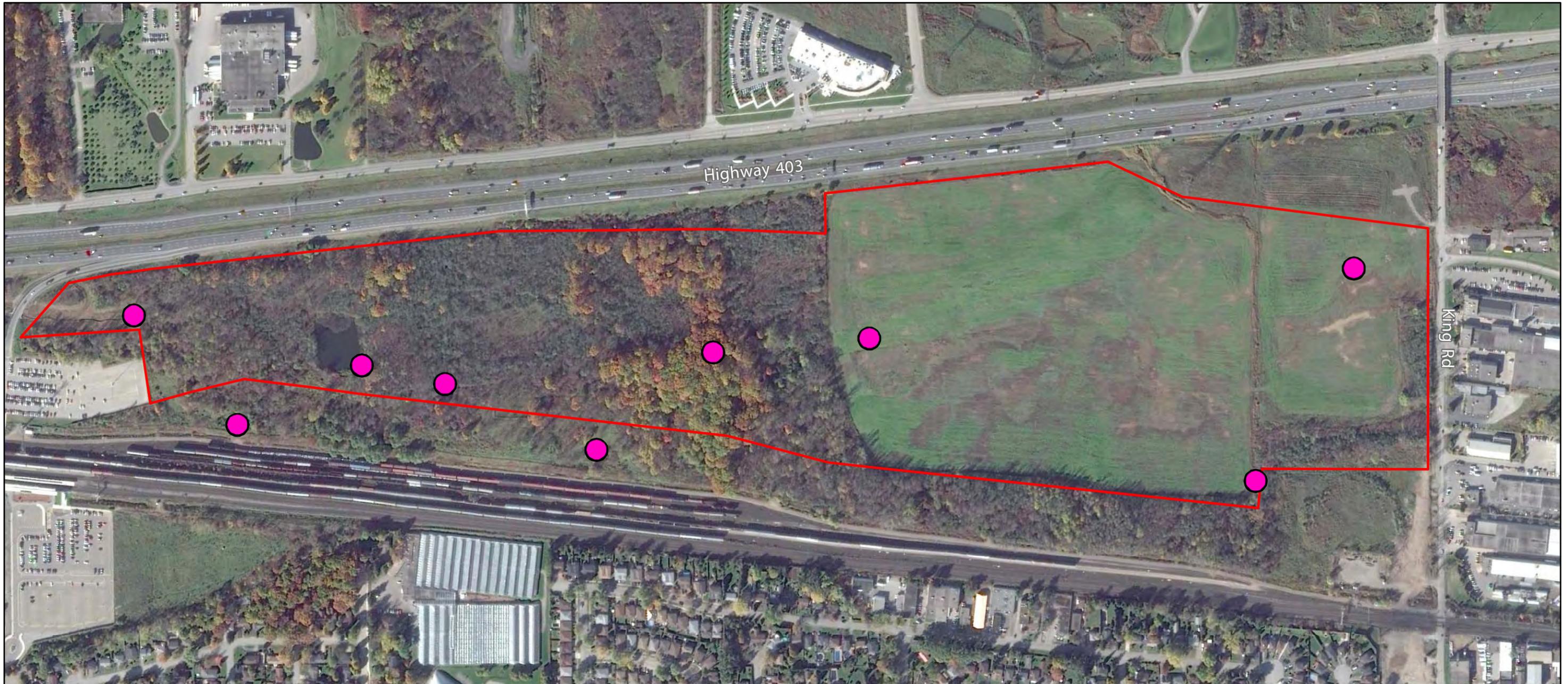
Paletta King Road

**Figure 3
Amphibian Breeding Survey**

DRAFT - PRIVILEGED & CONFIDENTIAL

0 100 Meters
1:5,000





- Property boundary
- Breeding bird point count stations

Paletta King Road

Figure 4 Breeding Bird Survey

DRAFT - PRIVILEGED & CONFIDENTIAL





- Winter Wildlife Species**
- Property boundary
 - T1 Location of transect
 - Deer Mouse or White-footed Mouse
 - Meadow Vole
 - Domestic Dog
 - Mink
 - Eastern Cottontail
 - Northern Raccoon
 - Eastern Grey Squirrel
 - Unknown Small Mammal Species
 - Long-tailed or Short-tailed Weasel
 - White-tailed Deer

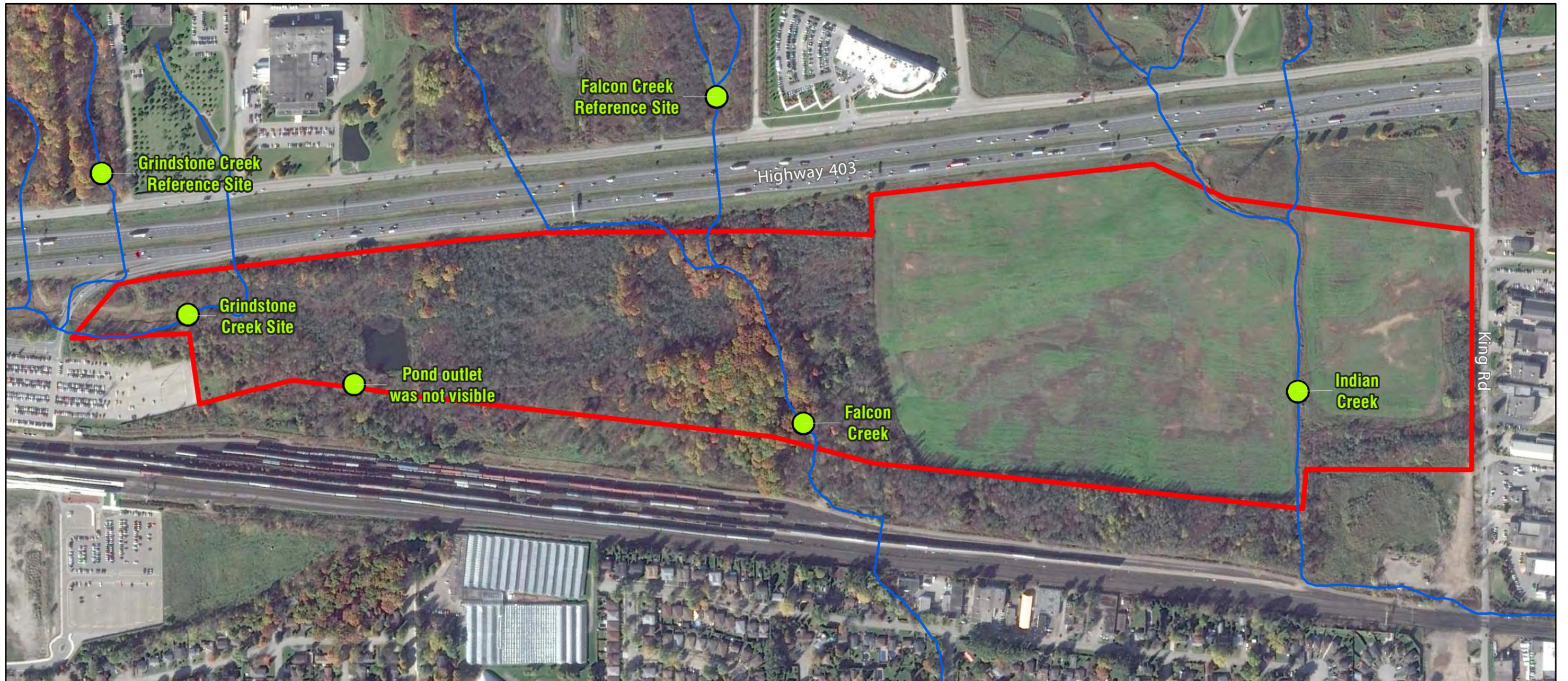
Species 2 Number of occurrences
** implies too numerous to count*

Paletta King Road

Figure 5
Winter Wildlife

DRAFT - PRIVILEGED & CONFIDENTIAL





- Property Boundary
- Approximate Location of Benthic Sampling Stations
- Stream

Paletta King Road

Figure 6 Benthic Sampling Locations

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0 100 Meters
1:5,000





ELC Legend

FOREST

- FOD5-3 Dry-Fresh Sugar Maple-Oak Deciduous Forest
- FOD7-2 Fresh-Moist Ash Lowland Deciduous Forest

SWAMP

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- SWT2-4 Buttonbush Mineral Thicket Swamp

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- CUT1-7* Buckthorn Cultural Thicket
- CUW Deciduous Cultural Woodland
- CUT Cultural Thicket
- CUM1-1 Dry-Fresh Old Field Cultural Meadow

- P Pond

**Denotes a type not listed in Southern Ontario ELC Guide*

- Property boundary
- Adjacent lands
- Ecological land classification
- Butternuts selection
- Significant valleylands
- Stream
- Fish habitat

- Significant wildlife habitat (confirmed)
- Significant woodlands
- ANSI (MNR LIO)
- ESA (MNR LIO)

Paletta King Road

**Figure 7
Natural Heritage Features
Within Future Proposed
Development Area**

0 100 Meters
1:5,000



DRAFT - PRIVILEGED & CONFIDENTIAL





Notes:

1. This Figure represents interim findings and interpretations. EIA Interim Baseline Report (Savanta Inc 2013).
2. Areas of High Constraint are those natural features and associated functions defined by the PPS as generally unavailable for development (i.e., PSWs, Significant Habitat of Endangered and Threatened species). None are present on the Subject Lands.
3. Areas of Moderate Constraint are those areas where development may be considered subject to meeting the PPS test of no negative impact.
4. Low Constraint - Potential Moderate is an area of potential Significant Wildlife Habitat (subject to confirmation)

5. Low constraint represents areas with limited and localized natural features and functions that may be addressed through avoidance, mitigation and/or removal subject to further analysis and discussion.
6. No Constraint areas are active agricultural lands and disturbed areas with limited to no ecological functions.
7. These relative degrees of constraint have been developed to provide input to the planning processes underway for the Subject Lands. Detailed information is included in the accompanying technical report.

ELC Legend (provided as context and guide to some constraint limits)

FOREST
 FOD5-3 Dry-Fresh Sugar Maple-Oak Deciduous Forest
 FOD7-2 Fresh-Moist Ash Lowland Deciduous Forest

SWAMP
 SWD2-2 Green Ash Mineral Deciduous Swamp
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CULTURAL
 CUT1-1 Sumac Cultural Thicket
 CUT1-7* Buckthorn Cultural Thicket
 CUW Deciduous Cultural Woodland Cultural Thicket
 CUT Cultural Thicket
 CUM1-1 Dry-Fresh Old Field Cultural Meadow

P Pond

*Denotes a type not listed in Southern Ontario ELC Guide

- Property boundary
- Adjacent lands
- Butternut
- Stream
- Ecological land classification

Constraint

- No Constraint
- Low Constraint
- Low Constraint - Potential Moderate
- Moderate Constraint

Paletta King Road

Figure 8 Constraint Ranking

PRELIMINARY

0 100 Meters
1:5,000



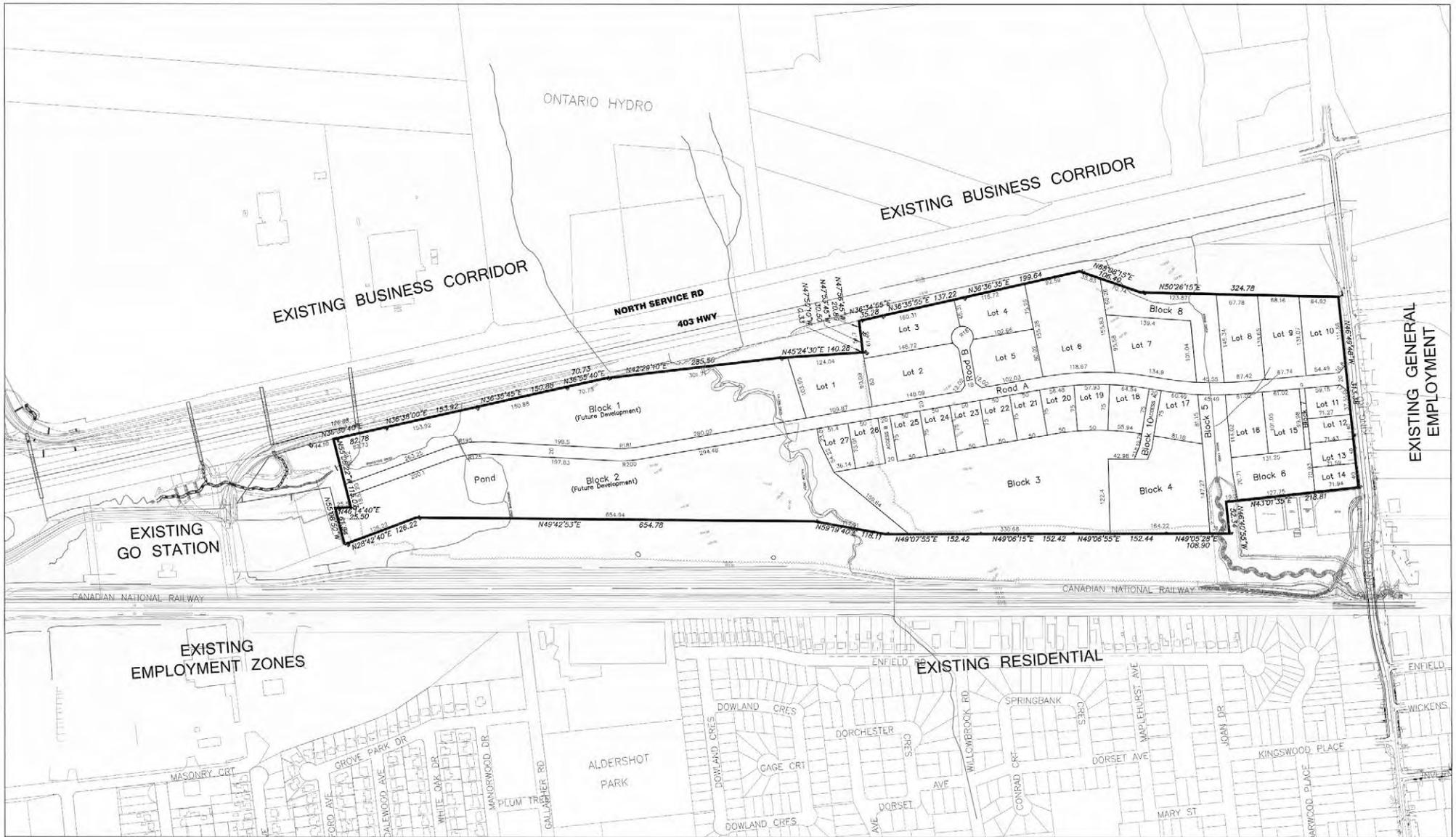
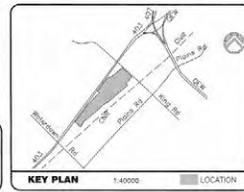


Figure 9 Site Plan

LEGEND:

	Legal Boundary
	Prop. Line
	Creek
	Existing Top of Bank



SCALE 1:2000

REQUIREMENTS OF THE PLANNING ACT, R.S.O. 1990, c. P.13 SECTION 51 (17)

(a) Site Plan	(g) Site Plan
(b) Site Plan	(h) Municipal Report
(c) Site Plan	(i) Site, Dev. Zoned
(d) Employment	(j) Site Plan
(e) Site Plan	(k) Full Municipal Services
(f) Site Plan	(l) Site Plan

OWNERS AUTHORIZATION
ANDER PALLETT

I, the undersigned, Metropolitan Counciling Inc., do hereby authorize and submit the Revised Draft Plan of Subdivision to the City of Burlington for review.

Place Property No. _____ Date _____

SURVEYORS CERTIFICATE
I hereby certify that the boundary of the lands to be subdivided and the requirements of the relevant laws are accurately and truthfully shown on this plan.

[Signature]
DATE: 11/27/14
FOR SURVEYOR AND NOTARY LIMITED

SCHEDULE OF LAND USE

PROPOSED LAND USE	TYPE	HA.	AC.
BUSINESS CORRIDOR	Lot 1-10	17.22	42.53
COMMERCIAL CORRIDOR	Lot 11-12	12.00	29.12
OFFICE SPACE	Block 1-4	14.00	34.50
COUCHING HOUSES	Block 5-8	14.00	34.50
COUCHING DEVELOPMENT	Block 9	14.00	34.50
HOUSING DEVELOPMENT	Block 10-14	14.00	34.50
STORAGE AND/OR WAREHOUSE	Block 15-17	14.00	34.50
INDUSTRIAL DEVELOPMENT	Block 18-28	14.00	34.50
ROADS			
High Road or Arterial	Block 1	0.10	0.25
Other Road or Arterial	Block 2	0.10	0.25
TOTAL PROPERTY AREA		49.17	121.52

2280 QUEENSWAY DRIVE
BURLINGTON, ON L7R 3T2
TEL: 905.637.3242
FAX: 905.637.3289
EMAIL: ENGINEERING@METROPOLITANCONSULTING.COM

METROPOLITAN CONSULTING

PENTA PROPERTIES INC.
4880 Paletta Court
Burlington, Ontario L7R 5R2

City of Burlington

DRAFT PLAN OF SUBDIVISION

PROPERTY
PART OF LOTS 3, 4, 5 AND 6, CON 1, PART 1 RP 20R-11103 AND PART 1 RP 20R-15410
Partially in the Township of Great Harwood, near the City of Burlington, Regional Municipality of Halton

PROJECT
1200 KING ROAD

CITY FILE NO. PROJECT NO.
P10003

DATE: January 16, 2014



SITE PLAN LEGEND:

- EXISTING WATERMAIN
- PROPOSED 300mm ϕ WATERMAIN
- PROPOSED 300mm ϕ WATERMAIN OPTION 1
- PROPOSED 300mm ϕ WATERMAIN OPTION 2
- PROPOSED 300mm ϕ WATERMAIN OPTION 3
- PROPOSED 300mm ϕ WATERMAIN OPTION 4
- PROPOSED 300mm ϕ WATERMAIN OPTION 5

Notes:

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 CUW Deciduous Cultural Woodland
 CUT Cultural Thicket
 CUM1-1 Dry-Fresh Old Field Cultural Meadow
- P Pond

*Denotes a type not listed in Southern Ontario ELC Guide

- Property boundary
- Butternut
- Stream
- Ecological land classification

- Constraint**
- No Constraint
 - Low Constraint
 - Low Constraint - Potential Moderate
 - Moderate Constraint

Paletta King Road

**Figure 10
 Overlay of Site Plan on
 Constraint Mapping**

0 100 Meters
 1:5,000



VOLUME 2

Data Tables

Table 1 Plant Species List (Savanta Inc., 2010)

Species Latin Name	Species Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSE-WIC Status	Global Status G-Rank	Local Status Halton
Reference					NHIC 2014	NHIC 2014		NHIC 2014	Crins et al., 2006
Dryopteridaceae									
<i>Matteuccia struthiopteris</i> var. <i>pensylvanica</i>	Ostrich Fern	5	-3		S5			G5	X
Aceraceae									
<i>Acer negundo</i>	Manitoba Maple	0	-2		S5			G5	X
<i>Acer rubrum</i>	Red Maple	4	0		S5			G5	X
<i>Acer saccharum</i> ssp. <i>saccharum</i>	Sugar Maple	4	3		S5			G5T?	X
Anacardiaceae									
<i>Rhus rydbergii</i>	Western Poison-ivy	0	0		S5			G5T	X
<i>Rhus typhina</i>	Staghorn Sumac	1	5		S5			G5	X
Apiaceae									
<i>Daucus carota</i>	Wild Carrot		5	-2	SE5			G?	X
<i>Sanicula marilandica</i>	Black Snakeroot	5	3		S5			G5	X
Asclepiadaceae									
<i>Asclepias syriaca</i>	Common Milkweed	0	5		S5			G5	X
<i>Cynanchum rossicum</i>	Swallow-wort				SE5			G?	X
Asteraceae									
<i>Achillea millefolium</i> ssp. <i>millefolium</i>	Common Yarrow		3	-1	SE?			G5T?	X
<i>Ambrosia artemisiifolia</i>	Common Ragweed	0	3		S5			G5	X
<i>Arctium lappa</i>	Great Burdock				SE5			G?	X
<i>Arctium minus</i> ssp. <i>minus</i>	Common Burdock		5	-2	SE5			G?T?	X
<i>Symphotrichum ericoides</i> var. <i>ericoides</i>	White Heath Aster				S5			G5T?	X
<i>Aster laevis</i> var. <i>laevis</i>	Smooth Blue Aster	7	5		S5			G5T?	U
<i>Symphotrichum lanceolatum</i> ssp. <i>lanceolatum</i>	Tall White Aster	3	-3		S5			G5T?	X
<i>Aster lateriflorus</i> var. <i>lateriflorus</i>	Calico Aster	3	-2		S5			G5T5	X
<i>Aster macrophyllus</i>	Large-leaved Aster	5	5		S5			G5	X
<i>Symphotrichum novae-angliae</i>	New England Aster	2	-3		S5			G5	X
<i>Bidens frondosa</i>	Devil's Beggar-ticks	3	-3		S5			G5	X
<i>Carduus nutans</i> ssp. <i>nutans</i>	Musk Thistle		5	-1	SE?			G?T?	X

<i>Chondrilla x pratensis</i>	Skeleton-weed		5	-1	SE1			G?	
<i>Chrysanthemum leucanthemum</i>	Ox-eye Daisy		5	-1	SE5			G?	X
<i>Cirsium arvense</i>	Canada Thistle		3	-1	SE5			G?	X
<i>Cirsium vulgare</i>	Bull Thistle		4	-1	SE5			G5	X
<i>Erigeron strigosus</i>	Daisy Fleabane	0	1		S5			G5	X
<i>Eupatorium perfoliatum</i>	Perfoliate Thoroughwort	2	-4		S5			G5	X
<i>Eupatorium rugosum</i>	White Snakeroot	5	3		S5			G5	X
<i>Lactuca serriola</i>	Prickly Lettuce		0	-1	SE5			G?	X
<i>Lapsana communis</i>	Nipplewort		5	-2	SE5			G?	X
<i>Matricaria perforata</i>	Scentless Chamomile		5	-1	SE?			G?	X
<i>Solidago altissima var. altissima</i>	Tall Goldenrod	1	3		S5				X
<i>Solidago caesia</i>	Blue-stem Goldenrod	5	3		S5			G5	X
<i>Solidago flexicaulis</i>	Zig-zag Goldenrod	6	3		S5			G5	X
<i>Sonchus asper ssp. asper</i>	Spiny-leaved Sow-thistle		0	-1	SE5			G?T?	X
<i>Tanacetum vulgare</i>	Common Tansy		5	-1	SE5			G?	X
<i>Taraxacum officinale</i>	Common Dandelion		3	-2	SE5			G5	X
<i>Tussilago farfara</i>	Coltsfoot		3	-2	SE5			G?	X
Balsaminaceae									
<i>Impatiens capensis</i>	Spotted Touch-me-not	4	-3		S5			G5	X
Berberidaceae									
<i>Berberis thunbergii</i>	Japanese Barberry		4	-3	SE5			G?	X
<i>Podophyllum peltatum</i>	May-apple	5	3		S5			G5	X
Betulaceae									
<i>Carpinus caroliniana ssp. virginiana</i>	Blue Beech	6	0		S5			G5T	X
<i>Ostrya virginiana</i>	Hop Hornbeam	4	4		S5			G5	X
Boraginaceae									
<i>Hackelia virginiana</i>	Virginia Stickweed	5	1		S5			G5	U
<i>Myosotis laxa</i>	Smaller Forget-me-not	6	-5		S5			G5	X
Brassicaceae									
<i>Alliaria petiolata</i>	Garlic Mustard		0	-3	SE5			G5	X
<i>Barbarea vulgaris</i>	Yellow Rocket		0	-1	SE5			G?	X
<i>Berteroa incana</i>	Hoary Alyssum		5	-3	SE5			G?	X
<i>Hesperis matronalis</i>	Dame's Rocket		5	-3	SE5			G4G5	X
<i>Lepidium campestre</i>	Field Cress		5	-1	SE5			G?	X
Caprifoliaceae									
<i>Lonicera dioica</i>	Glaucous Honeysuckle	5	3		S5			G5	X

<i>Lonicera tatarica</i>	Tartarian Honeysuckle		3	-3	SE5			G?	X
<i>Viburnum trilobum</i>	High Bush Cranberry	5	-3		S5			G5T5	X
Caryophyllaceae									
<i>Silene latifolia</i>	Bladder Campion				SE5			G?	X
<i>Silene vulgaris</i>	Catchfly		5	-1	SE5			G?	X
Chenopodiaceae									
<i>Atriplex patula</i>	Spreading Atriplex	0	-2		S5			G5	X
<i>Chenopodium album</i> var. <i>album</i>	Lamb's Quarters		1	-1	SE5			G5T5	X
Convolvulaceae									
<i>Convolvulus arvensis</i>	Field Bindweed		5	-1	SE5			G?	X
Cornaceae									
<i>Cornus foemina</i> ssp. <i>racemosa</i>	Red Panicked Dogwood	2	-2		S5			G5?	X
<i>Cornus stolonifera</i>	Red-osier Dogwood	2	-3		S5			G5	X
Dipsacaceae									
<i>Dipsacus fullonum</i> ssp. <i>sylvestris</i>	Wild Teasel		5	-1	SE5			G?T?	X
Euphorbiaceae									
<i>Acalypha virginica</i> var. <i>rhomboidea</i>	Three-seeded Mercury	0	3		S5			G5T5	X
Fabaceae									
<i>Coronilla varia</i>	Variable Crown-vetch		5	-2	SE5			G?	X
<i>Robinia pseudo-acacia</i>	Black Locust		4	-3	SE5			G5	X
<i>Vicia cracca</i>	Tufted Vetch		5	-1	SE5			G?	X
<i>Vicia tetrasperma</i>	Slender Vetch		5	-1	SE5			G?	X
Fagaceae									
<i>Fagus grandifolia</i>	American Beech	6	3		S5			G5	X
<i>Quercus alba</i>	White Oak	6	3		S5			G5	X
<i>Quercus macrocarpa</i>	Bur Oak	5	1		S5			G5	X
<i>Quercus rubra</i>	Red Oak	6	3		S5			G5	X
Geraniaceae									
<i>Geranium maculatum</i>	Spotted Crane's-bill	6	3		S5			G5	X
Grossulariaceae									
<i>Ribes rubrum</i>	Red Currant		5	-2	SE5			G4G5	X

Guttiferae									
<i>Hypericum perforatum</i>	Common St. John's-wort		5	-3	SE5			G?	X
Juglandaceae									
<i>Carya cordiformis</i>	Bitternut hickory	6	0		S5			G5	X
<i>Carya ovata</i> var. <i>ovata</i>	Shagbark Hickory	6	3		S5			G5	X
<i>Juglans cinerea</i>	Butternut	6	2		S3?	END	END	G4	X
<i>Juglans nigra</i>	Black Walnut	5	3		S4			G5	X
Lamiaceae									
<i>Glechoma hederacea</i>	Creeping Charlie		5	-2	SE5			G?	X
<i>Leonurus cardiaca</i> ssp. <i>cardiaca</i>	Common Motherwort		5	-2	SE5			G?T?	X
<i>Lycopus americanus</i>	Cut-leaved Water-horehound	4	-5		S5			G5	X
<i>Lycopus europaeus</i>	European Water-horehound		-5	-2	SE5			G?	X
<i>Monarda fistulosa</i>	Wild Bergamot	6	3		S5			G5	X
<i>Nepeta cataria</i>	Catnip		1	-2	SE5			G?	X
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	Heal-all	5	5		S5			G5T?	X
Lythraceae									
<i>Lythrum salicaria</i>	Purple Loosestrife		-5	-3	SE5			G5	X
Malvaceae									
<i>Malva neglecta</i>	Cheeses		5	-1	SE5			G?	X
Moraceae									
<i>Morus alba</i>	White Mulberry		0	-3	SE5			G?	X
Oleaceae									
<i>Fraxinus americana</i>	White Ash	4	3		S5			G5	X
<i>Fraxinus pennsylvanica</i>	Red Ash	3	-3		S5			G5	X
<i>Ligustrum vulgare</i>	Common Privet		1	-2	SE5			G?	X
<i>Syringa vulgaris</i>	Common Lilac		5	-2	SE5			G?	X
Onagraceae									
<i>Circaea lutetiana</i> ssp. <i>canadensis</i>	Yellowish Enchanter's Nightshade	3	3		S5			G5T5	X
<i>Epilobium coloratum</i>	Purple-veined Willow-herb	3	-5		S5			G5	U
<i>Epilobium hirsutum</i>	Great Hairy Willow-herb		-4	-2	SE5			G?	X
<i>Epilobium parviflorum</i>	Sparse-flowered Willow-herb		3	-1	SE4			G?	X
Polygonaceae									
<i>Polygonum aviculare</i>	Prostrate Knotweed		1	-1	SE5			G?	X
<i>Polygonum convolvulus</i>	Black Bindweed		1	-1	SE5			G?	X

<i>Polygonum hydropiper</i>	Water-pepper	4	-5		SE5		G5	X
<i>Polygonum lapathifolium</i>	Pale Smartweed	2	-4		S5		G5	U
<i>Polygonum persicaria</i>	Lady's-thumb		-3	-1	SE5		G?	X
<i>Rumex crispus</i>	Curly-leaf Dock		-1	-2	SE5		G?	X
Ranunculaceae								
<i>Anemone americana</i>	Round-lobed Hepatica	6	5		S5		G?	U
<i>Clematis virginiana</i>	Virgin's-bower	3	0		S5		G5	X
<i>Ranunculus abortivus</i>	Kidney-leaf Buttercup	2	-2		S5		G5	X
<i>Ranunculus acris</i>	Tall Buttercup			-2	SE5		G5	X
<i>Ranunculus hispidus var. caricetorum</i>	Swamp Buttercup	5	-5		S5		G5T5	X
<i>Ranunculus sceleratus var. sceleratus</i>	Cursed Buttercup	2	-5		S5		G5T5	X
<i>Thalictrum dioicum</i>	Early Meadow-rue	5	2		S5		G5	X
Rhamnaceae								
<i>Rhamnus cathartica</i>	Common Buckthorn		3	-3	SE5		G?	X
Rosaceae								
<i>Agrimonia gryposepala</i>	Tall Hairy Agrimony	2	2		S5		G5	X
<i>Crataegus species</i>	Hawthorn species							
<i>Fragaria vesca ssp. americana</i>	Woodland Strawberry	4	4		S5		G5T?	X
<i>Fragaria virginiana ssp. virginiana</i>	Scarlet Strawberry	2	1		SU		G5T?	X
<i>Geum aleppicum</i>	Yellow Avens	2	-1		S5		G5	X
<i>Geum canadense</i>	White Avens	3	0		S5		G5	X
<i>Potentilla recta</i>	Rough-fruited Cinquefoil		5	-2	SE5		G?	X
<i>Potentilla simplex</i>	Old-field Cinquefoil	3	4		S5		G5	U
<i>Prunus serotina</i>	Black Cherry	3	3		S5		G5	X
<i>Prunus virginiana ssp. virginiana</i>	Choke Cherry	2	1		S5		G5T?	X
<i>Rosa multiflora</i>	Multiflora Rose		3	-3	SE4		G?	X
<i>Rubus idaeus ssp. melanolasius</i>	Wild Red Raspberry	0	-2		S5		G5T	X
<i>Rubus occidentalis</i>	Thimble-berry	2	5		S5		G5	X
Rubiaceae								
<i>Cephalanthus occidentalis</i>	Eastern Buttonbush	7	-5		S5		G5	U
<i>Galium aparine</i>	Cleavers	4	3		S5		G5	X
<i>Galium triflorum</i>	Sweet-scented Bedstraw	4	2		S5		G5	X
Salicaceae								
<i>Populus deltoides ssp. deltoides</i>	Eastern Cottonwood	4	-1		S5		G5T?	X
<i>Salix purpurea</i>	Basket Willow		-3	-1	SE4		G5	X
<i>Salix x rubens</i>	Reddish Willow		-4	-3	SE4		HYB	X

Scrophulariaceae									
<i>Chaenorrhinum minus</i>	Dwarf Snapdragon		5	-1	SE5			G?	X
<i>Linaria vulgaris</i>	Butter-and-eggs		5	-1	SE5			G?	X
<i>Verbascum thapsus</i>	Common Mullein		5	-2	SE5			G?	X
<i>Veronica officinalis</i>	Common Speedwell		5	-2	SE5			G5	X
<i>Veronica serpyllifolia ssp. serpyllifolia</i>	Thyme-leaved Speedwell				SE5			G?T?	X
Tiliaceae									
<i>Tilia americana</i>	American Basswood		4	3	S5			G5	X
Ulmaceae									
<i>Ulmus americana</i>	White Elm		3	-2	S5			G5?	X
Urticaceae									
<i>Pilea pumila</i>	Dwarf Clearweed		5	-3	S5			G5	X
<i>Urtica dioica ssp. dioica</i>	European Stinging Nettle			-1	SE2			G5T?	X
Verbenaceae									
<i>Verbena stricta</i>	Hoary Vervain		7	5	S4			G5	
<i>Verbena urticifolia</i>	White Vervain		4	-1	S5			G5	X
Violaceae									
<i>Viola sororia</i>	Woolly Blue Violet				S5			G5	X
Vitaceae									
<i>Parthenocissus inserta</i>	Inserted Virginia-creeper		3	3	S5			G5	X
<i>Vitis riparia</i>	Riverbank Grape		0	-2	S5			G5	X
Araceae									
<i>Arisaema triphyllum ssp. triphyllum</i>	Small Jack-in-the-pulpit		5	-2	S5			G5T5	X
Cyperaceae									
<i>Carex bebbii</i>	Bebb's Sedge		3	-5	S5			G5	X
<i>Carex granularis</i>	Meadow Sedge		3	-4	S5			G5	X
<i>Carex pensylvanica</i>	Pennsylvania Sedge		5	5	S5			G5	X
<i>Carex projecta</i>	Necklace Sedge		5	-4	S5			G5	U
<i>Carex radiata</i>	Radiate Sedge		4	5	S5			G4	X
<i>Carex stipata</i>	Awl-fruited Sedge		3	-5	S5			G5	X
<i>Cyperus esculentus</i>	Yellow Nut-grass		1	-3	S5			G5	X
<i>Eleocharis obtusa</i>	Blunt Spike-rush		5	-5	S5			G5	U
Juncaceae									

<i>Juncus dudleyi</i>	Dudley's Rush	1	0		S5			G5	X
Lemnaceae									
<i>Lemna minor</i>	Lesser Duckweed	2	-5		S5			G5	X
<i>Spirodela polyrhiza</i>	Greater Duckweed	4	-5		S5			G5	R4
Liliaceae									
<i>Allium sativum</i>	Garden Garlic		5	-1	SE2			G?	X
<i>Asparagus officinalis</i>	Garden Asparagus		3	-1	SE5			G5?	X
<i>Convallaria majalis</i>	Lily-of-the-valley		5	-2	SE5			G5	X
<i>Maianthemum racemosum ssp. racemosum</i>	False Solomon's Seal	4	3		S5			G5T	X
<i>Polygonatum pubescens</i>	Hairy Solomon's Seal	5	5		S5			G5	X
<i>Trillium grandiflorum</i>	White Trillium	5	5		S5			G5	X
Orchidaceae									
<i>Epipactis helleborine</i>	Common Helleborine		5	-2	SE5			G?	X
Poaceae									
<i>Alopecurus pratensis</i>	Meadow Foxtail		-3	-1	SE5			G?	X
<i>Arrhenatherum elatius</i>	Tall Oat Grass		3	-1	SE4			G?	X
<i>Bromus inermis ssp. inermis</i>	Awnless Brome		5	-3	SE5			G4G5T?	X
<i>Bromus tectorum</i>	Downy Chess		5	-2	SE5			G?	X
<i>Dactylis glomerata</i>	Orchard Grass		3	-1	SE5			G?	X
<i>Echinochloa crus-galli</i>	Common Barnyard Grass		-3	-1	SE5			G?	X
<i>Elymus repens</i>	Quack Grass		3	-3	SE5			G?	X
<i>Glyceria grandis</i>	Tall Manna Grass	5	-5		S4S5			G5	X
<i>Glyceria maxima</i>	Sweet Manna Grass		-5	-1	SE5			G?	X
<i>Glyceria striata</i>	Fowl Meadow Grass	3	-5		S5			G5	X
<i>Hordeum jubatum ssp. jubatum</i>	Squirrel-tail Grass		-1	-1	SE5			G5T?	X
<i>Poa compressa</i>	Canada Blue Grass	0	2		S5			G?	X
<i>Poa pratensis ssp. pratensis</i>	Kentucky Bluegrass	0	1		S5			G5T	X
Typhaceae									
<i>Typha angustifolia</i>	Narrow-leaved Cattail	3	-5		S5			G5	X
<i>Typha x glauca</i>	Glaucous Cattail	3	-5		S5			HYB	X
STATISTICS									
Species Richness									
Total Number of Species:		176							
Native Species:		100	57%						
Exotic Species		76	43%						

S1-S3 Species	1	1%							
S4 Species	3	3%							
S5 Species	95	96%							
Floristic Quality Indices									
Mean Co-efficient of Conservatism (CC)	3.6								
CC 0 - 3 lowest sensitivity	45	46%							
CC 4 - 6 moderate sensitivity	50	51%							
CC 7 - 8 high sensitivity	3	3%							
CC 9 - 10 highest sensitivity	0	0%							
Floristic Quality Index (FQI)	35								
Weedy and Invasive Species									
Mean Weediness Index	-1.7								
-1 low potential invasiveness	35	49%							
-2 moderate potential invasiveness	22	31%							
-3 high potential invasiveness	14	20%							
Wetland Species									
Mean Wetness Index	1.2								
upland	45	27%							
facultative upland	47	28%							
facultative	29	17%							
facultative wetland	29	17%							
obligate wetland	18	11%							

Table 2 Amphibian Species List (Savnata Inc., 2010)

Common Name	Scientific Name	Global Status G-rank (NHIC, 2013)	Provincial Status S-rank (NHIC, 2013)	MNR (NHIC, 2013)	COSEWIC (NHIC, 2013)	Eco-region 7E Candidate SWH Species (OMNR, 2012)	Local Status (Dwyer, 2006)
Eastern American Toad	<i>Bufo americanus</i>	G5	S5			x	Abundant
Gray Treefrog	<i>Hyla versicolor</i>	G5	S5			x	Abundant
Green Frog	<i>Rana clamitans</i>	G5	S5			x	Abundant
<p>S ranks: Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperiled), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list October 2013</p>							
<p>G ranks: Global ranks are from the Natural Heritage Information Centre; G1 (extremely rare), G2 (very rare), G3 (rare to uncommon), G4 (common), G5 (very common); ranks were updated using NHIC species list October 2013</p>							
<p>COSSARO (MNR): Ontario Species at Risk as listed by the Committee on the Status of Species at Risk in Ontario (from NHIC Table October 2013); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk; Candidate Species at Risk to be assessed by COSSARO are listed online: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/STDPROD_068707.html/. Status were updated based on the results of the COSSARO meetings in June and January 2013 as released in April 2014.</p>							
<p>COSEWIC: Canada Species at Risk as listed by the Committee on the Status of Endangered Wildlife in Canada (from NHIC Table October 2013); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk; Candidate Species at Risk to be assessed by COSEWIC are listed online: www.cosewic.gc.ca/eng/sct3/index_e.cfm/.</p>							
<p>Eco-region 7E: Candidate SWH species as outlined in the Province's draft criteria for Eco-region 7E (OMNR, 2012)</p>							
<p>Local Status: Halton Natural Areas Inventory (Dwyer, 2006)</p>							

Table 3 Mammals, Reptiles, Insects Recorded

Savanta 2010

Common Name	Scientific Name	Global Status G-rank (NHIC, 2013)	Provincial Status rank (NHIC, 2013)	MNR (NHIC, 2013)	COSEWIC (NHIC, 2013)	Eco-region 7E Candidate SWH Species (OMNR, 2012)	Local Status (Dwyer, 2006)
Mammalia							
Northern Raccoon	<i>Procyon lotor</i>	G5	S5				Common
White footed/ Deer Mouse	<i>Peromyscus maniculatus</i>	G5	S5				Common
Eastern Cottontail	<i>Sylvilagus floridanus</i>	G5	S5				Common
Big Brown Bat	<i>Eptesicus fuscus</i>	G5	S5			x	Common
Red Squirrel	<i>Sciurus vulgaris</i>	G5	S5				Common
Short-tailed/Long Tailed Weasel	<i>Mustela frenata</i>	G5	S4				Common
Eastern Chipmunk	<i>Tamias striatus</i>	G5	S5				Common
Meadow Vole	<i>Microtus pennsylvanicus</i>	G5	S5				Common
Eastern Grey Squirrel	<i>Sciurus carolinensis</i> ,	G5	S5				Common
Beaver	<i>Castor canadensis</i>	G5	S5				Common
American Mink	<i>Mustela vison</i>	G5	S4				Common
White-tailed Deer	<i>Odocoileus virginianus</i>	G5	S5			x	Common
Herpetofauna							
Common Snapping Turtle	<i>Chelydra serpentina</i>	G5	S3	SC	SC	x	Common
Midland Painted Turtle	<i>Chrysemys picta</i>	G5T5	S5			x	Common
Odonata							
Canada Darner	<i>Aeshna canadensis</i>	G5	S5				Uncommon
Common Green Darner	<i>Anax junius</i>	G5	S5				Common
Ebony Jewelwing	<i>Calopteryx maculata</i>	G5	S5				Common
Common Baskettail	<i>Epitheca synosura</i>	G5	S5				Uncommon
Familiar Bluet	<i>Enallagma civile</i>	G5	S5				Common
Eastern Forktail	<i>Ischnura verticalis</i>	G5	S5				Common

Table 3 Mammals, Reptiles, Insects Recorded

Savanta 2010

Common Name	Scientific Name	Global Status G-rank (NHIC, 2013)	Provincial Status S- rank (NHIC, 2013)	MNR (NHIC, 2013)	COSEWIC (NHIC, 2013)	Eco-region 7E Candidate SWH Species (OMNR, 2012)	Local Status (Dwyer, 2006)
Northern Spreadwing	<i>Lestes disjunctus</i>	G5	S5				Rare
Slender Spreadwing	<i>Lestes rectangularis</i>	G5	S5				Common
Lyre-Tipped Spreadwing	<i>Lestes unguiculatus</i>	G5	S5				Common
Widow Skimmer	<i>Libellula lucuosa</i>	G5	S5				Common
Twelve-spotted Skimmer	<i>Libellula pulchella</i>	G5	S5				Common
Wandering Glider	<i>Pantala flavescens</i>	G5	S4				Uncommon
Common Whitetail	<i>Plathemis lydia</i>	G5	S5				Common
Cherry-faced Meadowhawk	<i>Sympetrum internum</i>	G5	S5				Common
Ruby Meadowhawk	<i>Sympetrum rubicundulum</i>	G5	S5				Common
Black Saddlebags	<i>Tramea lacerata</i>	G5	S4				Common
Lepidoptera							
8 Spotted Forester	<i>Alypia octomaculata</i>	G5	S5				N/A
Least Skipper	<i>Ancyloxypha numitor</i>	G5	S5				Common
Arctic Skipper	<i>Carterocephalus palaemon</i>	G5	S5				Common
Spring Azure Complex	<i>Celastrina ladon</i>	G4G5	S5				Common
Summer Azure Complex	<i>Celastrina neglecta</i>	G5	S5				Common
Yellow Collared Scape Moth	<i>Cisseys fulvicollis</i>	G5	SNR				NA
Plume Moth	<i>Cnaemidophorus rhododactylus</i>	GNR	SNR				NA
Common Ringlet	<i>Coenonympha tullia</i>	G5	S5				Common
Orange Sulphur	<i>Colias eurytheme</i>	G5	S5				Common
Common Sulphur	<i>Colias philodice</i>	G5	S5				Common
Virginia Ctenucha Moth	<i>Ctenucha virginica</i>	G5	S5				Common
Monarch	<i>Danaus plexippus</i>	G5	S4B, S2N	SC	SC		Common
Eastern tailed blue	<i>Everes comyntas</i>	G5	S5				Common

Table 3 Mammals, Reptiles, Insects Recorded

Savanta 2010

Common Name	Scientific Name	Global Status G-rank (NHIC, 2013)	Provincial Status S- rank (NHIC, 2013)	MNR (NHIC, 2013)	COSEWIC (NHIC, 2013)	Eco-region 7E Candidate SWH Species (OMNR, 2012)	Local Status (Dwyer, 2006)
Silvery Blue	<i>Glaucopsyche lygdamus</i>	G5	S5				Common
Viceroy	<i>Limenitis archippus</i>	G5	S5				Common
White Admiral	<i>Limenitis arthemis arthemis</i>	G5	S5				Common
Red Spotted Purple	<i>Limenitis arthemis asthyanx</i>	G5T5	S5				Common
Little Wood Satyr	<i>Megisto cymela</i>	G5	S5				Common
Mourning Cloak	<i>Nymphalis antiopa</i>	G5	S5				Common
Canadian Tiger Swallowtail	<i>Papilio canadensis</i>	G5	S5				N/A
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	G5	S4S5				Common
Black Swallowtail	<i>Papilio polyxenes</i>	G5	S5				Common
Northern Crescent	<i>Phyciodes cocyta</i>	G5	S5				N/A
Early Peal Crescent	<i>Phyciodes tharos</i>	G5	S4				Common
Cabbage White	<i>Pieris rapae</i>	G5	SNA				Common
Question Mark	<i>Polygonia interrogationis</i>	G5	S5				Common
Eyed Brown	<i>Satyrodes eurydice</i>	G4	S5				Common
Virginia Tiger Moth	<i>Spilosoma virginica</i>	G5	S5				Common?
European Skipper	<i>Thymelicus lineola</i>	G4	SNA				Common
Red Admiral	<i>Vanessa atalanta</i>	G5	S5B				Common
<p>S ranks: Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperiled), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list October 2013</p>							
<p>G ranks: Global ranks are from the Natural Heritage Information Centre; G1 (extremely rare), G2 (very rare), G3 (rare to uncommon), G4 (common), G5 (very common); ranks were updated using NHIC species list October 2013</p>							

Table 3 Mammals, Reptiles, Insects Recorded

Savanta 2010

Common Name	Scientific Name	Global Status G-rank (NHIC, 2013)	Provincial Status rank (NHIC, 2013)	MNR (NHIC, 2013)	COSEWIC (NHIC, 2013)	Eco-region 7E Candidate SWH Species (OMNR, 2012)	Local Status (Dwyer, 2006)
<p>COSSARO (MNR): Ontario Species at Risk as listed by the Committee on the Status of Species at Risk in Ontario (from NHIC Table October 2013); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk; Candidate Species at Risk to be assessed by COSSARO are listed online: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/STDPROD_068707.html/. Status were updated based on the results of the COSSARO meetings in June and January 2013 as released in April 2014.</p>							
<p>COSEWIC: Canada Species at Risk as listed by the Committee on the Status of Endangered Wildlife in Canada (from NHIC Table October 2013); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk; Candidate Species at Risk to be assessed by COSEWIC are listed online: www.cosewic.gc.ca/eng/sct3/index_e.cfm/.</p>							
<p>Eco-region 7E: Candidate SWH species as outlined in the Province's draft criteria for Eco-region 7E (OMNR, 2012)</p>							
<p>Local Status: Halton Natural Areas Inventory (Dwyer, 2006)</p>							

Table 4 – Burlington King Road Raw Data from Benthic Samples (Entomogen 2012)

Class	Order	Family	Falcon Creek	Falcon Creek Reference	Indian Creek	Grindstone	Grindstone Reference	TOTAL
ANNELIDA	HIRUDINEA	GLOSSIPHONIIDAE				1		1
ANNELIDA	OLIGOCHAETA		1	16	35	42	10	104
COLLEMBOLA	PODUROMORPHA	HYPOGASTURIDAE		1				1
CRUSTACEA	AMPHIPODA		20				6	26
CRUSTACEA	CLADOCERA	DAPHNIA	1					1
CRUSTACEA	COPEPODA				1			1
CRUSTACEA	OSTRACODA				1			1
GASTROPODA	BASOMMATOPHORA	LYMNAEIDAE		7	3	1	1	12
GASTROPODA	BASOMMATOPHORA	PHYSIDAE				1		1
GASTROPODA	BASOMMATOPHORA	PLANORBIIIDAE			1		1	2
INSECTA	COLEOPTERA	ELMIDAE		1				1
INSECTA	DIPTERA	CERATOPOGONIDAE	1	1				2
INSECTA	DIPTERA	CHIRONOMIDAE	308	740	3	2	40	1093
INSECTA	DIPTERA	TABANIDAE		3	3		7	13
INSECTA	DIPTERA	TIPULIDAE		4				4
INSECTA	DIPTERA	PSYCHODIDAE		1				1
INSECTA	DIPTERA	Unknown pupa	3	3			1	7
INSECTA	MEGALOPTERA	SIALIDAE					1	1
INSECTA	PLECOPTERA	CAPNIIDAE	5				1	6
INSECTA	PLECOPTERA	NEMOURIDAE		5				5
INSECTA	PLECOPTERA	LEUCTRIDAE	1					1
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	2					2
INSECTA	TRICHOPTERA	LIMNEPHILIDAE		1			3	4
INSECTA	TRICHOPTERA	POLYCENTROPODIDAE	1	1				2
INSECTA	TRICHOPTERA	UENOIDAE	3	8				11
MALACOSTRACTA	ISOPODA		12	51	22			85
NEMATODA				1				1
PELECYPODA	VENEROIDA	PISIDIIDAE		2	2		12	16
TURBELLARIA						3		3
Terrestrial Drop-in			2			2	2	6
Total			360	846	71	52	85	1414

Table 5 - Ecological Studies Personnel and Conditions (2010-2011)

Project No.	Survey Type	Surveyors (lead first)	Survey Date	Survey Start Time	Survey End Time	Air Temp (°C)	Humidity (%)	Cloud cover (%)	Beaufort wind speed ⁺	Wind Direction	Precipitation
2010 Ecological Surveys											
6378	Breeding Amphibian Survey	D. McRae, P. Burke	14-Apr	20:00	22:00	9	58	50	2	N	
6378	Breeding Bird Survey and Area Search	D. McRae, P. Burke	20-Apr	5:30	10:30	6	63	0	2	N	
6378	Ecological Land Classification and Botanical inventory	C.Zoladeski	07-May	9:00	12:00	7	67	5	2	NW	
6378	Breeding Bird Survey and Area Search and Breeding Amphibian Survey	D. McRae, P. Burke	19-May	5:30	10:30	11	59	5	2	N	
6378	Ecological Land Classification and Botanical inventory	C.Zoladeski	27-May	9:00	12:00	11	94	100	3	NE	drizzle
6378	Breeding Bird Survey and Area Search	D. McRae, P. Burke	10-Jun	5:30	10:30	15	86	90	3	NW	
6378	Breeding Amphibian Survey	C. Zoladeski	28-Jun	22:00	23:00	21	68	0	2	NW	
6378	Lepidoptera and Odonate survey	C. Kerling and J. Vickruck (Entomogen Inc.)	30-Jun	-	-	8	51	0	4	NW	
6378	Lepidoptera and Odonate survey	C. Kerling and J. Vickruck (Entomogen Inc.)	27-Jul	-	-	17	54	0	3	SE	
6378	Breeding Bird Survey and Area Search	D. McRae, P. Burke	03-Jul	5:30	10:30	17	76	0	3	SW	

6378	Ecological Land Classification and Botanical inventory	C.Zoladeski	30-Jul	9:00	12:00	17	76	90	2	NE	
6378	Lepidoptera and Odonate survey	C. Kerling and J. Vickruck (Entomogen Inc.)	25-Aug	-	-	19	75	100	2	SE	
6378	Ecological Land Classification and Botanical inventory	C.Zoladeski	01-Oct	9:00	12:00	6	61	5	4	N	
2011 Ecological Surveys											
6378	Rapture Survey	Burke	07-Mar	5:30	10:30	-12	75	90	4	NW	
6378	Breeding Amphibian Survey	S. Geddes	04-May	20:30	22:30	13	30	60	3	NW	
6378	Breeding Amphibian Survey	C. Zoladeski, G. Buckton	27-May	21:30	23:00	12	98	100	3	E	drizzle and fog
6378	Lepidoptera and Odonate survey (resurvey)	C. Kerling and J. Vickruck (Entomogen Inc.)	10-Jun	-	-	9	58	90	3	SE	
6378	Breeding Amphibian Survey	A. Zimic C. Zoladeski	26-Jun	21:30	23:30	15	73	90	3	SE	
Beaufort Wind Speed Scale⁺											
0	Calm (<1 km/hr)										
1	Light Air (1-5 km/hr)										
2	Light Breeze (6-11 km/hr)										
3	Gentle Breeze (12-19 km/hr)										
4	Moderate Breeze (20-28 km/hr)										

VOLUME 2

Principal Authors

TOM HILDITCH

President & CEO

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SELECT PROJECT EXPERIENCE

- North Markham Natural Heritage System Critique, Assessment and Alternate Design, NMLG
- Environmental Baseline, Impact Assessment and Natural Heritage System Design Studies, North-west Brampton
- Ninth Line Natural Heritage Planning Critique and Assessment
- Official Plan Natural Heritage Policy and Guideline Assessment and Critique, Cities of London, Ottawa, Hamilton, and Halton, Peel and York Regions, on behalf of major Landowner Groups
- Integrated Coastal Zone Planning and Management, China; CIDA and World Bank
- Subwatershed Planning and Management, City of Brampton
- Orinoco-Apure Sustainable Development Rapid Assessment; CIDA funded with CAF and the Government of Venezuela
- Humber River System Ecosystem Definition, TRCA, Toronto, Canada
- Grandview Ravines Environmental Impact Assessment (EIA) and Condition Implementation, Brantford
- State of the Aggregate Resource in Ontario Study, Directed Rehabilitation Paper 6

INTRODUCTION

Mr. Hilditch is an environmental professional specializing in Environmental Impact Assessment, Environmental Planning and Ecological Restoration. During the past 33 years, he has directed or managed hundreds of projects in Canada, China, Hong Kong, Japan, Venezuela, and Equatorial Guinea. He has developed a broad appreciation for a full range of environmental challenges and solutions and he specializes in collaboratively and creatively resolving complex environmental challenges.

PUBLIC SECTOR AND STAKEHOLDER WORK

Mr. Hilditch has worked with National, State, Federal, Provincial and local governments, in the delivery of projects related to regional, coastal zone and local planning, as well as legislation, policy and associated guideline development. For example, he assisted the Government of Venezuela in the development of a Biodiversity Conservation Framework; he trained planners and politicians in coastal zone planning and management in China; he developed Rapid Coastal Zone Plans in Liaoning, Shandong, Jiangsu and Fujian Provinces (China) and he assisted the Province of Ontario with guideline documents and practical, technical and training manuals that would support natural heritage aspects of Provincial Policy.

That Ontario natural heritage policy and guideline development project required that Mr. Hilditch train about 600 of Ontario's scientists, academics, engineers, land use and environmental planners, NGOs and regulators, in the practice of Impact Assessment for developments that pose potential effects on adjacent significant ecological resources.

He has also assisted the Province of Ontario in their assessment of Species at Risk Safe Harbour Agreements, the assessment of proposals to restore local habitats and the communication of critical information (web-based) to various stakeholders regarding species at risk characteristics, significance and ecology.

Tom has directed numerous innovative projects, which drew together private, ENGO and government partners to create positive and unique SAR outcomes (e.g., American Badger Recovery tool development, SAR restoration guidelines for the extractives industry and invasive species control initiatives on Lake Erie Sand dunes, sandspits and savannahs).

SELECT PROJECT EXPERIENCE

- Tillsonburg Golf Course Expansion EIA
- Grandview Resort Golf Course Development EIA, Huntsville
- Environmental Baseline, Impact Assessment and Natural Heritage System Design Study, Heritage Heights, Brampton
- Nelson Burlington Quarry License Expansion and Rehabilitation Design
- Environmental Inventory Reporting, North Oakville Secondary Plan Implementation
- EIAs for Clublink Corporation: Kings Riding, Cherry Downs, Rolling Hills
- EIAs for Kaneff Group Golf Course developments: Royal Ontario, Lionhead
- EIA for golf course, resort and condo development, Grand Niagara, Niagara Falls
- Eagle Heights Environmental Impact Assessment, Environmental Monitoring and Expert Testimony
- St Marys Cement Greenfield Quarry EIA and ARA Application, Flamborough
- Brighton, Presqu'île Species at Risk Conservation and Restoration Planning, St Marys Cement
- American Badger Strategic Assessment of Range and Soils/Habitat; Creation of Innovative Recovery Tools

PRIVATE SECTOR WORK

Mr. Hilditch has completed hundreds of site-specific impact studies, to satisfy regulatory requirements. These projects have required the design and implementation of scientific inventories, assessments of significance and sensitivity to potential development related effects and the development of sound mitigation measure recommendations. He has worked amongst various stakeholders, many involving the design and restoration of rare habitats for plant and wildlife Species At Risk (SAR).

Mr. Hilditch has been actively involved and directed the natural heritage components of the planning and design of future, healthy communities in about 5,000 ha of future urban lands in southern Ontario. He has, in that landscape scale work, completed baseline surveys, impact assessment work and the design and implementation of new natural heritage systems as integral components of development.

He has worked with some of Canada's largest land development companies, assisting them in strategic planning for land acquisition and disposition and is working with a number of clients assisting in the consideration of ecosystem monetization and the preparation for adaptation requirements associated with climate change.

SCIENTIFIC AND INDUSTRY ASSOCIATION WORK

Tom has been active as well in a number of relevant scientific and industry committees and associations over the years. For the 5 years leading up to early 2014, he served as a member and Chair of the Species at Risk Program Advisory Committee (SARPAC), a body reporting to Ontario's Minister of Natural Resources, regarding the implementation of Ontario's *Endangered Species Act, 2007*. He served as a Director on the Ontario Board for, Nature Conservancy Canada and has remained an active participant in the Building and Land Development Industry of Ontario (BILD) and served as the Special Advisor to the Board of Directors of the Ontario Stone, Sand and Gravel Association (OSSGA), for all matters related to environment and natural heritage.

Tom has served as the President of the Canadian Chapter of the Society of Wetland Scientists and for the Ontario Canadian Land Reclamation Association (Ontario).

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SELECT PROJECT EXPERIENCE

- Airport Expansion, Screening Level Environmental Assessment, Equatorial Guinea, Africa
- Mai Po Wetland EIS and Conservation Planning Investigation, Hong Kong, PRC
- Niagara Waterfront Planning Study; Master Planning for Economic Rejuvenation
- Municipal Class Environment Assessment – Scarborough Golf Club Road – Rail Separation
- Municipal Class Environment Assessment – Jackson District Sanitary and Storm Sewer
- Horseshoe Valley Resort Corporation – Sewage Treatment Class Environment Assessment
- Kingston Area Waste Management Master Plan
- GO Transit Class EA - Rail Line Upgrade, Toronto
- Swan Lake Wetland Management Concept Plan, Wehai Province, PRC
- Downsview National Urban Park Design and Green Infrastructure Plan
- Greening of the Official Plan, Regional Municipality of York
- Elephant Conservation ENGO Observations & Opportunities, Confidential Exploratory Document

SELECT PUBLICATIONS AND PRESENTATIONS

The 2014 Provincial Planning Statement and Environmental Protection. Land Development & Planning Forum, 2014. Toronto, Canada.

The Ontario Endangered Species Act Conference, Founder and Chair, Royal Ontario Museum, April 2013.

Innovations in Endangered Species Legislation. 2nd World Biodiversity Congress, Kuching, Malaysia, September 2011.

Endangered Species Legislation as a Stimulus For Habitat Restoration. Society for Ecological Restoration, Merida, Mexico, August 2011.

The Presqu'île Bay Species at Risk Outreach Project case Study, International Association For Great lakes Research, May 17 – 21, 2010, Toronto.

Endangered Species Act, 2007. Implications and Opportunities. Ontario Stone Sand and Gravel Rehabilitation Tour, September 25, 2008. Bowmanville. September 11, 2008.

Endangered Species Act, 2007. Consequences and Opportunities. Ontario East Municipal Conference. Kingston September 11, 2008.

Endangered Species Act, 2007, A Private Sector Perspective, Ontario Bar Association, February 26, 2008.

A Private Sector Species at Risk Initiative - St. Mary's Cement and Great Lakes Wetland Stewardship, A.D. Latornell Conservation Symposium, November 14, 2007.

"An Overview of Canadian Environmental Technologies", T. W. Hilditch, Invited Speaker, Environment 2001 Conference, Abu Dhabi, United Arab Emirates, February 2001.

"Achieving Excellence in Natural Heritage Planning", T. W. Hilditch, D. Charlton, R. Hubbard, Ontario Provincial Planners Conference, October 2000, Niagara Falls, Canada.

"Biodiversity Planning; Multi-layered Stakeholder Consensus Building, A Model For Success", International Association for Impact Assessment, Annual Meeting, April 1998, Christchurch, New Zealand, T. W. Hilditch, Presenter and Workshop Co-Facilitator.

"Provincial Wetlands Policy, Environmental Impact Study Requirements", T.W. Hilditch, Society of Wetland Scientists, Washington 1994.

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Brick Wetlands Complex, An EIS Case Study”, T. W. Hilditch. Wetlands Boundaries, Buffers and Gradients Conference, Waterloo, Ontario, Canada, April 1994.

Wetland Impact Mitigation Techniques, A Case Study, T. W. Hilditch, Presented to the Ontario Ministries of Natural Resources and Transportation, February 1994.

Wetland Policy Statement – Implementation Issues and Experiences, Long Range Planning Directors, Ontario Municipalities Association, December 1993.

Woodland Evaluation Systems – Their Use and Application in Municipal Planning, T. W. Hilditch, The Significant Woodlands Workshop, Ontario Ministry of Natural Resources, Dorset, November 1993.

Buffers for the Protection of Wetland Ecological Integrity – A Model For Buffer Determination, T. W. Hilditch, International Association of Ecology’s IV International Wetlands Conference, September 1992, Columbus, Ohio.

GIS As A Tool For Ecological Mapping and Impact Assessment of an Environmentally Sensitive Area, Presented To The International Association For Impact Assessment, Annual Meeting, The World Bank, Washington D.C., August 1992.

EDUCATION

- B.Sc. Agr., Resources Management, University of Guelph

PROFESSIONAL AND OTHER AFFILIATIONS

- Society for Conservation Biology
- International Association for Impact Assessment
- Ontario Field Ornithologists
- Canadian Society of Environmental Biologists
- International Association for Environmental Philosophy
- The International Society for Ecological Economics
- Ontario Stone, Sand and Gravel Association
- Society for Ecological Restoration
- Canadian Land Reclamation Association



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EMPLOYMENT HISTORY

- Savanta Inc. 2006 – Current: President & CEO
- Stantec Consulting 2005 – 2006: Vice President
- Stantec Consulting 2005 – 2005: Senior Principal
- Stantec Consulting 2003 – 2005: Principal
- ESG International Inc 2001 – 2003: President
- ESG International Inc 1997 – 2001: Vice President
- ESG International Inc 1994 – 1997: Senior Ecologist, Principal
- Gartner Lee Ltd 1989 – 1994: Senior Ecologist, Associate
- Gartner Lee Ltd 1983 – 1989: Ecologist
- Lake Simcoe Region Conservation Authority 1981 – 1983: Forest and Wetland Technician
- Ecologistics Ltd 1981: Manager, Field Biology Team
- Toronto and Region Conservation Authority 1979-1981: Field Biologist, Environmentally Significant Areas Study

SEAN GEDDES
**Manager of Aquatic
Sciences**www.savanta.ca**SELECT PROJECT EXPERIENCE**

- Project Aquatic Biologist, North Markham Land Use Planning and Secondary Plan Development, Markham
- Project Aquatic Biologist, Northwest Brampton Conceptual Fisheries Compensation Plan, Brampton
- Project Aquatic Biologist, Nelson Aggregates Proposed Burlington Quarry Extension, Burlington
- Project Ecologist, Proposed Flamborough Quarry Haul Route Study
- Project Manager, Grand River Wall Repairs and Species at Risk Assessments, Paris
- Project Manager, King Road Development Area Environmental Impact Statement, Burlington
- Project Manager, Ellesmere Medical Health Centre Natural Heritage Impact Assessment, Scarborough
- Project Aquatic Biologist, Eagle Heights Development Area, Burlington
- Project Aquatic Biologist, North Newmarket Land Use Planning (Secondary Plan), Newmarket
- Project Manager, Area 48 Master Environmental Servicing Plan, Phases 1 & 2, Brampton
- Project Manager, Brantford Industrial Park Site Development and Fisheries Compensation
- Project Manager, Piers 22 & 27 Site Development, Hamilton Harbour
- Project Co-Manager, Redside Dace Management Approaches in the Golden Horseshoe, MNR / BILD
- Project Aquatic Biologist, Island Falls Hydroelectric Dam EA, Phase 1, Smooth Rock Falls
- Project Biologist, Columbia Lake Dam Removal and Lake Enhancement

INTRODUCTION

Sean has over 23 years of experience in the fisheries and aquatic habitat field, including fish habitat assessments, impact analyses and site monitoring for projects in the aggregate, waste management, energy, transportation, and land planning and development sectors. His experience includes a mix of private and public sector work, with projects ranging from streams to large rivers and small inland lakes to the Great Lakes environments.

Sean served as a plan review aquatic biologist with the Grand River Conservation Authority (GRCA). With the GRCA, he was responsible for the review of projects under Section 35 of the Federal Fisheries Act on behalf of Fisheries and Oceans Canada as part of a Level 3 Agreement with the agency. As a result, Sean brings with him extensive experience in the permits and approvals process, including developing and negotiating fish habitat mitigation and compensation approaches as they are outlined in formal Letters of Intent and Fisheries Act authorizations. Sean has also held positions with the Ontario Ministry of Natural Resources, the Ministry of the Environment and the University of Guelph.

EDUCATION

- Specialized Honours Bachelor of Science, University of Guelph
 - Area of Specialization: Fisheries Biology
 - Strong emphasis in Wildlife Biology

CERTIFICATION AND TRAINING

- Canadian Environmental Conference and Tradeshow (CANECT), Annual speaker since 2007.
- TRCA Sediment and Erosion Control Workshop, 2003.
- Advanced Fish Habitat Training Sessions (numerous), 1998-2003.
- Fluvial Geomorphology Introductory and Advanced Training Courses, 2002.
- Dam Removal and Restoration of Biological Integrity, 2001.
- Design Standards for Improving Fish Habitat Management, 2001.
- Stream Restoration: Natural Channel Design, 2000.
- Regional Habitat Enforcement Training Course, 2000.
- Second International Conference on Natural Channel Systems, 1999.

EMPLOYMENT HISTORY

- Savanta Inc., 2009 - Current: Manager of Aquatic Sciences.
- Stantec Consulting, 2003 – 2009: Associate/Senior Project Manager.
- Grand River Conservation Authority, 1997 – 2003: Aquatic Biologist, Plan Review.
- Ecoplans Ltd., 1993 – 1997: Aquatic Biologist.
- Dance Environmental Inc., 1992 – 1993: Contract Fisheries Biologist.
- Grand River Conservation Authority, 1992: Critical Habitat Technician.
- Grand River Conservation Authority, 1991: Fish Habitat Restoration Technician.
- University of Guelph, 1991: Fish Genetics Technician.
- Ministry of the Environment, 1990: Aquatic Survey Technician.
- Ministry of Natural Resources, Lake Erie Research Unit, 1986-1990: Aquatic Technician, Fisheries and Limnology



ANTONETTE ZIMIC

www.savanta.ca

Project Manager

SELECT PROJECT EXPERIENCE

- Tillsonburg Golf and Country Club Expansion, Environmental Impact Assessment
- Calloway REIT, Halton Hills, 401 Corridor Sub-watershed Impact Study.
- Oriskany Sandstone (Cayuga Lands) Management Plan and Safe Harbour Agreement Overview, Nelson Aggregate Co. and MNR.
- King Road Environmental Impact Study, Burlington.
- Bronte Road and Lakeshore Road West Proposed Mature Lifestyle Development Environmental Impact Study, Oakville.
- Lionhead Golf and Country Club, Environmental Impact Study, Brampton.
- Star Oak Developments, Environmental Impact Study, Oakville.
- Eagle Heights and Taylor Lands Environmental Impact Study, Burlington.
- Derry Green Business Park Environmental Impact Study, Milton.
- Yonge and Greenlane Environmental Impact Study, East Gwillimbury.

INTRODUCTION

Antonette has over 20 years of experience working in the environmental impact assessment field. Initially in the public sector as a Regulations Enforcement Officer for the Niagara Peninsula Conservation Authority and as a Resource Technician and Customer Service Representative with The Ontario Ministry of Natural Resources. Ms. Zimic played an active part of the coordination, enforcement and administration of the Authority's Fill, Construction and Alteration to Waterways Regulation, where she prepared reports for approval by board members relating to works around watercourses, identified flood and erosion hazard areas and engaged in pro-active education of the public, local municipalities, and other government agencies with respect to the Authority's regulations.

The last ten years with the Province were focused primarily upon Species at Risk in the multiple areas of project planning, fieldwork and rare species mapping. Antonette assisted in the administration of the Guelph District Species at Risk program and also played key roles in studies across Ontario that focused on Wood Turtle, Black Rat Snake, White Wood Aster, Cucumber Tree and Red Mulberry.

Coordinating environmental projects, completing environmental impact studies, fieldwork, budgeting and initiating projects with new clients has Antonette quite comfortable interacting with the general public, all levels of government, partners and environmental consultants, making her the ideal Project Manager. Her regulation experience with both the Conservation Authority and the MNR extends well beyond enforcement, requiring extensive work with the development industry to disseminate program information, as well as providing proactive education materials. This experience has resulted in Antonette being a positive forward thinker with superior interpersonal skills and conflict resolution abilities.

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EDUCATION

- Honours B.Sc., Biology, Brock University

CERTIFICATES AND TRAINING

- Natural Heritage Information Centre Sensitivity Training for Species at Risk
- Royal Ontario Museum Fish Identification certification.

SELECT PUBLICATIONS AND PRESENTATIONS

Paper published on the Lyons Creek Wetlands as part of the Proceeding for the Annual Flood and Erosion Control Workshop, 1990.

EMPLOYMENT HISTORY

- Savanta Inc. 2007 – Current: Project Manager
- Ontario Ministry of Natural Resources – 2003-2007: Species at Risk Technician
- Ontario Ministry of Natural Resources – 2003: Fish and Wildlife Technician
- Ontario Ministry of Natural Resources – 2001-2002: Resource Technician Conservation Land Tax Incentive Program
- Ontario Ministry of Natural Resources – 2000: South Cayuga Land Ownership Project.
- Ontario Ministry of Natural Resources – 1997-2000: Natural Resource Values System technician (NRVS).
- Niagara Peninsula Conservation Authority – 1991-1996: Regulations Officer.
- Hamilton Region Conservation Authority – 1991: Conservation Planner.
- Ontario Ministry of Natural Resources – 1989-1991: Public Lands Act Officer

VOLUME 2

Contributing Technical Staff

CHRISTOPHER ZOLADESKI

www.savanta.ca

Senior Ecologist, Botanist

SELECT PROJECT EXPERIENCE

- Environmental Impact Studies for golf course, aggregate and residential developments, Greater Toronto Area and Southern Ontario
- Pilot Grassland Restoration Project, The Ontario Aggregate Resources Corporation and Ontario Ministry of Natural Resources
- Lake Erie Sand Spit Savannas and Species at Risk: Invasive Species Inventory and Vegetation Restoration Strategy, Ontario Ministry of Natural Resources, Canadian Wildlife Service, Walker Industries, and LESSS Recovery Team
- Cherry Birch Recovery Strategy, Ontario Ministry of Natural Resources
- State of Aggregate Resources in Ontario Study: Paper 6 – Rehabilitation, Field Assessments, Ontario Ministry of Natural Resources
- Terrestrial Habitat and Species Monitoring, Discussion Paper, Toronto and Region Conservation Authority
- Sustainable Forest Licence Audits, Ontario Ministry of Natural Resources

INTRODUCTION

Chris has over 25 years of environmental consulting experience on projects ranging from biological surveys to comprehensive natural heritage strategies and sustainable forestry audits. He has an extensive knowledge of forest, wetland and applied plant ecology and Ecological Land Classification and flora of southern and central Ontario.

He implemented conservation biology principles in the development of biodiversity, watershed and natural heritage policy planning. He conducted numerous Environmental Impact Assessments including habitat restoration, species at risk management and wetland delineation for projects ranging from housing and golf course developments to comprehensive assessments of aggregate sites.

HABITAT RESTORATION

Chris had a leading role in several projects involving major habitat restoration initiatives, in particular those carried out by aggregate resources operators and major land developers. For example, he provided a template for a tallgrass prairie restoration and rehabilitation strategy at sites in southern Ontario. In northwest Brampton, he was a member of a multidisciplinary team devising a natural heritage system along re-aligned watercourse and valley channel.

IMPACT ASSESSMENT

Chris participated in various roles, from field investigations and data analysis to project management in hundreds of site-specific environmental impact studies for housing, industrial and pipeline developments. These assignments significantly included proposals for mitigation measures to lessen the impacts on the natural habitats and species, while ensuring a balanced approach to land use.

WETLAND DELINEATION AND SIGNIFICANT WOODLANDS

Based on his knowledge of wetland vegetation, flora, soils and habitat features and functions, Chris has completed numerous wetland delineations and analyses. The results contributed to a better understanding of these ecosystems and better decisions regarding development limits. Similarly, using the criteria established by municipali-

ties and the province, he delineated and analyzed many sites containing Significant Woodland areas.

SELECT PUBLICATIONS

Books

Zoladeski, C.A., Delorme, R.J., Wickware, G.M., Corns, I.G.W. and Allan, D.T. 1998. Forest ecosystem toposequences in Manitoba. Special Report 12, Canadian Forest Service, Northern Forestry Centre, Edmonton, Alberta, 63p.

Zoladeski, C.A., Cowell, D.W. and Ecosystem Classification Advisory Committee. 1996. Ecosystem classification for the southeast Yukon: field guide, first approximation; Yukon Renewable Resources, Canadian Forest Service, Department of Indian and Northern Affairs and Northern Development, Whitehorse, Yukon, 409p.

Zoladeski, C.A., Wickware, G.M., Delorme, R.J., Sims, R.A. and Corns, I.G.W. 1995. Forest ecosystem classification for Manitoba: field guide, special report 2; UBC Press, Vancouver, B.C., 205p.

Articles in Periodicals

Zoladeski, C.A. 1991. Vegetation zonation in dune slacks on the Leba Bar, Polish Baltic Sea coast; *Journal of Vegetation Science*, v.2, p.255-258.

Zoladeski, C.A. and Maycock, P.F. 1990. Dynamics of the boreal forest in northwestern Ontario; *American Midland Naturalist*, v.124, p.289-300.

Zoladeski, C.A. 1989. Current status of rare vascular plants on Cape Enragé (Bic), Quebec; *Le Naturaliste canadien*, v.116, p.113-116.

Zoladeski, C.A. 1988. New station for *Malaxis paludosa*, bog adder's-mouth orchid, in northwestern Ontario; *The Canadian Field-Naturalist*, v.102, p.548-549.

Zoladeski, C.A. 1988. Classification and gradient analysis of forest vegetation of Cape Enragé, Bic Park, Quebec; *Le Naturaliste canadien*, v.115, p.9-11.

EDUCATION

- Ph.D., Botany, University of Toronto
- M.Sc., Forest Ecology and Soil Science, Laval University

CERTIFICATIONS & TRAINING

- Environmental Impact Study Training Session, Ontario Ministry of Natural Resources



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CURRICULUM VITAE
CHRISTOPHER A. ZOLADESKI, Ph.D., Botany

- Ecological Land Classification Training Course
- Ontario Wetland Evaluation System Training Course

EMPLOYMENT HISTORY

- Savanta Inc. 2009 – Current: Senior Ecologist, Botanist
- Stantec Consulting 2002 – 2009: Senior Scientist
- Toronto and Region Conservation Authority 1999 - 2000: Co-ordinator, Natural Heritage Systems
- Geomatics International Inc. 1992 – 1999: Senior Ecologist
- Acres International Limited (1990-1992): Ecologist



GEORGE BUCKTON

Ecologist

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SELECT PROJECT EXPERIENCE

- Evaluation and classification of headwater drainage features for the Heritage Heights Subwatershed Study, Brampton, ON.
- Project management and natural heritage inventories for the Harmony Creek and Oshawa Creek Master Environmental Servicing Plan, Oshawa, ON.
- Natural Heritage Assessment for the Grimsby Energy Anaerobic Digester Renewable Energy Approval, Grimsby, ON.
- Environment Canada: Inventory of research needs identified in recovery planning documents for Species at Risk.
- Project management and natural heritage inventories for the Peel Zone 5 Sub-Transmission Main Environmental Assessment, Mississauga, ON.
- State of Aggregate Resources in Ontario Study: Ecological Land Classification for MNR.
- Pinery Provincial Park: Species at Risk monitoring and mapping.
- Pinery Provincial Park: GIS analysis of the impact of roads and trails on fragmentation of Species at Risk habitat.
- Ontario Biodiversity Science Forum: Data collection and analysis of knowledge gaps of Ontario's biodiversity.
- Pinery Provincial Park: Development of a Species at Risk moni-

INTRODUCTION

George Buckton focuses on projects in a variety of sectors including ecological restoration and management, and conventional development approval studies, such as environmental impact assessments, Master Environmental Servicing Plans, renewable energy approvals, restoration plans, and natural heritage baseline studies. He is certified in Ecological Land Classification, Wetland Evaluation, Vegetative Sampling Protocol, and Electrofishing. George has experience evaluating and classifying headwater drainage features using the most up to date guidelines from Credit Valley Conservation and the Toronto and Region Conservation Authority.

George has completed numerous projects related to species at risk including rare flora and fauna monitoring and mapping, and the development of a species at risk database. For his Master of Forest Conservation final research paper, George researched biological information for selected species at risk, including habitat feature requirements, species ranges, and sensitivity to fragmentation. He then used ArcGIS mapping and statistical software to identify which roads and trails most impacted species at risk habitat loss and negative edge effects.

As a wildlife surveyor, George is experienced with identification of southern Ontario terrestrial and emergent vegetation, reptiles, amphibians, mammals, fishes, and mollusks. He has participated in surveys for various species at risk plants including dwarf hackberry, butternut, Bluehearts, Pitcher's thistle, and dense blazing star, as well as species at risk mollusks such as Snuffbox, Northern Riffleshell, and Kidneyshell.

As assistant researcher to the Ontario Biodiversity Research Forum, George gained experience reviewing and writing reports on various biodiversity issues in Ontario, including biodiversity knowledge gaps and the impact of fire suppression in Ontario.

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EDUCATION

- B.A. Honours Psychology, University of Western Ontario
- M.F.C., Master of Forest Conservation, University of Toronto

PROFESSIONAL AND OTHER AFFILIATIONS

- Field Botanists of Ontario, Member

CERTIFICATIONS & TRAINING

- Class 2 Back Pack Electrofishing Crew Leader Certification
- OMNR Ecological Land Classification (ELC) Certification
- OMNR Wetland Evaluation System Certification
- OMNR Vegetation Sampling Protocol Certification
- Identification of Ontario Fishes Workshop
- Tropical Forest Conservation Field Course focusing on Rapid Biodiversity Assessment (Dr. S. Thomas 2008)

EMPLOYMENT HISTORY

- Savanta Incorporated
March 2009 – present: Ecologist
- Ontario Biodiversity Science Forum
January 2009 – August 2009: Assistant Researcher
- Pinery Provincial Park
June 2008 – September 2008: Natural Heritage Internship
- Thindata Incorporated
April 2005 – July 2007: Senior Art Director

PETER BURKE

Biologist

SELECT PROJECT EXPERIENCE

- Contract Biologist, OMNR, Peterborough; Constructed annotated bibliography by collection copious amounts of information from a diverse array of sources to complete the document, which was over 1200 pages. Also prepared Management Plans for Special Concern Species, the West Virginia White and Black Tern, which included an extensive literature search and analysis of large data sets to extract important information related to current distribution.
- Contract Biologist, Savanta, St. Catharines; Performed field surveys for SAR species including birds and other wildlife (heptiles, mammals, odonates, Lepidoptera), providing documentation, reports including datasets, and mapping of specific inhabited areas on the subject lands.
- Contract Biologist, Canadian Wildlife Service, Ontario Region; Reconnaissance work to detect Kirtland's Warbler in potential breeding locations in Southern Ontario. Site determination via FRI mapping, GIS, contact with Forestry industry and previous research efforts. Site searches, songmeter deployment, documentation of breeding evidence and reporting of habitat characteristics, presence /absence, future efforts.

INTRODUCTION

Peter Burke has an extensive natural history knowledge of wildlife, insect and vegetation communities within Southern Ontario and beyond. He possesses an expert knowledge of birds across North, Central and South America, including breeding bird surveys, bird banding expertise, bird field guide illustration and bird tour leading. Peter also possesses expert knowledge of butterfly, dragonfly and damselfly communities in Eastern Canada, including identification of species both adults and larvae, as well as field guide illustration. He is experienced in the writing of Management Plans and preparing extensive annotated bibliographies for Species at Risk for the Ministry of Natural Resources in Ontario.

Peter has also been on contract to search for and document potential habitat of the Endangered Kirtland's Warbler in Ontario by the Canadian Wildlife Service. He is a professional tour leader for Field Guides Inc., and is a world-renowned professional illustrator for various bird field identification guides, including National Geographic. Peter has extensive work experience as a biologist and consultant for various industries, firms and academic institutions over the last 25 years.

EXPERIENCE

As a biologist for the OMNR, Peter has constructed an annotated bibliography for 25 bird Species at Risk. This included the collection of scientific papers, PhD. dissertations, relevant internet resources, books, and consultations with over 20 experts in Canada and the United States. Covering all SAR in Ontario, information was categorized for various topics ranging from relationship to vegetation management, forestry and agricultural practices, wind turbine energy, aggregates, transportation, pesticides/herbicides, fisheries, mining, and so on. The document exceeded 1200 pages.

As a contract Biologist for Savanta, Peter has conducted field surveys for breeding birds, including SAR species and other wildlife including herptiles, mammals, odonates and lepidoptera. He was responsible for documenting specific breeding information on SAR species and conducting MNR protocols for searches of these species. He also reported all species into datasets and written summaries of important areas for wildlife found on the subject lands., completed specific reporting on SAR species found on the subject lands, and mapped polygons to delimit specific inhabited areas.

PROJECT EXPERIENCE CONT'D

- Contract Biologist, Natural Heritage Information Centre, Peterborough; Surveyed for rare species of Odonata at numerous sites across Ontario by detection of adult and larval forms. Collected data on site-specific information that described biotic and abiotic features. Specimens prepared for museum collection. Final report summarizing all species recorded during surveys.
- Contract Biologist, MNR & Trent University, London; Yearly breeding bird productivity monitoring studies. Found and monitored nesting success of forest birds in a hardwood community across several logging practices in Algonquin Park and public and private woodlots in SW Ontario. Included banding endangered species like the Acadian Flycatcher. Vegetation surveys were included to quantify territory and site level structural characteristics. Also participated in salamander monitoring surveys using mark-recapture techniques and cover boards. Assisted in Southern Flying Squirrel trapping using mark-recapture techniques and live traps.
- Biology Consultant; Various organizations, including the Canadian Forest Service and Environment Canada. Conducted breeding bird surveys, waterfowl surveys via helicopter and detailed vegetation surveys.

EDUCATION

- B.Sc. Biology, Guelph University (1991)

PROFESSIONAL AND OTHER AFFILIATIONS

- Created Listserve for public use of natural history in Middlesex, Oxford & Elgin Counties: 2009
- Served as Chair of the Ontario Bird Records Committee: 2001
- World renowned illustrator for bird identification guides.

CERTIFICATIONS & TRAINING

- Wilderness First Aid Training
- Wilderness Bear Safety Courses

EMPLOYMENT HISTORY

- Savanta Incorporated: Biologist
June – August 2010-2013 (contract), April 2014 – Present (Full-Time)
- Canadian Wildlife Service: Contract Biologist
February 2013 – Present
- Ontario Ministry of Natural Resources: Contract Biologist
October 2012 - Present
- Canadian Wildlife Service: Contract Biologist
January 2013 - Present
- Golder & Associates: Contract Biologist
April – November 2010
- Natural Heritage Information Centre, MNR: Contract Biologist
June – September 2010, May – September 2003
- MNR & Trent University: Contract Biologist
July 2001 – 2011
- Bird Studies Canada: Field Biologist
May 1991 – November 1003
- Various Organizations: Biology Consultant
1987 – 1991
Organizations include: Canadian Forest Service, Canadian Wildlife Service, Environment Canada, Trent University
- Ministry of Natural Resources: Interpretive Naturalist
June – September 1987 – 1990

DOUG MCRAE
Ecologistwww.savanta.ca**EXPERIENCE HIGHLIGHTS**

- Monitoring study of Species at Risk, including King Rail and Least Bittern, Presqu'ile Bay, Ontario
- Migration study on late fall migration on the coast of James Bay, Multiple, Ontario
- Avifaunal survey of High Bluff Island, Internal Report for Ontario Ministry of Natural Resources
- Birds of Presqu'ile Provincial Park, published by the Ontario Ministry of Natural Resources (1982)
- Detailed inventory of reptiles and amphibians of Presqu'ile Provincial Park, Internal Report for the Ontario Ministry of Natural Resources
- Field Manager and co-author of report on biological inventory at selected sites along Ontario coast of Hudson and James Bay, Ontario Ministry of Natural Resources

INTRODUCTION

Doug has been studying birds for nearly 40 years. He has been involved with countless projects and research expeditions. Much of this work has involved grassland bird communities in the Canadian prairies and Ontario sites, including the Carden and Napanee Plains.

Doug has extensive experience in migration monitoring, winter and breeding bird studies. He has been involved in both Ontario Breeding Bird Atlases, the Breeding Bird Survey, numerous inventories of natural areas and properties, and detailed monitoring studies of endangered and threatened species including King Rail and Least Bittern in Presqu'ile Bay, and Red Knot in James Bay. Doug has also conducted pioneering migration studies on late fall migration on the James Bay coast. He has served several terms on the Ontario Bird Records Committee, including one as Chair.

CANADIAN EXPERIENCE

Doug has conducted many aerial and ground-based surveys of shorebirds, waterfowl and colonial birds (primary gulls, terns and herons) for various agencies, including the Ontario Ministry of Natural Resources, Canadian Wildlife Service, Queen's University, Long Point Waterfowl and Wetlands Research Fund in the Presqu'ile Important Bird area. The majority of this work took place in the Hudson Bay Lowland, but also included work in Southern Ontario, New Brunswick, Nova Scotia and Newfoundland.

Doug has also participated in numerous volunteer-based surveys such as the Breeding Bird Survey, Breeding Bird Atlas projects in Ontario and the Maritimes, Ontario Nest Record Scheme and Christmas Bird Counts, including the large Scarlet Ibis roost in Trinidad's Caroni Swamp.

Doug has conducted and authored a detailed inventory of reptiles and amphibians, a detailed avifaunal survey of High Bluff Island, including colonial bird groupings, and he collected, compiled and wrote up all available data on birds of Presqu'ile Provincial Park Ontario.

Doug has worked extensively in the Hudson's Bay Lowlands in both Ontario and Manitoba. He has conducted 3-year late fall migration surveys of birds, documenting large movements of birds out of the Bay in relation to freeze-up. This work included standardized sur-

veys counting very large numbers of birds in adverse weather. He has studied and guarded a small nesting colony of the rare Ross' Gull, which involved a great deal of public relations work and observational studies. While working on this project, Doug documented the first breeding of the Little Gull in the lowland and published the findings on *American Birds*. He also launched a field study of nesting Bonaparte's Gulls, monitoring twenty nests for the duration of the breeding season.

INTERNATIONAL EXPERIENCE

Doug has developed a great deal of expertise with the ecology of boreal, temperate, neo-tropical and tropical ecosystems. In the past 20 years, he has become well versed with the regional avifauna, and with almost all species in the Caribbean. Doug's experience is gained principally as a leader with Field Guides Incorporated, an ecotourism company that provides comprehensive birding tour programs, focused on studying as many of the endemic species from each island as is possible.

During the course of more than 100 trips, Doug has led tours in the following countries: Antigua, Barbados, Belize (including offshore Cays), Cuba, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, St. Lucia, St. Vincent, Trinidad and Tobago. This work involves frequent interaction with local guides, residents, landowners and business people, as well as Government officials and representatives from conservation organizations.

In addition to leading birding tours, Doug was part of a five-year cooperative international program between the Cuban Academy of Sciences, Canadian Wildlife Service and the Long Point Bird Observatory (now Bird Studies Canada). The research generated a number of papers and reports, several of which Doug co-authored.

PROFESSIONAL AND OTHER AFFILIATIONS

- Ontario Bird Records Committee
- Ontario Breeding Bird Atlas
- Breeding Bird Survey
- Ontario Nest Record Scheme
- Christmas Bird Counts

CERTIFICATION AND TRAINING

- Ontario Ecological Land Classification Certification (2008)
- Professional botanist training (Dr. S. Newmaster 2007)
- Conservation field course (Dr. S. Hilts 2005)

PAST AND CURRENT EMPLOYERS

- Savanta inc.
- Ontario Ministry of Natural Resources
- Royal Ontario Museum
- Canadian Wildlife Service
- Queen's University
- Long Point Waterfowl and Wetlands Research Fund
- Field Guides Incorporated

