ECOLOGICAL STUDIES BASELINE REPORT

GRAND NIAGARA SECONDARY PLAN

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SAVANTA

Ecological Studies Baseline Report

Grand Niagara Development

Niagara Falls, ON

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1.0 INTRODUCTION

1.1 Study Purpose

The Grand Niagara Incorporated (Grand Niagara) holdings (Subject Lands) are located in the urban area of the City of Niagara Falls (City), south of the Welland River, north of Biggar Road, west of the QEW and east of Morris Road (Figure 1). The Subject Lands have been investigated since the late 1990s in response to proposed development. The earliest environmental work responded to the proposed golf course itself and to associated facilities. Construction was initiated on the golf course areas of the Grand Niagara Resort in 2002, after considerable multi-season and multi-disciplinary investigations. Supplementary natural heritage studies were completed from 2012 to 2014 as development options were explored and a draft EIS (Savanta Inc., July 24, 2014) was prepared.

In response to proposed development of residential and hospital land uses, Savanta was retained by Grand Niagara in 2015, to complete an ecological studies update report. Detailed natural heritage studies were conducted in 2015 to update ecological data, to interpret the significance of natural features and functions associated with the Subject Lands, and to present preliminary information regarding natural heritage constraints and opportunities. A complete impact assessment is forthcoming, pending finalization of the development plan and ongoing discussions with Niagara Region (Region), the City and the Niagara Peninsula Conservation Authority (NPCA).

Figures and data tables from Savanta's 2015 ecological studies are provided in Appendices A and B, respectively. Figures and data tables from Savanta's earlier 2012-2014 ecological studies are provided as addendum to this report, for context.

1.2 Natural Heritage Planning Considerations

In addition to an assessment of natural heritage features and functions of the Subject Lands, there are legislation and environmental policies that also affect development on these lands. Planning Act related discussions are addressed directly by MMM Group Limited (MMM). This report addresses Natural Heritage policies and associated guidelines; areas affected by these regulatory aspects are illustrated on Figure 2.

In terms of municipal policies, the City of Niagara Falls proposed that OPA 69 be applied to the Subject Lands as an outcome of OPA 96 Ontario Municipal Board settlement discussions with the proponent in 2014. That settlement proposal is applied in this report, recognizing that OPA 96 and its associated environmental policies (i.e., policies 12.1, 12.2) do not fully apply, and that the current PPS (i.e., 2014) should be applied along with other relevant and current agency legislation and policies (e.g., *Conservation Authorities Act*, Ontario Regulation 155/06 and *Endangered Species Act, 2007*).

This updated ecological report provides a baseline of information that serves as input to the Secondary Planning process. As dialogue and this planning process progress, this report will also serve as the baseline from which an Environmental Impact Study (EIS) can be produced (i.e., as required in order to comply with the Regional Official Plan). Portions of the Region's Core Natural Heritage System occur on the Subject Lands (Section 7 and Schedule C; Region, 2015); development adjacent to these natural features triggers the need for an EIS.

The Subject Lands are located outside the Greenbelt Plan Area. The site is subject to the Provincial Policy Statement (2014), Ontario *Endangered Species Act* (2007) and NPCA regulations.

1.2.1 Municipal Official Plans

Given that the City of Niagara Falls OPA 96 does not apply to these lands, the Region of Niagara Official Plan (consolidated version August 2015) was relied upon for additional guidance and direction pertaining to natural heritage features and associated functions.

As noted previously, the Subject Lands contain elements of the Region's Core Natural Heritage System (the Regional NHS). Policy 7.B.1.1. (RPP, 2015) summarizes the components of the Regional NHS as follows:

- Core Natural Areas, classified as Environmental Protection Areas (EPA) or Environmental Conservation Areas (ECA);
- Potential Natural Heritage Corridors connecting the Core Natural Areas;
- Greenbelt Natural Heritage and Water Resource Systems; and,
- Fish Habitat.

The Region's EPA designation includes:

- Provincially significant wetlands;
- Provincially significant life science Areas of Natural and Scientific Interest (ANSIs);
- Significant habitat of endangered and threatened species (not mapped by the Region, where identified this habitat will be subject to EPA policies);
- Greenbelt Natural Heritage System (wetlands, significant valleylands, significant woodlands, SWH, habitat of species of concern, publicly owned conservation lands savannahs, tallgrass prairies, alvars); and,

Environmental Conservation Areas (ECA) include:

- Significant woodlands, significant wildlife habitat, significant habitat of species of concern;
- Regionally significant life science ANSIs;
- Other evaluated wetlands;
- Significant valleylands;
- Savannahs, tallgrass prairie and alvars; and,
- Publicly owned conservation lands.

Potential Natural Heritage Corridors include:

- Areas that maintain and, where possible, enhance the ecological functions of the corridor in linking the core natural areas.

Regional NHS policies (Chapter 7.B; Region, 2015) that apply to Regional NHS elements on the Subject Lands are summarized below:

- Only minor adjustments to EPA boundaries will be permitted without amendment to the Regional Official Plan (Plan);
- Development and site alteration may be permitted without amendment to the Plan in ECAs and on adjacent land to EPA and ECAs outside the Greenbelt NHS if it has been demonstrated over the long term that there will be no significant negative impact on the Regional NHS or adjacent lands and the proposed development or site alteration is not prohibited by other policies;
- Where it is demonstrated that all, or a portion of, an ECA does not meet the criteria for designation under this Plan the restrictions on development and site alteration do not apply;
- Where development or site alteration is proposed in or near a potential natural heritage corridor (shown conceptually on Schedule C), development should be located, designed and constructed to maintain and, where possible, enhance the ecological functions of the corridor in linking core natural areas or an alternative corridor should be developed;
- Development or site alteration within fish habitat may occur if it will result in no net loss of the productive capacity of fish habitat as determined by the Department of Fisheries and Oceans or its designate;
- Where development or site alteration is approved in or adjacent to the Regional NHS, new lots shall not extend into the area to be retained in a natural state as part of the NHS or the buffer zone identified through an EIS; and,
- Where development or site alteration is approved within the Regional NHS or adjacent lands the applicant shall submit a Tree Saving Plan that maintains or enhances the remaining natural features and ecological functions.

1.2.3 Niagara Peninsula Conservation Authority

The NPCA conducts reviews of planning processes associated with the future development of properties within its jurisdiction. In addition, the NPCA provides planning and technical advice to planning authorities to assist them with fulfilling their responsibilities regarding natural hazards, natural heritage and other relevant policy areas pursuant to the Planning Act. The NPCA administers the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit process, under Ontario Regulation 155/06.

1.2.4 Provincial Legislation and Associated Guideline Documents

Provincial Policy Statement (2014)

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 (MMAH, 2014). 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 Ecological Baseline Report 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).

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

- Significant wetlands
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Fish habitat;
- Habitat of endangered and threatened species; 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 the habitat of endangered and threatened species or in fish habitat, except in accordance with provincial and federal requirements. Development and site alteration may be permitted on lands adjacent to fish habitat provided it has been demonstrated that there will be no negative impacts on the natural feature or their ecological functions.

Ontario's Endangered Species Act (2007)

The provincial Endangered Species Act (ESA) 2007 was developed to:

- Identify species at risk, based upon best available science;
- Protect species at risk and their habitats and to promote the recovery of species at risk; and
- Promote stewardship activities that would support those protection and recovery efforts.

The ESA protects all threatened, endangered and extirpated species itemized on the Species at Risk in Ontario (SARO) list. These species are legally protected from harm or harassment and their associated habitats are legally protected from damage or destruction, as defined under the ESA 2007.

2.0 DATA COLLECTION APPROACH & METHODS

2.1 Background References

Substantial work has already been completed on the Subject Lands. Studies completed by ESG International Ltd. (ESG, now Stantec Consulting) included:

- Environmental Impact Assessment (EIA), 2001;
- Tree Preservation Plan, March 7, 2001;
- EIA Addendum Report, June 22, 2001; and,
- Environmental Implementation Report (EIR), March 12, 2003.

The previous studies made specific reference to data collected from:

- OMNR wetlands and fisheries information;
- Natural Heritage Information Centre (NHIC) rare species and communities;
- NPCA natural areas, species of concern and hazard land mapping;
- Regional Official Plans, ESA studies, natural areas reports, greenway inventory and tree-cutting bylaw;
- City Official Plan, Urban Wooded and Treed Inventory and Assessment study; and,
- Various provincial wildlife atlases (i.e., butterflies, amphibians, reptiles, breeding birds, mammals).

This ecological studies update, which incorporates the results of detailed ecological surveys conducted in 2015, partially relies upon additional supporting background information, agencies and resources that are listed below:

- Federal and Provincial Species at Risk (SAR) websites;
- Ontario Ministry of Natural Resources and Forestry (MNRF), Aurora District;
- Natural Heritage Information Centre (NHIC) rare species and communities;
- NPCA Natural Areas Inventory (2010);
- NPCA South Niagara Falls Watershed Report (2008); and,
- Natural Heritage Information Centre (NHIC, 2014).2.1.1 LIO Natural Features Summary

Based on a search of the MNRF Land Information Ontario (LIO) geographic database, there are no ANSIs present on or within 120m of the Subject Lands. LIO natural heritage features are shown on Figure 2.

2.1.2 NHIC Database

The MNRF maintains the NHIC database. A search of this database in 2015 identified 35 Species at Risk and provincially rare species (SH, S1-S3) in the vicinity of the

Subject Lands. Table 1 (Appendix B) summarizes preferred habitat and possible presence / absence on the Subject Lands.

2.2 Agency Discussion

2.2.1 Ministry of Natural Resources and Forestry (MNRF)

The MNRF Guelph District Information Request Form pertaining to Species at Risk and natural heritage features on, and adjacent to, the Subject Lands was submitted on October 21, 2015. A response letter has not yet been received.

2.2.2 Niagara Peninsula Conservation Authority (NPCA)

The NPCA provided comments to the Terms of Reference for the EIS at a pre-consultation meeting for the Grand Niagara Secondary Plan on August 6, 2015. Based on these comments a technical meeting with the NPCA took place on October 7, 2015 to review and provide clarification with respect to their comments on natural heritage. In addition, some targeted field investigation actions were identified to be carried out in the spring of 2016. These studies are currently underway and the results will be provided as an addendum to this EIS.

2.3 Field Investigations

The substantial volume of background information already available through historic fieldwork conducted on the Subject Lands was supplemented with targeted fieldwork to verify the current ecological condition of the Subject Lands; this work was undertaken by Savanta in 2012, 2013 and in 2014. Detailed ecological studies were then conducted in 2015 in response to the proposed development of residential and hospital land uses.

Field studies were conducted by ESG for the original Environmental Impact Assessment in 2001 and for the Environmental Implementation Report in 2003. Field investigations completed in 2000, 2002 and 2003 included: fish habitat assessment and fisheries inventory, three-season botanical inventory, Ecological Land Classification of vegetation communities, woodland assessment, breeding bird survey, breeding amphibian survey, incidental wildlife (including discernable movement paths) and soils. Additional work completed by Savanta in 2006 / 2007 included: late season botanical survey (October 15, 2006), tree assessment (November 28, 2006), and verification of vegetation communities (ELC) and species composition (July 31, 2007).

Surveys conducted by Savanta ecologists in 2015 are summarized in Table 2. Surveys conducted from 2012-2014 are summarized in Addendum Table I.

3.0 ENVIRONMENTAL SETTING AND CHARACTERISTICS

3.1 Physical Baseline Conditions

The Subject Lands are situated in the Haldimand Clay physiographic region (Chapman and Putnam, 1984). Soils are characterized as being poorly drained and the water table is usually located close to the surface until late spring. Surface cracking is common during dry periods. The surface horizon ranges from 15 cm to 20 cm deep and has a texture of clay loam to clay; subsoils are heavy clays.

Further supplementary information regarding soils, hydrology, and slopes were provided in previous reports listed in Section 2.1.

3.2 Biological Baseline Conditions

The Subject Lands occur in the Carolinian or Deciduous Forest Zone; an area that is characterized by a warmer climate 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-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). Due to Niagara Region's southern location and warmer climate, some trees and shrubs that are provincially uncommon in other areas of Ontario are locally common (e.g., pin oak, black gum, and swamp white oak).

3.2.1 Vegetation Communities

Table 3 (Appendix B) provides brief descriptions of the ELC types recognized on the Subject Lands. Current vegetation community types and locations are depicted on Figure 3. The Subject Lands contain a variety of tableland, wetland and riparian natural areas along with anthropogenically created features (i.e., hedgerows, golf course rough areas and ponds) that have been colonized by flora and fauna. Riparian vegetation is discontinuous along the Lyon's Creek and Grassy Brook watercourses on-site. A vegetated buffer remains along the extent of the Welland River at the north end of the site. The larger blocks of natural areas often include units of the Lower Grassy Brook provincially significant wetland complex (Figure 2). Areas outside of the naturally vegetated areas are disturbed and have been previously farmed, utilized as an active golf course and/or cleared of vegetation in preparation for development. The Subject Lands are also bisected by a railway spur line.

Botanical investigations were conducted on July 21, August 7 and August 13, 2015 (no access was available during the survey period for 2015 spring ephemeral flora; surveys conducted in previous years). Vegetation communities were first identified on aerial imagery and then verified in the field. Vegetation community types were confirmed, sampled and revised, if necessary, using the sampling protocol of the ELC for Southern

Ontario (Lee at al. 1998). ELC was completed to the finest level of resolution (Vegetation Type) where feasible. Species names generally follow nomenclature from the Flora Ontario – Integrated Botanical Information System (FOIBIS; Newmaster and Ragupathy, 2012). Regional rarity of vegetation communities was based on the Niagara Natural Areas Inventory (NPCA, 2010). Regional rarity of plants was based on Oldham (2010).

The provincial status of all plant species and vegetation communities is based on NHIC (2013). Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

Ecological Land Classification

Table 3 (Appendix B) provides brief descriptions of the ELC types recognized on the Subject Lands. Some communities are characterized at higher levels of classification than the ELC Type due to high diversity of species, absence of clear dominants, and/or prevalence of human influences (golf course use, historical land uses). Several vegetation communities are considered provincially and/or globally rare (NHIC, 2016):

- Pin Oak Mineral Deciduous Swamp SWD1-3: G2, S2S3 – located south of the rail line within an area zoned ECA and is within the buffer of the Lyon's Creek watercourse.

- Two other pin oak swamp communities (SWD1-5* and SWD1-6*) are not listed in the southern Ontario ELC manual; however, due to dominance of Pin Oak these communities may be considered similar in rarity to SWD1-3 (previous bullet). SWD1-5* is located north of the rail line and is partially contained within the buffer of the Lyon's Creek watercourse. SWD1-6* is part of a provincially significant wetland (PSW) unit south of the rail line.

- Buttonbush Mineral Thicket Swamp SWT2-4: G4, S3 – is located adjacent to / beneath the dripline of a significant woodland and within the buffer area required for an adjacent PSW unit. This community is also the only regionally rare (NPCA, 2010) type on the Subject Lands.

3.2.1.1 Vascular Plants

Botanical inventories completed on the Subject Lands identified a total of 226 species of vascular plants. Of that number, 165 (or 73%) are native and 61 (or 27%) are exotic. A full species list is included in Table 4 (Appendix B).

The majority of the native species (91%) are ranked S5 (secure in Ontario). Thirteen species (8% are ranked S4 (apparently secure in Ontario; NHIC, 2013), while one species (Black Gum) is ranked S3 (Vulnerable; this species is described further below). Seven regionally rare and ten regionally uncommon plants were observed (Oldham, 2010); none of these species are considered rare in Ontario. Two species recorded from the Subject Lands have a co-efficient of conservation value of 9 or 10 (Black Gum and Pin Oak, described further below).

No Species at Risk (SAR) plant species were recorded on the Subject Lands. Targeted searches confirmed the presence of one provincially rare (S3; NHIC, 2013) plant species: Black Gum (*Nyssa sylvatica*). This species was located in the woodlot on the north side of Grassy Brook Road, where at least four mature trees (DBH 30 cm to 40 cm) and associated shrub-sized stems from root suckers grow in the vicinity of vernal pools.

Six species are considered rare in Niagara region (Oldham, 2010):

- Fennel-leaved Pondweed (*Stuckenia pectinata*);
- Greater Duckweed (*Spirodela plyrhiza*);
- Water-meal (*Wolffia columbiana*);
- Hispid Hedge-nettle (*Stachys hispida*);
- Swamp red currant (*Ribes triste*); and,
- Cardinal Flower (*Lobelia cardinalis).*

Historical Surveys

ESG (2001) recorded three locally rare species north of Grassy Brook Road: Fragrant White Water Lily (*Nymphaea odorata ssp. odorata*), Black Gum (*Nyssa sylvatica*) and Sallow Sedge (*Carex lurida*).

One species recorded by ESG (2003) is provincially ranked S3 (vulnerable in Ontario) according to NHIC (2013): Pignut hickory (*Carya glabra*). This species was observed in a woodland south of the railway by ESG (2003), this species is uncommon in Niagara Region (Oldham, 2010). It was not relocated during 2012 to 2015 vegetation surveys.

The following species identified in the ESG (2003) report, are rare in Niagara Region (Oldham, 2010):

- Purple Cress (S4), Niagara Region (R)
- Cardinal Flower (S5), rare in Niagara Region (R)
- Rough Hedge-nettle (S4S5), rare in Niagara Region (R)
- Dark-purple Alexanders (S5), rare in Niagara Region (R)
- Rough Fleabane (S5), rare in Niagara Region (R)
- Cardinal Flower (S5), rare in Niagara Region (R)

- Wild Red Currant (S5), rare in Niagara Region
- Rose-Twisted Stalk (S5), rare historic in Niagara Region (RH; no record since 1980s)
- Pin Cherry (S5), rare in Niagara Region (R)
- Beaked Hazel (S5), rare in Niagara Region (R)

3.2.2 Wildlife Species

Site visits were performed in 2012 - 2015 (Savanta) to assess wildlife use of the Subject Lands. Surveys included targeted searches for breeding birds, Species at Risk grassland birds, calling amphibians, snakes, turtles, bats, insects and incidental observations of mammals. Surveys included assessments of potential wildlife corridor functions. Methods and results are provided below for the detailed ecological studies completed in 2015 along with key findings from previous studies (ESG, 2001 and 2003; Savanta, 2012 - 2014).

3.2.2.1 Breeding Bird and Species at Risk Bird Surveys

Survey Methodology

Two-round breeding bird surveys were conducted following protocol set forth by the Ontario Breeding Bird Atlas (Cadman et al., 2007), the Ontario Forest Bird Monitoring Program (Cadman et al., 1998) and the Marsh Monitoring Program (Bird Studies Canada, 2014 and 2006). Survey dates and conditions are provided in Table 2 (Appendix B). Access was not available to conduct a 2015 first round breeding bird survey.

Surveys were conducted between dawn and five hours after dawn with suitable wind conditions, no thick fog or precipitation (Cadman et al., 2007). Point count stations were located in various habitat types within the Subject Lands and combined with area searches to help determine the presence, variety and abundance of bird species. Each point count station was surveyed for 10 minutes for birds within 100 m and outside 100 m. All species recorded on a point-count were mapped to provide specific spatial information and were observed for signs of breeding behaviour. Surveys were conducted at least 10 days apart.

During breeding bird surveys, vegetation was assessed for the potential presence of Species at Risk habitat. If suitable habitat was encountered or individuals were observed standard protocols were utilized (in consultation with MNRF).

Open grassland habitat, including pasture, hay fields and fallow areas, was surveyed according to the MNR (2012) Guidelines for Bobolink and Eastern Meadowlark. Point count stations (discussed above) were located within open grassland habitat. Where this habitat was greater than 250 m wide or long, two-point count stations were

completed (point count stations are set up every 250 m in large habitats). Transects or area searches were also conducted in addition to the 10-minute point count stations.

Both the Natural Heritage Information Centre (NHIC, 2013) database and the Species at Risk in Ontario (SARO) list (Ontario Regulation 230/08) were reviewed to determine the current provincial status for each bird species.

Investigations and Results

A total of 30, point count stations were surveyed within the Subject Lands. Point count stations were located within cultural meadow, upland forest, forested swamp, golf course, wetland, disturbed land and agricultural lands (Figure 4).

A total of 61 bird species were observed within the Subject Lands. Of this total, seven species are confirmed, 35 are probable and 11 are possible breeders on the Subject Lands. The remaining 8 bird species are considered non-breeders, flyovers or migrants. The observed breeding bird species are discussed in the sections below. All species observed on the Subject Lands are listed in Table 6 (Appendix B).

A total of 53 (100%) of the confirmed, probable or possible breeders are provincially ranked S5 (common and secure), S4 (apparently common and secure) or SNA (species not native to Ontario). One bird species is considered provincially rare (S1 - S3; NHIC, 2013) and is discussed below.

Great Egret (S2B; NHIC, 2013) was observed visiting and foraging along the edges of golf course water bunkers on the Subject Lands. These birds are presumed adults from nesting colonies in the Niagara River and no breeding evidence was recorded on the Subject Lands.

The following Species at Risk were observed on the Subject Lands:

- Bobolink (Threatened in Ontario and Canada);
- Barn Swallow (Threatened in Ontario and Canada);
- Eastern Wood-Pewee (Special Concern in Ontario and Canada); and,
- Wood Thrush (Special Concern in Ontario, Threatened in Canada).

Surveying for grassland bird Species at Risk included eleven point counts placed in cultural meadows and disturbed / fallow areas. These polygons did not provide suitable breeding habitat for Bobolink or Eastern Meadowlark due to small size, high disturbance and linear shape (i.e., lack of core / interior habitat). Several of the surveyed polygons were larger but did not provide suitable breeding habitat due to high disturbance, areas of bare soil or standing water, and inappropriate vegetation composition / structure (i.e., high forb content, low grass content, disturbed annual row crops). No post-breeding staging / flocking observations were recorded during surveys.

Two male Bobolinks were observed in flight at point count station 1 however no suitable breeding habitat was present at this location or anywhere else on the Subject Lands. These males were considered wanderers from off-site breeding habitat in the nearby landscape. No breeding evidence was recorded for this species on the Subject Lands.

Barn Swallows were observed foraging over the Subject Lands on several occasions. However, no structures were observed with Barn Swallows nesting on them during the surveys. Barn Swallows use portions of the site for foraging purposes.

Probable breeding evidence was recorded for Eastern Wood-Pewee and Wood Thrush. Each species was recorded at seven locations on the Subject Lands.

A variety of species were observed that are listed as indicator species according to the Province's significant wildlife habitat (SWH) criteria for ecoregion 7E (MNRF, 2015). These observations are summarized below for species that demonstrated breeding evidence on the Subject Lands.

Probable breeding evidence was recorded for Green Heron, which is an indicator species of colonial nesting (tree/shrub) breeding bird SWH and marsh breeding bird SWH, at point count station 26 during a third round survey. One adult and two juveniles flew in from the north and landed at the small pond just west of point count 26 on July 8, 2015. No Green Heron nests were found in the trees and shrubs in the vicinity of the pond where the birds landed**.** The origin of the nesting site / breeding habitat is not known and could be as far away as the Welland River. This species, which may nest in a loose colony or solitarily, can fly some distance from the water to establish a nesting site. Two or more Green Heron nests would be required to meet the colonial nesting (tree/shrub) SWH type. The latter SWH type is not present on the Subject Lands.

Probable breeding evidence was recorded for another indicator species of marsh breeding bird: Virginia Rail (two individuals were observed at point count station 24 during both the second and third round surveys). The minimum criteria for this SWH type are not met for this location on the Subject Lands.

An Osprey was observed flying overhead, which likely nests off-site along the Welland River. Several other SWH indicator species were observed on the Subject Lands (Northern Rough-winged Swallow, Cliff Swallow, Savannah Sparrow, Willow Flycatcher, Red-tailed Hawk, Spotted Sandpiper); however, the relevant criteria/thresholds were not met.

The following species that demonstrated breeding evidence on the Subject Lands are considered rare in Niagara region (NPCA, 2010):

- Virginia Rail – rare; and,
- Orchard Oriole – uncommon / rare.

Incidental Observations

There were 8 butterfly and 13 dragonfly species recorded on the Subject Lands. All but one species observed are provincially ranked S5 (common and secure), S4 (apparently common and secure) or SNA (species not native to Ontario). Slender Bluet (S1; NHIC, 2013) was observed in small numbers (6) along the south shore of the golf water bunker immediately south of point count station 21. A mated pair was observed in tandem, indicating that they were breeding at this pond. All species observed on the Subject Lands, including rarity ranks are provided in Table 10 (Appendix B).

The following species observed on the Subject Lands are considered rare in Niagara Region (NPCA, 2010):

- Emerald Spreadwing – point count station 10;
- Slender Spreadwing – grassland bird stations 16 and 20;
- Prince Baskettail – point count station 24;
- Spot-winged Glider – point count station 17;
- Cherry-faced Meadowhawk – point count station 10, grassland bird station 16;
- Tawny-edged Skipper – grassland bird station 20; and,
- Acadian Hairstreak – point count station 6.

In 2014, insect observations during breeding bird surveys included 18 *Odonata* and 10 *Lepidoptera*. Of these, several provincially rare species were observed (none of which were observed in 2015 despite survey effort):

- Monarch (Special Concern in Ontario and Canada);
- Swamp Darner (S2S3); and,
- Double-striped Bluet (S3).

In addition, the following regionally rare species were observed (NPCA, 2010):

- Emerald Spreadwing;
- Slender Spreadwing;
- Common Spreadwing;
- Sedge Sprite;
- Cherry-faced Meadowhawk; and,
- Prince Baskettail.

Historical Bird Surveys

The following Species at Risk birds were observed on the Subject Lands during three-round breeding bird surveys conducted in 2012 and two-round breeding bird surveys conducted in 2014 (Savanta):

- Barn Swallow (Threatened in Ontario and Canada) – foraging in low numbers over the Subject Lands; no nesting structures present;
- Eastern Wood-Pewee (Special Concern in Ontario and Canada) – breeding in several woodlands; and,
- Wood Thrush (Special Concern in Ontario, Threatened in Canada) – breeding in a woodland south of the rail line.

A variety of species are indicators of significant wildlife habitat (MNRF, 2015) in 2014, bird species that require specialized marsh nesting habitat were found in a marsh adjacent to the central woodland south of the railway, including Virginia Rail and Sora (same location where Virginia Rail was observed in 2015). The SWH criteria were not met.

The following species that demonstrated breeding evidence on the Subject Lands are considered rare in Niagara Region (NPCA, 2010):

- Orchard Oriole – uncommon / rare resident; and,
- Tufted Titmouse – rare permanent resident.

All bird species recorded in the 2001 EIS (48 species in total) and 2003 EIA (15 species in total) are provincially ranked S5 (common and secure in Ontario) or S4 (apparently secure in Ontario) (NHIC, 2013).

3.2.2.2 Calling Amphibians

Survey Methodology

Three rounds of calling amphibian surveys were completed in April, May and June 2015 following standard protocols outlined in the Great Lakes Marsh Monitoring Program (BSC, 2003). The stations were identified using a preliminary review of aerial photography and verified in the field to confirm the presence of suitable breeding habitat.

Surveys were conducted on warm nights with light to gentle breezes. The surveys commenced one half hour before dusk and ended shortly after midnight. Each round of surveys was conducted at least 15 days apart and as per protocols, the first visit occurred with a minimum nighttime air temperature of 5°C, the second visit with a minimum of 10°C and the third visit with a minimum of 17°C. If noise from plane, road traffic and/or trains was present, monitoring paused until there was a quiet period.

Each station was surveyed for three minutes and a three level call category system was utilized to identify the activity of the frogs. The call levels are: 1) Individual calls do not overlap and calling individuals can be discreetly counted; 2) Calls of individuals sometimes overlap but number of individuals can still be estimated; 3) Overlap among

calls seems continuous (full chorus) and a count estimate is impossible. Anurans were recorded as within the station if they were within 100m. All other species were recorded as incidental records heard outside the station. Road crossing observations were documented, during call-count surveys, at targeted areas (i.e. potential amphibian movement corridors for non-woodland breeding amphibians; MNRF, 2015).

During all evening amphibian surveys, Wildlife Acoustics' Echo Meter Touch Ultrasonic Modules were used to record and analyze bat echolocations. Each bat recording is assigned a GPS location for accuracy. The echo-meter serves as a reconnaissance exercise in an attempt to: identify bats in the general area (e.g. foraging over ponds or open meadows/wetlands); and identify potential bat roost habitat (maternity roost, as well as day roost for Species at Risk bats). Roosts can include trees/snags with signs of decay and cavities, as well old buildings/structures.

Both the Natural Heritage Information Centre (NHIC, 2013) database and the Species at Risk in Ontario (SARO) list (Ontario Regulation 230/08) were reviewed to determine the current provincial status for each amphibian species.

Investigations and Findings

A total of 41 amphibian call count stations were surveyed within the Subject Lands. Stations were located within swamps, marshes, naturalized ponds and golf course ponds (Figure 4, Appendix A). Of these stations, eight were dry at the time of the second round (May) amphibian call count survey. Full amphibian call count data, including survey personnel and weather conditions, are provided in Table 2 (Appendix B) and results are provided in Table 5 (Appendix B).

A total of six amphibian species were heard calling within the Subject Lands during the three rounds of call count surveys (Table 5, Appendix B). All of these species are provincially ranked S5 (common and secure) or S4 (apparently common and secure). No Species at Risk or provincially rare amphibians were recorded on the Subject Lands. All of these amphibian species are considered widespread in Niagara region (NPCA, 2010).

A variety of amphibian species that are listed as indicator species according to the Province's significant wildlife habitat (SWH) criteria for ecoregion 7E (MNRF, 2015) were observed. These observations are summarized below.

- The following station meets the criteria for the amphibian breeding habitat (woodland) SWH type: Station C.

- The following stations meet the criteria for the amphibian breeding habitat (open wetland) SWH type: Stations CC, DD, G, HH, I, J, K, LL, M, NN, OO, W and Y. All but one station (K) are golf course ponds that supported low numbers of

calling amphibians but are considered SWH due to the presence of Bullfrog (1 to 3 specimens). Based on historical aerial imagery, the pond at station K existed before creation of the golf course.

- The MNRF (2015) requires that wetlands that contain amphibian, breeding habitat (open wetland) SWH also be examined for the presence of amphibian movement corridors. The only natural pond (station K) is part of a larger PSW and significant woodland unit that will be retained. The anthropogenic ponds are being examined in terms of potential for removal and replication of features and functions (pending demonstration of no negative impact; PPS, 2014). Movement corridor functions can be enhanced amongst the retained, larger wetland patches through naturalization of wetland and watercourse buffers. Establishment of a select number of local linkages would be beneficial, i.e. linkage to the Welland River and more robust link between the Lyon's Creek and Grassy Brook watercourses.

Incidental Observations

During evening surveys several incidental wildlife observations of note were recorded, including a bat species observed at station CC (echo-meter did not pick up a recording for this individual) and American Woodcock heard calling at stations DD, L, P, and W. Several other common bird species were observed. All wildlife species observed on the Subject Lands are summarized in Table 10 (Appendix B).

Historical Surveys

Amphibian surveys were conducted in April, May and June 2013 within the central portion of the Subject Lands. Survey station locations and results are shown on Figures 6 and 7 (Addendum). Surveys were conducted in accordance with the Marsh Monitoring Program (BSC, 2003). The greatest diversity and abundance of species were recorded during the early-spring survey in April. Full choruses of Spring Peeper were heard at several stations. Several other frog species were heard calling in lower numbers: Western Chorus Frog, Wood Frog, Northern Leopard Frog, Green Frog, and American Bullfrog.

3.2.2.3 Reptiles

The site visit conducted on June 23, 2015, included surveys for snakes, turtle basking, and turtle nesting. The weather was appropriate for completion of these reptile surveys and was as follows: air temperature 26°C, water temperature 21°C (basking is more prevalent when the water temperature is cooler than the air temperature), full / partial sun, and wind 1 km/hr to 5 km/hr. Specific survey methods are described below.

Survey Methodology

i. Turtle Basking Survey Methods

Potentially suitable aquatic habitat for turtles was identified using aerial photography (ponds, open wetlands, and riparian / lacustrine areas). Binoculars were used to scan, from a distance, for ten minutes, the edges and surface of each water body for basking turtles. Data recorded includes: water and air temperatures (basking prevalent when air is warmer than water), vegetation composition around the water body, and presence of basking features (logs, floating vegetation mats, floating / emergent debris like tires).

This survey methodology focuses on Snapping Turtle and Midland Painted Turtle, which are two species that generally occur in the vicinity of the Subject Lands. Species-specific habitat preferences (COSEWIC, 2008) and survey methods of the MNRF (2015) and Toronto Zoo (Caverhill et al., 2011) were considered in the formulation of this basking survey protocol.

ii. Turtle Nesting Survey Methods

The survey occurred during the peak nesting period, which spans from late spring / early summer (late May - June). Candidate turtle nesting areas include shores/beaches of wetlands, lakes or rivers; gravel trails and driveways; and farm field margins with suitable substrate and aspect in relatively close proximity to core habitat (i.e., areas where turtles are observed basking). Potentially suitable nesting areas were searched for evidence, such as test nest dig sites, claw marks, turtle trails or predated nests. Where potential habitat was noted, soil type mapping was reviewed for the presence of potentially suitable substrate (site is an active golf course and soil auger samples were not permitted). Data recorded included: nesting area size, % slope of the nesting area, % canopy cover over the nesting area, direction of orientation (i.e., east facing), location (UTM coordinates), soil substrate, and distance from roadways.

Species-specific habitat preferences (i.e., COSEWIC, 2008) and the survey methods of the OMNR (2012a) and Toronto Zoo (Caverhill et al., 2011; Kula, 2011) were considered in the formulation of this nesting survey protocol.

iii. Snake Survey Methods

Preliminary aerial photography review was performed to identify suitable snake habitat (cultural meadow, disturbed meadow, wetland edges, cultural woodland, cultural savannah, rural residence and farm buildings). Surveys focused on searching natural cover, like logs and debris (carpeting, tarps). All objects were replaced as they were found to reduce disturbance. Old barns, foundations and houses, where access was granted, were also searched.

Transects were walked along the Subject Lands as well as along roads for basking snakes or snake mortalities. Data recorded during snake surveys includes species observed and locations (UTM coordinates), air temperature, water temperature, start and end time, and weather conditions.

This survey methodology focuses on Milksnake and Eastern Ribbonsnake, which are two Special Concern species that generally occur in the vicinity of the Subject Lands. Survey methods are based on OMNR (2012b) and Toronto Zoo (Yanuzzi et al. 2013) snake survey protocols and are also informed by specifies-specific habitat preferences (i.e., Environment Canada, 2015a and 2015b).

Investigations and Findings

Reptile survey stations and transects are summarized on Figure 4. Detailed survey results, including survey personnel and weather conditions, are provided in Table 2 (Appendix B). Seventeen turtle basking stations, three turtle nesting transects, and four road transects were established on the Subject Lands and adjacent roadways. Snakes were searched for at all turtle basking and nesting transects.

Four reptiles were observed within the Subject Lands, all of which are provincially ranked S5 (common and secure in Ontario; NHIC, 2013) and considered widespread in Niagara region (NPCA, 2010). Detailed results are provided in Tables 7 to 9 (Appendix B); a summary is offered below:

- One or more Midland Painted Turtles were observed basking at stations: 6, 9, 10, 13, 14, 16 and 17;
- One Eastern Gartersnake was observed travelling between turtle basking stations 3 and 2;
- One Dekay's Brownsnake was flushed along the edge of station 15 and one was observed dead near the golf cart path crossing of the railroad during the May evening amphibian survey; and,
- One Northern Watersnake was basking along the edge of station 6.

No evidence of turtle nesting was observed during the survey. The site is dominated by tight clay soils that are not suitable for productive turtle nesting (i.e., nest would be drowned during storm events due to lack of suitable substrate). The sand bunkers within the golf course are too shallow (20 cm deep and underlain by clay) to provide suitable nesting habitat. No suitable snake hibernacula were observed.

The reptile species observed on the Subject Lands are listed as indicator species according to the Province's significant wildlife habitat (SWH) criteria for ecoregion 7E (MNRF, 2015). These observations are summarized below.

- Turtle basking station 16 is a natural pond with greater than five Midland Painted Turtles observed. Since the turtles were observed in June, which is outside the spring and fall observation windows required by MNRF (2015), it is not known if this pond provides turtle overwintering SWH. Survey effort in early spring (April) 2016 would confirm whether this pond provides turtle overwintering SWH. This pond is already considered SWH for other reasons (amphibian habitat) and is located partially within the buffer of a PSW unit.
- Congregations of turtles were noted at several man-made ponds, however; these dug ponds are not eligible as SWH according to MNRF (2015).

In addition, several other non-reptile SWH types were observed. Bullfrog was heard calling at turtle basking stations 4, 10, 14 and 16, which triggers the presence of the breeding amphibian open wetland SWH type.

Terrestrial crayfish chimneys were observed at several turtle basking stations. The presence of one or more terrestrial crayfish individuals or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites triggers the presence of the terrestrial crayfish SWH type. The Subject Lands are located within the range of both Chimney Crayfish (*Fallicambarus fodiens*; S3G5) and the provincially rare Meadow Crayfish (*Cambarus diogenes*; S3G5) (MNRF, 2014). The cultural meadow (CUM1) beside turtle basking station 15 meets the criteria to be considered terrestrial crayfish SWH (one chimney in this ELC unit at UTM 651743 4766354). Single terrestrial crayfish chimneys were observed within four golf course 'rough' areas beside fairways. The latter do not meet the SWH criteria, as they are not located within listed ELC communities.

Historical Surveys

Two snake species were observed during 2012 and 2014 surveys. Four eastern garter snakes were observed in 2012 and two in 2014; and one Dekay's brownsnake was observed during each of 2012 and 2014. Two midland painted turtles were observed in a marsh associated with the Central Development Block woodland south of the railway. No reptiles are mentioned in the previous studies (ESG, 2001 and 2003). All reptile species observed are common and secure in Ontario (NHIC, 2013).

3.2.2.4 Other Wildlife

All incidental wildlife observed on the Subject Lands are listed in Table 10 (Appendix B). In 2015, seven mammal species were observed. All of these species are common and secure in Ontario and Canada (no rarity listing for mammals at the regional level).

Seven mammal species were observed on the Subject Lands through incidental observations recorded in 2012 and 2014. Previous studies (ESG, 2001 and 2003) recorded three mammal species that were not observed during recent surveys (Savanta, 2012-2014): northern short-tailed shrew, eastern cottontail, and meadow vole.

These species likely still persist on the Subject Lands. All of the species observed are common and secure in Ontario (NHIC, 2013).

3.2.3 Aquatic Resources

3.2.3.1 Headwater Drainage Feature Assessment

Survey Methodology

Potential drainage features on the Subject Lands were assessed for categorization and subsequent identification of management recommendations using the Credit Valley Conservation (CVC)/Toronto Region and Conservation Authority (TRCA) Guidelines for the "Evaluation, Classification, and Management of Headwater Drainage Features" (2014). Savanta has adopted the 2014 guidelines and developed a standardized approach to the headwater drainage feature assessments (HDFA).

Savanta conducted two site visits to examine headwater drainage features; in the spring on April 30, 2015 and in the summer on July 8, 2015. During the April 30 survey, all features were generally dry except for some shallow standing water at the extreme downstream ends of a few features associated with Lyon's Creek and occasional shallow standing water in low areas. In all cases no flowing water was observed. During both visits, standard field sheets were completed and a photographic record was taken. A third visit was not required as all features were dry during the second round visit.

Investigations and Findings

The 2014 HDFA Guidelines address the approach towards classification of the headwater drainage features by providing step-by-step characterization of specific functions that may be associated with the features. These functions include: hydrology, riparian vegetation within 0-30m of the feature, fish and fish habitat and the presence of terrestrial habitat.

The HDFA guidelines provide subsequent guidance on linking the characteristics and functions of features to specific management recommendations that may be applied to those features. The Guidelines include a figure entitled "Flow Chart Providing Direction on Management Options" to guide the user through the functional assessment of features. The flow chart depicts various decision points associated with hydrology, fish habitat, riparian vegetation and terrestrial vegetation, and ultimately leads to an appropriate management recommendation for the feature on the landscape in the context of changing land use. The flow chart was used to determine the management recommendations for the features on the Subject Lands.

Thirty-four (34) headwater drainage features were identified and assessed by Savanta in the field in 2015 (Figure 5). The assessments and analyses resulted in a

management recommendation of “No Management Required” for all HDFs assessed indicating “these features are generally characterized by minimal flow, no fish or fish habitat and no amphibian habitat” (CVC/TRCA, 2014). It should be noted that these features occur in cultivated agricultural fields and exhibit no riparian vegetation. It is possible that they have been cultivated completely through in other years, however in 2015, it was apparent that a no-till approach to sowing soybeans was utilized so the drainage scars were evident on the landscape. In clay-based soils, drainage is often “encouraged” on the landscape through the use of V-ditch plows, designed to create a shallow trench that speeds up the process of field drainage during the spring period thus allowing for earlier seeding times. V-ditches are often created in the fall in preparation for the spring runoff period of the following year.

3.2.3.2 Aquatic Habitat Assessment

Survey Methodology

Savanta conducted aquatic habitat assessments for two watercourses on the Subject Lands: Grassy Brook and the Lyons Creek. These assessments were conducted in conjunction with HDFA surveys on April 30 and July 8, 2015 and built upon assessments of Grassy Brook conducted by Savanta in 2012. Both watercourses are discussed in detail below.

Investigations and Findings

Grassy Brook

The Grassy Brook headwaters originate 5.5 km to the west of the Subject Lands, in the vicinity of the Welland Canal, west of Darby Road. The creek bed winds in a northeasterly direction from its origins, entering the Subject Lands after crossing under Morris Road (Figure 6). From this point, it extends through the Subject Lands and continues in an easterly direction, eventually joining the Chippawa River east of the Queen Elizabeth Way (QEW), and downstream of the confluence of the Welland River with the Chippawa River. The Chippawa River then continues east, joining the Niagara River upstream of Niagara Falls. Grassy Brook is a warmwater system.

A watercourse and fish habitat assessment was conducted by Savanta on August 15, 2012 and then reassessed during 2015 surveys to identify any changes since 2012. The assessment included an examination of Grassy Brook at the Morris Road crossing, and walking the entire length of the channel on the Subject Lands from the west property boundary and downstream of Crowland Avenue/Grand Niagara Drive. The creek was examined for evidence of flows, bank conditions and dimensions, substrate and vegetation.

At Morris Road, Grassy Brook appears as a grass-lined watercourse with a bottom width of approximately 3 m. The entire channel is lined with terrestrial grasses.

Bankfull width of the channel is approximately 10 m, and the banks are lined primarily with reed canary grass. No flow was present in the channel in 2012, however, standing water was present at the culvert. A thick growth of duckweed was observed on the standing pool, suggesting the water had been present for some time and was exhibiting stagnation. In April 2015, much more water was present in the creek, and evidence of overbank conditions was noted in the field edges upstream of Crowland Avenue.

At the Crowland Avenue/Grand Niagara Drive crossing, the creek retains its grass-lined drain appearance. The creek flows under Crowland Avenue via a 4 m wide box culvert, and downstream the channel is lined with heavy growths of cattail and terrestrial grasses. No water was present in 2012 at the culvert or through much of the length of the channel examined. In April 2015, more water was present. It is apparent that Grassy Brook experiences seasonal fluctuations in flow, with general flooding and overbank conditions occurring in early spring and subsidence to intermittent conditions in summer and early fall.

As the channel enters the wooded area to the east of the Crowland Avenue, terrestrial vegetation lining the channel bed thins out due to overhead shading. Piled woody debris within the floodplain provides evidence of seasonal high flows. The channel bottom width is approximately 2 m to 3 m, while the flooded or bankfull width approximates 10 m and ranges with local micro-topography.

Further into the wooded area, a section of the channel exhibited exposed mud substrates and bare bank areas. This short channel section contained no vegetation due to a combination of complete shading and sustained pooling of water. A shallow pool, approximately 5 cm deep, was noted in this area. No fish were noted in this pool; however green frogs were present.

Beyond the exposed bed area, the overhead canopy thins out somewhat to allow more sunlight in, and the channel resumes its appearance as a grass-lined watercourse. At the downstream end of the wooded area, riparian vegetation is restricted to a narrow band of poplar trees and old-field vegetation. Buffer widths are minimal at this location, approximating 3 m to 5 m in width at their widest point. The channel is more incised at this location, resembling an agricultural drain given its incision and straight appearance.

Downstream of the wooded riparian area, much of the channel is open, and resembles the reed canary grass-lined configuration noted in the reaches upstream of Crowland Avenue/Grand Niagara Drive. The north side of the channel exhibits a minimal buffer of approximately 2 m between the channel and the adjacent soybean field.

Fisheries data for Grassy Brook were obtained from the NPCA in 2012. Species captured at various stations along Grassy Brook are representative of a warmwater community and, depending on station location (i.e. proximate to Chippawa River), include a variety of cyprinids (minnows), as well as top predators, such as bass and

pike. Pike spawning habitat and Grass Pickerel (Special Concern in Ontario and Canada) have been recorded from the Grassy Brook system. While Grass Pickerel is not currently listed under the Endangered Species Act, its dual listing under "Special Concern" has led to the identification of Grassy Brook as Type 1, critical fish habitat by NPCA.

Fisheries and Oceans Canada (DFO) has produced mapping entitled *Distribution of Fish Species at Risk*, commonly referred to as SARA mapping, for the majority of Conservation Authority jurisdictions in Ontario, including the Niagara Peninsula Conservation Authority. The SARA mapping for NPCA identifies both Grassy Brook and Lyon's Creek as habitat for Grass Pickerel.

The data provided by NPCA (October 29, 2012) indicate that Grass Pickerel have been found at fisheries sampling stations upstream of the Subject Lands. In 2012, a report was prepared by MNRF entitled *The Niagara River Watershed Fish Community Assessment (1997-2011)*. The report summarizes a number of fish community data collected between 1997 and 2011 for a variety of watercourses in the Niagara River watershed. That report provides records for Grass Pickerel upstream of the Subject Lands, as well as another member of the family *Esocidae,* Northern Pike, a species with very similar habitat requirements.

Esocidae, such as Grass Pickerel and Northern Pike, inhabit warm, slow-moving streams, ponds and bays of lakes with an abundance of aquatic vegetation. They will spawn in the spring when water temperatures are in the range of 8^{o}C to 12^{o}C, and lay their eggs in vegetated areas where the eggs adhere to instream vegetation and organic debris. No parental care is provided to the eggs or young.

Given that Grassy Brook is an intermittent or discontinuously flowing watercourse, Grass Pickerel likely move through the reaches on the Grand Niagara lands during spring flow periods when sufficient water is present to allow for migration of this species. They then likely recede downstream as flow conditions taper off and become discontinuous as the summer season progresses.

There are some areas of the channel on the Subject Lands that support ample in-stream vegetation, however other portions of the channel are surrounded by dense riparian or streamside vegetation that provides heavy shade that precludes the in-stream growth. This results in a discontinuous reach of grass-lined and bare channel sections. Areas of well-connected grassy floodplain that would provide suitable conditions for spawning when overbank flows occur during the spring. Downstream of Crowland Avenue, channel areas with open grassy banks tend to be incised and somewhat disconnected from the floodplain, while channel sections with shallower banks and which are frequently connected to floodplain overbank flows are in the forested stand that does not support good understorey or instream vegetation for spawning habitat.

Channel sections upstream of Crowland Avenue and Morris Road are much more open and are characterized by a considerable length of grass-lined channel, due to the lack of shade providing riparian tree growth in these agricultural areas. In general, those upstream areas contain ample in-stream vegetation for spawning habitat. The overbank and floodplain zones are well connected to the main channel; however, vegetation tends to be reduced or impacted by cultivation practices in the open agricultural lands.

Lyon's Creek Tributary

A tributary of Lyons Creek arises approximately 2 km southwest of the Subject lands on the west side of McKenney Road. The tributary enters the Subject Lands at the western boundary, downstream of Morris Road, and continues across the Subject Lands generally parallel to, and south of, Grassy Brook (Figure 6). It continues in an easterly direction to its confluence with the main Lyon's Creek, east of the QEW immediately south of Lyons Creek Road. This creek is an intermittent warmwater tributary.

During the April 30, 2015, site visit the tributary exhibited discontinuous pockets of standing water, with evidence of previous flooding and overbank flow conditions. The feature is primarily a shallow watercourse flowing through alternating pockets of mineral meadow marsh, occasional deciduous swamps pockets and agricultural fields. The majority of the channel's riparian vegetation is limited to narrow meadow marsh communities beyond which the land is ploughed for agricultural purposes.

Historical fish data are available for Lyon's Creek near its confluence with the Welland River (Niblett Environmental Associates, 1995). Fisheries data are also available for Hunter Drain, which empties into the Welland River at the junction of the river and Lyon's Creek. Fisheries data for Lyons Creek, collected in 1974, 1976 and 1981, were also summarized by Niblett Environmental Associates (1995).

A total of 21 fish species have been reported from the length of Lyon's Creek, including areas outside of the Subject Lands. In addition to the usual complement of minnow and sucker species, black and brown bullhead, tadpole madtom, grass pickerel, northern pike, central mudminnow, rock bass, pumpkinseed, black crappie, and yellow perch have been documented. Spawning of northern pike has been documented in both Lyon's Creek and Hunter Drain (ESG, 2001).

Grass Pickerel (Special Concern in Ontario and Canada) was recorded from the Lyon's Creek system. No MNRF fisheries data are available for the tributary associated with the Subject Lands, nor was it sampled for any of the years listed in the *Niagara River Watershed Fish Community Assessment* report.

Based on surveys conducted by ESG (2001) only two species of fish were recorded from the tributary to Lyon's Creek on the Subject Lands: Pumpkinseed Sunfish and Golden Shiner. A detailed habitat assessment carried out by ESG at the time, described the reach of Lyon's Creek downstream of Crowland Avenue as providing little aquatic

diversity. The channel is described as poorly defined and approximately two meters in width with a well vegetated floodplain consisting of soft silts, sands and clay. Little evidence of permanent flow was observed by ESG in 2001, however at the downstream edge of the woodlot, rushes and cattails are established suggesting lengthier periods of moisture.

According to studies conducted by ESG (2001) a few locations throughout this reach on the Subject Lands could provide spawning habitat for both Grass Pickerel and Northern Pike if fish access from downstream is feasible. Observations of habitat conditions by Savanta, particularly in the reaches upstream of Crowland Avenue suggest that instream vegetation dominated by Reed Canary Grass, and seasonal flooding conditions provide potentially suitable spawning habitat for Esocids, including Grass Pickerel.

3.3 ANALYSIS OF ECOLOGICAL & NATURAL HERITAGE SIGNIFICANCE (PPS)

The most recent Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act*, and came into effect on April 30, 2014. 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 EIS 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 across other pertinent legislation (e.g., sections 2.1.6 and 2.1.7; Federal *Fisheries Act* and the Provincial *Endangered Species Act, 2007*)

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

- Significant wetlands
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Fish habitat;
- Habitat of endangered and threatened species; 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 the habitat of endangered and threatened species or in fish habitat, except in accordance with provincial and federal requirements. Development and site alteration may be permitted on lands adjacent to fish habitat provided it has been demonstrated that there will be no negative impacts on the natural feature or their ecological functions.

A number of these elements appear to occur within and/or immediately adjacent to the Subject Lands. Significant Wetlands, Significant Wildlife Habitat, and Significant Woodlands are located on and/or adjacent to the three zoned development blocks. Some foraging habitat occurs for a threatened species, Barn Swallow (*Hirundo rustica*), on the Subject Lands. Each of these elements is described in detail in the following sections. Grassy Brook and Lyon's Creek contain Fish Habitat. The naturally vegetated portions of the Welland River valley would reasonably meet thresholds for determination as Significant Valleyland.

3.3.1 Significant Wetlands

Within Ontario, Significant Wetlands are identified by the MNRF or by their designates. Other evaluated or unevaluated wetlands may be identified for conservation by the municipality or the conservation authority. MNRF's database was consulted and natural heritage features (i.e., PSW, woodlands) are depicted, along with NPCA-identified natural features (Figure 2). Portions of the Lower Grassy Brook PSW complex are located on the Subject Lands.

3.3.2 Habitat of Endangered and Threatened Species

Endangered and threatened species are identified by the Committee on the Status of Species at Risk in Ontario ("COSSARO") and are listed by the MNRF under regulations to the Endangered Species Act, 2007.

Barn Swallow, which is listed as Threatened under Ontario's *Endangered Species Act*, *2007*, was observed foraging over the Subject Lands in low numbers but no breeding evidence was recorded. There are no nesting structures known from the Subject Lands. Barn Swallow foraging habitat is addressed on a case-by-case basis by the MNRF to determine whether the reduction in foraging habitat, caused by the development, would trigger the need for an overall benefit Permit under the ESA, 2007. The MNR General Habitat Description defines Barn Swallow foraging habitat as woodland edges, pasture

with livestock and waterbodies. The Subject Lands provide foraging habitat in the form of tributaries, ponds and woodland / swamp edges.

A search of the NHIC database in 2015 identified 35 Species at Risk and provincially rare species (SH, S1-S3) in the vicinity of the Subject Lands. Table 1 (Appendix B) summarizes preferred habitat and possible presence / absence on the Subject Lands for each species. MNRF Guelph District typically requests a table of this nature be completed for all Species at Risk that occur in the regional municipality. It must be demonstrated that either no habitat is present or that sufficient survey effort has been invested in an effort to detect the species.

Due to the presence of Jefferson Salamander (Endangered in Ontario and Canada) in proximity to the Subject Lands, wetlands that contain suitable habitat for this species must have a buffer applied that protects the life processes of this species. If development is proposed to intrude into this buffer, then an overall benefit permit may be required. Based on 2015 data, potentially suitable habitat for this species is present in the swamp north of Grassybrook Road and the central swamp units' north and south of the rail line. All of these swamps are already considered PSW units, which typically require a 30 m buffer. Buffer width will be refined as part of the forthcoming impact assessment process.

An Information Gathering Form to address Species at Risk must be prepared to address species raised in the MNRF Information Request Form (once received).

3.3.3 Fish Habitat

Fish habitat, as defined in the federal *Fisheries Act, c. F-14*, means… spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. *Fish*, as defined in S.2 of the *Fisheries Act, c. F-14*, includes parts of fish, shellfish, crustaceans marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals (Department of Fisheries and Oceans, 2013).

The SARA mapping for NPCA identifies both Grassy Brook and Lyon's Creek tributary, on the Subject Lands, as habitat for Grass Pickerel (Special Concern in Ontario and Canada). Grassy Brook is an intermittent watercourse that provides warmwater fish habitat. This watercourse is designated by the NPCA as Type 1 or critical fish habitat due to potential spawning habitat for Grass Pickerel and Pike. Grass Pickerel has, however, been recorded upstream of the Subject Lands and likely pass through the reach that crosses the Subject Lands.

The unnamed tributary of Lyon's Creek that crosses the Subject Lands is an intermittent watercourse that provides warmwater fish habitat. Lyon's Creek is mapped as providing spawning habitat for Grass Pickerel and Northern Pike and, according to studies

conducted by ESG (2001), a number of locations throughout this reach on the Subject Lands could provide spawning habitat for both these species of fish access from downstream is feasible. Due to these characteristics the watercourse is considered Type 1 or critical fish habitat.

None of the headwater drainage features noted on the Subject Lands (Figure 5) provide fish habitat.

3.3.4 Significant Woodlands

Significant woodlands should be identified by the planning authority using criteria established by the MNRF. Under the NHRM (2010), woodlands are defined as:

> *...treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels.*

The Region (2015) defines woodland as a treed area that provides environmental and economic benefits to both the private landowner and general public, such as ecosystem goods and services. It does not include a cultivated fruit or nut orchard or a plantation used for the purpose of producing Christmas trees.

In accordance with this definition, natural treed communities (FOC, FOD, FOM, SWC, SWD, SWM) and cultural forest / plantation communities (CUW, CUP) are considered woodlands (i.e., meet the Forestry Act woodland density requirements). Woodland patches are considered part of the same continuous woodland if they are within 20 m of each other.

To be identified as significant, a woodland on the Subject Lands must meet one or more of the following criteria (Region, 2015):

a) Contain threatened or endangered species or species of concern (Special Concern in Ontario or Canada or provincially ranked S1-S3);
b) Within the Urban Area, be 2 hectares or greater in size;
c) Contain interior woodland habitat at least 100m in from the woodland boundaries;
d) Contain older growth forest and be 2 hectares or greater in area;

e) Overlap or contain one or more of the other significant natural heritage features listed in Region (2015) policies 7.B.1.3 or 7.B.1.4 (i.e., EPA, ECA or fish habitat); and,
f) Abut or be crossed by a watercourse or water body and be 2 or more hectares in area.

The majority of the treed ELC polygons on the Subject Lands meet the Region's (2015) definition of woodland. Woodland patches that meet one or more of the significant woodland criteria, listed above, are shown on Figure 7.

3.3.5 Significant Valleyland

Significant Valleylands should be defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the NHRM (MNR, 2010) for Policy 2.1 of the PPS. Recommended criteria for designating significant valley lands include prominence as a distinctive landform, degree of naturalness, and importance of its ecological functions, restoration potential, and historical and cultural values

The Welland River was identified as a significant valleyland. The contiguous riparian vegetation that fronts the Welland River, on the Subject Lands, was identified as significant valleyland on Figure 9.

3.3.6 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) is one of the more complex natural heritage features to identify and evaluate. There are several provincial documents that discuss identifying and evaluating SWH; including the:

- Natural Heritage Reference Manual (NHRM) (MNR, 2010);
- Significant Wildlife Habitat Technical Guide (MNR, 2000);
- Final SWH Ecoregion Criterion Schedule (MNRF, 2015); and
- SWH Mitigation Support Tool (MNRF, 2014).

The Subject Lands are located in ecoregion 7E and were therefore assessed using the 7E Criteria Schedule (MNRF, 2015).

There are four general types of SWH: seasonal concentration areas, rare or specialized habitats, habitat for species of conservation concern, and animal movement corridors. All types of SWH in relation to the Subject Lands are discussed in detail below; portions of the Subject Lands are considered SWH (Figure 8).

Seasonal Concentration Areas

No evidence of seasonal concentration areas was observed on or adjacent to the Subject Lands.
Seasonal concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. The following is a partial list of numerous potential examples: deer yards, amphibian breeding ponds, snake hibernacula, waterfowl staging and molting areas, raptor roosts, bird nesting colonies, shorebird staging areas, and passerine migration concentrations. Only the best examples of these concentration areas are usually designated as significant wildlife habitat. Areas that support Special Concern species or provincially vulnerable to imperiled species (S1-S3), or if a large proportion of the population may be lost if the habitat is destroyed, are examples of seasonal concentration areas which should be designated as significant.

Rare of Specialized Habitat

Rare or specialized habitat, are two separate components. Rare habitats are those with vegetation communities that are considered rare in the province. SRANKS are rarity rankings applied to species at the provincial level, and are part of a system developed under the auspices of the Nature Conservancy (Arlington, VA). Generally, community types with SRANKS of S1 to S3 (extremely rare to rare-uncommon in Ontario), as defined by the NHIC, could qualify. It is assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Specialized habitats are microhabitats that are critical to some wildlife species. Potential examples include woodland amphibian breeding ponds and deep interior habitat for area-sensitive woodland or grassland fauna.

Based upon observations of the site and adjacent lands, a number of SWH types within this category were evaluated. Three types are confirmed to be present – rare vegetation communities, non-woodland (open wetland) amphibian breeding habitat, and woodland amphibian breeding habitat:

- Rare vegetation communities are present on the Subject Lands, including SWT2-4 (buttonbush mineral thicket swamp), SWD1-3 (pin oak deciduous swamp) and potentially two other swamp types dominated by pin oak (SWD1-5*, SWD1-6*);
- Non-woodland (open wetland) amphibian breeding habitat is present at various stations (yellow shading on Figure 8 and the natural pond at amphibian station K);
- Woodland amphibian breeding habitat is present at station C with a swamp that is already identified as PSW; and,
- The pond at amphibian station K may support turtle overwintering habitat (would require 2016 confirmation).

Species of Conservation Concern

Species of conservation concern include four types of species: i) those that are rare; ii) those whose populations are significantly declining; iii) those that have been identified as being at risk to certain common activities; and iv) those with relatively large populations in Ontario compared to the remainder of the globe. Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the ESA, 2007. Endangered and threatened species are discussed in Section 3.3.2.

The following species and their habitats were assessed to determine what would meet the definition of habitat of species of concern:

- Four Special Concern species were observed:
  - Monarch (*Danaus plexippus*) was observed in low numbers in 2012 and 2014. Large concentrations of Monarch are normally required for designation of provincially significant wildlife habitat for this species.
  - Grass Pickerel (*Esox americanus vermiculatus*) was observed in 2000. Grass Pickerel passes through the Subject Lands at some point during the year due to the proximity of off-site spawning habitat (i.e., upstream of the Subject Lands).
  - Eastern Wood-Pewee breeding evidence was recorded in a variety of woodlands on the Subject Lands. These woodlands provide sufficient canopy cover and height to sustain this species. Pewee is known to utilize woodlands close to human housing developments, possibly because it is less sensitive to changes in the lower levels of the forest.
  - Wood Thrush breeding evidence was recorded in the South Block woodlot and, further south, in the woods opposite the railway (off-site). While there is no interior woodland habitat >200 m from edge on or adjacent to the Subject Lands, the South Block woodland and the woods south of the railway in this area, are suitable for nesting Wood Thrush based on available vegetation structure and layers that this species prefers.

- Four provincially rare species were observed:
  - One provincially rare plant species was found in the swamp north of Grassy Brook Road: Black Gum (S3).
  - One provincially rare odonate species was recorded in 2015: Slender Bluet (S1), which was observed in small numbers (6) along the south shore of the golf water bunker immediately south of point count 21.

- Two provincially rare odonate species were recorded in 2014 that were not found in 2015 despite survey effort: Swamp Darner (S2S3) and Double-striped Bluet (S3). Both species were found in areas that are overlapped by other natural heritage designations (i.e. PSW, significant woodland, etc).

- Regionally rare plants, birds and insects were identified previously.

Animal Movement Corridors

Animal movement corridors are areas that are traditionally used by wildlife to move from one habitat to another. This is usually in response to different seasonal habitat requirements. Some examples are trails used by deer to move to wintering areas, and areas used by amphibians between breeding and summering habitat.

Corridors containing water sources are usually more significant than similar corridors without water because of its importance to a variety of wildlife (OMNR, 2000). The most important riparian corridors should have at least 15 m of vegetation on both sides of the waterway. Though this is the case for Grassy Brook across part of the Subject Lands, riparian vegetation is discontinuous – particularly west of Crowland Avenue (active cultivation) and east of the Subject Lands where the creek passes through golf course fairways.

The Lyon's Creek corridor provides additional fish and wildlife movement functions. The vegetated corridor along the railway, south of the Subject Lands, also provides terrestrial linkage and movement corridor functions. These areas provide habitat for localized movement and connectivity and would not meet recommended levels of importance at a regional or provincial scale.

No evidence of traditional mammal trails was found during any of the site visits. While mammals utilize these lands, there is no indication of a formal migration corridor or other evidence of "high traffic" trails.

Snake observations, though still low overall, occurred in several years along the rail line. Opportunities exist to enhance linkages between the swamp communities' north and south of the rail (i.e., increasing natural vegetation cover).

3.3.7 Summary of Significant Wildlife Habitat Present on the Subject Lands

Portions of the Subject Lands or adjacent lands (south of railway) meet the following criteria for designation as Significant Wildlife Habitat:

Rare or Specialized Habitat

- Rare vegetation community (buttonbush mineral thicket swamp and pin oak deciduous swamps);

- Woodland amphibian breeding habitat;
- Non-woodland (open wetland) amphibian breeding habitat; and,
- Potential turtle overwintering habitat.

Habitat of Species of Conservation Concern

- Eastern Wood-Pewee (Special Concern in Ontario and Canada);
- Wood Thrush (Special Concern in Ontario, Threatened in Canada);
- Monarch Butterfly (Special Concern in Ontario and Canada);
- Grass Pickerel (Special Concern in Ontario and Canada);
- Black Gum (S3);
- Provincially rare odonates: Slender Bluet (S1), Swamp Darner (S2S3), Double-striped Bluet (S3); and,
- Regionally rare plants, birds and insects.

4.0 PRELIMINARY NATURAL HERITAGE

The composite of Natural Heritage policy related definitions is depicted on Figure 10. These areas represent a variety of natural features and associated functions in which the Province and municipalities have an interest.

Natural heritage features were ranked on the Subject Lands to provide input into the planning process underway. Natural heritage features and associated functions defined by the PPS as generally unavailable for development which includes Provincially Significant Wetlands (PSWs), Critical fish habitat and significant habitat for endangered and threatened species were given the highest ranking and are protected from development, except in accordance with provincial and federal requirements. This may for example, include development that has satisfied an overall benefit test associated with an *Endangered Species Act, 2007* permit.

In addition, development shall not be permitted in other natural heritage policy component areas unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions. Given these rules, development is essentially prohibited in Significant Wetlands. Development may occur in other areas subject to meeting specific tests (e.g., no negative impacts). In that sense, Figure 10 presents a partial explanation of potential constraints to development. Portions of depicted natural heritage policy areas may be included in community development, subject to meeting tests. In the case of the Grand Niagara Secondary Plan Area there are many opportunities for the enhancement and restoration of natural areas and associated functions.

The potential for development within natural areas and for the enhancement and restoration of natural areas continues to be the focus of dialogue with the City, Region and NPCA. The following are some general principles that can be applied to these lands to guide the community planning process. The limits of natural features and development should be subject of dialogue with the planning team to optimize ecological outcomes.

- Generally, define a 30 m buffer along Grassy Brook Creek, Lyon's Creek, and the Welland River given the presence of Type 1 or critical fish habitat and, for the latter, significant valleyland as well.
- Generally, define a 30 m buffer from PSW units as defined by the MNRF and as mapped on the Region's Official Plan Schedule C. Where development is proposed within buffers and general catchments should consider feature-based water balances to ensure the balancing of pre- and post-development wetland hydrology.

  The general 30 m buffer from PSW units will provide support and protection for any potential occurrences of Jefferson Salamander (Endangered in Ontario and

Canada). Buffer widths and character will be refined as part of the subsequent impact assessment.

- Barn Swallow (Threatened in Ontario and Canada) foraging habitat is associated with the central portion of the Subject Lands. Discussions with the MNRF should occur (i.e., as per the *ESA, 2007)* through the Species at Risk Information Gathering Form process. Opportunities exist to enhance the habitat for this species within the Subject Lands through the provision of created nesting habitat (e.g., Barn Swallow nest structure installation).
- Generally, define a 30 m buffer along the Welland River to provide protection to the significant valleyland, fish habitat and PSW's associated with this feature.
- Generally, define a 15 m buffer along Grassy Brook Creek and Lyon's Creek given the presence of Type 1 or critical fish habitat. In many areas the buffer will be greater than 15 m in order to capture the 100-year floodplain limits.
- Where significant woodland will be retained, generally define a 10 m buffer (measured from the drip line).
- Where significant natural heritage features are proposed for removal, compensatory mitigation may be required to meet the no negative impact test. Restoration efforts (e.g., restored naturalized ponds to provide habitat for amphibians, including Bullfrog). Significant areas and opportunities exist west of Crowland Avenue for substantial restoration initiatives. These measures, and the extent to which they may be required to meet various ecological policy tests should be subject to detailed planning and dialogue with the City, Region and agencies.

This baseline report is intended to provide input to the Secondary Planning process. It serves as a background set of data and analyses to allow environmental impact assessment work to proceed as land use planning is advanced. This report will be revised in response to study team comments and will be finalized for submission in accordance with instructions from the MMM Group.

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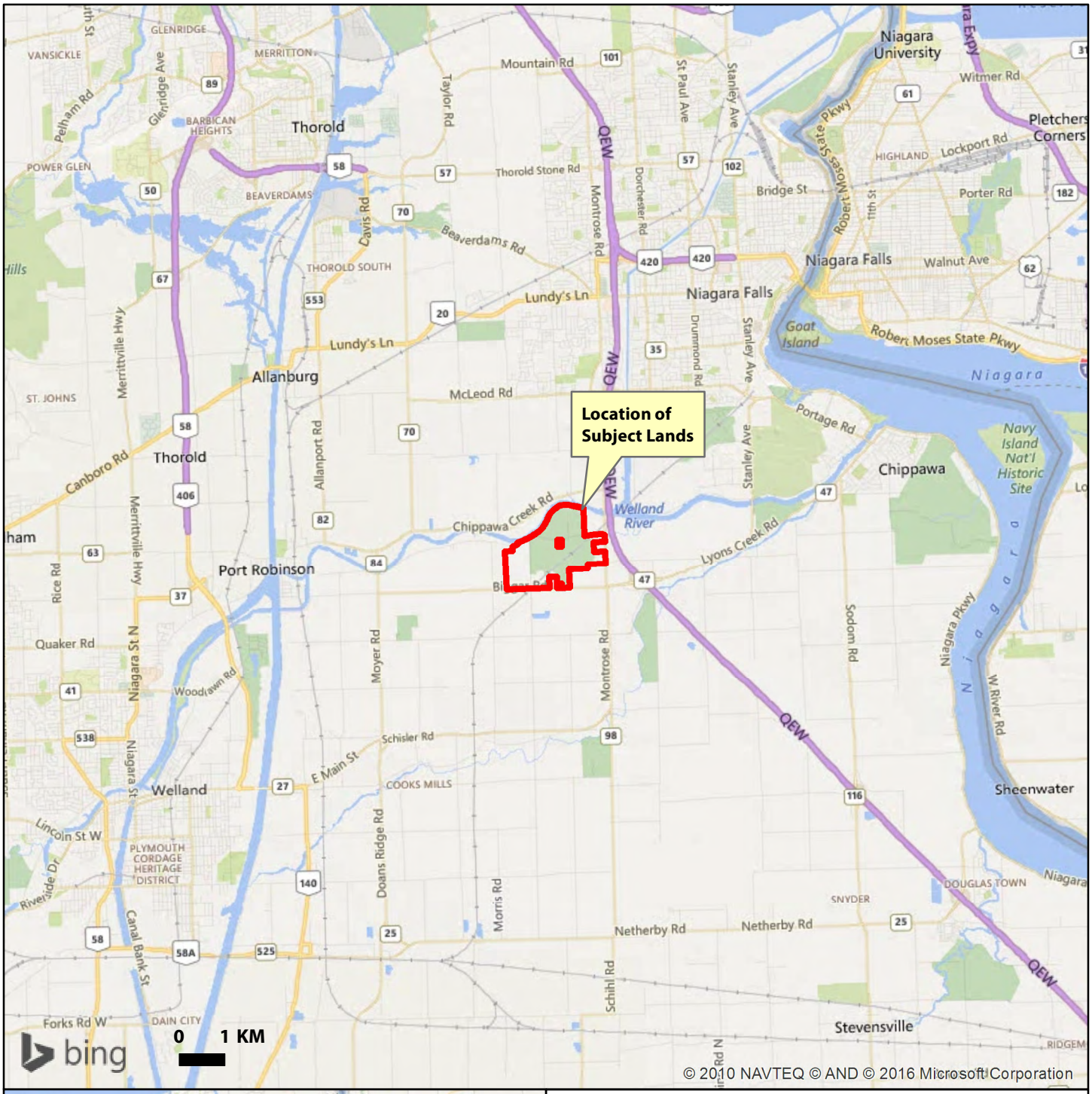
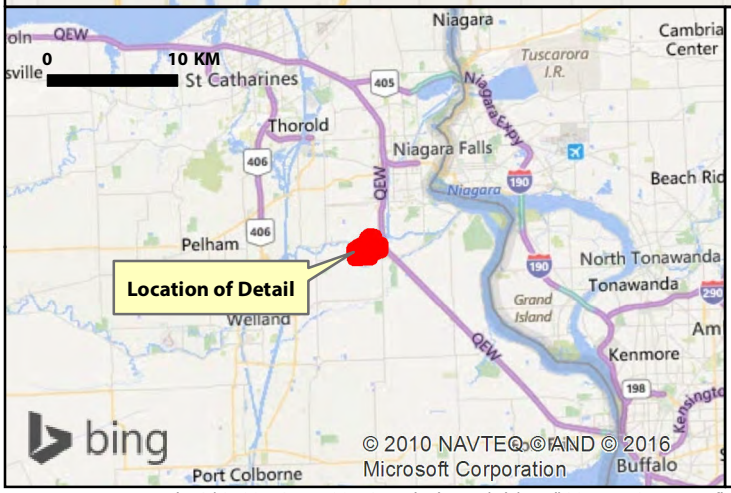
APPENDIX A

Figures





Grand Niagara

Figure 1 Location of Subject Lands

Grand Niagara Holdings

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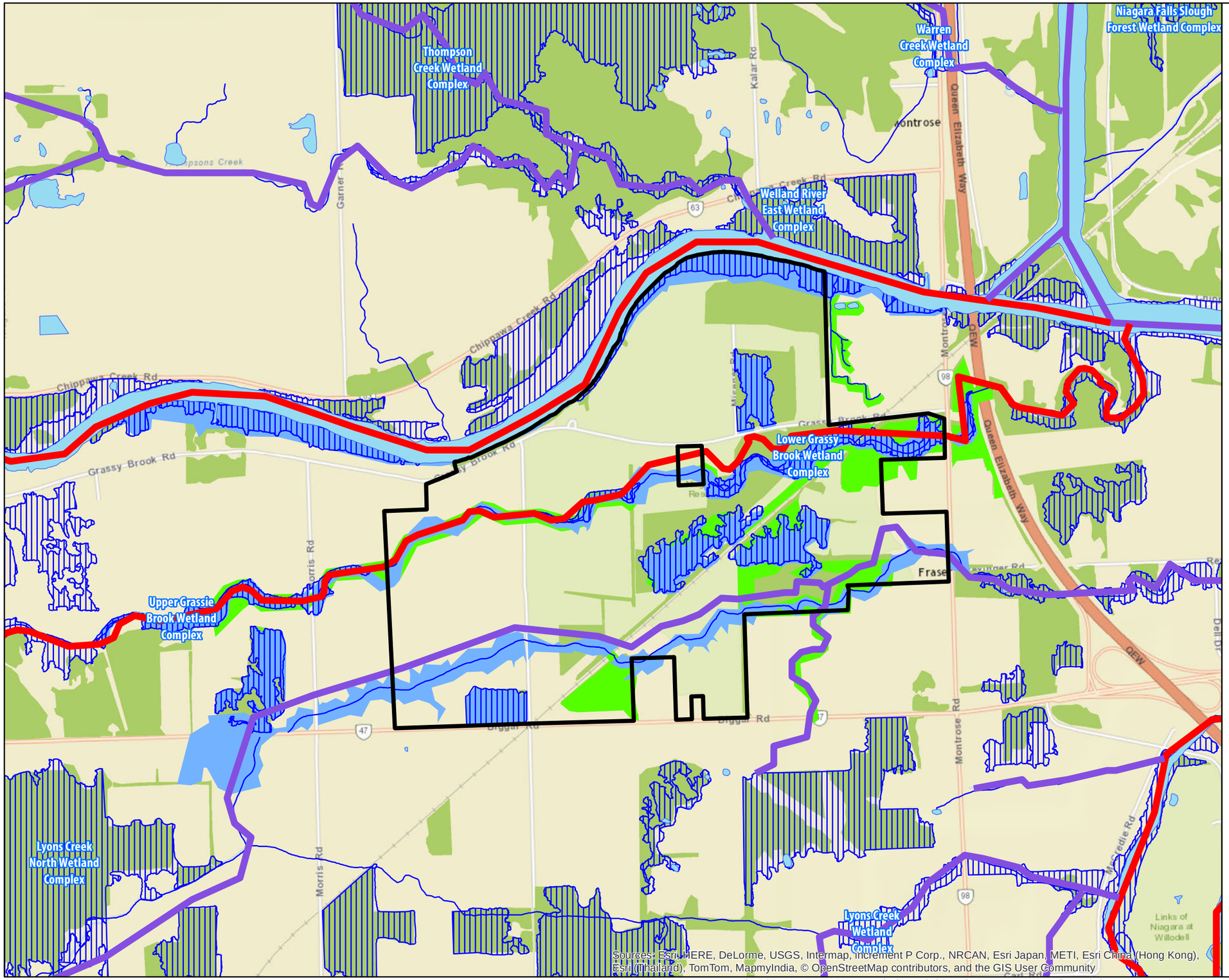

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Grand Niagara Holdings

Fish Habitat (MNRF LIO)

- TYPE 1
- TYPE 2

Natural Features (MNRF LIO)

- ANSI
- Evaluated-Provincially significant wetland
- Watercourse
- Woodland

Niagara Regional Policy Plan 2015 Sch C

- ECA Amendment 96 Schedule A
- EPA Amendment 96 Schedule A

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Grand Niagara

Figure 2
Natural Heritage Features - Desktop Analysis

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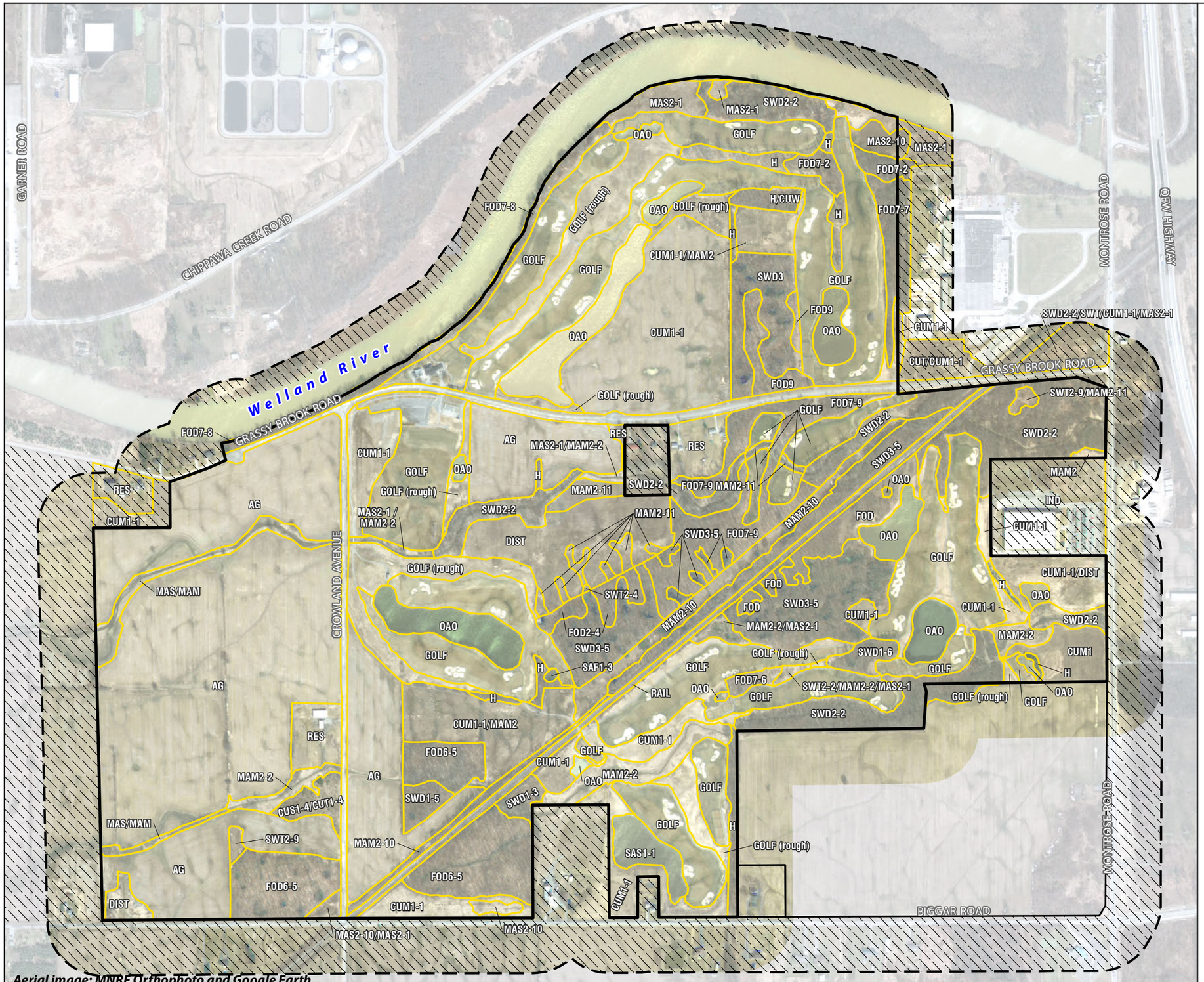

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- Grand Niagara Holdings
- Non-participating land
- 120m adjacent lands
- Ecological Land Classification

ELC Legend

FOREST

FOD	Deciduous Forest
FOD2-4	Dry-Fresh Oak-Hardwood Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest
FOD7-6*	Fresh-Moist Red Maple Lowland Deciduous Forest
FOD7-7*	Fresh-Moist Ash-Elm Lowland Deciduous Forest
FOD7-8*	Fresh-Moist Walnut-Ash-Willow Lowland Deciduous Forest
FOD7-9*	Fresh-Moist Pin Oak-Green Ash Lowland Deciduous Forest
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest

SWAMP

SWD1-3	Pin Oak Mineral Deciduous Swamp
SWD1-5*	Green Ash-Pin Oak Mineral Deciduous Swamp
SWD1-6*	Pin Oak-Ash-Maple Mineral Deciduous Swamp
SWD2-2	Green Ash Mineral Deciduous Swamp
SWD3	Maple Mineral Deciduous Swamp
SWD3-5*	Maple Mineral Deciduous Swamp
SWT	Thicket Swamp
SWT2-2	Willow Mineral Thicket Swamp
SWT2-4	Buttonbush Mineral Thicket Swamp
SWT2-9	Grey Dogwood Mineral Thicket Swamp

MARSH

MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAM2-11*	Mixed Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
MAS2-10*	Common Reed Mineral Shallow Marsh

OPEN WATER

OAO	Open Aquatic

SHALLOW WATER

SAS1-1	Pondweed Submerged Shallow Aquatic
SAF1-3	Duckweed Floating-leaved Shallow Aquatic

CULTURAL

CUW	Cultural Woodland
CUS1-4*	White Pine Cultural Savanna
CUT	Cultural Thicket
CUT1-4	Grey Dogwood Cultural Thicket
CUM1-1	Fresh-Moist Old Field Meadow

**not listed in Southern Ontario ELC Guide*

RES	Residence
H	Hedgerow

Grand Niagara

Figure 3
Vegetation Communitiies

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- Grand Niagara Holdings
- Non-participating lands
- 120m Adjacent Lands
- Ecological Land Classification
- Amphibian call station location
- No amphibian breeding habitat present as of May 2015
- Breeding bird survey point count station (2015)
- Grassland Species at Risk bird point count station (2015)
- Turtle basking station
- Wildlife road crossing transect
- Reptile survey transect

Aerial image: MNRF Orthophoto and Google Earth.

Grand Niagara

Figure 4
Wildlife Monitoring Station Locations

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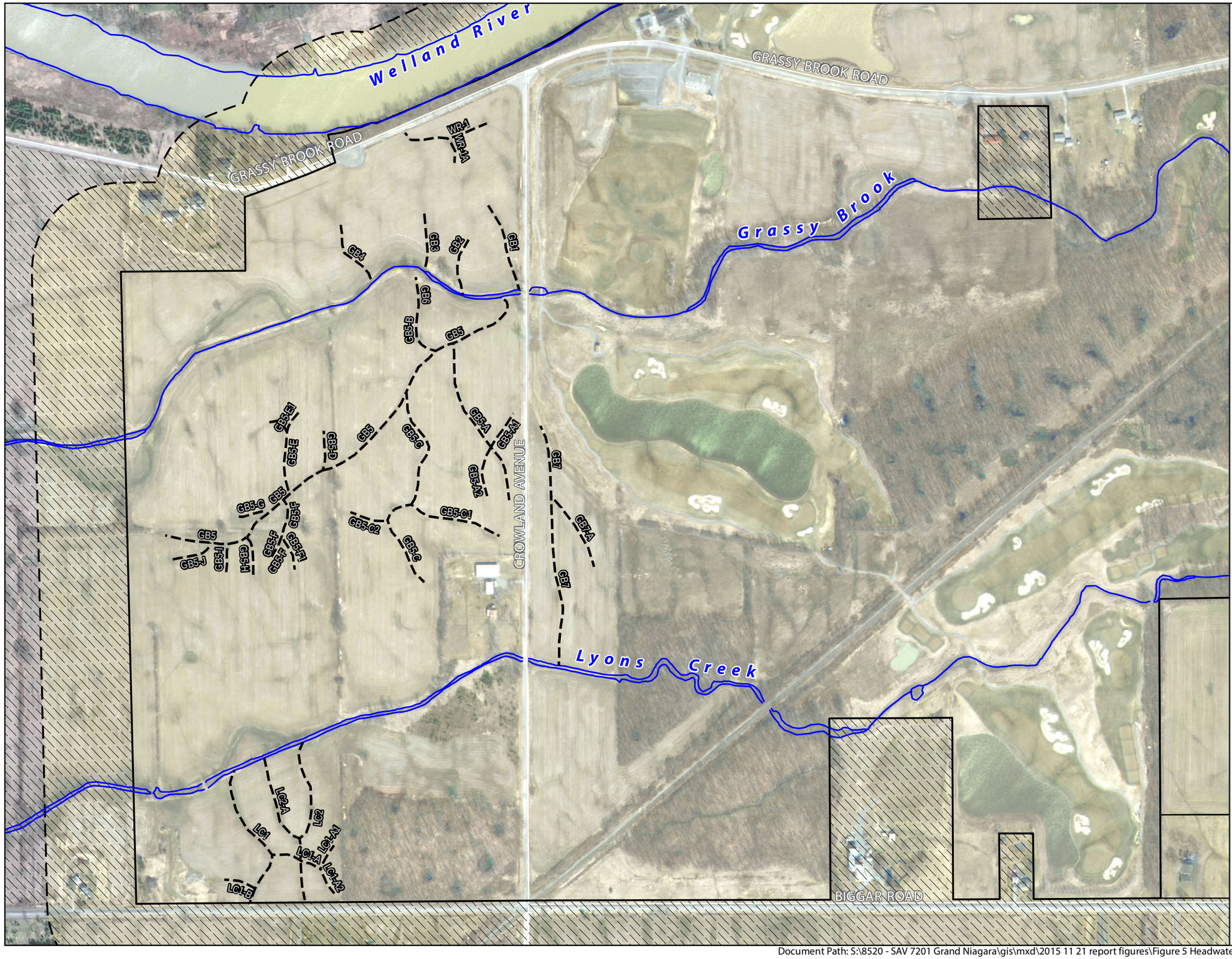

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Grand Niagara Holdings

Non-participating lands

120m Adjacent Lands

Headwater Drainage

No management required

Headwater Drainage Feature Assessment Guidelines Management Recommendations (TRCA/CVC)

Watercourse (MNRF LIO)

Orthophoto: Google Earth. Image date spring 2010.

Grand Niagara

Figure 5
Headwater Drainage Features

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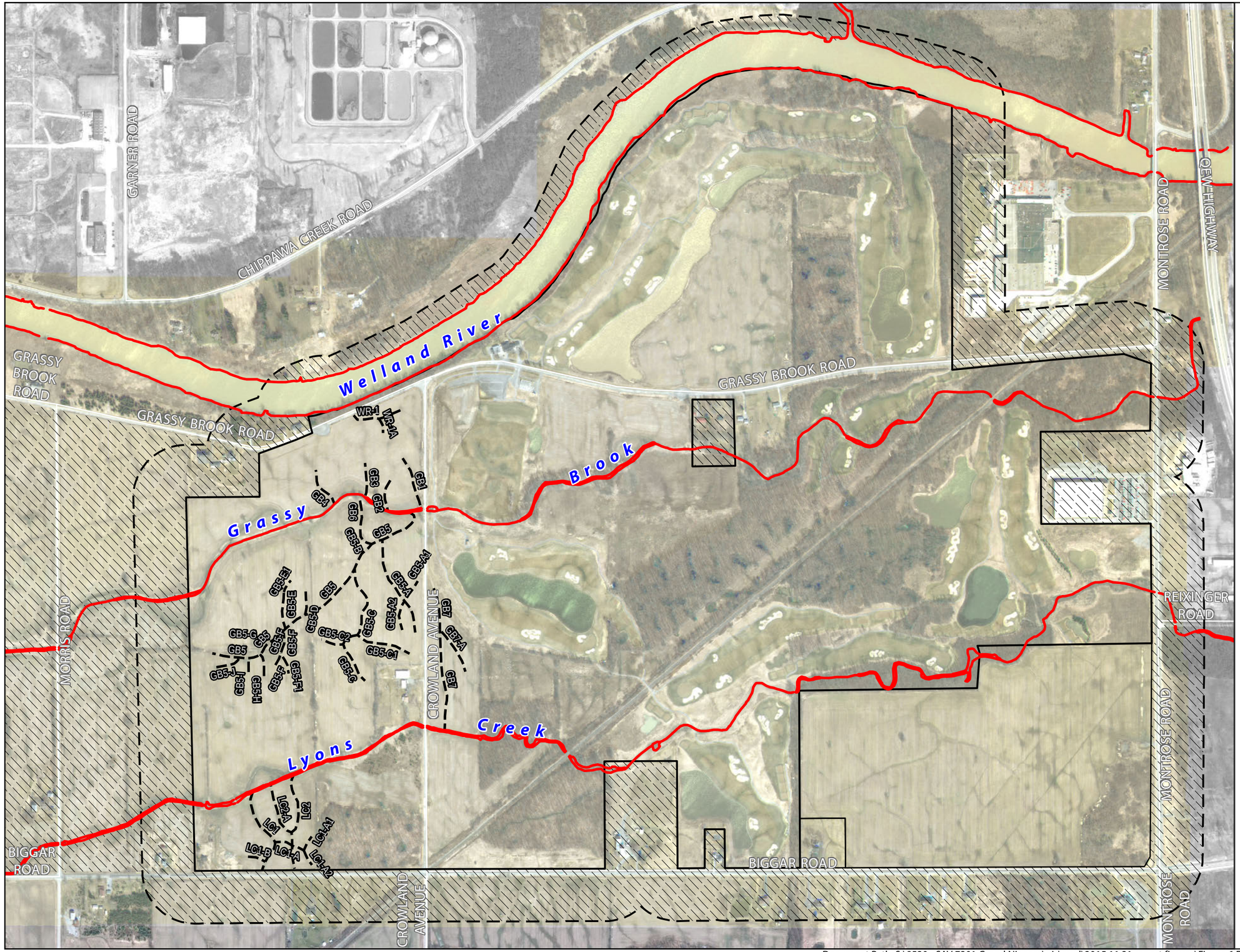

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Grand Niagara Holdings

Non-participating lands

120m Adjacent Lands

Headwater Drainage

No management required

Headwater Drainage Feature Assessment Guidelines Management Recommendations (TRCA/CVC)

Fish Habitat

Type 1 - Critical Fish Habitat

Orthophoto: Google Earth. Image date spring 2010.

Grand Niagara

Figure 6
Existing Fish Habitat

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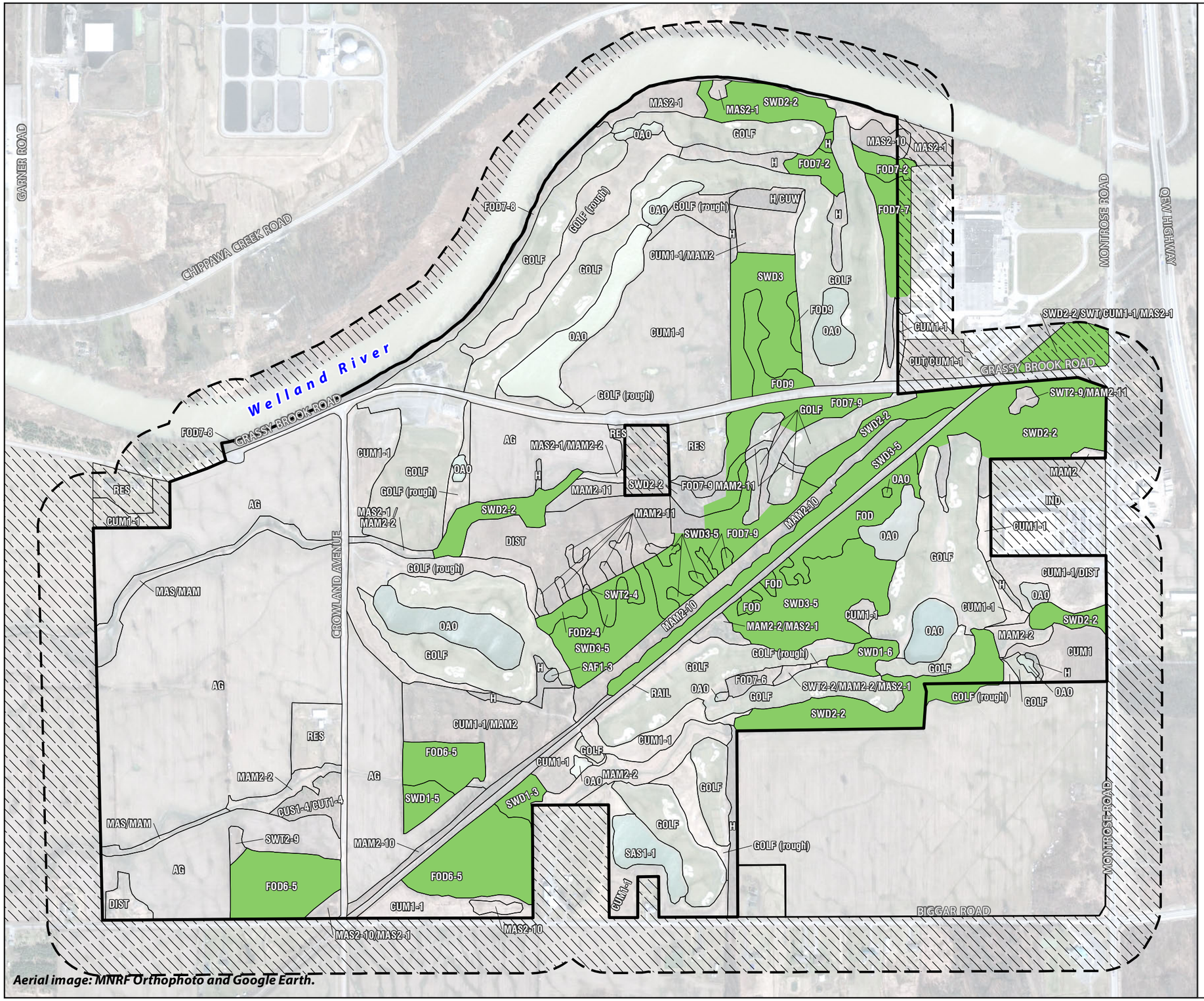

Aerial image: MNRF Orthophoto and Google Earth.

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- Grand Niagara Holdings
- Non-participating land
- 120m adjacent lands
- Ecological Land Classification
- Significant woodlands

ELC Legend

FOREST

FOD	Deciduous Forest
FOD2-4	Dry-Fresh Oak-Hardwood Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest
FOD7-6*	Fresh-Moist Red Maple Lowland Deciduous Forest
FOD7-7*	Fresh-Moist Ash-Elm Lowland Deciduous Forest
FOD7-8*	Fresh-Moist Walnut-Ash-Willow Lowland Deciduous Forest
FOD7-9*	Fresh-Moist Pin Oak-Green Ash Lowland Deciduous Forest
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest

SWAMP

SWD1-3	Pin Oak Mineral Deciduous Swamp
SWD1-5*	Green Ash-Pin Oak Mineral Deciduous Swamp
SWD1-6*	Pin Oak-Ash-Maple Mineral Deciduous Swamp
SWD2-2	Green Ash Mineral Deciduous Swamp
SWD3	Maple Mineral Deciduous Swamp
SWD3-5*	Maple Mineral Deciduous Swamp
SWT	Thicket Swamp
SWT2-2	Willow Mineral Thicket Swamp
SWT2-4	Buttonbush Mineral Thicket Swamp
SWT2-9	Grey Dogwood Mineral Thicket Swamp

MARSH

MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAM2-11*	Mixed Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
MAS2-10*	Common Reed Mineral Shallow Marsh

OPEN WATER

OAO	Open Aquatic

SHALLOW WATER

SAS1-1	Pondweed Submerged Shallow Aquatic
SAF1-3	Duckweed Floating-leaved Shallow Aquatic

CULTURAL

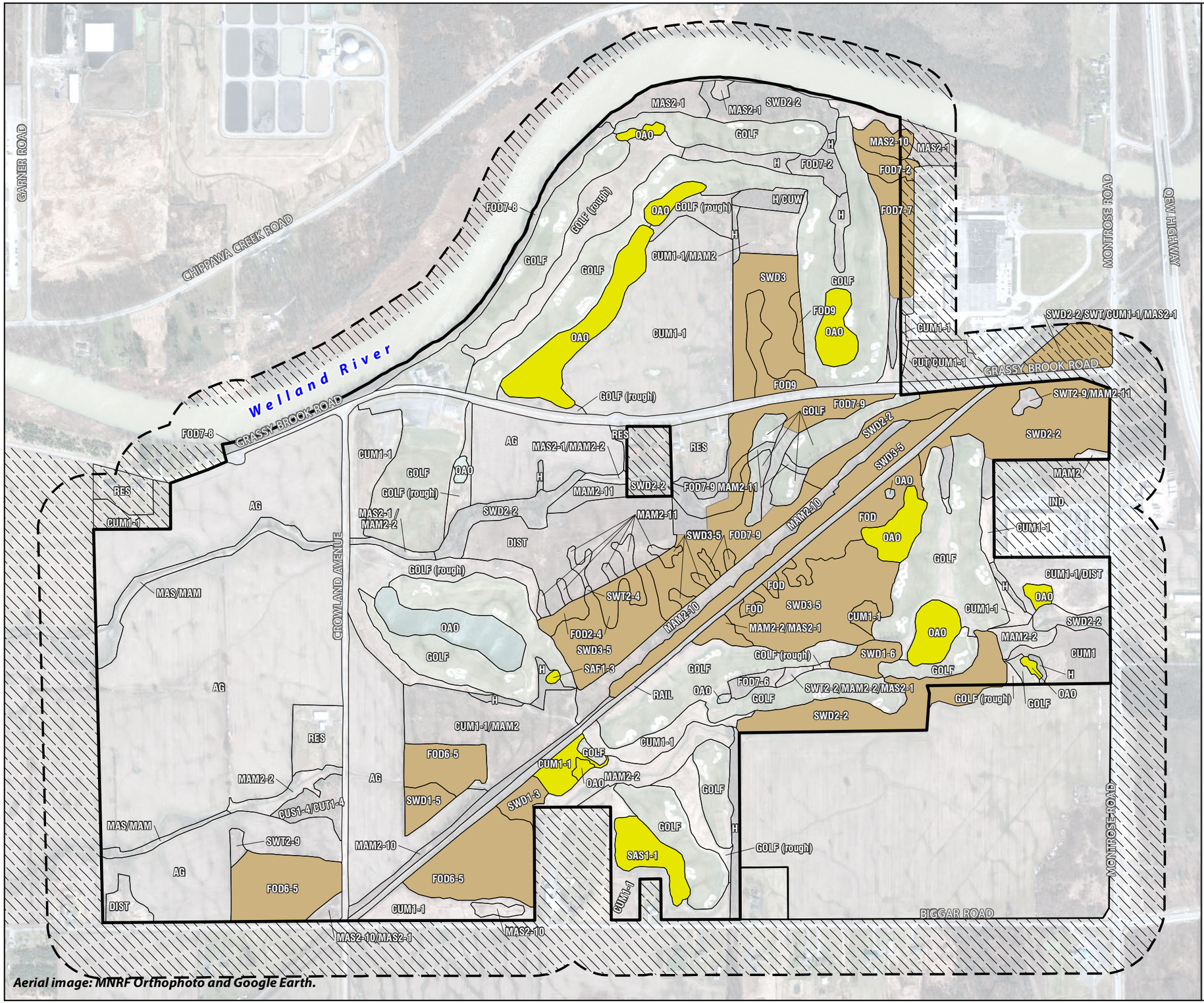
CUW	Cultural Woodland
CUS1-4*	White Pine Cultural Savanna
CUT	Cultural Thicket
CUT1-4	Grey Dogwood Cultural Thicket
CUM1-1	Fresh-Moist Old Field Meadow

**not listed in Southern Ontario ELC Guide*

RES	Residence
H	Hedgerow

Grand Niagara

Figure 7
Woodland Assessment



Aerial image: MNRF Orthophoto and Google Earth.

0 200 Meters

N

SAVANTA

Privileged & Confidential

- Grand Niagara Holdings
- Non-participating land
- 120m adjacent lands
- Ecological Land Classification
- Significant wildlife habitat
- Significant wildlife habitat in created anthropogenic features; potential removal of these features would require demonstration of no negative impact (Niagara Regional Policy Plan, 2015; PPS, 2014)

ELC Legend

FOREST

FOD	Deciduous Forest
FOD2-4	Dry-Fresh Oak-Hardwood Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest
FOD7-6*	Fresh-Moist Red Maple Lowland Deciduous Forest
FOD7-7*	Fresh-Moist Ash-Elm Lowland Deciduous Forest
FOD7-8*	Fresh-Moist Walnut-Ash-Willow Lowland Deciduous Forest
FOD7-9*	Fresh-Moist Pin Oak-Green Ash Lowland Deciduous Forest
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest

SWAMP

SWD1-3	Pin Oak Mineral Deciduous Swamp
SWD1-5*	Green Ash-Pin Oak Mineral Deciduous Swamp
SWD1-6*	Pin Oak-Ash-Maple Mineral Deciduous Swamp
SWD2-2	Green Ash Mineral Deciduous Swamp
SWD3	Maple Mineral Deciduous Swamp
SWD3-5*	Maple Mineral Deciduous Swamp
SWT	Thicket Swamp
SWT2-2	Willow Mineral Thicket Swamp
SWT2-4	Buttonbush Mineral Thicket Swamp
SWT2-9	Grey Dogwood Mineral Thicket Swamp

MARSH

MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAM2-11*	Mixed Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
MAS2-10*	Common Reed Mineral Shallow Marsh

OPEN WATER

OAO	Open Aquatic

SHALLOW WATER

SAS1-1	Pondweed Submerged Shallow Aquatic
SAF1-3	Duckweed Floating-leaved Shallow Aquatic

CULTURAL

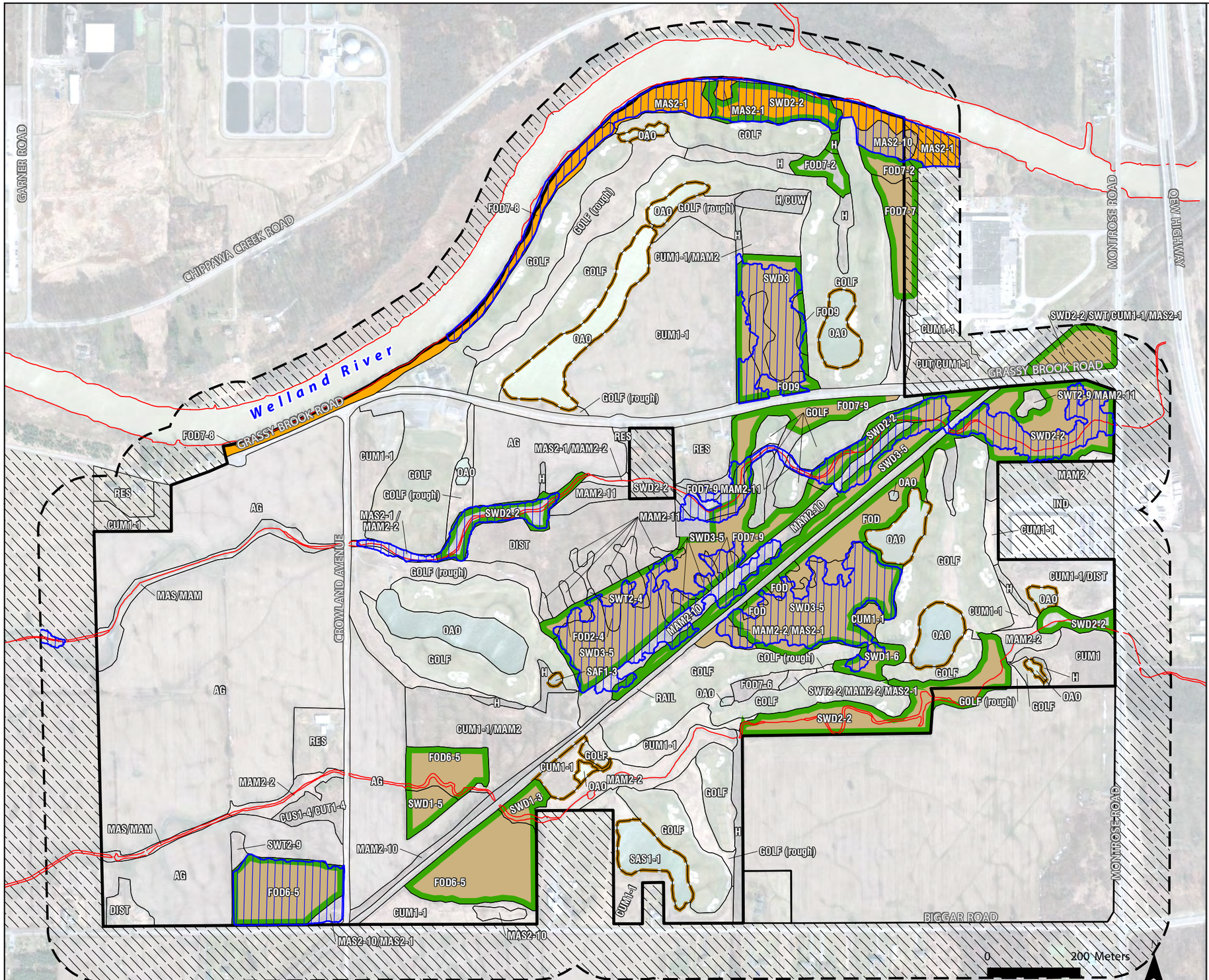
CUW	Cultural Woodland
CUS1-4*	White Pine Cultural Savanna
CUT	Cultural Thicket
CUT1-4	Grey Dogwood Cultural Thicket
CUM1-1	Fresh-Moist Old Field Meadow

**not listed in Southern Ontario ELC Guide*

RES	Residence
H	Hedgerow

Grand Niagara

Figure 8
Significant Wildlife Habitat



Aerial image: MNRF Orthophoto and Google Earth.

SAVANTA

- Grand Niagara Holdings
- Non-participating land
- 120m adjacent lands
- Ecological Land Classification
- Critical Fish Habitat Type 1
- Provincially Significant Wetland
- Significant woodlands
- Significant valleyland
- Significant wildlife habitat
- Created Anthropogenic features where significant wildlife habitat is present; feature can be removed provided no negative impact can be demonstrated (Niagara Regional Policy Plan, 2015; PPS, 2014)

ELC Legend

FOREST

FOD	Deciduous Forest
FOD2-4	Dry-Fresh Oak-Hardwood Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest
FOD7-6*	Fresh-Moist Red Maple Lowland Deciduous Forest
FOD7-7*	Fresh-Moist Ash-Elm Lowland Deciduous Forest
FOD7-8*	Fresh-Moist Walnut-Ash-Willow Lowland Deciduous Forest
FOD7-9*	Fresh-Moist Pin Oak-Green Ash Lowland Deciduous Forest
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest

SWAMP

SWD1-3	Pin Oak Mineral Deciduous Swamp
SWD1-5*	Green Ash-Pin Oak Mineral Deciduous Swamp
SWD1-6*	Pin Oak-Ash-Maple Mineral Deciduous Swamp
SWD2-2	Green Ash Mineral Deciduous Swamp
SWD3	Maple Mineral Deciduous Swamp
SWD3-5*	Maple Mineral Deciduous Swamp
SWT	Thicket Swamp
SWT2-2	Willow Mineral Thicket Swamp
SWT2-4	Buttonbush Mineral Thicket Swamp
SWT2-9	Grey Dogwood Mineral Thicket Swamp

MARSH

MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAM2-11*	Mixed Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
MAS2-10*	Common Reed Mineral Shallow Marsh

OPEN WATER

OAO	Open Aquatic

SHALLOW WATER

SAS1-1	Pondweed Submerged Shallow Aquatic
SAF1-3	Duckweed Floating-leaved Shallow Aquatic

CULTURAL

CUW	Cultural Woodland
CUS1-4*	White Pine Cultural Savanna
CUT	Cultural Thicket
CUT1-4	Grey Dogwood Cultural Thicket
CUM1-1	Fresh-Moist Old Field Meadow

**not listed in Southern Ontario ELC Guide*

RES	Residence
H	Hedgerow

Grand Niagara

Privileged & Confidential

Figure 9
Analysis of Natural Heritage Significance

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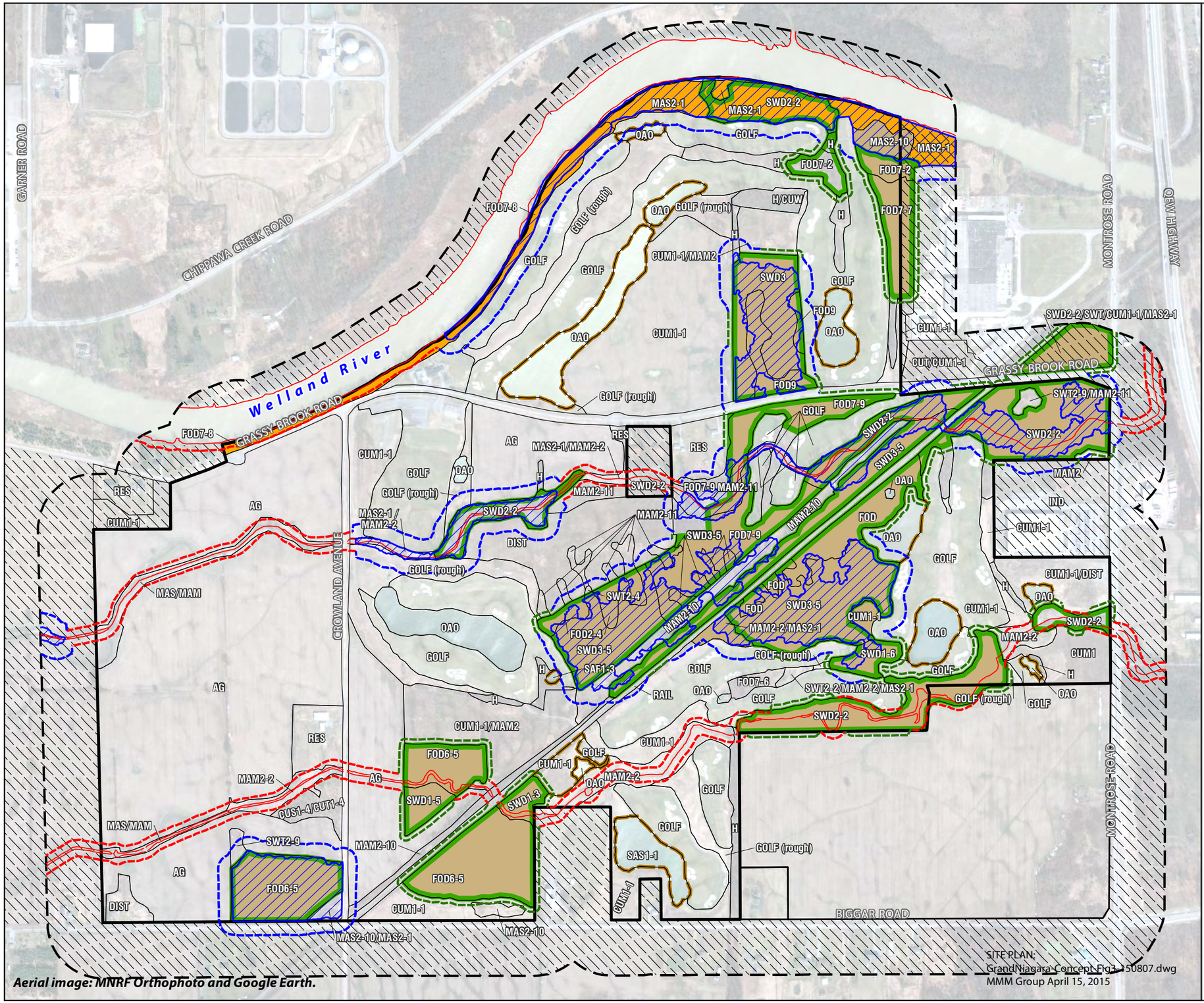

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APPENDIX B

Data Tables

Table 1: Potential Species at Risk Within 1 km of the Subject Lands (NHIC, 2015)

COMMON NAME	SCIENTIFIC NAME	PROVINCIAL STATUS (S-RANK)	GLOBAL STATUS (G-RANK)	COSSARO (MNRF)	LAST DATE OBSERVED	EXTIRPATED	HABITAT SUITABILITY (SUBJECT LANDS)
Northern Bobwhite	*Colinus virginianus*	S1	G5	END	1900	Yes	NA – species extirpated.
Hairy Green Sedge	*Carex hirsutella*	S3	G5		1981		Habitat (open woods, fields and meadows) is potentially present, however the species was not found on the Subject Lands.
Smith's Bulrush	*Schoenoplectiella smithii*	S3	G5?		1896-08	Yes	NA – species extirpated.
Round-leaved Yellow Violet	*Viola rotundifolia*	SH	G5		1892-06	Yes	NA – species extirpated.
White-haired Panicgrass	*Dichanthelium praecocius*	S3	G5		1902-06-17		Preferred habitat (dry prairies) and marginal / disturbed habitat (old field meadows) are not present on the Subject Lands; species not found during inventories and the record is historic.
Shiny Wedge Grass	*Sphenopholis nitida*	S1	G5		1892-06-26		Preferred habitat (rich woods, rocky slopes and outcrops) partly present on the Subject Lands; species not found during inventories and the record is historic.
Northern Hawthorn	*Crataegus pruinosa* var. *dissona*	S3	G4G5		1905-09-27		Habitat (thickets) is potentially present on the Subject Lands; this subspecies not found during inventories and the record is historic.
Northern Hawthorn	*Crataegus pruinosa var. dissona*	S3	G4G5		1982-06-11		Habitat (thickets) is potentially present on the Subject Lands, this subspecies was not found during the inventories.
Northern Hawthorn	*Crataegus pruinosa* var. *dissona*	S3	G4G5		1977-05-18		Habitat (thickets) is potentially present on the Subject Lands; this subspecies was not found during the inventories.
Stiff Gentian	*Gentianella quinquefolia*	S2	G5T4T5		1894-09-03	Yes	NA – species extirpated.
Biennial Gaura	*Oenothera gaura*	S3	G5		1995-09-13		Habitat (damp shores and meadows) potentially present; species was not found during botanical inventories.

COMMON NAME	SCIENTIFIC NAME	PROVINCIAL STATUS (S-RANK)	GLOBAL STATUS (G-RANK)	COSSARO (MNRF)	LAST DATE OBSERVED	EXTIRPATED	HABITAT SUITABILITY (SUBJECT LANDS)
Scarlet Beebalm	*Monarda didyma*	S3	G5		1904		Habitat (rich woods, thickets and bottomlands) present on the Subject Lands; species was not found during botanical inventories and the record is historic.
Sharp-fruited Rush	*Juncus acuminatus*	S3	G5		1901-07-08		Habitat (damp habitats and meadows) present on the Subject Lands; species not found during inventories and the record is historic.
Stiff Yellow Flax	*Linim medium* var. *medium*	S3?	G5T3T4		1877-07-27		Habitat (dry prairies, open sandy ground, meadows) marginally present on the Subject Lands; species not found during inventories and the record is historic.
Woodland Flax	*Linum virginianum*	S2	G4G5		1897-07-16		Habitat (open woods, thickets and clearings) present on the Subject Lands; species not found during inventories and the record is historic.
Timber Rattlesnake	*Crotalus horridus*	SX	G4	EXP	1941-08-22	Yes	NA – species extirpated.
Unicorn Clubtail	*Arigomphus villosipes*	S2S3	G5		1934-06-20		Open wetlands with emergent vegetation constitute habitat for this species; the natural pond located south of the railway (breeding bird station 24) is the most likely to provide suitable habitat. This species has not been detected in-flight during surveys. Larval sampling would be required to conclude absence; however the record is historic.
Copenhagan Hawthorn	*Crataegus intricate*	SH	G5		1912-10-07		Habitat (thickets) is potentially present on the Subject Lands; species not found during inventories and the record is historic.
Eastern Flowering Dogwood	*Cornus florida*	S2?	G5	END	2008-06-17		The Subject Lands contain few upland, dry, well-drained sugar maple-dominated forest that are preferred by this species; this species was not detected despite botanical investigations conducted by Savanta (2012, 2014, 2015) and by previous consultants (Section 2.1).

COMMON NAME	SCIENTIFIC NAME	PROVINCIAL STATUS (S-RANK)	GLOBAL STATUS (G-RANK)	COSSARO (MNRF)	LAST DATE OBSERVED	EXTIRPATED	HABITAT SUITABILITY (SUBJECT LANDS)
Swamp Rose-mallow	*Hibiscus moscheutos*	S3	G5	SC	2004		It is possible that the species may be present in the more inaccessible habitats along the Welland River, where its existence would not be threatened by proposed development; this species was not found in the portions of the Welland River wetlands that were sampled.
Green Arrow Arum	*Peltandra virginica*	S2	G5		2004		Despite the presence of potentially suitable habitat, this species was not found during botanical inventories.
Large Yellow Pond-lily	*Nuphar advena*	S3	G5T5		2004		Despite the presence of potentially suitable habitat, this species was not found during botanical inventories.
Fairywand	*Chamaelirium luteum*	SX	G5		1891-06-12	Yes	NA – species extirpated.
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	G5T5		1948-08-20		Habitat (rocky woods, slopes, shaded cliffs) is not present on the Subject Lands; species not found during inventories and the record is historic.
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	G4		2004		Habitat (fens, dry and wet prairies) is not present on the Subject Lands; species not found during the inventories.
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	G5?		1995-09-13		Habitat (thickets, shores, alluvial woods) potentially present on the Subject Lands; species was not found during botanical inventories.
Round-leaved Greenbrier	*Smilax rotundifolia*	S2	G5	THR	2003-06-01		Habitat (moist thickets and woods) present on the Subject Lands; species was not found during botanical inventories.
Round-leaved Greenbrier	*Smilax rotundifolia*	S2	G5	THR	1999-09-22		Habitat (moist thickets and woods) present on the Subject Lands; species was not found during botanical inventories.
Panicled Hawkweed	*Hieracium paniculatum*	S2?	G5		1937-08-16		Habitat (open woods) present on the Subject Lands; species not found during inventories and the record is historic.

COMMON NAME	SCIENTIFIC NAME	PROVINCIAL STATUS (S-RANK)	GLOBAL STATUS (G-RANK)	COSSARO (MNRF)	LAST DATE OBSERVED	EXTIRPATED	HABITAT SUITABILITY (SUBJECT LANDS)
American Water-willow	*Justicia americana*	S1	G5	THR	2007-10-04		It is possible that the species may be present in the more inaccessible habitats (river shorelines) along the Welland River, where its existence would not be threatened by the proposed development; this species was not found in the portions of the Welland River wetlands that were sampled.
Greater Redhorse	*Moxostoma valenciennesi*	S3	G4		1992-08-26		This species is associated with larger river systems and would be present in a larger waterbody, like the Welland River. On the Subject Lands, Grassy Brook is a relatively shallow, slow-moving watercourse that does not contain the rifle-run morphology and coarse substrates that the species prefers for spawning. Given the shallow nature of the watercourse and its tendency to become intermittent or discontinuous on the Subject Lands, no suitable habitat exists for Greater Redhorse. This species may be present off-site near the confluence with Chippewa Creek.
Northern Bayberry	*Morella pennsylvanica*	S1	G5		1968-07-01		Habitat (dry to wet, sterile soil in coastal locations, seepage thickets) is not present on the Subject Lands and the species was not recorded during botanical surveys.
Yellow-breasted Chat	*Icteria virens*	S2B	G5	END	1983-07-07		Yellow-breasted Chat was not observed during the 2012-2015 surveys, during appropriate times of the breeding season. The habitat available is very limited and not of proper age/structure in general as younger growth has reached higher levels and filled in the former habitat, especially along the railway tracks. Savanta's surveys would have detected the species had it been present during the 2012, 2014 or 2015 field seasons, as work was conducted at appropriate times during the breeding season.

COMMON NAME	SCIENTIFIC NAME	PROVINCIAL STATUS (S-RANK)	GLOBAL STATUS (G-RANK)	COSSARO (MNRF)	LAST DATE OBSERVED	EXTIRPATED	HABITAT SUITABILITY (SUBJECT LANDS)
Shumard Oak	*Quercus shumardii*	S3	G5	SC	1980		Habitat (rich woods and bottomlands) present on the Subject Lands; species was not found during botanical inventories.
Azure Bluet	*Enallagma aspersum*	S3	G5		1997-06-27		Savanta detected the presence of two damselflies- Double-striped (*Enallagma basidens*) and Slender Bluet (*E. traviatum*) on the Subject Lands in 2014 and 2015. The Azure Bluet (*E. aspersum*) tends to prefer similar habitats to these two species: man-made, shallow pools in open areas, such as aggregate pits or golf course ponds. Suitable habitat is present on-site, however, this species was not detected.

Table 2: Ecological Survey Personnel, Timing and Conditions

PROJECT NO.	SURVEYOR(S) (SURNAME, INTL)	SURVEY TYPE	DATE	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
7201	Davis, H Park, O	Calling Amphibians	29-AP-15	8:58	12:00	13	61	10	0	• None
7201	Davis, H Park, O	Calling Amphibians	30-AP-15	8:54	12:35	11	63	15	1	• None
7201	Geddes, S Collnson, C	Headwater Drainage Feature Assessment	30-AP-15	9:00	4:00	15	44	0	3	• None
7201	Davis, H Park, O	Calling Amphibians	14-MA-15	9:26	11:02	13	44	70	2	• None
7201	Davis, H	Calling Amphibians	15-MA-15	9:08	11:10	19	59	100	3	• Light drizzle

LEGEND:

BEAUFORT WIND SPEED SCALE	
1	Calm (<1 km/hr)
2	Light Air (1-5 km/hr)
3	Light Breeze (6-11 km/hr)
4	Gentle Breeze (12-19 km/hr)
5	Moderate Breeze (20-28 km/hr)

MONTH (CODE)	
JA	January
FB	February
MR	March
AP	April
MA	May
JU	June
JL	July
AU	August
SE	September
OC	October
NO	November
DE	December

Table 2: Ecological Survey Personnel, Timing and Conditions

PROJECT NO.	SURVEYOR(S) (SURNAME, INTL)	SURVEY TYPE	DATE	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
	Park, O									
7201	Davis, H Zoladeski, C	Calling Amphibians	21-MA-15	9:12	10:56	12	56	95	2	• None
7201	Davis, H Park, O	Calling Amphibians	24-JU-15	9:39	12:03	20	62	10	2	• None
7201	Davis, H Park, O	Calling Amphibians	25-JU-15	9:30	11:45	17	94	20	1	• None

LEGEND:

BEAUFORT WIND SPEED SCALE	
1	Calm (<1 km/hr)
2	Light Air (1-5 km/hr)
3	Light Breeze (6-11 km/hr)
4	Gentle Breeze (12-19 km/hr)
5	Moderate Breeze (20-28 km/hr)

MONTH (CODE)	
JA	January
FB	February
MR	March
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Table 2: Ecological Survey Personnel, Timing and Conditions

PROJECT NO.	SURVEYOR(S) (SURNAME, INTL)	SURVEY TYPE	DATE	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
7201		Wildlife Road Crossing Survey	23-JU-15			20				• Light rain
7201	Geddes, S Collnson, C	Headwater Drainage Feature Assessment	8-JL-15	9:00	4:00	20	51	0	3	• None

LEGEND:

BEAUFORT WIND SPEED SCALE	
1	Calm (<1 km/hr)
2	Light Air (1-5 km/hr)
3	Light Breeze (6-11 km/hr)
4	Gentle Breeze (12-19 km/hr)
5	Moderate Breeze (20-28 km/hr)

MONTH (CODE)	
JA	January
FB	February
MR	March
AP	April
MA	May
JU	June
JL	July
AU	August
SE	September
OC	October
NO	November
DE	December

Table 3: Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	COMMUNITY DESCRIPTION	NHIC	
		S-RANK	G-RANK
FOREST (FO)			
Deciduous Forest (FOD)			
FOD DECIDUOUS FOREST	• This generic designation includes communities composed of several possible trees species , for example sugar maple, shagbark hickory, beech, black cherry, pin and red oak, green ash or white elm, growing in various combinations and proportions.	NR	NR
FOD2-4 DRY-FRESH OAK - HARDWOOD DECID FOREST	• Red oak and sugar maple are the dominants, followed by black cherry, shagbark hickory and white oak.	S5	G?
FOD6-5' FRESH-MOIST SUGAR MAPLE-HARDWOOD DECIDUOUS FOREST	• A lowland forest composed of sugar maple and several co-dominants, including red oak, shagbark hickory, beech, basswood and swamp white oak. • The understorey shrub and herb layers are well developed, with tree saplings, choke cherry, multiflora rose, enchanter's nightshade, white avens, jewelweed, may-apple, Pennsylvania sedge and wild crane's-bill.	S5	G?
FOD7-2 FRESH-MOIST ASH LOWLAND DECIDUOUS FOREST	• Green ash is the dominant canopy species in these stands. However, many trees have been affected by emerald ash borer infestation and are of poor health or dying. Associate species include red maple, pin oak, shagbark hickory and white oak. • The shrub layer is well developed and composed of canopy tree saplings as well as true shrubs, such as grey dogwood, poison ivy, red raspberry, common buckthorn and choke cherry. • The herb layer is moderately developed with enchanter's nightshade, white avens, rough-leaf goldenrod, Jack-in-the-pulpit and garlic mustard.	S5	G?
FOD7-6* FRESH-MOIST RED MAPLE LOWLAND DECIDUOUS FOREST	• This forest type is represented by a narrow strip of woods separating two golf playing fields. • Young red maple trees are associated with scattered pin oak and green ash. • The shrub understorey is dominated by grey dogwood, with lesser abundance of common buckthorn, poison ivy, Alleghany blackberry and hawthorn. I • The herb layer is n weakly developed and is dominated by enchanter's nightshade, rough-leaf goldenrod, starved aster and common speedwell	NR	NR
FOD7-7* FRESH-MOIST ASH-ELM LOWLAND DECIDUOUS FOREST	• A hedgerow-type regenerating community at the edge of the golf course composed of green ash and white elm. Tree regeneration is almost entirely ash., • The well-developed shrub layer is dominated by grey dogwood, common buckthorn, Virginia-creeper and riverbank grape. • Herb cover is composed of starved aster, tall goldenrod, white avens, garlic mustard, enchanter's nightshade and Virginia knotweed.	NR	NR
FOD7-8* FRESH-MOIST WALNUT-ASH-WILLOW	• A long and narrow unit located on the low slope of the Welland River. • The vegetation is significantly disturbed due to windfalls and is uneven in structure and composition.	NR	NR

ELC TYPE	COMMUNITY DESCRIPTION	NHIC	
		S-RANK	G-RANK
LOWLAND DECIDUOUS FOREST	• The main tree species include black walnut, green ash, reddish willow and black cherry. • Main shrub species include black raspberry, grey dogwood, common buckthorn and multiflora rose. The two dominant herbs are enchanter's nightshade and garlic mustard.		
FOD7-9* FRESH-MOIST PIN OAK-GREEN ASH LOWLAND DECIDUOUS FOREST	• Located partly within hydro right-of-way, this narrow community is dominated by pin oak, followed by green ash and white elm. • The main species in the shrub layer are common buckthorn, grey dogwood and red raspberry. The herb layer is poorly developed and dominated by garlic mustard.	NR	NR
FOD9 FRESH-MOIST OAK-MAPLE-HICKORY DECIDUOUS FOREST ECOSITE	• A variably composed forest without a dominant tree species. • The main canopy is dominated by beech, red oak, shagbark hickory, sugar maple, red maple, ironwood and white elm. • Shrub species include choke cherry, Virginia creeper, red raspberry and tree saplings. • The ground cover consists of may-apple, Jack-in-the-pulpit, enchanter's nightshade, wild crane's-bill, wood fern and wild lily-of-the valley.	NR	NR
CULTURAL (CU)			
Cultural Savanna (CUS)			
CUS1-4* WHITE PINE CULTURAL SAVANNA	• Found only at one location, this community is composed of widely spaced young white pine trees that were originally planted in regular rows and have been left unmanaged. • The spaces between the pines are covered by a thicket of grey dogwood, while the herbaceous cover is of the old field meadow type.	NR	NR
Cultural Meadow (CUM)			
CUM1-1 FRESH-MOIST OLD FIELD MEADOW	• These open communities are composed of several non-native and native species, such as Canada bluegrass, Kentucky bluegrass, tufted vetch, timothy, Canada thistle, teasel, wild carrot, red clover, tall goldenrod, New England aster and common ragweed.	NR	NR
Cultural Thicket (CUT)			
CUT1-4 GREY DOGWOOD CULTURAL THICKET	• Associated with unit CUS1-4, this is a medium shrub community of grey dogwood with co-dominant presence of narrow-leaved meadow-sweet.	NR	NR
Cultural Woodland (CUW)			
CUW	• The open tree canopy is composed of black cherry, while the shrubs include hawthorn, silky dogwood, and common buckthorn.	NR	NR

ELC TYPE	COMMUNITY DESCRIPTION	NHIC	
		S-RANK	G-RANK
SWAMP (SW)			
Deciduous Swamp (SWD)			
SWD1-3 PIN-OAK MINERAL DECIDUOUS SWAMP	• Dominated by pin oak, with some presence of shagbark hickory and green ash. • Main understorey species are grey dogwood, inserted Virginia-creeper, riverbank grape, moneywort, starved aster and Virginia knotweed.	S2S3	G2
SWD1-5 GREEN ASH PIN-OAK MINERAL DECIDUOUS SWAMP	• Main species in the tree canopy are green ash and pin oak, with lesser amounts of shagbark hickory. • Poison ivy and swamp rose are the dominant shrubs, while the herb layer is composed of moneywort, jewelweed, fowl meadow grass, and various sedges.	**NR**	**NR**
SWD1-6 PIN OAK-ASH-MAPLE MINERAL DECIDUOUS SWAMP	• This is an open-canopy stand, due to dieback of almost all ash and elm trees, which has resulted in vigorous development of a tall shrub layer of grey dogwood. • The regenerating tree species, which surround the few surviving elm and ash, include red maple, pin oak and swamp maple. Herb layer is poorly developed and dominated by rough-leaf goldenrod.	**NR**	**NR**
SWD2-2 GREEN ASH MINERAL DECIDUOUS SWAMP	• Diverse community dominated by green ash, with associates such as pin oak, swamp white oak and white elm. • Both shrub and herb layers are well developed and composed of grey dogwood, red raspberry, narrow-leaved meadow-sweet, common elderberry, common buckthorn, lake-bank sedge, jewelweed, reed-canary grass and fringed loosestrife.	**S5**	**G?**
SWD3 MAPLE MINERAL DECIDUOUS SWAMP	• Located in the largest woodland patch north of Grassybrook Road, this is a complex community of treed areas and vernal pools, which support aquatic and marsh species. • There is no dominant tree canopy species. Tree species include: swamp maple, red maple, swamp white oak, shagbark hickory and green ash. • The shrub layer is composed of poison ivy, blue beech, Virginia creeper and saplings of canopy trees. The herb layer is well-developed but patchy, with sensitive fern, fowl meadow grass, Jack-in-the-pulpit and several species of sedges.	**S5**	**G4?**
SWD3-5 MAPLE MINERAL DECIDUOUS SWAMP	• Red and silver maples are the dominant tree canopy species, with associate pin oak and shagbark hickory. 1. Shrub layer is well developed with frequent occurrence of buttonbush. The herb layer is rich, composed of sedges, grasses and forbs.	**S5**	**G47**
Thicket Swamp (SWT)			
SWT	• This general designation describes variously composed stands of willow and dogwood (grey and/or red-osier), often in complex with treed swamps and meadow marshes.	**NR**	**NR**
SWT2-2 WILLOW MINERAL THICKET SWAMP	• This small unit occurs only in a complex with the shallow and meadow marsh types, and is composed of saplings of reddish willow and some presence of grey dogwood and common elderberry.	**S5**	**G5**

ELC TYPE	COMMUNITY DESCRIPTION	NHIC	
		S-RANK	G-RANK
SWT2-4 BUTTONBUSH MINERAL THICKET SWAMP	• Buttonbush forms a tall dense thicket, with minor presence of silky dogwood and Bebb's sedge. • Herbaceous species, located primarily along the periphery include dark-green bulrush, purple loosestrife and broad-fruited bur-reed.	**S3**	**G4**
SWT2-9 GREY DOGWOOD MINERAL THICKET SWAMP	• Grey dogwood dominates the shrub canopy, followed by narrow-leaved meadow-sweet, green ash saplings and Bebb's sedge.	**S3S4**	**G5**
MARSH (MA)			
Meadow Marsh (MAM)			
MAM MEADOW MARSH	• These are variously composed meadows of reed-canary grass, tall white aster, jewelweed, tall goldenrod, common reed, Joe-pye weed, broad-fruit bur-reed, beggarticks, and several others.	**NR**	**NR**
MAM2 MINERAL MEADOW MARSH	• These communities are generally dominated by reed-canary grass, tall white aster and broad-leaved arrowhead, in various combinations.	**NR**	**NR**
MAM 2-2 REED-CANARY GRASS MINERAL MEADOW MARSH	• In these communities, reed-canary grass is often the only herbaceous species, to the exclusion of others.	**NR**	**NR**
MAM2-10 FORB MINERAL MEADOW MARSH	• The usual dominant species in these communities are tall white aster, jewelweed and spotted Joe-pye weed.	**S4S5**	**G5**
MAM2-11* MIXED MINERAL MEADOW MARSH	• This is a very diverse type incorporating many graminoid and forb species, such as reed-canary grass, common reed, porcupine sedge, fox sedge, spotted Joe-pye-weed, jewelweed, tall white aster, tall goldenrod, rough-leaved goldenrod, and blue vervain.	**NR**	**NR**
Shallow Marsh (MAS)	•		
MAS2-1 CATTAIL MINERAL SHALLOW MARSH (AREA 4)	• Under the dominant layer of glaucous cattail grow such species as reed-canary grass, American bindweed and jewelweed.	**S5**	**G5**
NON-VEGETATED SHALLOW WATER*			
OW* OPEN WATER	• This pond contained less than 25% cover of vascular plants and a depth of less than 2 meters.	**NR**	**NR**

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

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Dennstaedtiaceae	**Bracken Fern Family**								
Pteridium aquilinum	Bracken Fern	*2*	*3*		*S5*			*G5*	*C*
Dryopteridaceae	**Wood Fern Family**								
Athyrium filix-femina	Lady Fern	*4*	*0*		*S5*			*G5*	*C*
Dryopteris carthusiana	Spinulose Wood Fern	*5*	*-2*		*S5*			*G5*	*C*
Onoclea sensibilis	Sensitive Fern	*4*	*-3*		*S5*			*G5*	*C*
Polystichum acrostichoides	Christmas Fern	*5*	*5*		*S5*			*G5*	*C*
Equisetaceae	**Horsetail Family**								
Equisetum arvense	Field Horsetail	*0*	*0*		*S5*			*G5*	*C*
Thelypteridaceae	**Marsh Fern Family**								
Thelypteris palustris	Marsh Fern	*5*	*-4*		*S5*			*G5*	*C*
Cupressaceae	**Cedar Family**								
Thuja occidentalis	Eastern White Cedar	*4*	*-3*		*S5*			*G5*	*U*
Pinaceae	**Pine Family**								
Pinus nigra	Austrian Pine		*-5*	*-1*	*SNA*			*GNA*	*IR*
Pinus strobus	Eastern White Pine	*4*	*3*		*S5*			*G5*	*C*
Pinus sylvestris	Scotch Pine		*5*	*-3*	*SNA*			*GNA*	*IC*
Aceraceae	**Maple Family**								
Acer negundo	Manitoba Maple	*0*	*-2*		*S5*			*G5*	*C*
Acer rubrum	Red Maple	*4*	*0*		*S5*			*G5*	*C*
Acer saccharum ssp. saccharum	Sugar Maple	*4*	*3*		*S5*			*G5T5*	*C*
Acer x freemanii	Freeman's Maple				*SNA*			*GNA*	*hyb*
Anacardiaceae	**Sumac or Cashew Family**								
Rhus typhina	Staghorn Sumac	*1*	*5*		*S5*			*G5*	*C*
Toxicodendron rydbergii	Rydberg's Poison Ivy	*0*	*0*		*S5*			*G5T*	*C*
Apiaceae	**Carrot or Parsley Family**								
Cicuta maculata	Spotted Water-hemlock	*6*	*-5*		*S5*			*G5*	*C*
Daucus carota	Wild Carrot		*5*	*-2*	*SNA*			*GNR*	*IC*
Sium suave	Hemlock Water-parsnip	*4*	*-5*		*S5*			*G5*	*C*
Apocynaceae	**Dogbane Family**								
Apocynum androsaemifolium ssp. androsaemifo	Spreading Dogbane	*3*	*5*		*S5*			*G5T5*	*C*
Araliaceae	**Ginseng Family**								
Aralia nudicaulis	Wild Sarsaparilla	*4*	*3*		*S5*			*G5*	*C*
Asclepiadaceae	**Milkweed Family**								
Asclepias incarnata	Swamp Milkweed	*6*	*-5*		*S5*			*G5*	*C*
Asclepias syriaca	Common Milkweed	*0*	*5*		*S5*			*G5*	*C*
Asteraceae	**Composite or Aster Family**								
Achillea millefolium	Yarrow		*3*	*-1*	*S5*			*G5*	*C*
Ambrosia artemisiifolia	Annual Ragweed	*0*	*3*		*S5*			*G5*	*C*
Arctium minus	Common Burdock		*5*	*-2*	*SNA*			*GNR*	*IC*
Bidens cernua	Nodding Beggarticks	*2*	*-5*		*S5*			*G5*	*C*
Bidens frondosa	Devil's Beggaticks	*3*	*-3*		*S5*			*G5*	*C*
Bidens tripartita	Three-parted Beggarticks	*4*	*-3*		*S5*			*G5*	*C*
Carduus nutans ssp. nutans	Nodding Thistle		*5*	*-1*	*SNA*			*GNRTNR*	*IR*
Centaurea stoebe	Spotted Knapweed		*5*	*-3*	*SNA*			*GNR*	
Cichorium intybus	Chicory		*5*	*-1*	*SNA*			*GNR*	*IC*

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Cirsium arvense	Canada Thistle		3	-1	SNA			GNR	IC
Cirsium vulgare	Bull Thistle		4	-1	SNA			GNR	IC
Erigeron annuus	Annual Fleabane				S5			G5	C
Erigeron strigosus	Daisy Fleabane	0	1		S5			G5	R
Eupatorium perfoliatum	Common Boneset	2	-4		S5			G5	C
Eurybia macrophylla	Large-leaved Aster	5	5		S5			G5	C
Euthamia graminifolia	Grass-leaved Goldenrod	2	-2		S5			G5	C
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	3	-5		S5			G5T5	C
Lactuca serriola	Prickly Lettuce		0	-1	SNA			GNR	IC
Leucanthemum vulgare	Oxeye Daisy		5	-1	SNA			GNR	IC
Pilosella caespitosa	Field Hawkweed		5	-2	SNA			GNR	IC
Rudbeckia hirta	Black-eyed Susan	0	3		S5			G5	C
Solidago altissima	Tall Goldenrod	1	3		S5			G5	C
Solidago caesia	Blue-stemmed Goldenrod	5	3		S5			G5	C
Solidago canadensis	Canada Goldenrod	1	3		S5			G5	C
Solidago flexicaulis	Zig-zag Goldenrod	6	3		S5			G5	C
Solidago juncea	Early Goldenrod	3	5		S5			G5	C
Solidago rugosa	Rough-leaf Goldenrod	4	-1		S5			G5	C
Sonchus arvensis ssp. *arvensis*	Field Sow-thistle				SNA			GNRTNR	IC
Sonchus asper	Prickly Sow-thistle		0	-1	SNA			GNR	IC
Symphyotrichum cordifolium	Heart-leaved Aster	5	5		S5			G5	C
Symphyotrichum ericoides var. *ericoides*	White Heath Aster				S5			G5T5	C
Symphyotrichum lanceolatum ssp. lanceolatum	Tall White Aster	3	-3		S5			G5T5	C
Symphyotrichum lateriflorum	Starved Aster	3	-2		S5			G5	C
Symphyotrichum novae-angliae	New England Aster	2	-3		S5			G5	C
Symphyotrichum pilosum var. pilosum	Old Field Aster	4	2		S5			G5T5	C
Symphyotrichum puniceum var. puniceum	Swamp Aster				S5			G5T5	C
Tragopogon dubius	Yellow Goat's-beard		5	-1	SNA			GNR	IU
Balsaminaceae	**Touch-me-not Family**								
Impatiens capensis	Spotted Jewelweed	4	-3		S5			G5	C
Berberidaceae	**Barberry Family**								
Podophyllum peltatum	May Apple	5	3		S5			G5	C
Betulaceae	**Birch Family**								
Betula alleghaniensis	Yellow Birch	6	0		S5			G5	C
Betula papyrifera	White Birch		2		S5			G5	C
Carpinus caroliniana	Blue-beech	6	0		S5			G5	C
Ostrya virginiana	Eastern Hop-hornbeam	4	4		S5			G5	C
Boraginaceae	**Borage Family**								
Echium vulgare	Blueweed		5	-2	SNA			GNR	IC
Brassicaceae	**Mustard Family**								
Alliaria petiolata	Garlic Mustard		0	-3	SNA			GNR	IC
Hesperis matronalis	Dame's Rocket		5	-3	SNA			G4G5	IC
Lepidium campestre	Field Pepper-grass		5	-1	SNA			GNR	IC
Campanulaceae	**Bellflower Family**								
Lobelia cardinalis	Cardinal Flower	7	-5		S5			G5	R
Caprifoliaceae	**Honeysuckle Family**								
Lonicera tatarica	Tartarian Honeysuckle		3	-3	SNA			GNR	IC
Sambucus canadensis	Common Elderberry	5	-2		S5			G5T5	C
Viburnum opulus ssp. *trilobum*	Highbush Cranberry	5	-3		S5			G5T5	C
Celastraceae	**Staff-tree Family**								
Euonymus obovatus	Running Strawberry-bush	6	5		S5			G5	C

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Chenopodiaceae	**Goosefoot Family**								
Atriplex patula	Halberd-leaf Saltbush	*0*	*-2*		*S5*			*G5*	*IU*
Chenopodium album var. *album*	White Goosefoot		*1*	*-1*	*SNA*			*G5TNR*	*IC*
Convolvulaceae	**Morning-glory Family**								
Calystegia sepium ssp. *americana*	American Bindweed	*2*	*0*		*SU*			*G5T5*	*C*
Convolvulus arvensis	Field Bindweed		*5*	*-1*	*SNA*			*GNR*	*IC*
Cornaceae	**Dogwood Family**								
Cornus alternifolia	Alternate-leaf Dogwood	*6*	*5*		*S5*			*G5*	*C*
Cornus foemina	Grey Dogwood	*2*	*-2*		*S5*			*GNR*	*C*
Cornus sericea	Red-osier Dogwood	*2*	*-3*		*S5*			*G5*	*U*
Cucurbitaceae	**Gourd Family**								
Echinocystis lobata	Wild Mock-cucumber	*3*	*-2*		*S5*			*G5*	*C*
Dipsacaceae	**Teasel Family**								
Dipsacus fullonum	Fuller's Teasel		*5*	*-1*	*SNA*			*GNR*	*IC*
Fabaceae	**Pea Family**								
Lotus corniculatus	Bird's-foot Trefoil		*1*	*-2*	*SNA*			*GNR*	*IC*
Melilotus albus	White Sweetclover		*3*	*-3*	*SNA*			*G5*	*IC*
Trifolium pratense	Red Clover		*2*	*-2*	*SNA*			*GNR*	*IC*
Vicia cracca	Tufted Vetch		*5*	*-1*	*SNA*			*GNR*	*IC*
Vicia tetrasperma	Lentil Vetch		*5*	*-1*	*SNA*			*GNR*	*IU*
Fagaceae	**Beech Family**								
Fagus grandifolia	American Beech	*6*	*3*		*S4*			*G5*	*C*
Quercus alba	White Oak	*6*	*3*		*S5*			*G5*	*C*
Quercus bicolor	Swamp White Oak	*8*	*-4*		*S4*			*G5*	*C*
Quercus macrocarpa	Bur Oak	*5*	*1*		*S5*			*G5*	*U*
Quercus palustris	Pin Oak	*9*	*-3*		*S4*			*G5*	*C*
Quercus rubra	Northern Red Oak	*6*	*3*		*S5*			*G5*	
Geraniaceae	**Geranium Family**								
Geranium maculatum	Wild Crane's-bill	*6*	*3*		*S5*			*G5*	*C*
Geranium robertianum	Herb-robert		*5*	*-2*	*SNA*			*G5*	*IC*
Grossulariaceae	**Currant Family**								
Ribes americanum	Wild Black Currant	*4*	*-3*		*S5*			*G5*	*C*
Ribes cynosbati	Prickly Gooseberry	*4*	*5*		*S5*			*G5*	*C*
Ribes rubrum	Northern Red Currant		*5*	*-2*	*SNA*			*G4G5*	*IC*
Ribes triste	Swamp Red Currant	*6*	*-5*		*S5*			*G5*	*R*
Guttiferae	**St. John's-wort Family**								
Hypericum mutilum	Slender St. John's-wort	*6*	*-3*		*S5*			*G5*	*U*
Hypericum perforatum	Common St. John's-wort		*5*	*-3*	*SNA*			*GNR*	*IC*
Hydrophyllaceae	**Water-leaf Family**								
Hydrophyllum virginianum	Virginia Waterleaf	*6*	*-2*		*S5*			*G5*	*C*
Juglandaceae	**Walnut Family**								
Carya cordiformis	Bitternut hickory	*6*	*0*		*S5*			*G5*	*C*
Carya ovata	Shagbark Hickory	*6*	*3*		*S5*			*G5*	*C*
Juglans nigra	Black Walnut	*5*	*3*		*S4*			*G5*	*C*
Lamiaceae	**Mint Family**								
Lycopus uniflorus	Northern Bugleweed	*5*	*-5*		*S5*			*G5*	*C*

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Mentha arvensis	Corn Mint	*3*	*-3*		*S5*			*G5*	*C*
Prunella vulgaris ssp. *lanceolata*	Self-heal	*5*	*5*		*S5*			*G5T5*	*C*
Stachys hispida	Hispid Hedge-nettle	*7*	*-4*		*S4S5*			*G5T4Q*	*R*
Lythraceae	**Loosestrife Family**								
Lythrum salicaria	Purple Loosestrife		*-5*	*-3*	*SNA*			*G5*	*IC*
Nymphaeaceae	**Water-lily Family**								
Nuphar variegata	Yellow Cowlily	*4*	*-5*		*S5*			*G5T5*	*U*
Nyssaceae	**Sour Gum Family**								
Nyssa sylvatica	Black Gum	*9*	*-4*		*S3*			*G5*	*U*
Oleaceae	**Olive Family**								
Fraxinus pennsylvanica	Red Ash	*3*	*-3*		*S5*			*G5*	*C*
Onagraceae	**Evening-primrose Family**								
Circaea lutetiana	Enchanter's Nightshade	*3*	*3*		*S5*			*G5*	*C*
Epilobium ciliatum ssp. *ciliatum*	Hairy Willow-herb	*3*	*3*		*S5*			*G5T5*	*C*
Ludwigia palustris	Marsh Seedbox	*5*	*-5*		*S5*			*G5*	*C*
Oenothera parviflora	Northern Evening-primrose	*1*	*3*		*S4?*			*G4?*	*DD*
Orobanchaceae	**Broom-rape Family**								
Epifagus virginiana	Beech-drops	*6*	*5*		*S5*			*G5*	*C*
Oxalidaceae	**Wood Sorrel Family**								
Oxalis stricta	Upright Yellow Wood-sorrel	*0*	*3*		*S5*			*G5*	*C*
Plantaginaceae	**Plantain Family**								
Plantago lanceolata	English Plantain		*0*	*-1*	*SNA*			*G5*	*IC*
Plantago major	Common Plantain		*-1*	*-1*	*S5*			*G5*	*IC*
Polygalaceae	**Milkwort Family**								
Persicaria hydropiper	Marshpepper Smartweed	*4*	*-5*		*SNA*			*GNR*	*IC*
Persicaria pensylvanica	Pennsylvania Smartweed	*3*	*-4*		*S5*			*G5*	*C*
Persicaria sagittata	Arrow-leaved Tearthumb	*5*	*-5*		*S4*			*G5*	*C*
Persicaria virginiana	Virginia Knotweed	*6*	*0*		*S4*			*G5*	*C*
Polygonum amphibium	Water Smartweed	*5*	*-5*		*S5*			*G5*	*U*
Rumex crispus	Curly Dock		*-1*	*-2*	*SNA*			*GNR*	*IC*
Primulaceae	**Primrose Family**								
Lysimachia ciliata	Fringed Loosestrife	*4*	*-3*		*S5*			*G5*	*C*
Lysimachia nummularia	Moneywort		*-4*	*-3*	*SNA*			*GNR*	*IC*
Ranunculaceae	**Buttercup Family**								
Ranunculus abortivus	Kidney-leaf Buttercup	*2*	*-2*		*S5*			*G5*	*C*
Ranunculus acris	Tall Buttercup			*-2*	*SNA*			*G5*	*IC*
Ranunculus pensylvanicus	Bristly Crowfoot	*3*	*-5*		*S5*			*G5*	*C*
Ranunculus recurvatus	Hooked Buttercup	*4*	*-3*		*S5*			*G5*	*C*
Ranunculus sceleratus var. sceleratus	Cursed Buttercup	*2*	*-5*		*SU*			*G5T5*	*C*
Rhamnaceae	**Buckthorn Family**								
Frangula alnus	Glossy Buckthorn		*-1*	*-3*	*SNA*			*GNR*	*IC*
Rhamnus cathartica	Common Buckthorn		*3*	*-3*	*SNA*			*GNR*	*IC*
Rosaceae	**Rose Family**								
Agrimonia gryposepala	Tall Hairy Groovebur	*2*	*2*		*S5*			*G5*	*C*
Crataegus punctata	Large-fruited Thorn	*4*	*5*		*S5*			*G5*	*C*
Fragaria virginiana	Virginia Strawberry	*2*	*1*		*S5*			*G5*	*C*

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Geum aleppicum	Yellow Avens	*2*	*-1*		*S5*			*G5*	*C*
Geum canadense	White Avens	*3*	*0*		*S5*			*G5*	*C*
Geum laciniatum	Rough Avens		*-3*		*S4*			*G5*	*C*
Potentilla recta	Sulphur Cinquefoil		*5*	*-2*	*SNA*			*GNR*	*IC*
Potentilla simplex	Old-field Cinquefoil	*3*	*4*		*S5*			*G5*	*C*
Prunus avium	Sweet Cherry		*5*	*-2*	*SNA*			*GNR*	*IC*
Prunus serotina	Black Cherry	*3*	*3*		*S5*			*G5*	*C*
Prunus virginiana	Choke Cherry	*2*	*1*		*S5*			*G5*	*C*
Rosa multiflora	Multiflora Rose		*3*	*-3*	*SNA*			*GNR*	*IC*
Rubus allegheniensis	Alleghany Blackberry	*2*	*2*		*S5*			*G5*	*C*
Rubus hispidus	Bristly Dewberry	*6*	*-3*		*S4S5*			*G5*	*C*
Rubus idaeus ssp. *strigosus*	Red Raspberry	*0*	*-2*		*S5*			*G5T5*	*C*
Rubus occidentalis	Black Raspberry	*2*	*5*		*S5*			*G5*	*C*
Spiraea alba	Narrow-leaved Meadow-sweet	*3*	*-4*		*S5*			*G5*	*C*
Rubiaceae	**Madder Family**								
Cephalanthus occidentalis	Common Buttonbush	*7*	*-5*		*S5*			*G5*	*C*
Galium palustre	Marsh Bedstraw	*5*	*-5*		*S5*			*G5*	*C*
Salicaceae	**Willow Family**								
Populus deltoides ssp. *deltoides*	Eastern Cottonwood	*4*	*-1*		*S5*			*G5T5*	*C*
Populus tremuloides	Trembling Aspen		*0*		*S5*			*G5*	*C*
Salix bebbiana	Bebb's Willow	*4*	*-4*		*S5*			*G5*	*C*
Salix eriocephala	Heart-leaved Willow	*4*	*-3*		*S5*			*G5*	*C*
Salix x rubens	Reddish Willow		*-4*	*-3*	*SNA*			*GNA*	
Scrophulariaceae	**Figwort Family**								
Linaria vulgaris	Butter-and-eggs		*5*	*-1*	*SNA*			*GNR*	*IC*
Verbascum thapsus	Common Mullein		*5*	*-2*	*SNA*			*GNR*	*IC*
Veronica officinalis	Common Speedwell		*5*	*-2*	*SNA*			*G5*	*IC*
Veronica scutellata	Marsh Speedwell	*7*	*-5*		*S5*			*G5*	*U*
Solanaceae	**Nightshade Family**								
Solanum dulcamara	Climbing Nightshade		*0*	*-2*	*SNA*			*GNR*	*IC*
Tiliaceae	**Linden Family**								
Tilia americana	American Basswood	*4*	*3*		*S5*			*G5*	*C*
Ulmaceae	**Elm Family**								
Ulmus americana	White Elm	*3*	*-2*		*S5*			*G5?*	*C*
Urticaceae	**Nettle Family**								
Boehmeria cylindrica	False Nettle	*4*	*-5*		*S5*			*G5*	*C*
Pilea pumila	Dwarf Clearweed	*5*	*-3*		*S5*			*G5*	*C*
Urtica dioica ssp. *gracilis*	American Stinging Nettle	*2*	*-1*		*S5*			*G5T5*	*C*
Verbenaceae	**Vervain Family**								
Verbena hastata	Blue Vervain	*4*	*-4*		*S5*			*G5*	*C*
Verbena urticifolia	White Vervain	*4*	*-1*		*S5*			*G5*	*C*
Vitaceae	**Grape Family**								
Parthenocissus inserta	Inserted Virginia-creeper	*3*	*3*		*S5*			*G5*	*C*
Vitis riparia	Riverbank Grape	*0*	*-2*		*S5*			*G5*	*C*
Alismataceae	**Water-plantain Family**								
Alisma triviale	Northern Water-plantain	*3*	*-5*		*S5*			*G5*	*DD*
Sagittaria latifolia	Broad-leaved Arrowhead	*4*	*-5*		*S5*			*G5*	*C*
Araceae	**Arum Family**								

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	MNRF Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara
Reference								NHIC 2013	Oldham 2010
Arisaema triphyllum	Jack-in-the-pulpit	*5*	*-2*		*S5*			*G5*	*C*
Cyperaceae	**Sedge Family**								
Carex bebbii	Bebb's Sedge	*3*	*-5*		*S5*			*G5*	*C*
Carex crinita	Fringed Sedge	*6*	*-4*		*S5*			*G5*	*C*
Carex hystericina	Porcupine Sedge	*5*	*-5*		*S5*			*G5*	*C*
Carex intumescens	Bladder Sedge	*6*	*-4*		*S5*			*G5*	*C*
Carex lacustris	Lake-bank Sedge	*5*	*-5*		*S5*			*G5*	*C*
Carex lupulina	Hop Sedge	*6*	*-5*		*S5*			*G5*	*C*
Carex lurida	Sallow Sedge	*6*	*-5*		*S5*			*G5*	*U*
Carex pensylvanica	Pennsylvania Sedge	*5*	*5*		*S5*			*G5*	*C*
Carex spicata	Spiked Sedge		*5*	*-1*	*SNA*			*GNR*	*IC*
Carex stipata	Awl-fruited Sedge	*3*	*-5*		*S5*			*G5*	*C*
Carex vulpinoidea	Fox Sedge	*3*	*-5*		*S5*			*G5*	*C*
Scirpus atrovirens	Dark-green Bulrush	*3*	*-5*		*S5*			*G5?*	*C*
Scirpus cyperinus	Wool-grass	*4*	*-5*		*S5*			*G5*	*C*
Dioscoreaceae	**Yam Family**								
Dioscorea villosa	Wild Yam-root	*7*	*1*		*S4*			*G4G5*	*U*
Iridaceae	**Iris Family**								
Iris virginica	Southern Blue-flag	*5*	*-5*		*S5*			*G5*	*DD*
Juncaceae	**Rush Family**								
Juncus dudleyi	Dudley's Rush	*1*	*0*		*S5*			*G5*	*C*
Juncus effusus var. *solutus*	Soft Rush	*4*	*-5*		*S5?*			*G5T5*	*C*
Juncus tenuis	Path Rush	*0*	*0*		*S5*			*G5*	*C*
Lemnaceae	**Duckweed Family**								
Lemna minor	Lesser Duckweed	*2*	*-5*		*S5*			*G5*	*C*
Spirodela polyrhiza	Greater Duckweed	*4*	*-5*		*S5*			*G5*	*R*
Wolffia columbiana	Water-meal	*4*	*-5*		*S4S5*			*G5*	*R*
Liliaceae	**Lily Family**								
Asparagus officinalis	Garden Asparagus		*3*	*-1*	*SNA*			*G5?*	*IC*
Maianthemum racemosum	False Solomon's Seal	*4*	*3*		*S5*			*G5T*	*C*
Polygonatum pubescens	Downy Solomon's Seal	*5*	*5*		*S5*			*G5*	*C*
Poaceae	**Grass Family**								
Agrostis gigantea	Redtop		*0*	*-2*	*SNA*			*G4G5*	*IC*
Agrostis stolonifera	Redtop		*-3*		*S5*			*G5*	*C*
Bromus inermis	Awnless Brome		*5*	*-3*	*SNA*			*G5TNR*	*IC*
Dactylis glomerata	Orchard Grass		*3*	*-1*	*SNA*			*GNR*	*IC*
Echinochloa crus-galli	Common Barnyard Grass		*-3*	*-1*	*SNA*			*GNR*	*IC*
Elymus repens	Quack Grass		*3*	*-3*	*SNA*			*GNR*	*IC*
Elymus virginicus	Virginia Wild Rye	*5*	*-2*		*S5*			*G5*	*C*
Festuca rubra ssp. *rubra*	Red Fescue		*1*	*-1*	*SNA*			*G5T5*	*IC*
Glyceria striata	Fowl Meadow Grass	*3*	*-5*		*S5*			*G5*	*C*
Leersia oryzoides	Rice Cut Grass	*3*	*-5*		*S5*			*G5*	*C*
Leersia virginica	White Cut Grass	*6*	*-3*		*S4*			*G5*	*C*
Phalaris arundinacea	Reed Canary Grass	*0*	*-4*		*S5*			*G5*	*C*
Phleum pratense	Timothy		*3*	*-1*	*SNA*			*GNR*	*IC*
Phragmites australis ssp. australis	European Reed				*SNR*			*GNR*	
Poa compressa	Canada Blue Grass	*0*	*2*		*SNA*			*GNR*	*IC*
Poa palustris	Fowl Meadow Grass	*5*	*-4*		*S5*			*G5*	*C*
Poa pratensis ssp. pratensis	Kentucky Bluegrass	*0*	*1*		*S5*			*G5T5*	*IC*
Potamogetonaceae	**Pondweed Family**								
Stuckenia pectinata	Fennel-leaved Pondweed	*4*	*-5*		*S5*			*G5*	*R*

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	MNRF Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara
Reference								NHIC 2013	Oldham 2010
Sparganiaceae	**Bur-reed Family**								
Sparganium eurycarpum	Broad-fruited Bur-reed	*3*	*-5*		*S5*			*G5*	*C*
Typhaceae	**Cattail Family**								
Typha angustifolia	Narrow-leaved Cattail	*3*	*-5*		*SNA*			*G5*	*C*
Typha latifolia	Broad-leaved Cattail	*3*	*-5*		*S5*			*G5*	*C*
Typha x glauca	Glaucous Cattail	*3*	*-5*		*SNA*			*GNA*	*hyb*

STATISTICS

Species Richness		
Total Number of Species:	226	
Native Species:	165	73%
Exotic Species	61	27%
S1-S3 Species	1	1%
S4 Species	13	8%
S5 Species	149	91%
Floristic Quality Indices		
Mean Co-efficient of Conservatism (CC)	3.8	
CC 0 - 3 lowest sensitivity	67	42%
CC 4 - 6 moderate sensitivity	84	53%
CC 7 - 8 high sensitivity	6	4%
CC 9 - 10 highest sensitivity	2	1%
Floristic Quality Index (FQI)	48	
Weedy and Invasive Species		
Mean Weediness Index	-1.8	
-1 low potential invasiveness	25	45%
-2 moderate potential invasiveness	16	29%
-3 high potential invasivenss	15	27%
Wetland Species		
Mean Wetness Index	-0.2	
upland	42	19%
facultative upland	44	20%
facultative	36	17%
facultative wetland	53	24%
obligate wetland	43	20%

EXPLANATION OF TERMINOLOGY

Botanical and Common Name: From Newmaster et al, 1988. Species requiring confirmation noted (cf).

Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is bassed on a species tolerance of disturbance and fidelity to a specific habitat integrity,

Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.

Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator or disturbance.

Provincial Status: Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province, Species ranked S1-S3 are considered to be rare in Ontario.

STATUS IN NIAGARA REGIONAL MUNICIPALITY (OLDHAM 2010)

R: Rare, 10 or fewer post 1980 records
RH: Rare Historic, no records post 1980
U: Uncommon, 11-20 post 1980 records
C: Common, more than 20 post 1980 records
DD: Data deficient further work needed to determine status
I: Introduced
hyb: hybrid, no Niagara status assigned

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	MNRF Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara
Reference								NHIC 2013	Oldham 2010

REFERENCES

Nomenclature based on:
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. 550pp. + appendices.

Co-efficient of Conservatism, Wetness & Weediness

Oldham, M.J., W.D. Bakowsky and D.A. Sutherland. 1995. Floristic Quality Assessment for Southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.

Provincial (Ontario) Status:
Natural Heritage Information Centre (NHIC). 2000. Provincial Status of Plants, Wildlife and Vegetation Communities Database.
S-ranks: Provincial ranks are from the NHIC online database (October 2013); S1 (critically imperiled), S2 (imperiled), S3 (vulnerable), S4 (apparently secure), S5 (secure)

Global Status:
G-ranks: Global ranks are from the NHIC online database (October 2013); G1 (extremely rare), G2 (very rare), G3 (rare to uncommon), G4 (common), G5 (very common)

MNRF Status:

Ontario Species at Risk are listed by the Committee on the Status of Species at Risk in Ontario (COSSARO) [from NHIC Octobere 2013]; END - Endangered; THR - Threatened; SC - Special Concern; NAR - Not at Risk; Candidate Species at Risk to be assessed b y COSSARO are listed online.

COSEWIC Status:

Assessed Species at Risk at the national level are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) [from NHIC 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.

Local Status:

Goldham, M.J. 2010. Checklist of the Vascular Plants of Niagara Regional Municipality. Ontario Natural Heritage Information Centre (NHIC), Ministry of Natural Resources, Peterborough. Ontario for Niagara Peninsula Conservation Authority, Welland, Ontario.

Sutherland, D.A. 1987. The Vascular Plants of Halimand-Norfolk; M.E. Gartshore, D.A. Sutherland & J.D. McCrackend (Eds.) Final Report on thr Natural Areas Inventory of the RM of Haldimand-Norfolk. 1985-86; Vol. II: Annotated Checklists. (pp. 1-152); Simcoe, Ontario. Norfolk Field Naturalists.

Table 5: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												WATER		SIGNIFICANT WILDLIFE HABITAT
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Y/N	DEPTH (CM)	Y/N
1	A	X												Y	20	No
2	A													N	Dry	
1	AA						1(4)							Y	13	No
2	AA													N	Dry	
1	B					1(5)			1(1)					Y	>12	No
2	B	X												Y	12.5	
3	B	X												Y	7.5	
1	BB					1(1)	1(12)							Y	>5	No
2	BB													N	Dry	
1	C					2(2)	1(4)		1(1)					Y	30	Yes (woodland)
2	C					1(2)								Y	11	
3	C	X												Y	7	

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Folwers Toad	*Anaxyrus fowleri*
GRTR	Gray Tree Frog	*Hyla versicolor*
CHFR	Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvatica*
NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	Bullfrog	*Lithobates catesbeiana*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

Notes:

– For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals heard calling of that species; and

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1	CC	X												Y	24	Y (wetland)
2	CC										1(2)	1(1)		Y	Deep	
3	CC										1(1)	1(2)		Y	Deep	
1	D						1(3)							Y	25	N
2	D	X												Y	19	
3	D										1(2)			Y	7	
1	DD	X												Y	Deep	Y (wetland)
2	DD	X												Y	Deep	
3	DD										1(4)	1(2)		Y	Deep	
1	E					1(4)	1(8)							Y	15	N
2	E					1(2)								Y	4.5	
3	E										1(5)			Y	8	

LEGEND:

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		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Y/N	DEPTH (CM)	Y/N
1	EE	X												Y	24	N
2	EE													N	Dry	
1	F	X												Y	Deep	N
2	F	X												Y	Deep	
3	F	X												Y	Deep	
1	FF					1(3)	1(4)							Y	15	N
2	FF					1 (7)								Y	8	
3	FF	X												Y	8	
1	G					2(25)								Y	Deep	Y (wetland)
2	G	X												Y	Deep	
3	G										1(3)	X		Y	Deep	
1	GG		1(2)											Y	27	N

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PIFR	Pickerel Frog	*Lithobates palustris*
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2	GG		~40 tadpoles											Y	8	N
3	GG		Dried out tadpoles											Y	7	
1	H						1(2)							Y	15	N
2	H													N	Dry	
1	HH	X												Y	Deep	Y (wetland)
2	HH	X												Y	Deep	
3	HH										1(1)	1(1)		Y	Deep	
1	I						1(1)		1(1)					Y	>24	Y (wetland)
2	I	X												Y	Deep	
3	I										1(3)	1(4)		Y	Deep	
1	II	X												Y	Deep	N

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2	II	X												Y	Deep	
3	II										1(1)			Y	Deep	
1	J	X												Y	Deep	Y (wetland)
2	J	X												Y	Deep	
3	J										1(1)	1(2)		Y	Deep	
1	JJ	X												Y	Deep	N
2	JJ	X												Y	40	
3	JJ										1(1)			Y	25	
1	K					1 (6)	1(4)							Y	14	Y (wetland)
2	K					1(2)								Y	18	
3	K										1(5)	X		Y	5	
1	KK		1(2)											Y	Deep	N

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2	KK	X												Y	40	
3	KK	X												Y	30	
1	L	X												Y	39	No
2	L	X												Y	Deep	
3	L										1(5)			Y	Deep	
2	LL	X												Y	Deep	Y (wetland)
3	LL										1(1)	1(1)		Y	Deep	
1	M	X												Y	Deep	Y (wetland)
2	M	X												Y	Deep	
3	M											1(1)		Y	Deep	
2	MM	X												Y	15	N
3	MM													N	Dry	

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1	N						1(2)							Y	8	N
2	N													N	Dry	
2	NN											1(1)		Y	Deep	Y (wetland)
3	NN										1(2)	1(1)		Y	Deep	
1	O					1(1)	1(3)							Y	.>13	N
2	O	X												Y	4	
3	O	X												Y	6	
2	OO	X												Y	Deep	Y (wetland)
3	OO										1(1)	X		Y	Deep	
1	P	X												Y	8	N
2	P													N	Dry	

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PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	Bullfrog	*Lithobates catesbeiana*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

Notes:

– For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals heard calling of that species; and
– One or more Bullfrogs were heard calling at several stations during a daytime reptile survey on June 23, 2015 – these observations are noted with an 'X' under the BULL column.

Table 5: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												WATER		SIGNIFICANT WILDLIFE HABITAT
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Y/N	DEPTH (CM)	Y/N
1	Q						1(1)							Y	Deep	N
2	Q	X												Y	Deep	
3	Q										1(1)			Y	30	
1	R								1(1)					Y	Deep	N
2	R	X												Y	Deep	
3	R	X												Y	32	
1	S								1(1)					Y	Deep	N
2	S	X												Y	50	
3	S	X												Y	33	
1	T					1(2)								Y	Deep	N
2	T	X												Y	50	

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Folwers Toad	*Anaxyrus fowleri*
GRTR	Gray Tree Frog	*Hyla versicolor*
CHFR	Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvatica*
NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	Bullfrog	*Lithobates catesbeiana*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

Notes:

– For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals heard calling of that species; and

– One or more Bullfrogs were heard calling at several stations during a daytime reptile survey on June 23, 2015 – these observations are noted with an 'X' under the BULL column.

Table 5: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												WATER		SIGNIFICANT WILDLIFE HABITAT
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Y/N	DEPTH (CM)	Y/N
3	T										1(2)			Y	30	
1	U						1(5)							Y	18	N
2	U	X												Y	14	
3	U	X												Y	5	
1	V	X												Y	23	N
2	V	X												Y	14	
3	V	X												Y	31	
1	W	X												Y	>17	Y (wetland)
2	W	X												Y	Deep	
3	W										1(3)	1(3)		Y	Deep	
1	X	X												Y	20	N

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Folwers Toad	*Anaxyrus fowleri*
GRTR	Gray Tree Frog	*Hyla versicolor*
CHFR	Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvatica*
NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	Bullfrog	*Lithobates catesbeiana*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

Notes:

– For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals heard calling of that species; and
– One or more Bullfrogs were heard calling at several stations during a daytime reptile survey on June 23, 2015 – these observations are noted with an 'X' under the BULL column.

Table 5: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												WATER		SIGNIFICANT WILDLIFE HABITAT
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Y/N	DEPTH (CM)	Y/N
2	X													N	Dry	
3	X	X												Y	20 Refilled	
1	Y	X												Y	Deep	Y (wetland)
2	Y	X												Y	Deep	
3	Y											1(1)		Y	Deep	
1	Z						1(3)							Y	8	N
2	Z													N	Dry	

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Folwers Toad	*Anaxyrus fowleri*
GRTR	Gray Tree Frog	*Hyla versicolor*
CHFR	Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvatica*
NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	Bullfrog	*Lithobates catesbeiana*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

Notes:

– For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals heard calling of that species; and

– One or more Bullfrogs were heard calling at several stations during a daytime reptile survey on June 23, 2015 – these observations are noted with an 'X' under the BULL column.

Common Name	Scientific Name	Provincial Status (S Rank)	National Status (G Rank)	COSSARO (MNRF)	COSEWIC (Federal)	SWH Indicator Species	Highest Breeding Evidence*
Anseriformes							
Anatidae							
Wood Duck	*Aix sponsa*	S5	G5			X	PO-H
Galliformes							
Phasianinae							
Gaviiformes							
Gaviidae							
Podicipediformes							
Podicipedidae							
Suliformes							
Phalacrocoracidae							
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	G5				OB-X
Pelecaniformes							
Ardeidae							
Great Blue Heron	*Ardea herodias*	S4	G5			X	OB-X
Great Egret	*Ardea alba*	S2B	G5			X	OB-X
Green Heron	*Butorides virescens*	S4B	G5			X	PR-T
Pelecanidae							
Accipitriformes							
Cathartidae							
Turkey Vulture	*Cathartes aura*	S5B	G5				PO-H
Pandionidae							
Osprey	*Pandion haliaetus*	S5B	G5			X	OB-X
Accipitridae							
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5			X	PO-H
Gruiformes							
Rallidae							
Virginia Rail	*Rallus limicola*	S5B	G5			X	PR-A
Gruidae							
Charadriiformes							
Charadriidae							
Killdeer	*Charadrius vociferus*	S5B, S5N	G5				PR-T
Scolopacidae							
Spotted Sandpiper	*Actitis macularius*	S5	G5			X	CO-FY
Laridae							
Ring-billed Gull	*Larus delawarensis*	S5B,S4N	G5			X	OB-X
Herring Gull	*Larus argentatus*	S5B,S5N	G5			X	OB-X
Caspian Tern	*Hydroprogne caspia*	S3B	G5			X	OB-X
Columbiformes							
Columbidae							
Mourning Dove	*Zenaida macroura*	S5	G5				P0-H
Cuculiformes							
Cuculidae							
Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	G5				PO-S
Strigiformes							
Strigidae							
Caprimulgiformes							
Caprimulgidae							

Common Name	Scientific Name	Provincial Status (S Rank)	National Status (G Rank)	COSSARO (MNRF)	COSEWIC (Federal)	SWH Indicator Species	Highest Breeding Evidence*
Apodiformes							
Apodidae							
Trochilidae							
Coraciiformes							
Alcedinidae							
Belted Kingfisher	*Megaceryle alcyon*	S4B	G5				PO-H
Piciformes							
Picidae							
Downy Woodpecker	*Picoides pubescens*	S5	G5				PR-T
Hairy Woodpecker	*Picoides villosus*	S5	G5				PR-T
Northern Flicker	*Colaptes auratus*	S4B	G5				PR-A
Falconiformes							
Falconidae							
Passeriformes							
Tyrannidae							
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC		PR-T
Willow Flycatcher	*Empidonax traillii*	S5B	G5			X	PR-T
Eastern Phoebe	*Sayornis phoebe*	S5B	G5				PR-T
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5				PR-T
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5				PR-T
Laniidae							
Vireonidae							
Warbling Vireo	*Vireo gilvus*	S5B	G5				PR-T
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5				PR-T
Corvidae							
Blue Jay	*Cyanocitta cristata*	S5	G5				PR-T
American Crow	*Corvus brachyrhynchos*	S5B	G5				PR-T
Alaudidae							
Horned Lark	*Eremophila alpestris*	S4B	G5				CO-FY
Hirundinidae							
Tree Swallow	*Tachycineta bicolor*	S4B	G5				PR-T
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5			X	PO-H
Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	G5			X	PO-H
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR		PO-H
Paridae							
Black-capped Chickadee	*Poecile atricapillus*	S5	G5				PR-T
Sittidae							
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5				PR-T
Certhiidae							
Troglodytidae							
Polioptilidae							
Blue-gray Gnatcatcher	*Polioptila caerulea*	S4B	G5				PR-T
Regulidae							
Turdidae							
Eastern Bluebird	*Sialia sialis*	S5B	G5				PO-S
Wood Thrush	*Hylocichla mustelina*	S4B	G5	SC	THR		PR-T
American Robin	*Turdus migratorius*	S5B	G5				CO-FY
Mimidae							
Gray Catbird	*Dumetella carolinensis*	S4B	G5				PR-T

Common Name	Scientific Name	Provincial Status (S Rank)	National Status (G Rank)	COSSARO (MNRF)	COSEWIC (Federal)	SWH Indicator Species	Highest Breeding Evidence*
Sturnidae							
European Starling	*Sturnus vulgaris*	SNA	G5				PR-T
Motacillidae							
Bombycillidae							
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5				PR-P
Calcariidae							
Parulidae							
Blue-winged Warbler	*Vermivora cyanoptera*	S4B	G5				PO-S
Common Yellowthroat	*Geothlypis trichas*	S5B	G5				PR-T
Yellow Warbler	*Setophaga petechia*	S5B	G5				PR-T
Emberizidae							
Chipping Sparrow	*Spizella passerina*	S5B	G5				PR-T
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5			X	CO-NE
Song Sparrow	*Melospiza melodia*	S5B	G5				CO-FY
Swamp Sparrow	*Melospiza georgiana*	S5B	G5				PR-T
Cardinalidae							
Northern Cardinal	*Cardinalis cardinalis*	S5	G5				PR-T
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5				PR-T
Indigo Bunting	*Passerina cyanea*	S4B	G5				PR-P
Icteridae							
Bobolink	*Dolichonyx oryzivorus*	S4B	G5	THR	THR		OB-X
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5				CO-FY
Common Grackle	*Quiscalus quiscula*	S5B	G5				CO-FY
Brown-headed Cowbird	*Molothrus ater*	S4B	G5				PR-T
Orchard Oriole	*Icterus spurius*	S4B	G5				PR-P
Baltimore Oriole	*Icterus galbula*	S4B	G5				PR-T
Fringillidae							
American Goldfinch	*Spinus tristis*	S5B	G5				PR-T
Passeridae							

Table 7: Snake Survey Results

DATE SURVEYED	SURVEY ROUND	REPTILE TRANSECT 'T' # OR STATION #	SPECIES CODE														
			NOSN	EAGA	MISN	BRSN	RBSN	NWSN	RISN	BLRA	BUGA	FOSN	HOSN	MASS	RNSN	SGSN	QUSN
23-JU-15	1	T1		1													
23-JU-15	1	T2	X														
23-JU-15	1	T3	X														
23-JU-15	1	STN 1	X														
23-JU-15	1	STN 2	X														
23-JU-15	1	STN 3	X														
23-JU-15	1	STN 4	X														
23-JU-15	1	STN 5	X														
23-JU-15	1	STN 6				1											
23-JU-15	1	STN 7	X														
23-JU-15	1	STN 8	X														

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOSN	No Snakes	No snakes despite survey effort
EAGA	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*
MISN	Eastern Milksnake	*Lampropeltis triangulum*
BRSN	DeKay's Brownsnake	*Storeria dekayi*
RBSN	Northern Red-bellied Snake	*Storeria occipitomaculata occipitomaculata*
RASN	Gray Ratsnake	*Pantherophis spiloides*
RISN	Eastern Ribbonsnake	*Thamnophis sauritus*
BLRA	Blue Racer	*Coluber constrictor foxii*
BUGA	Butler's Gartersnake	*Thamnophis butleri*
FOSN	Eastern Foxsnake	*Pantherophis gloyd*
HOSN	Eastern Hog-nosed Snake	*Heterodon platirhinos*
MASS	Massassauga	*Sistrusus catenatus catenatus*
RNSN	Ring-necked Snake	*Diadophis punctatus*
SGSN	Smooth Greensnake	*Opheodrys vernalis*
QUSN	Queensnake	*Regina septemvittata*

DATE	
MONTH	CODE
January	JA
February	FE
March	MR
April	AP
May	MA
June	JU
July	JL
August	AU
September	SE
October	OC
November	NO
December	DE

Table 7: Snake Survey Results

DATE SURVEYED	SURVEY ROUND	REPTILE TRANSECT 'T' # OR STATION #	SPECIES CODE														
			NOSN	EAGA	MISN	BRSN	RBSN	NWSN	RISN	BLRA	BUGA	FOSN	HOSN	MASS	RNSN	SGSN	QUSN
23-JU-15	1	STN 9	X														
23-JU-15	1	STN 10	X														
23-JU-15	1	STN 11	X														
23-JU-15	1	STN 12	X														
23-JU-15	1	STN 13	X														
23-JU-15	1	STN 14	X														
23-JU-15	1	STN 15						1									
23-JU-15	1	STN 16	X														

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOSN	No Snakes	No snakes despite survey effort
EAGA	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*
MISN	Eastern Milksnake	*Lampropeltis triangulum*
BRSN	DeKay's Brownsnake	*Storeria dekayi*
RBSN	Northern Red-bellied Snake	*Storeria occipitomaculata occipitomaculata*
RASN	Gray Ratsnake	*Pantherophis spiloides*
RISN	Eastern Ribbonsnake	*Thamnophis sauritus*
BLRA	Blue Racer	*Coluber constrictor foxii*
BUGA	Butler's Gartersnake	*Thamnophis butleri*
FOSN	Eastern Foxsnake	*Pantherophis gloyd*
HOSN	Eastern Hog-nosed Snake	*Heterodon platirhinos*
MASS	Massassauga	*Sistrusus catenatus catenatus*
RNSN	Ring-necked Snake	*Diadophis punctatus*
SGSN	Smooth Greensnake	*Opheodrys vernalis*
QUSN	Queensnake	*Regina septemvittata*

DATE	
MONTH	CODE
January	JA
February	FE
March	MR
April	AP
May	MA
June	JU
July	JL
August	AU
September	SE
October	OC
November	NO
December	DE

Table 8: Turtle Survey Results

DATE SURVEYED	SURVEY ROUND	TRANSECT OR STATION NUMBER	SPECIES CODE								
			NOTU	MPTU	SNTU	MATU	BLTU	SSTU	WOTU	STIN	SPTU
23-JU-15	1	STN 1	X								
23-JU-15	1	STN 2	X								
23-JU-15	1	STN 3	X								
23-JU-15	1	STN 4	X								
23-JU-15	1	STN 5	X								
23-JU-15	1	STN 6		3							
23-JU-15	1	STN 7	X								
23-JU-15	1	STN 8	X								
23-JU-15	1	STN 9		9							
23-JU-15	1	STN 10		1							
23-JU-15	1	STN 11	X								
23-JU-15	1	STN 12	X								
23-JU-15	1	STN 13		2							
23-JU-15	1	STN 14		3							
23-JU-15	1	STN 15	X								

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOTU	No Turtles	No turtles despite survey effort
MPTU	Midland Painted Turtle	*Chrysemys picta marginata*
SNTU	Snapping Turtle	*Chelydra serpentina*
MATU	Northern Map Turtle	*Graptemys geographica*
BLTU	Blanding's Turtle	*Emydoidea blandingii*
SSTU	Spiny Soft-shelled Turtle	*Apalone spinifera*
WOTU	Wood Turtle	*Glyptemys insculpta*
STIN	Stinkpot Turtle	*Stemotherus odoratus*
SPTU	Spotted Turtle	*Clemmys guttata*

DATE	
MONTH	CODE
January	JA
February	FE
March	MR
April	AP
May	MA
June	JU
July	JL
August	AU
September	SE
October	OC
November	NO
December	DE

Table 8: Turtle Survey Results

DATE SURVEYED	SURVEY ROUND	TRANSECT OR STATION NUMBER	SPECIES CODE								
			NOTU	MPTU	SNTU	MATU	BLTU	SSTU	WOTU	STIN	SPTU
23-JU-15	1	STN 16		5							
23-JU-15	1	STN 17		5							
23-JU-15	1	T1	X								
23-JU-15	1	T2	X								
23-JU-15	1	T3	X								

Turtle Survey Results – Nesting

- A visual turtle nesting habitat / evidence survey was completed (Transects T1 to T3 and around perimeter of each pond station 1 to 17);
- Soil auger tests were not permitted due to use of the site as an active golf course;
- Soil mapping indicates no suitable substrate (high clay content soils);
- Sand present in golf course bunkers was of insufficient depth for nesting; and,
- No nesting evidence (i.e., test digs, claw marks, predated nests) was observed.

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOTU	No Turtles	No turtles despite survey effort
MPTU	Midland Painted Turtle	*Chrysemys picta marginata*
SNTU	Snapping Turtle	*Chelydra serpentina*
MATU	Northern Map Turtle	*Graptemys geographica*
BLTU	Blanding's Turtle	*Emydoidea blandingii*
SSTU	Spiny Soft-shelled Turtle	*Apalone spinifera*
WOTU	Wood Turtle	*Glyptemys insculpta*
STIN	Stinkpot Turtle	*Stemotherus odoratus*
SPTU	Spotted Turtle	*Clemmys guttata*

DATE	
MONTH	CODE
January	JA
February	FE
March	MR
April	AP
May	MA
June	JU
July	JL
August	AU
September	SE
October	OC
November	NO
December	DE

Table 9: Wildlife Road Crossing Survey Results

SURVEY DATE	SURVEY ROUND (X OF Y)	TRANSECT NO.	SPECIES OBSERVED	UTM OF OBSERVATION		INDIVIDUALS	
				EASTING	NORTHING	QTY	STATUS
23-Jun-15	1 of 1	R1	None observed				
23-Jun-15	1 of 1	R2	None observed				
23-Jun-15	1 of 1	R3	None observed				
23-Jun-15	1 of 1	R4	None observed				

LEGEND:

MONTH	
JA	January
FE	February
MR	March
AL	April
MA	May
JN	June
JL	July
AU	August
SE	September
OC	October
NO	November
DE	December

COMMON NAME	SCIENTIFIC NAME	Provincial SRANK	Global GRANK	COSSARO	COSEWIC	Niagara Natural Areas Inventory
ODONATA						
Emerald Spreadwing	*Lestes dryas*	S5	G5			R
Slender Spreadwing	*Lestes rectangularis*	S5	G5			R
Familiar Bluet	*Enallagma civile*	S5	G5			C
Slender Bluet	*Enallagma traviatum westfalli*	S1	G5			Not listed
Eastern Forktail	*Ischnura verticalis*	S5	G5			C
Common Green Darner	*Anax junius*	S5	G5			C
Prince Baskettail	*Epitheca princeps*	S5	G5			R
Eastern Pondhawk	*Erythemis simplicicollis*	S5	G5			C
Widow Skimmer	*Libellula luctuosa*	S5	G5			C
Spot-winged Glider	*Pantala hymenaea*	S4	G5			R
Eastern Amberwing	*Perithemis tenera*	S4	G5			C
Cherry-faced Meadowhawk	*Sympetrum internum*	S5	G5			R
Black Saddlebags	*Tramea lacerata*	S4	G5			C
BUTTERFLIES						
Tawny-edged Skipper	*Polites themistocles*	S5	G5			RH
Cabbage White	*Pieris rapae*	SNA	G5			IC
Clouded Sulphur	*Colias philodice*	S5	G5			Not listed
Acadian Hairstreak	*Satyrium acadicum*	S4	G5			R
Eastern Tailed Blue	*Everes comyntas*	S5	G5			C
Pearl Crescent	*Phyciodes tharos*	S4	G5			C
Red Admiral	*Vanessa atalanta*	S5	G5			C
Common Wood-Nymph	*Cercyonis pegala*	S5	G5			C
OTHER ARTHROPODS						
European Mantid	*Mantis religiosa*					Not listed
NON-INSECT ARTHROPODS						
Digger Crayfish (burrow, terrestrial crayfish spp)	*Fallicambarus fodiens*	S4	G5			Not listed
Meadow Crayfish (burrow, terrestrial crayfish spp)	*Cambarus diogenes*	S3	G5			Not listed
AMPHIBIANS						
American Toad	*Anaxyrus americanus*	S5	G5			W
American Bullfrog	*Lithobates catesbeiana*	S4	G5			W
Northern Green Frog	*Lithobates clamitans*	S5	G5			W
Northern Leopard Frog	*Lithobates pipiens*	S5	G5			W
Wood Frog	*Lithobates sylvaticus*	S5	G5			W
Spring Peeper	*Pseudacris crucifer*	S5	G5			W
Western Chorus Frog / Carolinean population	*Pseudacris triseriata pop. 1*	S4	G5TNR			W
REPTILES						
Midland Painted Turtle	*Chrysemys picta marginata*	S5	G5T5			W
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5			W
DeKay's Brownsnake	*Storeria dekayi*	S5	G5			W
Northern Watershanke	*Nerodia sipedon sipedon*	S5	G5T5			W
BIRDS						
Canada Goose	*Branta canadensis*	S5	G5			C
Mallard	*Anas platyrhynchos*	S5	G5			C
Wood Duck	*Aix sponsa*	S5	G5			U
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	G5			C
Great Blue Heron	*Ardea herodias*	S4	G5			U
Great Egret	*Ardea alba*	S2B	G5			R
Green Heron	*Butorides virescens*	S4B	G5			U
Turkey Vulture	*Cathartes aura*	S5B	G5			U
Wild Turkey	*Anas platyrhynchos*	S5	G5			U
American Woodcock	*Scolopax minor*	S4B	G5			U
Osprey	*Pandion haliaetus*	S5B	G5			O
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5			U
Virginia Rail	*Rallus limicola*	S5B	G5			R
Killdeer	*Charadrius vociferus*	S5B, S5N	G5			C
Least Sandpiper	*Calidris minutilla*	S4B, S5N	G5			C
Spotted Sandpiper	*Actitis macularius*	S5	G5			C
Ring-billed Gull	*Larus delawarensis*	S5B,S4N	G5			C
Herring Gull	*Larus argentatus*	S5B,S5N	G5			U
Caspian Tern	*Hydroprogne caspia*	S3B	G5			U
Mourning Dove	*Zenaida macroura*	S5	G5			C
Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	G5			U
Belted Kingfisher	*Megaceryle alcyon*	S4B	G5			U
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5			U
Downy Woodpecker	*Picoides pubescens*	S5	G5			C
Hairy Woodpecker	*Picoides villosus*	S5	G5			U
Northern Flicker	*Colaptes auratus*	S4B	G5			C
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC	C

COMMON NAME	SCIENTIFIC NAME	Provincial SRANK	Global GRANK	COSSARO	COSEWIC	Niagara Natural Areas Inventory
Willow Flycatcher	*Empidonax traillii*	S5B	G5			U
Eastern Phoebe	*Sayornis phoebe*	S5B	G5			U
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5			C
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5			C
Warbling Vireo	*Vireo gilvus*	S5B	G5			C
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5			C
Blue Jay	*Cyanocitta cristata*	S5	G5			C
American Crow	*Corvus brachyrhynchos*	S5B	G5			C
Horned Lark	*Eremophila alpestris*	S4B	G5			C
Tree Swallow	*Tachycineta bicolor*	S4B	G5			C
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5			U
Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	G5			U
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR	C
Black-capped Chickadee	*Poecile atricapillus*	S5	G5			C
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5			U
Blue-gray Gnatcatcher	*Polioptila caerulea*	S4B	G5			U
Eastern Bluebird	*Sialia sialis*	S5B	G5			U
Wood Thrush	*Hylocichla mustelina*	S4B	G5	SC	THR	U
American Robin	*Turdus migratorius*	S5B	G5			C
Gray Catbird	*Dumetella carolinensis*	S4B	G5			C
European Starling	*Sturnus vulgaris*	SNA	G5			C
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5			C
Blue-winged Warbler	*Vermivora cyanoptera*	S4B	G5			U
Common Yellowthroat	*Geothlypis trichas*	S5B	G5			C
Yellow Warbler	*Setophaga petechia*	S5B	G5			C
Chipping Sparrow	*Spizella passerina*	S5B	G5			C
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5			C
Song Sparrow	*Melospiza melodia*	S5B	G5			C
Swamp Sparrow	*Melospiza georgiana*	S5B	G5			U
Northern Cardinal	*Cardinalis cardinalis*	S5	G5			C
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5			C
Indigo Bunting	*Passerina cyanea*	S4B	G5			C
Bobolink	*Dolichonyx oryzivorus*	S4B	G5	THR	THR	U
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5			C
Common Grackle	*Quiscalus quiscula*	S5B	G5			C
Brown-headed Cowbird	*Molothrus ater*	S4B	G5			C
Orchard Oriole	*Icterus spurius*	S4B	G5			U/R
Baltimore Oriole	*Icterus galbula*	S4B	G5			C
American Goldfinch	*Spinus tristis*	S5B	G5			C
MAMMALS						
Bat species						
Eastern Chipmunk	*Tamias striatus*	S5	G5			Not listed
Eastern Gray Squirrel	*Sciurus carolinensis*	S5	G5			Not listed
Meadow Vole	*Microtus pennsylvanicus*	S5	G5			Not listed
Coyote	*Canis latrans*	S5	G5			Not listed
Red Fox	*Vulpes vulpes*	S5	G5			Not listed
White-tailed Deer	*Odocoileus virginianus*	S5	G5			Not listed

Explanation of Status and Acronymns

COSSARO: Committee on the Status of Species at Risk in Ontario
COSEWIC: Committee on the Status of Endangered Wildlife in Canada
REGION: Rare in a Site Region
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)
S4: Apparently Secure—Uncommon but not rare
S5: Secure—Common, widespread, and abundant in the province
SX: Presumed extirpated
SH: Possibly Extirpated (Historical)
SNR: Unranked
SU: Unrankable—Currently unrankable due to lack of information
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species
S#B- Breeding status rank
S#N- Non Breeding status rank
?: Indicates uncertainty in the assigned rank
G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range
G1G2: Extremely rare to very rare globally
G2: Very rare globally; usually between 5-10 occurrences in the overall range
G2G3: Very rare to uncommon globally
G3: Rare to uncommon globally; usually between 20-100 occurrences

COMMON NAME	SCIENTIFIC NAME	Provincial SRANK	Global GRANK	COSSARO	COSEWIC	Niagara Natural Areas Inventory

G3G4: Rare to common globally
G4: Common globally; usually more than 100 occurrences in the overall range
G4G5: Common to very common globally
G5: Very common globally; demonstrably secure
GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.
T: Denotes that the rank applies to a subspecies or variety
Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable.
END: Endangered
THR: Threatened
SC: Special Concern
NAR: Not At Risk
IND: Indeterminant, insufficient information to assign status
DD: Data Deficient
R: Locally Rare
RH: Locally Regionally Rare
O: Locally Occasional
U:Locally Uncommon
C: Locally Common
W: Locally Widespread
IC: Invasive and Locally Common

REFERENCES

Local Status: Oldham, M.J., Curry, R., Yagi, A. R. 2010. Niagara Natural Areas Inventory 2006 - 2009. Species Checklists. Niagara Penninsula Conservation Authority.

S ranks: Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperlied), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list October 2013

G ranks: National 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

COSSARO (MNRF): 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/.

COSEWIC: Assessed Species at Risk at the national level 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/.

Drainage Feature Segment	Step 1. Hydrology	Step 2. Riparian	Step 3. Fish Habitat	Step 4. Terrestrial Habitat	Management Recommendation
LC1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC1-A	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC1- A1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC1-B	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC2	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC2-A	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC3	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
LC4	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB7	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB7-A	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
WR1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
WR1-A	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB3	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB4	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB2	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB6	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-A	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-D	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-E	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-G	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-F	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-F1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-H	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-E1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-A1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-A2	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-B	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-I	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-J	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-C	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-C1	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required
GB5-C2	Limited Functions	Limited Functions	Contributing Functions	Limited Functions	No Management Required

Note: Clay soils throughout the Subject Lands. Lands are completely cultivated. Ephemeral flow contributes only sediment and water; no food energy would be transported.