DRAFT

AECOM

Glancaster Road Municipal Class Environmental Assessment

Natural Environment Report

City of Hamilton

60637047

February 2022

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

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Revision History

Rev #	Revision Date	Revised By:	Revision Description
00	September 17, 2021		Draft
01	February 2, 2022	Heather Hughes	Revised based on comments received from City of Hamilton and Hamilton Conservation Authority

Distribution List

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1. Introduction

AECOM Canada Ltd. (AECOM) was retained by the City of Hamilton to complete a Natural Environment Report: Existing Conditions and Preliminary Impact Assessment (hereafter Natural Environment Report) as part of the Glancaster Road improvements for the Municipal Class Environmental Assessment Phase 3 and 4 (hereafter MCEA). The Study Area for the Glancaster Road MCEA is located along Glancaster Road between Garner Road East and Dickenson Road West in the City of Hamilton and traverses a largely rural context.

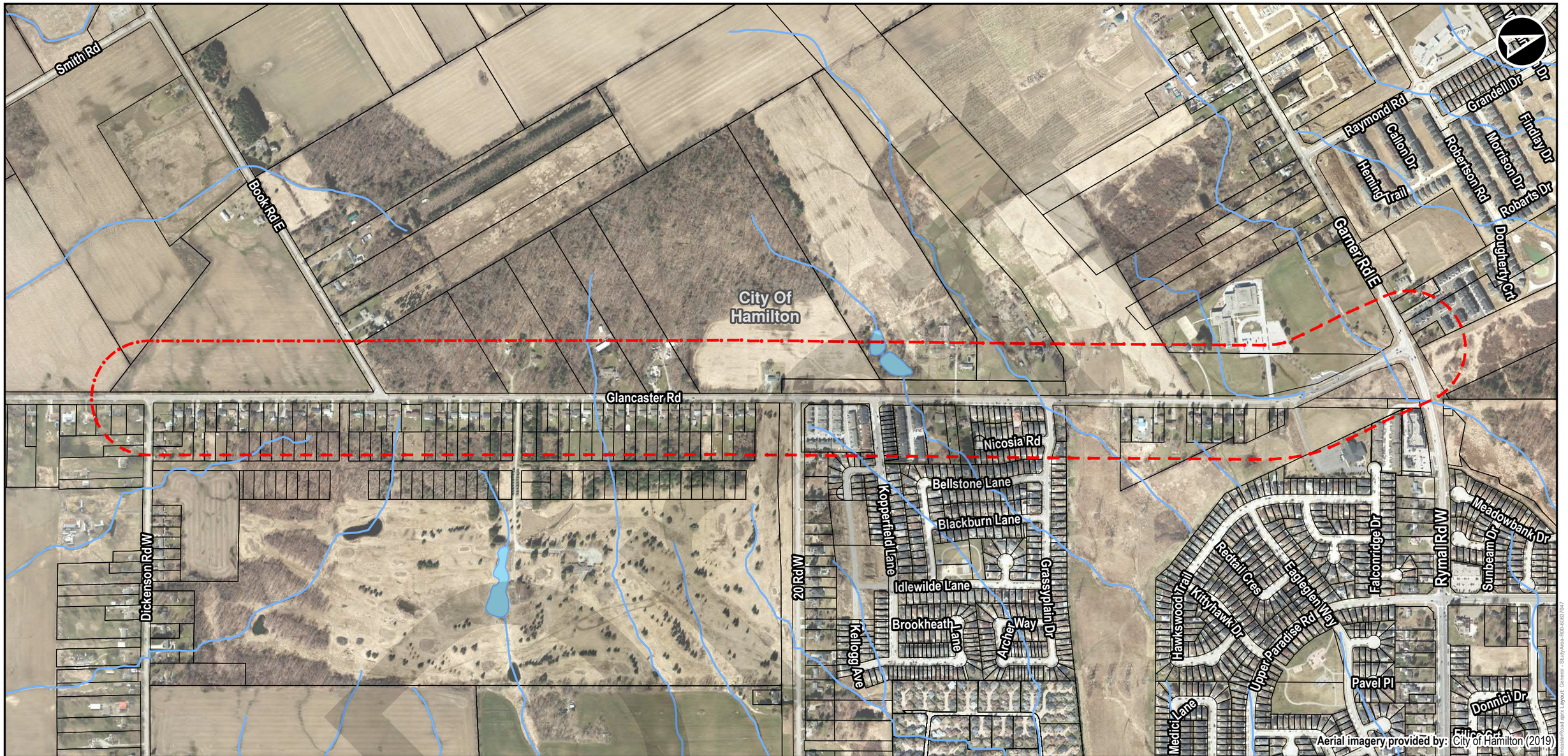
Glancaster Road is located within Hamilton's Airport Employment Growth District (hereafter AEGD) as identified under the Urban Hamilton Official Plan (City of Hamilton 2013, amended 2021; henceforth referred to as UHOP). Over the past several years, planning has been undertaken to support the future development of lands within the AEGD. This area is identified as prime industrial and commercial employment land within various planning documents, particularly the AEGD Secondary Plan which was approved in 2015. The Secondary Plan identified a multi-modal transportation network as being critical for supporting development in the AEGD. This network was further expanded on in the AEGD TMP prepared in 2011 and subsequently updated in 2016. The need and justification for widening of the Glancaster Road section between Garner Road East/Rymal Road West and Dickenson Road West from two to four lanes is rooted in future/ultimate capacity deficiencies and operational issues coming about as a result of new development in the AEGD.

This Natural Environment Report has been prepared in accordance with the Environmental Impact Statement (EIS) Guidelines (City of Hamilton, 2015a), Urban Hamilton Official Plan, Rural Hamilton Official Plan (City of Hamilton 2012, amended 2021; hereafter referred to as RHOP) and is consistent with the Provincial Policy Statement (PPS; MMAH, 2020), the Natural Heritage Reference Manual (NHRM; MNR, 2010), and other relevant Provincial and Federal legislation, policies, and regulations. For the purposes of this report, the Study Area includes Glancaster Road (from Garner Road East to Dickenson Road West) plus an additional 120 m area of investigation (**Figure 1**). This report documents the following:

- The terrestrial and aquatic existing conditions within the Study Area based on a combination of background information review and field investigations, and includes the following:
  - Designated Natural Areas and Policy Areas including but not limited to Provincially Significant Wetlands (PSWs), Area of Natural and Scientific Interest (ANSIs), significant woodlands and environmentally sensitive areas.
  - Physical features including bedrock geology, landforms, recharge areas and soil types
  - Biological features including the following:
    - Vegetation communities identified based on Ecological Land Classification (ELC) protocol for Southern Ontario (Lee *et al.*, 1998)
    - General Wildlife (e.g., breeding birds and amphibians)
    - Species at Risk (SAR) and their habitats
    - Significant Wildlife Habitat (SWH)
  - Landscape features including a Linkage Assessment

Assessment of potential impacts as result of the proposed works and identification of appropriate avoidance and mitigation measures (including setbacks), monitoring plan and anticipated permits and approvals will be provided for the City of Hamilton at the next iteration of this report once the preliminary design is available.

The Natural Environment Report has been prepared and is intended to be read in conjunction with the Glancaster Headwater Drainage Feature Assessment Report (AECOM, 2022), which identifies and assesses headwater drainage features and their influence on the downstream reaches of the watershed, as well as any aquatic and terrestrial habitat and physical functions that need to be maintained.



Legend

Study Area

Hamilton Water Features

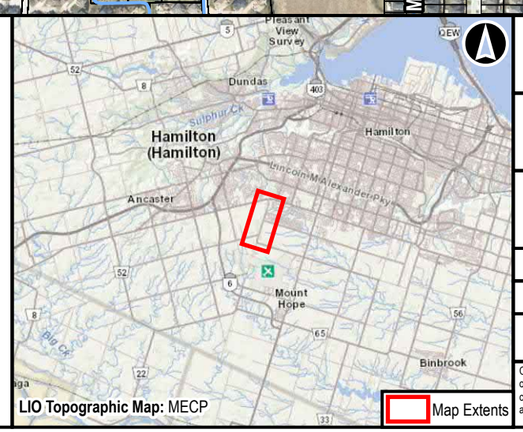
Watercourse

Pond or Lake

Base Layers

Municipal Boundary

Parcel Boundary



Glancaster Road Class EA

Study Area

0 50 100 200 300 400 500 600 M

NAD 1983 UTM Zone 17N

Jan, 2022	1:8,000	**Data Sources** MECP, MMAH, City of Hamilton
P:60637047	Rev:00	
AECOM		**Figure: 1**

Project Location: I:\Projects\60637047\500-CAD_GIS\520-GIS\Graphics\MXD\Data\PR_60637047_GlancasterRoad.aprx Layout: General - Study Area ROD 60637047
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2. Legislative Requirements

The Project requires the consideration of federal, provincial, and municipal policies, legislation, and regulations. The following sections briefly outline how they relate to the natural heritage features and functions of the Study Area.

2.1 Federal

2.1.1 Fisheries Act 1985 (amended 2019)

On August 28, 2019 the new Fish and Fish Habitat Protection Provisions of the Amended Fisheries Act came into force. Changes to the Act include a return to the policies that were enforced prior to the 2012 amendments, focusing on the following key concepts:

- Protecting all fish and fish habitat (i.e., the focus is no longer on only protecting Commercial, Recreational and Aboriginal fisheries);
- Restoring the previous prohibition against 'harmful alteration, disruption or destruction of fish habitat' (HADD); and,
- Restoring a prohibition against causing 'the death of a fish by any other means than fishing'.

The Fish and Fish Habitat Protection Program ensures compliance with relevant provisions under the Fisheries Act and Species at Risk Act (SARA). Proponents are asked to submit a request for review to Fisheries and Oceans Canada (DFO) in cases where harm to fish or the harmful alteration, disruption or destruction (HADD) of fish habitat cannot be avoided and/or mitigated or the scope of work cannot be covered under a Standard or Code of Practice. .

If death of a fish, or HADD is likely to result from a project, the proponent will be required to obtain an Authorization from DFO. An authorization includes terms and conditions the proponent must follow to avoid, mitigate, offset and monitor the impacts to fish and fish habitat resulting from the Project.

2.1.2 Species at Risk Act 2002

The federal SARA protects and provides recovery strategies for SAR listed as Extirpated, Endangered or Threatened species under Schedule 1 of the Act. With respect to terrestrial SAR, this legislation applies to federal lands, federally regulated projects or species with critical habitat on non-federal lands in specific circumstances unless they are aquatic species or migratory birds listed on Schedule 1. Critical habitat is identified in recovery strategies or action plans for species listed as END and THR under SARA and is defined as habitat that is vital to the survival or recovery of a species. The majority of species listed under Schedule 1 of SARA receive habitat protection on non-federal lands under the *Endangered Species Act, 2007* (ESA; refer to **Section 2.2.1**). Species that do not receive protection under the ESA and do not have critical habitat identified may be afforded protection under other legislation such as the *Migratory Birds Convention Act, 1994* (MBCA; refer to **Section 2.1.3**). In the case of aquatic Species at Risk, SARA provides protection for aquatic species and habitat on both federal and non-federal lands.

Species that are listed as Special Concern under Schedule 1 of SARA receive management initiatives to prevent them from becoming Endangered and Threatened, but do not receive individual or habitat protection under SARA.

Permits are required by those persons/organizations conducting activities that may affect species listed on Schedule 1 of SARA, as Extirpated, Endangered or Threatened and which contravene the Act's general or critical habitat prohibitions. The Act also contains a prohibition against the damage or destruction of their residences (e.g.,

nest or den). Under Section 73 of the SARA, a permit may be issued to engage in an activity affecting a listed wildlife species or any part of its critical habitat or residences.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was founded in 1977 as an independent body to assess the status of wildlife in Canada that may be at risk of becoming extinct. COSEWIC makes its assessments based on ecological, genetic, and management information, as well as systematics and Indigenous Traditional Knowledge. Under SARA, it is designated as an advisory body. COSEWIC assessments are considered by the Federal government when creating legislation and determining the list of species to be designated as At Risk.

2.1.3 Migratory Birds Convention Act, 1994

The MBCA is applied through the Regulations Respecting the Protection of Migratory Birds, which states that “no person shall disturb, destroy or take a nest, egg […] of a migratory bird.” Bird nests that are destroyed during construction and other related activities are referred to as “incidental take”. Incidental take is illegal except under the authority of a permit obtained through the Canadian Wildlife Service. The MBCA applies within the Study Area.

2.2 Provincial

2.2.1 Endangered Species Act, 2007

The ESA provides protection for provincial SAR and their habitats. Species are classified into one of four levels of risk: Extirpated, Endangered, Threatened or Special Concern. These risk levels are determined through science-based assessment via the Committee on the Status of Species at Risk in Ontario (COSSARO); classification is based on best-available science and Indigenous traditional knowledge. Species classified as Threatened or Endangered on the Species at Risk in Ontario (SARO) list are afforded individual and habitat protection under the ESA. This includes the “killing, harming, harassing, possessing, buying, selling, trading, leasing or transporting” of protected species.

Where a proposed activity may negatively affect protected species or habitat, changes to timing, location and methods of the proposed activity should be considered, where feasible, to avoid impacts to SAR. Where impacts cannot be avoided or mitigated, a permit process may be pursued. The Ministry of the Environment, Conservation and Parks (MECP) may grant a permit or other authorization for activities that would otherwise contravene the ESA. Several permit types are available, depending on the nature of the proposed work and may include conditions to provide an overall benefit to the targeted SAR.

Although listed as SAR under the ESA, species with a Special Concern status are not afforded species or habitat protection under the Act but receive protection under other acts such as the MBCA and Fish and Wildlife Conservation Act, 1997, and as Significant Wildlife Habitat (refer to **Section 2.2.3**) under the Provincial Policy Statement, 2000 (PPS), and other planning documents (e.g., municipal official plans).

2.2.2 Conservation Authorities Act, 1990

Wetlands or watercourses are regulated by the *Conservation Authorities Act* Ontario Regulation (O. Reg.) 97/04, with regional implementation for the Study Area falling under O. Reg 161/06, the Hamilton Conservation Authority (HCA) and O.Reg. 155/06, the Niagara Peninsula Conservation Authority (NPCA). Development in proximity to protected watercourses or wetlands would require review by the HCA or NPCA and the submission of an “Application for Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses” and

may also require other technical studies or plans at the request of Conservation Authority. Regulated limits of watercourses are present within the Study Area.

2.2.3 Provincial Policy Statement, 2020

The PPS provides direction on provincial matters of interest related to land use planning and development and sets the policy framework for regulating development and use of land, issued under the *Planning Act*. It came into effect May 1, 2020 and Sections 2.1.1 to 2.1.2 outline policies that provide legislative protection of natural heritage features for the long term including that the ecological function, biodiversity and connectivity of natural heritage systems should be maintained, restored or, where possible, improved recognizing linkages between and among natural heritage features and areas, surface water features and ground water features. Section 2.1.3 outlines that natural heritage systems shall be identified in Ecoregions 6E and 7E and will vary in size and form in settlement areas, rural areas, and prime agricultural areas. Legislative protection is included for the following natural heritage features:

- Significant habitat of Endangered or Threatened species;
- Provincially Significant Wetlands (PSW);
- Coastal wetlands;
- Fish habitat;
- Significant woodlands in Ecoregions 6E and 7E;
- Significant valley lands in Ecoregions 6E and 7E;
- Significant Wildlife Habitat (SWH), including habitat of Species of Conservation Concern (SOCC); and
- Significant Areas of Natural and Scientific Interest (ANSI).

Section 2.1.4 prohibits development or site alteration within PSWs in Ecoregions 5E, 6E and 7E as well as significant coastal wetlands. Meanwhile Section 2.1.5, prohibits development and site alteration in PSWs in the Canadian Shield north of Ecoregion 5E, SWH, Significant Woodlands and valleylands in Ecoregions 6E and 7E, coastal wetlands not subject to the policies of Section 2.1.4 and ANSIs unless it has been demonstrated that there will be “no negative impacts on the natural features or their ecological functions”. Planning authorities shall also protect, improve or restore the quality and quantity of water as outlined in Section 2.2. Development and site alteration may occur within fish habitat and habitat for Endangered or Threatened SAR provided that appropriate authorizations and permits are obtained and conditions therein are carried through in accordance with provincial and federal legislation such as the ESA (refer to **Section 2.2.1**), SARA (refer to **Section 2.1.2**) and the Fisheries Act. The following reference materials provide guidance for implementing the natural heritage policies of the PPS:

- Natural Heritage Reference Manual (MNRF, 2010);
- SWH Technical Guide (MNRF, 2000); and,
- SWH Criteria Schedules For Ecoregion 7E (MNRF, 2015).

The SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015) contains information and criteria for identifying SWH, which are defined as areas that have important ecological features and functions, and which support sustainable populations of plants, wildlife and other organisms within this Ecoregion. The Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) generally SWH into the following five categories:

- Seasonal Concentration Areas;

- Rare Vegetation Communities with a Provincial S-Rank[1] of S1-S3;
- Specialized Habitats for Wildlife;
- Habitats of Species of Conservation Concern; and
- Animal Movement Corridors.

Candidate SWH refers to potential habitats that meet the habitat criteria as defined in the SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015) but have not been confirmed as significant through additional detailed studies or as mapped by NDMNRF. According to the Natural Heritage Reference Manual (MNRF, 2010), SWH includes the habitat of SOCC, which is defined as the following:

- Species with Provincial S-rank assigned by the Natural Heritage Information Centre (NHIC) as S1 (critically imperiled), S2 (imperiled) or S3 (vulnerable);
- Species listed as Special Concern under the ESA; and
- Species identified as nationally Endangered or Threatened by the COSEWIC, which are not protected under the ESA.

Although SOCC do not receive legal protection under the ESA, their habitat is protected under the PPS and they may also be afforded protection under the MBCA, Ontario Fish and Wildlife Conservation Act or other planning documents such as municipal official plans and policies.

2.3 Municipal

2.3.1 Hamilton Official Plans

The UHOP is the land use planning document that guides development within the designated urban portions of the City. The UHOP identifies natural heritage features and their functions that are important to the City and outlines how development must be undertaken to ensure development appropriately balances social, economic and environmental interests of the community. The UHOP also contains Secondary Plans which include policies and mapping that provide community specific guidance on growth and change in smaller geographic areas of the City. The Airport Employment Growth District (AEGD) Secondary Plan includes the Study Area overlapping the designated features of the UHOP. Where Schedule B and the AEGD both overlap the Study Area, Schedule B of the UHOP is used to inform this report as being the most up to date (amended in 2021).

The RHOP is the land use planning document that guides development within designated rural portions of the City. The RHOP is also applicable to the project as a small section of lands located south of Twenty Road West and east of Glancaster Road are regulated under this plan within the Study Area. The lands, identified as Site Specific Policy Area 31 (R-31), are restricted from non-agricultural or urban uses.

The RHOP, UHOP and AEGD identify and map a Natural Heritage System which consists of the following in order to maintain the ecological functionality and connectivity of the natural system within the City of Hamilton:

- **Core Areas** – include key natural heritage features and key hydrological features as identified in the PPS such as PSWs, wetlands, ANSIs, streams and fish habitat, lakes and littoral zones, significant

1. *The Natural Heritage Information Centre and the NatureServe Network have developed standard methods to evaluate species and plant communities and assign conservation status ranks. S-rank is a sub-national conservation status assigned to a species or plant community within a particular province, territory or state (Ministry of Natural Resources and Forestry, 2019).*

woodlands, significant valleylands, SWH and SAR habitat, as well as other locally and provincially significant natural areas such as Environmentally Significant Areas;

- **Linkage Areas** – include natural areas such as old fields, meadows, thickets, successional habitat, hedgerows, riparian vegetation and woodlands that ecologically connect Core Areas that facilitate animal movement between critical habitats necessary for carrying out critical life functions (e.g., breeding, foraging, overwintering); and
- **Niagara Escarpment Plan area** – includes a policy framework that balances development and protection/conservation of geological and ecological features along the Niagara Escarpment (Niagara Escarpment Commission, 2017).

Designated Natural and Natural Heritage Policy Areas are shown on **Figures 2** and **3**.

The City of Hamilton does not allow development and/or site alteration in the following features:

- Within PSWs, significant coastal wetlands or habitat for SAR listed as Threatened or Endangered under the SARO list; and
- In other Core Areas or adjacent lands unless it has been demonstrated through an Environmental Impact Statement (EIS) that there are: no negative impacts on the following:
    - No negative impacts on natural heritage features therein and their ecological functions; and
    - Linkage Areas are maintained, or where possible, enhanced; and
    - Removal of other natural heritage features shall be avoided or minimized to the extent possible.
- In lands designated as Hazard Lands unless it is approved and any required permit is issued by the Conservation Authority having jurisdiction.

The EIS shall also propose a vegetation protection zone (VPZ) which is buffer of self-sustaining vegetation that has sufficient width to protect Core Areas from development impacts. The UHOP and RHOP identify minimum VPZ widths for different natural feature types, which are summarized in the **Table 2-1** below. In addition, the EIS will also contain a Linkage Assessment if the proposed development is located within a Linkage Area of the Natural Heritage System, which will need to (City of Hamilton, 2015):

- Identify and assess the linkage area including its vegetative, wildlife, and/or landscape features and functions;
- Assess the potential impacts on the viability and integrity of the linkage as a result of the development proposal; and
- Make recommendations to protect, enhance or mitigate impacts on the linkage and its functions through planning, design and construction practices.

Table 2-1 Minimum Vegetation Protection Zones

Natural Heritage Feature	Minimum Vegetation Protection Zone	
	UHOP	RHOP
Coldwater Watercourse and Critical Habitat	30 m on either side of stream	Not applicable
Warmwater Watercourse and Important and Marginal Habitat	15 m from either side of stream	Not applicable
Permanent and Intermittent Streams	Not applicable	30 m on site side from beyond stable top of bank
Lakes	Not applicable	30 m from stable top of shoreline
Fish Habitat	Not applicable	30 m on site side from beyond stable top of bank or meander belt allowance
Wetlands (Evaluated as PSWs or Local Wetlands) and Unevaluated Wetlands greater than 2 hectares in size.	30 m	30 m
Wetlands – Unevaluated wetlands less than 2 hectares in size	30 m unless identified a smaller VPZ can be identified via an EIS.	Not applicable
Woodlands	10 m from dripline	15 m from dripline
Significant Woodlands	15 m from dripline	30 m from dripline
ANSI	15 m	30 m
Valleylands	As required by the conservation authority	15 m from top of bank

Given that the Glancaster Road improvements are being assessed under the MCEA, this Natural Environment Report is considered to be meeting the UHOP and RHOP policy requirements for preparing an EIS and has been prepared in accordance with the Environmental Impact Statement (EIS) Guidelines (City of Hamilton, 2015a). The natural heritage features and policy areas identified through background information review that fall within the Study Area are further discussed in **Section 3.1.2.1.**

Legend

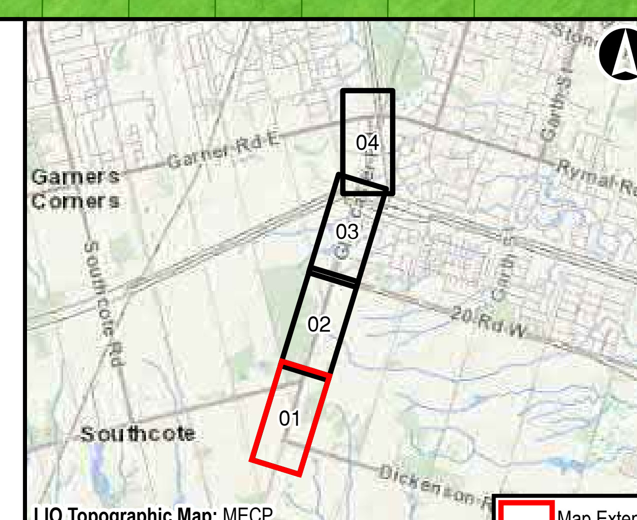
- Study Area
- Right of Way Limits

Natural Heritage Features

- Watercourse
- City of Hamilton Designated Significant Woodland

Base Layers

- Parcel Boundary



Glancaster Road Class EA

Designated Natural Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

Jan, 2022	1:2,000	**Data Sources** MECP, MMAH, AECOM, City of Hamilton
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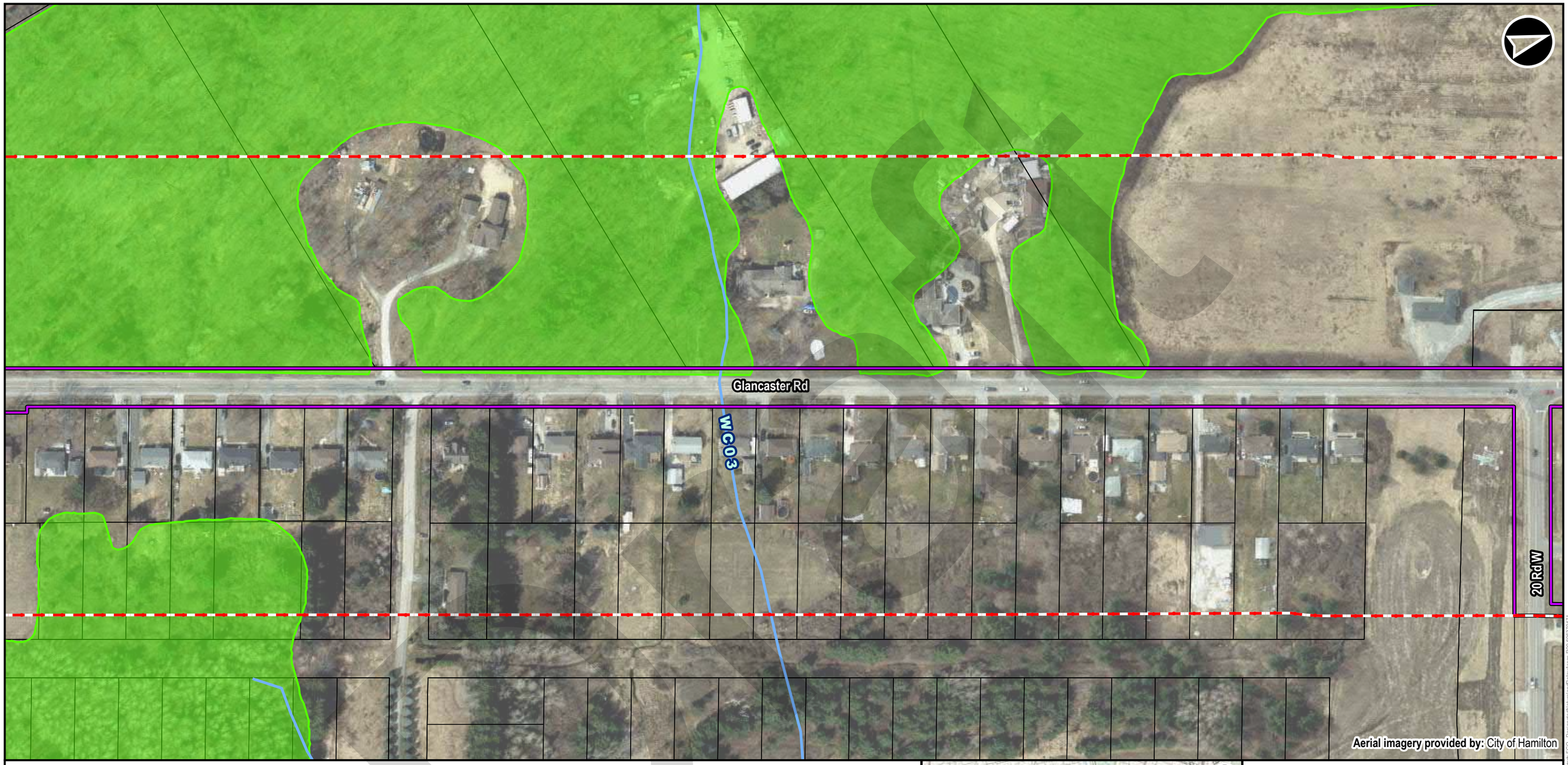
Figure: 2-01



Aerial imagery provided by: City of Hamilton

Legend

Study Area

Right of Way Limits

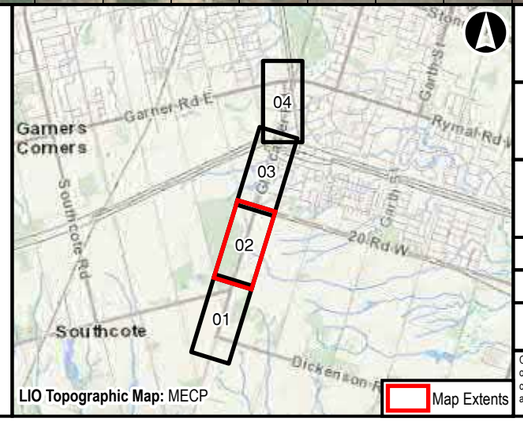
Natural Heritage Features

Watercourse

City of Hamilton Designated Significant Woodland

Base Layers

Parcel Boundary



LIO Topographic Map: MECP

Glancaster Road Class EA

Designated Natural Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

Jan, 2022	1:2,000	**Data Sources** MECP, MMAH, AECOM, City of Hamilton
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Figure: 2-02

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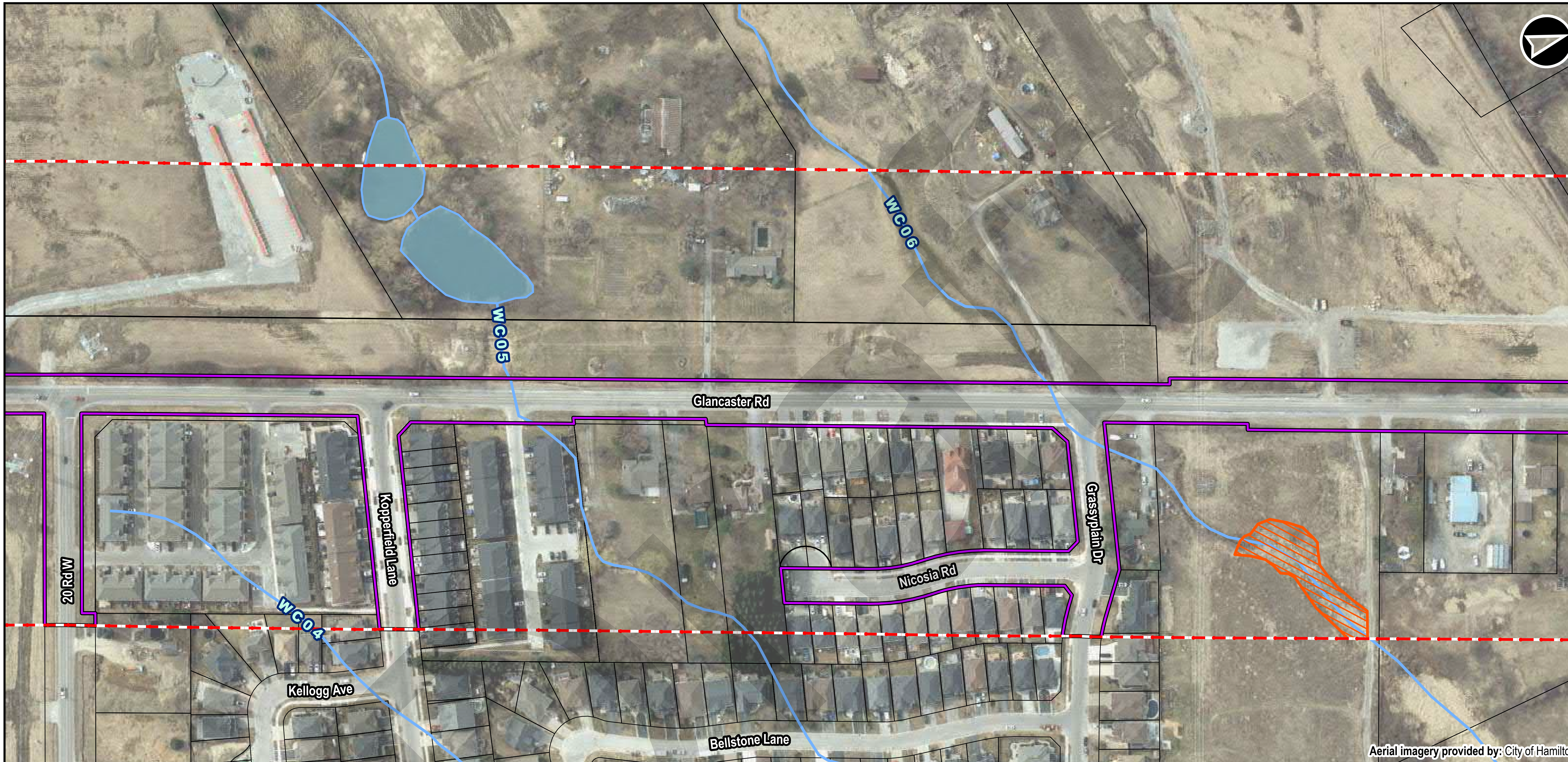


Legend

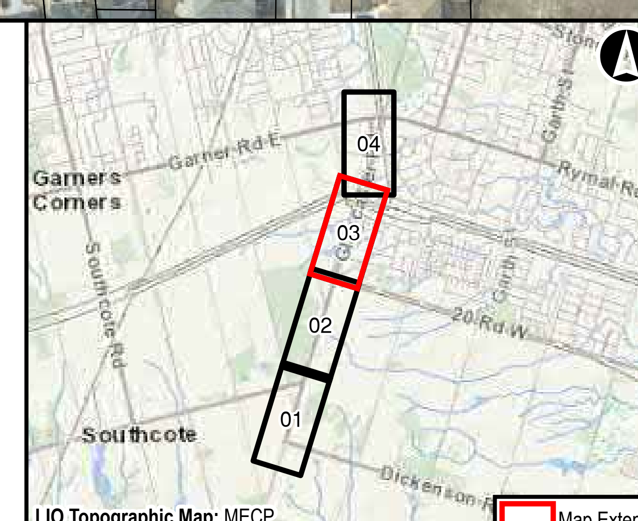
- Study Area
- Right of Way Limits

Natural Heritage Features

- Watercourse
- Pond or Lake
- Unevaluated Wetland

Base Layers

- Parcel Boundary



Glancaster Road Class EA

Designated Natural Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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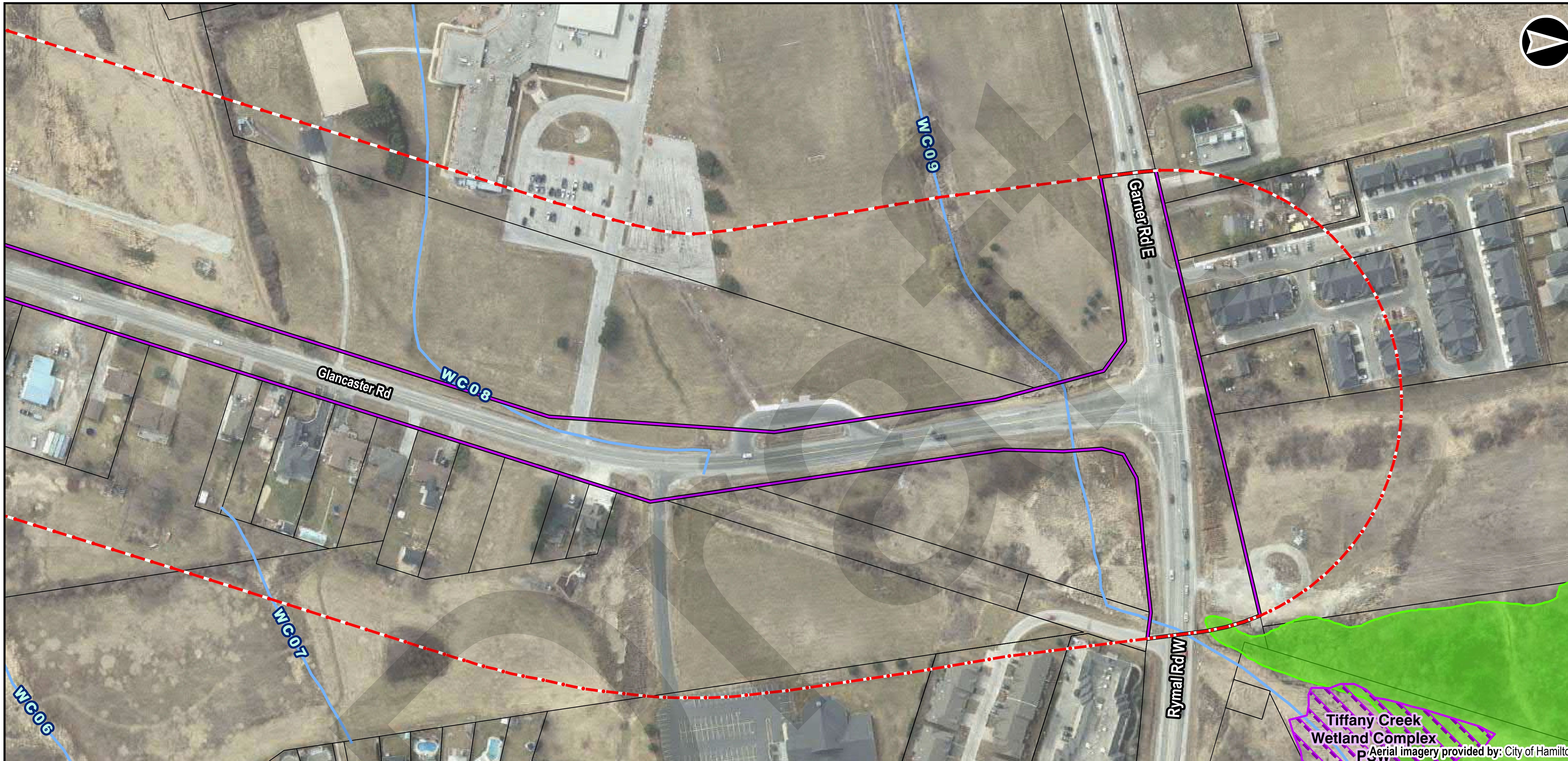
AECOM

Figure: 2-03



Legend

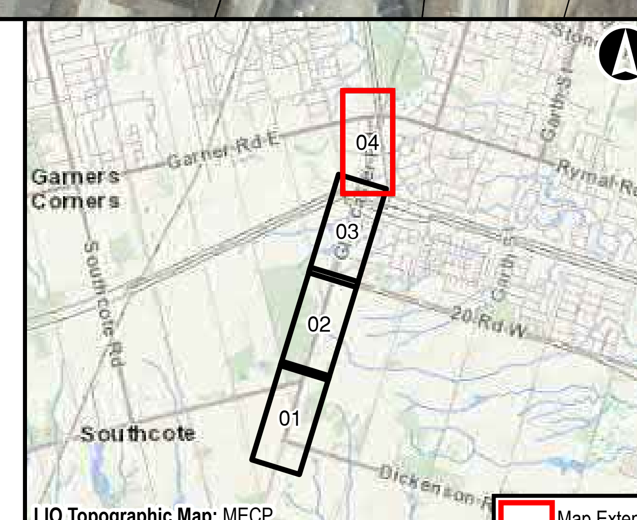
- Study Area
- Right of Way Limits

Natural Heritage Features

- Watercourse
- Provincially Significant Wetland (PSW)
- City of Hamilton Designated Significant Woodland

Base Layers

- Parcel Boundary



Glancaster Road Class EA

Designated Natural Areas

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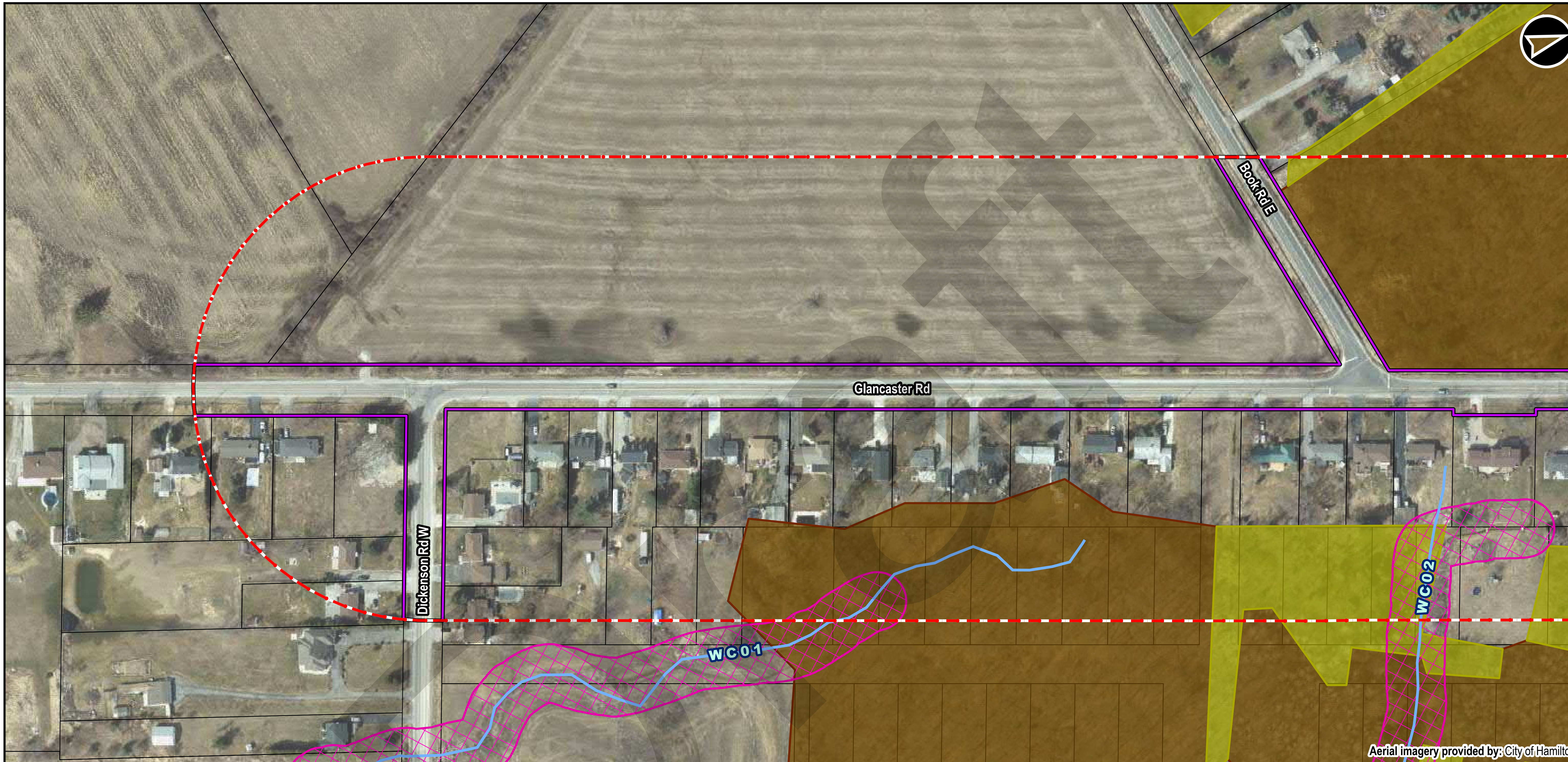
Figure: 2-04



Legend

Study Area

Right of Way Limits

Official Plan Category

Urban Boundary

Conservation Authority Regulated Areas

Niagara Peninsula Conservation

Urban Hamilton Official Plan - Schedule B - Natural Heritage System (Feb, 2021)

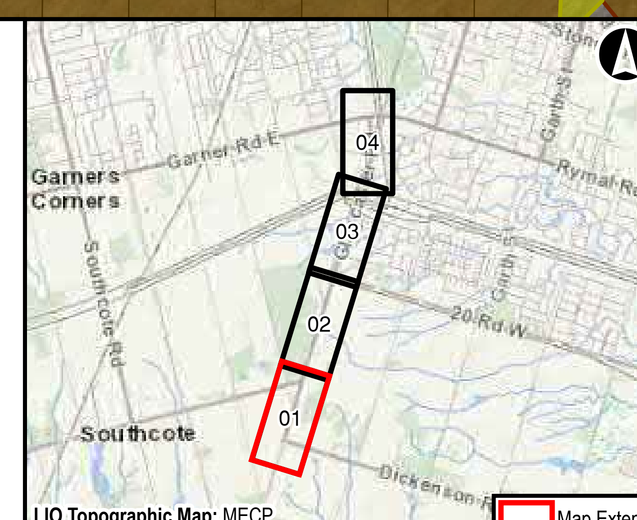
Core Area

Linkages

Base Layers

Parcel Boundary

Watercourse



Glancaster Road Class EA

Policy Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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AECOM

Figure: 3-01

Project Location: E:\PRJ\60637047_Glancaster\Data\PRJ-60637047-GlencasterRoad-20220107.aprx **Layout:** ECO - PolicyAreas-R00-60637004711
Date Saved: 1/26/2022 5:12 PM **User:** oraws

Aerial imagery provided by: City of Hamilton

Legend

- Study Area
- Right of Way Limits

Official Plan Category

- Rural Boundary
- Urban Boundary

Conservation Authority Regulated Areas

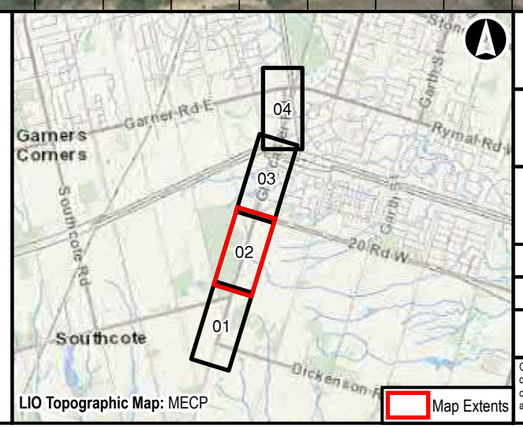
- Niagara Peninsula Conservation

Urban Hamilton Official Plan - Schedule B - Natural Heritage System (Feb, 2021)

- Core Area
- Linkages

Base Layers

- Parcel Boundary
- Watercourse



LIO Topographic Map: MECP

Map Extents

Glancaster Road Class EA

Policy Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

Jan, 2022	1:2,000	**Data Sources** MECP, MMAH, AECOM, City of Hamilton
P:60637047	Rev:00	

AECOM

Figure: 3-02

Project Location: E:\PE\60637047_Glancaster\Data\PLAN\GIS\Mxd\Glancaster\Road-20220107.aprx Layout: ECO - Policy Areas R00-60637047f1
Date Saved: 1/26/2022 5:12 PM User: graws

Legend

- Study Area
- Right of Way Limits

Official Plan Category

- Rural Boundary
- Urban Boundary

Conservation Authority Regulated Areas

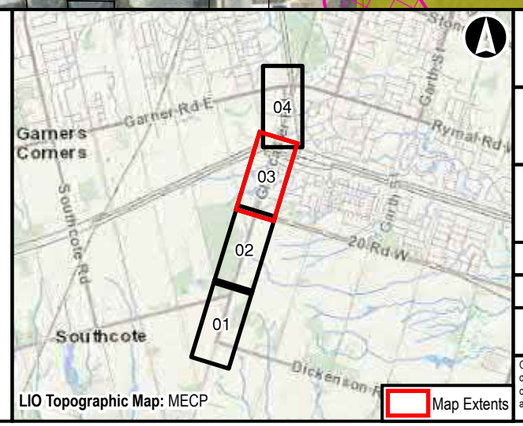
- Niagara Peninsula Conservation

Urban Hamilton Official Plan - Schedule B - Natural Heritage System (Feb, 2021)

- Core Area
- Linkages

Base Layers

- Parcel Boundary
- Pond or Lake
- Watercourse



LIO Topographic Map: MECP

Glancaster Road Class EA

Policy Areas

0 10 20 40 60 80 100 120 140 M

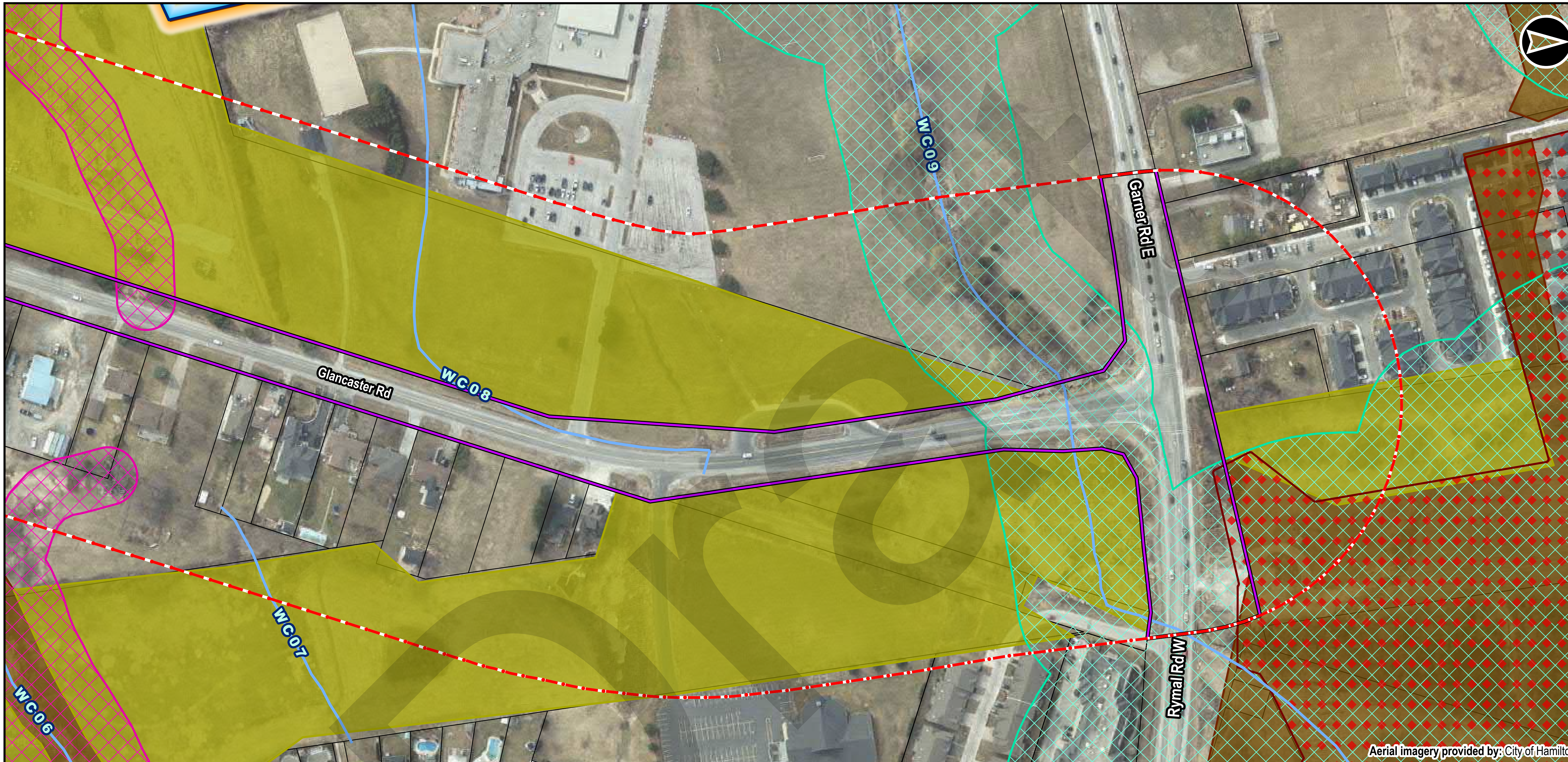
NAD 1983 UTM Zone 17N

Jan, 2022	1:2,000	**Data Sources** MECP, MMAH, AECOM, City of Hamilton
P:60637047	Rev:00	

AECOM

Figure: 3-03

Project Location: E:\PE\60637047_Glancaster\Data\PLAN\637047-GlancasterRoad-20220107.aprx Layout: ECO - Policy Areas ROI Date Saved: 1/26/2022 5:12 PM User: graws



Legend

Study Area

Right of Way Limits

Official Plan Category

Rural Boundary

Urban Boundary

Environmentally Sensitive Area (City of Hamilton 2021)

Conservation Authority Regulated Areas

Hamilton Conservation

Niagara Peninsula Conservation

Urban Hamilton Official Plan - Schedule B - Natural Heritage System (Feb, 2021)

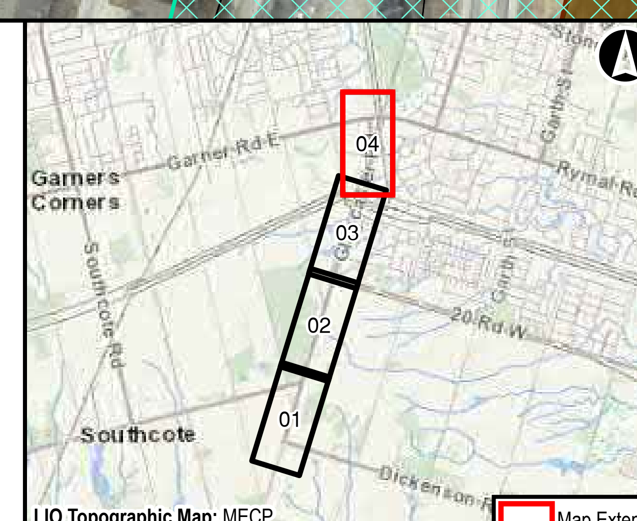
Core Area

Linkages

Base Layers

Parcel Boundary

Watercourse



Glancaster Road Class EA

Policy Areas

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

Jan, 2022	1:2,000	Data Sources MECP, MMAH, AECOM, City of Hamilton
P:60637047	Rev:00	

AECOM

Figure: 3-04

3. Existing Conditions

3.1 Background Information Review

A background information review was completed prior to field investigations to obtain information on known natural heritage features and species records, including rare species (i.e., SAR and SOCC) within the Study Area. The methods and results of the background information review are documented in the following sections.

3.1.1 Methods

Background information was obtained from the following sources:

- NDMNRF Make A Map: Natural Heritage Areas Application and NHIC NDMNRF GeoHub base mapping data, (NDMNRF, 2021a; NDMNRF 2021b; MNRF, 2017) for:
  - Designated natural areas (e.g., ANSI, wooded areas, PSWs/Locally Significant Wetlands[LSWs]/unevaluated wetlands, provincial parks);
  - Aquatic Resource Areas;
  - Dam Inventory,
  - Watershed mapping;
  - Wildlife habitats; and
  - NHIC provincially tracked species.
- Wildlife Atlases:
  - Ontario Breeding Bird Atlas (OBBA; BSC et al., 2006), Square 17TNH88;
  - Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2019), Square 17NH88;
  - Ontario Butterfly Atlas (OBA; TEA, 2021), Square 17NH88;
  - Bat Conservation International (BCI) Range Maps (2021);
  - DFO SAR Mapping (DFO, 2021);
  - eBird (2021);
  - iNaturalist (2021);
- Planning Documents and Guidelines:
  - UHOP (City of Hamilton, 2013, amended 2021);
    - Schedule B, B-2, B-4 and B-8 Mapping
    - AEGD Secondary Plan
    - Linkage Assessment Guideline (City of Hamilton, 2015b); and,
    - Environmental Impact Statement (EIS) Guidelines (City of Hamilton 2015a)
  - RHOP (City of Hamilton, 2012, amended 2021)
  - 20 Mile Creek Watershed Plan (NPCA, 2006);
  - Natural Heritage Reference Manual (MNRF, 2010);
  - SWH Technical Guide (MNRF, 2000); and,
  - SWH Criteria Schedules For Ecoregion 7E (MNRF, 2015)
  - The Marsh Monitoring Program Participant's Handbook for Surveying Amphibians (2008);
  - Ontario Wetland Evaluation System (OWES) Southern Manual (MNRF, 2013);
  - Survey Protocol for Ontario's SAR Snakes (MNRF, 2016);
- Open Portals and Interactive Mapping:
  - Open Hamilton, Environmentally Significant Areas only (City of Hamilton 2021)
  - HCA Regulated Areas Map Tool (HCA 2021)
  - NPCA GIS Open Data Portal (NPCA 2021)

  - Fisheries and Oceans Canada (DFO) SAR mapping (DFO, 2019)
  - Ontario Ministry of Agriculture and Rural Affairs (OMAFRA) AgMaps (OMAFRA, 2020);
- Reports:
  - AEGD Subwatershed Study & Stormwater Master Plan (Aquafor Beech, 2017);
  - Garner Road/Rymal Road and Garth Street Class Environmental Assessment, Environmental Study Report (SNC Lavalin, 2014); and,
- Aerial photography (2019).

Information requests were submitted to the NPCA and the HCA on August 27, 2020. A response was received from HCA, Colin Oaks, on September 3, 2020. HCA's response included 1 set of fish records for Tiffany Creek. A response was received from NPCA, Adam Aldworth, on September 18, 2020, which included links to natural heritage mapping, as well as, 20 Mile Creek Watershed Plan and AEGD Subwatershed Plan. Copies of agency correspondence are provided in **Appendix A**.

3.1.2 Results

The results of the background information review are provided below.

3.1.2.1 Designated Natural Features and Policy Areas

Designated natural areas or features include areas identified for protection by the NDMNRF, municipalities or other planning authority (e.g., conservation authority). Based on the review of the above-mentioned background information, the following provincially designated features are present within the Study Area:

- Deer Wintering Areas (NDMNRF)
- Tiffany Creek PSW Complex
- Tiffany Creek Environmentally Sensitive Area

The following locally designated natural areas are present within the Study Area as identified in the City's Natural Heritage System according to the UHOP, RHOP and AEGD:

- Core Areas (Schedule B)
- Linkages (Schedule B)
- Significant Woodlands (Schedule B2)
- Local Environmentally Significant Area (Schedule B6)
- Key Natural Heritage and Key Hydrologic Feature Wetlands (Schedule B4)
- Key Hydrological Features Streams (Schedule B8)

The above features are shown on **Figure 2** and **Figure 3.** It is important to note that not all Core Areas (i.e., habitat for Endangered and Threatened species, SWH, Significant Valleylands) have been mapped on these schedules.

Furthermore, the presence of SAR records and candidate (i.e., potential) SWH were identified within the Study Area through the background information review and are further detailed in **Section 3.1.2.6** and **Section 3.1.2.7**, respectively. Potential SAR habitats and candidate SWH are further discussed and refined based on results of field investigations in **Sections 3.3** and **3.4**, respectively.

3.1.2.2 Watercourses and Waterbodies

The Study Area is situated within the boundaries of the Jordan Harbour- Twenty Mile Creek and Burlington Canal-Hamilton Harbour quaternary watersheds. As such, the Study Area falls within the jurisdictions of both the NPCA and the HCA. All the watercourses and drains in the Study Area drain to Twenty Mile Creek, Three Mile Creek, and Tiffany Creek, and eventually into Lake Ontario. According to the MNRF, all of the watercourses have been classified with a warmwater thermal regime (NDMNRF, 2021a; NDMNRF, 2019; NDMNRF, 2021b). Watercourses and drains located in the Study Area are shown in **Figure 2**. According to available background information, there are no dams identified within the Study Area that could cause an impediment to upstream fish passage (NDMNRF, 2020). Based on the OMAFRA municipal drain mapping, there are no municipal drains (that have been classified by DFO or otherwise) in the Study Area (OMAFRA, 2020).

3.1.2.3 Fish and Fish Habitat

Records of documented aquatic species for the water features of the Study Area based on the background information review (refer to **Section 3.1.1)** are summarized in

Table 3-1 below. Records of 18 fish species were returned, while the species recorded were mainly forage fish species (i.e., small-bodied species), a few records of game species (i.e., predatory, large-bodied typically targeted by recreational anglers) were returned for Twenty Mile Creek, Three Mile Creek, and Tiffany Creek (NDMNRF, 2019).

A review of DFO aquatic SAR mapping returned records of Grass Pickerel (*Esox americanus vermiculatus)* within the Study Area (DFO, 2019). This species is listed as Special Concern under SARA and ESA (**Table 3-1**). While the Study Area is within the known range of Grass Pickerel, no records of occurrence were returned in the background information review. Despite this, Grass Pickerel is documented (as per **Table 3-1**) in other tributaries to Twenty Mile Creek and Three Mile Creek and has the potential to occur within the Study Area where there is suitable habitat.

Table 3-1: Fish Species within the Study Area

Common Name	Scientific Name	SARA Schedule 1 Status[1]	ESA Status[2]	Twenty Mile Creek	Three Mile Creek	Tiffany Creek
Black Crappie	*Pomoxis nigromaculatus*	-	-	X		
Blacknose Dace	*Rhinichthys atratulus*	-	-			X
Bluegill	*Lepomis macrochirus*	-	-	X		
Bluntnose Minnow	*Pimephales notatus*	-	-	X	X	
Brook Stickleback	*Culaea inconstans*	-	-			X
Brown Bullhead	*Ictalurus nebulosus*	-	-	X		
Central Mudminnow	*Umbria limi*	-	-		X	
Fathead Minnow	*Pimephales promelas*	-	-	X	X	X
Golden Shiner	*Notemigonus crysoleucas*	-	-	X	X	
Grass Pickerel	*Esox americanus vermiculatus*	SC	SC	X	X	
Green Sunfish	*Lepomis cyanellus*	-	-	X	X	
Iowa Darter	*Etheostoma exile*	-	-		X	
Johnny Darter	*Etheostoma nigrum*	-	-	X		
Largemouth Bass	*Micropterus salmoides*	-	-	X		
Northern Pike	*Esox lucius*	-	-	X		
Pumpkinseed	*Lepomis gibbosus*	-	-	X	X	
Tadpole Madtom	*Noturus gyrinus*	-	-	X		
White Crappie	*Pomoxis annularis*	-	-	X		
White Sucker	*Catostomus commersonii*	-	-		X	

Table Legend

[1]***SARA Status***: *The Species at Risk Act (SARA) protects Species at Risk designated as Endangered, Threatened and Extirpated listed under Schedule 1, including their habitats on federal land. Schedule 1 of SARA is the official list of wildlife species at risk in Canada and includes species listed as Extirpated, Endangered, Threatened and of Special Concern. Once a species is listed on Schedule 1, they receive protection and recovery measures that are required to be developed and implemented under SARA. Species that were designated at risk by COSEWIC before SARA need to be reassessed based on the new criteria of the Act before they can be listed under Schedule 1. These species that are waiting to be listed under Schedule 1 do not receive official protection under SARA. Once the species on other schedules (2 and 3) have been reassessed, they are either listed under Schedule 1 or not listed under the Act. The following are definitions of the SARA status rankings assigned to each species in the table above:*

END (Schedule 1) *– These species are listed as Endangered under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.*
THR (Schedule 1) *– These species are listed as Threatened under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.*
SC (Schedule 1) *– These species are listed as Special Concern under Schedule 1 of SARA and receive management initiatives under SARA to prevent them from becoming endangered and threatened.*
No Status (No Schedule) *– These species are evaluated and designated by COSEWIC but are not listed under Schedule 1 and therefore do not receive protection under SARA.*
NAR (Not at Risk) *– These species have either been assessed by COSEWIC as Not at Risk or there is not enough data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Not Applicable (N / A) *– These species have either been assessed by COSEWIC as Not at Risk or there is not enough data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Source: Government of Canada, 2009: Frequently Asked Questions: What are the SARA schedules? Accessed on January 2017. Available: http://www.dfo-mpo.gc.ca/species-especes/faq/faq-eng.htm

[2,3]***ESA Status:*** *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*

END *(Endangered) – A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.*
NAR *(Not at Risk) – A species that has been evaluated and found to be not at risk.*

3.1.2.4 Vegetation Communities and Plants

The Study Area is in the Haldimand Clay Plain physiographic region and the Lake Erie Lowland Ecoregion (Ecoregion 7E). The Ecoregion is part of the Mixedwood Plains Ecozone, which extends from Windsor to Toronto and includes the Niagara Region. The Lake Erie Lowland Ecoregion is underlain by carbonate-rich, Paleozoic bedrock, and is dominated by a variety of deep glacial deposits (Marshall and Schut, 1999). Clayey gleysolic and grey brown luvisolic soils are dominant, and soils of the Haldimand Clay Plain physiographic region are characterized by heavy texture and poor drainage (Marshall and Schut, 1999; Chapman and Putnam, 1984).

Forests in this Ecoregion are sparse due to agricultural and urban development and typically include widespread sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), eastern hemlock (*Tsuga canadensis*) or eastern white pine (*Pinus strobus*) with species characteristic of the Carolinian zone including tulip tree (*Liriodendron tulipifera*), American sycamore (*Platanus occidentalis*), Kentucky coffee-tree (*Gymnocladus dioicus*), various oaks (*Quercus* spp.) and hickories (*Carya* spp.) and common hackberry (*Celtis occidentalis*) (Crins *et al.*, 2009).

The surficial geology throughout much of the Ecoregion is underlain by limestone bedrock overlain by a calcareous mineral substrate. The ecoregion also contains glacial deposits including moraine deposits, drumlins and lacustrine deposits. The predominant substrates in the ecoregion include Gray Brown Luvisols (60%) and Gleysols (37%) (Crins *et al.*, 2009).

According to NHIC records, one Endangered plant species, spotted wintergreen (*Chimaphila maculata*) and one plant SOCC, perfoliate bellwort (*Uvularia perfoliate*) (S1S2), were identified as occurring within the 1 x 1 km grid squares that encompass the Study Area (square 17NH8682, 8683, 8684 and 8784).

NPCA open data includes a Draft ELC Community Class Series. This feature layer is based on interpretation of orthoimagery and was used, where available, as a preliminary habitat assessment and guide for field investigations. Detailed site specific assessments of ELC and plant community composition were completed within the Study Area by AECOM in 2020 and 2021, which refined community classifications. For additional information pertaining to ELC communities refer to **Sections 3.2.2.**

3.1.2.5 Wildlife

Background data was collected from the OBBA (BSC *et al.*, 2006), ORAA (Ontario Nature, 2019), OBA (TEA, 2021), iNaturalist, eBird and BCI Range Maps (2021) to identify wildlife that has been recorded in the vicinity of the Study Area. A review of these records indicated potential presence for 95 bird species, 72 butterfly species, 42 mammal species and 26 herpetofauna species with records of occurrence within the 10 x 10 km grid square encompassing the Study Area. Based on a review of these results, the majority of the wildlife within the Study Area are considered common in Ontario and tolerant to anthropogenic disturbances, while a small proportion is comprised of sensitive or rare species (refer to **Section 3.3** and **Section 3.4** for discussion on SAR and SOCC respectively).

The core areas and linkages that make up the City of Hamilton's Natural Heritage System provide important habitats for sustaining species populations and providing breeding and foraging habitat for wildlife in an urban setting (City of Hamilton, 2021). Core Areas and linkages include contiguous forest, wetland communities, and the parks and open spaces wildlife will use to travel between areas.

Just north of Book Road East in the southern portion of the Study Area a deciduous forest tract marked as a Core Area by the City of Hamilton is present. This forest is a known deer overwintering area providing shelter, food and a central congregation point for local white-tailed deer *(Odocoileus virginianus)* populations. Forests like this would also support a wide variety of common small mammal species such as gray squirrels (*Sciurus carolinensis)*, red

squirrels *(Tamiasciurus hudsonicus)* and eastern chipmunks *(Tamias striatus)* and the potential to support medium sized mammals such as red fox (*Vulpes vulpes*), coyote (*Canis latrans*) and raccoons (*Procyon lotor*).

The utility corridors along and perpendicular to Glancaster Road provide stepping stone habitat linking the core forest area with other sensitive habitats outside of the Study Area, the closest being the Tiffany Creek Headwaters just north of the study limits. The utility corridors are partially maintained and provide limited natural cover for species looking to move between areas. Land use along Glancaster Road and the utility corridor is also regularly interspersed with roads, driveways and maintained lawn areas providing barriers to smaller and less mobile wildlife present within the Study Area.

Most of the bird species recorded in the OBBA square consist of common species in Ontario that are tolerant to urban disturbance except for Barn Swallow (*Hirundo rustica)* and Chimney Swift (*Chaetura pelagica*), both SAR birds protected under the ESA. Both species are associated with anthropogenic structures, which increases their likelihood of using the Study Area. Other bird species recorded included Northern Cardinal (*Cardinalis cardinalis)*, House Wren (*Troglodytes aedon*), Red-winged Blackbird (*Agelaius phoeniceus*), Rock Pigeon (*Columba livia*), House Sparrow (*Passer domesticus*), and European Starling (*Sturnus vulgaris*). It is important to note that isolated trees and shrubs, vegetation communities and anthropogenic structures (e.g., buildings, bridges) can provide nesting habitat for many migratory birds protected under the MBCA.

3.1.2.6 Species at Risk

Data obtained from the Study Area records review identified 16 SAR (Endangered or Threatened) as summarized in **Table 3-2**. Records of species observations greater than 20 years old were considered historical in accordance with the standard Conservation Status Assessment (NatureServe, 2019), which the NHIC uses to evaluate a species' S-rank, and have not been included in this report as it is unlikely these species persist within the Study Area. Those considered likely to be present within the Study Area (i.e., species observed during field investigation or species with suitable habitat in the Study Area which did not receive targeted surveys) are further discussed in **Section 3.3.**

Table 3-2: Species at Risk Records

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	SARA Schedule 1[3]	Source
Species at Risk					
Barn Owl	*Tyto alba*	S1	END	END	OBBA
Bank Swallow	*Riparia riparia*	S4B	THR	THR	OBBA
Barn Swallow	*Hirundo rustica*	S4B	THR	THR	OBBA, eBird
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	OBBA
Chimney Swift	*Chaetura pelagica*	S4B,S4N	THR	THR	OBBA
Eastern Meadowlark	*Sturnella magna*	S4B	THR	THR	OBBA
Louisiana Waterthrush	*Parkesia motacilla*	S3B	THR	THR	OBBA
Northern Bobwhite	*Colinus virginianus*	S1	END	END	NHIC
Yellow-breasted Chat	*Icteria virens*	S1B	END	END	OBBA
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	BCI
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	No Status	BCI
Northern Myotis	*Myotis septentrionalis*	S3	END	END	BCI
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	BCI
Jefferson Salamander	*Ambystoma jeffersonianum*	SX	END	END	ORAA
Butternut	*Juglans cinerea*	S3	END	END	NHIC
Spotted Wintergreen	*Chimaphila maculate*	S1	THR	END	NHIC

[1] ***S rank:*** *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities*. The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

S3 – Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 – Secure—Common, widespread, and abundant in the nation or state/province.
SNR – Unranked—Province conservation status not yet assessed.
SU – Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
S#? – Rank uncertain

Breeding Status Qualifiers
B – Breeding—Conservation status refers to the breeding population of the species in the province.
N – Nonbreeding—Conservation status refers to the non-breeding population of the species in the province.

[2]***ESA Status***: *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*
END *(Endangered) – A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming Endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern) – A species that may become Threatened or Endangered due to a combination of biological characteristics and identified threats.*

[3]***SARA Sched. 1 Status:***

The SARA protects and ensures the recovery of SAR listed on Schedule 1 as Extirpated, Endangered and Threatened, and their critical habitats at a federal level. Schedule 1 of the SARA classifies SAR as follows:
Extirpated (EXP) – a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild (SARA Registry, 2012).
Endangered (END) – a wildlife species that is facing imminent extirpation or extinction (SARA Registry, 2012).
Threatened (THR) – a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction (SARA Registry, 2012).
Special Concern (SC) – a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats (SARA Registry, 2012).

3.1.2.7 Significant Wildlife Habitat

The presence of SWH, candidate SWH, as well as the potential presence of SOCC were identified during background review (**Section 3.1.1**). Based on the background review, the Study Area has one confirmed SWH, a Deer Overwintering Area, and nine SOCC recorded of occurring in or in the vicinity of the Study Area as summarized in **Table 3-3**. SWH and SOCC are discussed further in **Section 3.4.**

Table 3-3: Species of Conservation Concern Records

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	SARA Schedule 1[3]	Source
Species of Conservation Concern					
Grass Pickerel	*Esox americanus vermiculatus*	S3	SC	SC	DFO
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	OBBA
Golden-winged Warbler	*Vermivora chrysoptera*	S4B	SC	THR	OBBA
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	SC	OBBA
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	OBBA
Monarch	*Danaus plexippus*	S2N,S4B	SC	SC	OBA
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	ORAA
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	ORAA
Perfoliate bellwort	*Uvularia perfoliate*	S1S2	-	-	NHIC

[1] ***S rank:*** *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities*. The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

S3 – Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 – Secure—Common, widespread, and abundant in the nation or state/province.
SNR – Unranked—Province conservation status not yet assessed.
SU – Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Breeding Status Qualifiers
B – Breeding—Conservation status refers to the breeding population of the species in the province.
N – Nonbreeding—Conservation status refers to the non-breeding population of the species in the province.

[2]***ESA Status***: *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*
END *(Endangered) – A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming Endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern) – A species that may become Threatened or Endangered due to a combination of biological characteristics and identified threats.*

[3]***SARA Sched. 1 Status:***

The SARA protects and ensures the recovery of SAR listed on Schedule 1 as Extirpated, Endangered and Threatened, and their critical habitats at a federal level. Schedule 1 of the SARA classifies SAR as follows:
Extirpated (EXP) – a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild (SARA Registry, 2012).
Endangered (END) – a wildlife species that is facing imminent extirpation or extinction (SARA Registry, 2012).
Threatened (THR) – a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction (SARA Registry, 2012).
Special Concern (SC) – a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats (SARA Registry, 2012).

3.2 Field Investigations

Aquatic and terrestrial field investigations were completed in 2020 and 2021 within the Study Area for Glancaster Road where permission to enter was available. **Table 3-4** provides a summary of all aquatic and terrestrial investigations undertaken in support of this Natural Environment Report, including the field staff and survey dates. Qualifications in the form of curriculum viteas (CVs) for the field staff and field notes are provided in **Appendix B and Appendix C,** respectively**.** The following sections document the detailed methods and the results of these investigations.

Table 3-4 Summary of Field Surveys Conducted for the Study Area

Survey Type	Field Staff	Survey Dates	Notes
Fish Habitat Assessment	Olivia Butty Adam Egan	October 6, 2020	Fish Habitat assessments were limited to within the municipal road right-of-way (ROW). Notes on fish habitat were taken from the roadside or fence line.
Fish Community Survey via Electrofishing	Olivia Butty Adam Egan	Not applicable.	Electrofishing was completed within the ROW at WC-09. This was the only watercourse where it was possible to electro-fish within the ROW. The property beyond the ROW is owned by Hydro One Networks Inc. and permission to enter was not available during the time of investigations. Fish community surveys are recommended to be completed during detailed design once permission to enter is granted.
Ecological Land Classification (ELC)	Kasey McKenzie Nataliya Simonova	August 31, 2020 October 6, 2020	ELC surveys were largely limited to within the municipal road ROW unless permission to enter private property was granted. Where access was not granted, notes on vegetation communities were taken from the roadside or fence line via use of binoculars. For areas not visible from public roads aerial photograph interpretation was completed.

Survey Type	Field Staff	Survey Dates	Notes
Three-season Botanical Inventory	Kasey McKenzie Nataliya Simonova	Summer: August 31, 2020 Fall: October 6, 2020 Spring: May 20, 2021	Botanical surveys were largely limited to what was visible from within the municipal road ROW unless permission to enter private property was granted. Where access was not granted, notes on vegetation communities were taken from the roadside or fence line via use of binoculars. For areas not visible from public roads or without property access no inventory was completed.
Breeding Bird Surveys (Two Rounds)	Heather Hughes Mikayla Reid Nathan De Carlo	May 31, 2021 June 22, 2021	Breeding bird surveys were completed from within the municipal road ROW unless permission to enter private property was granted. Where permission to enter was provided surveys were conducted surrounded by the habitat.
Amphibian Vernal Pool Assessment	Kasey McKenzie	April 7, 2021	Within woodland features immediately adjacent to Glancaster Road where permission to enter was granted staff completed an assessment shortly after snow melt to identify vernal pools which may be used by amphibians for breeding.
Amphibian Nocturnal Call Surveys (Three Rounds)	Claire Atherton Mikayla Reid	April 15, 2021 May 17, 2021 June 15, 2021	Amphibian Nocturnal Call Surveys were completed from within the municipal road ROW adjacent communities where potentially suitable amphibian breeding habitat had been identified (vernal pools, wetlands, water features).
Snake Encounter Surveys (Five Rounds)	Claire Atherton Kasey McKenzie Heather Hughes Nataliya Simonova	August 31, 2020 October 6, 2020 April 7, 2021 May 20, 2021 June 22, 2021	Completed in conjunction with the above surveys.
Significant Wildlife Habitat Candidate and SAR Habitat Screenings	All above	All above	Completed in conjunction with the above surveys.
Incidental Wildlife Observations	All above	All above	Completed in conjunction with the above surveys.

A multi-season headwater drainage feature assessment in accordance with the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (CVC and TRCA, 2014) and the *Ontario Stream Assessment Protocol* (Stanfield, 2013) was also undertaken in conjunction with the above identified surveys; the methods and results of which are documented under a separate cover titled the *Glancaster Headwater Drainage Feature Assessment – Glancaster Road – Municipal Class Environmental Site Assessment Phases 3 and 4, AECOM 2022*.

3.2.1 Aquatic Habitat Assessment

3.2.1.1 Methods

On October 6, 2020, AECOM biologists conducted preliminary fish habitat assessments to document the existing conditions of the Twenty Mile Creek, Three Mile Creek, and Tiffany Creek tributaries within the Study Area (see **Figure 2**). Site reconnaissance focused on identifying and describing fish habitat suitability and features that may influence fish community composition. Due to the permission to enter limitations, the data for this report had to be collected mainly from the Glancaster Road ROW and from online sources. As a result, standardized methodologies such as Ontario Stream Assessment Protocol (OSAP) were adapted to characterize the fish habitat that was observed from the road. Fish habitat was documented following the definition provided in the NPCA watershed management as "*the spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend on directly or indirectly in order to carry out their life processes.*"; as well as following the definition provided by NPCA Watershed Management plan as "*areas that fish need, whether directly or indirectly in order to carry out their life processes including spawning grounds, nursery, rearing, food supply, and migration areas*"; and in accordance with the definition of fish habitat as per the Fisheries Act whereby "***fish habitat"*** means "water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas."

Data collection during field investigations included the following:

- Documentation of surrounding natural features and land uses (i.e., wetland, agriculture, etc.);
- Channel form, substrate composition, channel morphology and bank stability;
- Stream morphology forms:
  - Runs – typically deep, fast moving water with little to no turbulence of water;
  - Riffles – shallow, fast moving water typically running over rocks; riffles providing areas of high oxygenation;
  - Flats – low flowing water with a smooth un-agitated surface; and
  - Pools – deep pockets of slow-moving water that provide ideal habitat for fish;
- Substrate composition (i.e., clay, silt, sand, gravel, cobble, rock, boulder, muck and detritus);
- Water clarity, water colour, presence and type of macrophytes and algal growth, evidence of runoff;
- Identification of pollution sources (i.e., tile drain discharges, other piped discharges and road runoff); and
- A photographic record for each site to document habitat conditions.

Fish community surveys were not completed due to lack of permission to enter, unsuitable conditions for fish inhabitancy, and/ or fish community survey records were available for downstream of the Study Area. The watercourses that were feasible to conduct fish community assessments on were located on HONI lands, and AECOM Ecologists did not have permission to enter at the time of the surveys.

3.2.1.2 Results

A detailed description of the existing conditions documented in the field investigations is presented below. A photographic record was documented during the field surveys and is provided in **Appendix D** (fish and fish habitat photographs may be found in **Appendix D1)**.

WC-01

This drainage feature to Three Mile Creek originates from what appears to be a combination of roadside drainage and a meadow on the east side of Dickinson Road, approximately 3 km upstream from its confluence with Three Mile Creek. When this drainage feature was assessed by AECOM ecologists it was determined that this feature is located outside of the Study Area.

The drainage feature does not cross Glancaster Road but originates from a woodlot on the southeast side. The description below describes the watercourse assessed from the Municipal ROW along Dickson Road West.

Only standing water was present in the culvert of this feature when it was surveyed in October 2020. At the time of field reconnaissance, the channel was not defined, and no prominent banks were observed within the assessed upstream reach. Some gravel/pebble substrates were observed at the culvert inlet and outlet, but there did not appear to be any evidence of substrate sorting upstream or downstream of the culvert. The feature was overgrown with vegetation, and cattails (*Typha spp.)* were most prevalent within the roadside ditch and at the culvert inlet and outlet. Goldenrod (*Solidago spp*.), sedges and other meadow species were most prevalent upstream further away from the culvert inlet. These water-tolerant vegetation species provided a buffer zone for the feature from the surrounding agricultural field. The downstream section (southeast of Dickinson Rd) of this feature was unable to be assessed as the culvert was buried under the residential neighbourhood.

While there is a mapped connection to Three Mile Creek, the presence of a piped portion of the water feature, coupled with the lack of a defined channel bed and bank provides evidence indicating that this location is likely not fish habitat. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the drainage feature. According to the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)'s AgMaps (2020), the area on either side of Dickinson Road is not mapped as a significant groundwater recharge area as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-02

This drainage feature to Three Mile Creek originates from what appears to be a combination of roadside drainage and a woodlot on the west side of Glancaster Road. It flows west to east under Glancaster Road, approximately 3 km upstream from its confluence with Three Mile Creek.

At the time of field reconnaissance, there was no water present within the assessed portion of this drainage feature. There was no defined channel or prominent banks at the culvert inlet, and the inlet of the culvert appeared to be crushed. The surrounding area was highly vegetated with various grasses, sedges, and shrubs and there was no evidence of substrate sorting within the drainage feature. On the east side of Glancaster Road (downstream section), the culvert outlet had a short (>5 m) open area that flowed directly into a like-sized culvert that flowed underneath a residential lawn. There was no evidence of substrate sorting in this open area, no defined banks, and the gap between the culverts was comprised of maintained grass.

While there is a mapped connection to Three Mile Creek, the presence of a piped portion of the water feature, coupled with the lack of a defined channel bed and bank provides evidence indicating that this location is likely not fish habitat. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the drainage feature. According to the OMAFRA's AgMaps (2020), the area on the west side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be

vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-03

This drainage feature to Twenty Mile Creek originates from what appears to be a combination of roadside drainage and drainage from the woodlot on the west side of Glancaster Road. It flows west to east under Glancaster Road, approximately 3 km upstream from its confluence with Twenty Mile Creek.

This feature had very little water in the culvert inlet (west, upstream side) when surveyed in Oct. 2020. At the time of field reconnaissance, there was no water present at the culvert outlet within the assessed upstream reach. The upstream portion west of Glancaster Road had a small, defined channel with a stream bottom that was comprised of sorted material (clay, silt, and sand). The culvert outlet on the east side of Glancaster Road was slightly perched and had a short (>5 m) swale feature that flowed directly into a like-sized culvert that flowed underneath a residential lawn. Riprap erosion protection lined the bottom of this “channel”, and the banks were vegetated by the maintained lawn. No naturally occurring substrate sorting or vegetation was observed on the downstream side of this crossing.

While there is a mapped connection to Twenty Mile Creek, the presence of a piped portion of the water feature indicates that this location is likely not fish habitat. According to DFO online mapping (2021), the entire tributary has been mapped as potential Grass Pickerel (listed as Special Concern) habitat. OMAFRA’s AgMaps (2020), maps the area on either side of Glancaster Road in this location as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA’s source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-04

This water feature originates on the west side of Glancaster Road in a residential area and continues west to east under Kopperfield Lane. While there is a mapped connection to Twenty Mile Creek, there was no feature to assess at the Kopperfield Lane crossing. The water feature is piped underneath the residential neighbourhood, indicating that this feature is likely not fish habitat. It is approximately 1.9 km upstream from its confluence with Twenty Mile Creek.

The assessed reach is likely not fish habitat within the Study Area as there was only a drainage swale feature present. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the water feature. According to the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)’s AgMaps (2020), the area on the southwest side of Kopperfield Lane and the west side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA’s source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-05

This drainage feature to Twenty Mile Creek originates from what appears to be a stormwater management pond. It flows west to east under Glancaster Road, approximately 1.7 km upstream from its confluence with Twenty Mile Creek.

Standing water was present in the culvert when this feature was surveyed in October 2020. At the time of field reconnaissance, within the assessed upstream reach, there was a poorly defined channel that did not have

prominent banks and was overgrown with vegetation. At the culvert, common reed (*Phragmites australis subsp. Australis*) was the dominant vegetation type. Golden rod (*Solidago spp*.), sedges and other meadow species were most prevalent upstream further away from the culvert inlet. These water-tolerant vegetation species provided a buffer zone for the feature from the surrounding agricultural field. The downstream section (east side of Glancaster Rd.) of this drainage feature was unable to be assessed as the culvert was buried under the residential neighbourhood. As there was no permission to enter to the properties surrounding Glancaster Road, AECOM Ecologists were unable to determine if there was water present upstream of the culvert.

While there is a mapped connection to Twenty Mile Creek, the presence of a piped portion of the water feature, coupled with the lack of a defined channel bed and bank provides evidence indicating that this location is likely not fish habitat. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the drainage feature. According to OMAFRA's AgMaps (2020), the area on either side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (4/2) groundwater vulnerability rating as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-06

This drainage feature to Twenty Mile Creek flows west to east under Glancaster Road, approximately 1.5 km upstream from its confluence with Twenty Mile Creek.

At the time of field reconnaissance in October 2020, there was no defined channel in the upstream section within the assessed upstream reach, however, standing water was present in the upstream ditch. A new Hydro One access road crossing was observed at the upstream side. The downstream section (east side of Glancaster Rd.) of this drainage feature had a small defined channel (1.2 m bankful width) that had a stream bottom that was comprised of sorted material (cobble, gravel, sand, and silt were observed), and had flowing water at the time of inspection. The water present in the culvert and downstream of the culvert may be a collection of roadside drainage and stormwater collection. The banks appeared to be stable as they were heavily vegetated (70-90%) with primarily terrestrial, water-tolerant species. This led to the high riparian cover (~75%) in this drainage feature, as observed from within the right of way.

While fish were not observed during field reconnaissance, this tributary's potential fish community assemblage is likely similar to that of Twenty Mile Creek, which is comprised of primarily warmwater species. The assessed reach could provide seasonal habitat for small-bodied fish migration, feeding, and spawning and is generally non-limiting throughout (i.e., no sensitive, important or exceptional habitat was observed). According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the drainage feature. According to OMAFRA's AgMaps (2020), the area on either side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-07

This drainage feature to Twenty Mile Creek is mapped as a warmwater system that originates on the east side of Glancaster Road and flows east towards Hawkswood Trail. There is no crossing structure associated with this feature along Glancaster Road. According to OMAFRA's AgMaps (2020), the area on either side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater

vulnerability rating. This feature could not be assessed as AECOM's Ecologists did not have permission to enter the properties that this feature was on during the October 2020 field investigations.

WC-08

This drainage feature to Tiffany Creek originates across from the Glancaster Loop bus stop and flows north along the west side of Glancaster Road to its confluence with WC-09.

At the time of field reconnaissance in Oct. 2020, the assessed reach was dry. There was no defined channel or prominent banks, no evidence of substrate sorting, and the area around the culvert was treated as part of the maintained lawn of the surrounding property (the swale feature had mowed grass growing throughout it).

While there is a mapped connection to Tiffany Creek, lack of a defined channel bed and bank provides evidence indicating that this location is likely not fish habitat. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the feature. According to the OMAFRA's AgMaps (2020), the area on either side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

WC-09

Tiffany Creek originates around Smith Rd, approximately 2km upstream of the Study Area and flows east towards Glancaster road where it receives inputs from surrounding roadside drainage, and then flows northeast under Glancaster and Rymal Road. The land use around Tiffany Creek is a mixture of agricultural lands, scrubland, wetlands, woodlots, and rural residential areas.

At the time of field reconnaissance in October 2020 the assessed upstream reach consisted of a small (>1 m) defined channel present at the culvert on Glancaster Road. The banks appeared stable and were heavily vegetated with water-tolerant terrestrial species. The stream morphology at this location would be classified almost entirely as a run, except for the culvert inlet and outlet pools. There was some evidence of sorted material along the stream bottom, but the substrate appeared to be comprised primarily of fines (sand, silt, clay) around the culvert. This watercourse's downstream section (east side of Glancaster Road, south side of Rymal Road) drained into a cattail area. No defined channel was observed at the Rymal Road culvert outlet, but standing water was present near the culvert. As there was no permission to enter this wetland, no further investigations of it were completed.

Two Brook Sticklebacks were observed during the field reconnaissance of WC-09, confirming that this watercourse does support fish habitat. Tiffany Creek's fish community assemblage is comprised of primarily warmwater species and the assessed reach provides habitat for small-bodied fish. The habitat at this crossing was generally non-limiting throughout (i.e., no sensitive, important or exceptional habitat was observed) and could be considered to contribute to fish migration, feeding, or spawning habitat. According to DFO online mapping (2021), habitat for aquatic SAR has not been identified within this section of the watercourse. According to OMAFRA's AgMaps (2020), the area on either side of Glancaster Road in this location is mapped as a significant groundwater recharge area with a low/ medium (2/4) groundwater vulnerability rating as defined by OMAFRA's source water protection plan factsheet (2019). OMAFRA defines these groundwater recharge areas as wellhead protection areas (WHPAs). WHPAs are areas that could be vulnerable to activities that could affect the quality and quantity of the groundwater near that wellhead. The higher the vulnerability score the more likely it is that certain works could impact the groundwater.

3.2.2 Vegetation Communities and Plants

3.2.2.1 Methods

ELC surveys and a botanical inventory were undertaken within the Study Area over three visits: August 31 and October 6, 2020, and May 20, 2021. Surveys were undertaken upon properties where PTE was granted; elsewhere in the Study Area, surveys were limited to roadside investigations (Refer to **Figure 4**).

Vegetation Community Classification and Delineation

Vegetation communities within the Study Area were classified using the Southern Ontario ELC system (Lee *et al.*, 1998), which provides a standard for comparing similar vegetation communities across Ontario. This protocol classifies vegetation communities through the completion of a multilayer (canopy, sub-canopy, ground cover) vegetation inventory. A summary of disturbance factors, community conditions, plant species list and representative photographs were also recorded for each vegetation patch.

Community Sensitivity

Vegetation community sensitivity was based on the calculation of the Mean Coefficient of Conservatism (CC), the Floristic Quality Index (FQI), and the Weediness index (WI) for the Study Area. These parameters are intended to be used together in order to assign an ecological community sensitivity ranking based on plant species composition, and not the actual value of a particular community.

-
- *Co-efficient of Conservatism (CC)*:

  These values range from 0 (low) to 10 (high) and are based on species tolerance of disturbance and fidelity to a specific habitat.

  Vegetation species and community sensitivity were assessed through the application of CC values, assigned to each native species in southern Ontario (Oldham *et al.* 1995). These values range from 0 (low) to 10 (high) and the occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs. General habitat values associated with the CC values are:

  – 0-3: species found in a wide variety of communities, including disturbed sites
  – 4-6: species associated with a specific community, but tolerate moderate disturbance
  – 7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances
  – 9-10: species with a high degree of fidelity to a narrow range of synecological parameters

- *Floristic Quality Index (FQI)*:

  The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. A community with an FQI between 1-19 will be considered to be of low vegetative quality; communities with an FQI between 20-35 will be considered to have a high vegetative quality and communities with an FQI above 35 will be considered of “Natural Area” Quality.

- *Weediness Index (WI)*:

  These values, range from -1 (low) to -3 (high) and quantify the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

  The sensitivity of natural areas can be assessed through application of weediness as a measure of the potential invasiveness of non-native plants. In combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1 – to – 3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:

  1: little or no impact on natural areas (most non-native plants are in this category)
  2: occasional impacts on natural areas, generally infrequent or localized
  3: major potential impacts on natural areas.

- *Coefficient of Wetness (CW)*:

  All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish and Wildlife Service. Plants are designated into the following categories:

  – Obligate Wetland (OBL): occurs almost always in wetlands under natural conditions (estimated >99% probability)
  – Facultative Wetland (FACW): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)
  – Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)
  – Facultative Upland (FACU): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)
  – Upland (UPL): occurs almost never in wetlands under natural conditions (estimated <1% probability)

- Each of the above wetland categories has been assigned a numerical value to facilitate the quantification of the wetness index.

3.2.2.2 Results

Terrestrial Vegetation Communities

Eight vegetation communities were identified within the Study Area through field investigation including Dry – Fresh Beech Deciduous Forest (FOD4-1), Dry – Moist Old Field Meadow (CUM1-1) with a Mineral Meadow Marsh (MAM2) complex, Cattail Mineral Shallow Marsh (MAS2-1), Dry – Fresh Oak – Hickory Deciduous Forest (FOD2-2), Dry – Moist Old Field Meadow (CUM1-1), Dry – Moist Old Field Meadow (CUM1-1) / Mineral Cultural Thicket (CUT1), Reed-canary Grass Mineral Meadow Marsh (MAM2-2), and Mineral Thicket Swamp (SWT2) / Reed-canary Grass Mineral Meadow Marsh (MAM2-2). A flora list was also gathered for vegetation within the municipal ROW. Each ELC community is described in **Table 3-5** and a representative photograph is provided in **Appendix D2**. The location of each vegetation community is shown on **Figure 4** and a list of vascular plants, including scientific names, for each community is provided in **Appendix E.**

Communities assessed through aerial photograph interpretation where permission to enter was not available are not included in the table. These include Deciduous Forest (FOD), Mineral Cultural Thicket (CUT1), Mineral Cultural Thicket (CUT1) / Mixed Forest (FOM), Open Aquatic (OAO), Mineral Cultural Woodland (CUW1), Mineral Cultural Meadow (CUM1) / Mineral Meadow Marsh (MAM2), and a Mineral Shallow Marsh (MAS2). These communities are delineated as air photo interpretation on **Figure 4**.

Table 3-5: Ecological Land Classification within the Study Area

ELC Code	Dominant Species							
	Provincial Rank*	Complex	Vegetation/Ecosite Name	Community Age	Canopy	Sub-canopy	Understorey	Ground Layer
Forested Communities (FO)								
FOD4-1	S4S5	-	Dry – Fresh Beech Deciduous Forest Type	Mature	American beech (*Fagus grandifolia*), eastern hop-hornbeam (*Ostrya virginiana*), bitternut hickory (*Carya cordiformis*), and northern red oak (*Quercus rubra*).	Eastern hop-hornbeam, white ash (*Fraxinus americana*), American beech, and bitternut hickory.	European buckthorn (*Rhamnus cathartica*), riverbank grape (*Vitis riparia*), and Tatarian honeysuckle (*Lonicera tatarica*).	White ash, broad-leaved enchanter's nightshade (*Circaea canadensis*), goldenrod (*Solidago* sp.), and avens (*Geum* sp.).
FOD2-2	S3S4	-	Dry – Fresh Oak – Hickory Deciduous Forest Type	Mature	Northern red oak, shagbark hickory (*Carya ovata*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*).	Basswood, sugar maple, and shagbark hickory.	European buckthorn, white ash, Tatarian honeysuckle, (and grey dogwood (*Cornus racemosa*).	This community lacks a well-defined ground layer.
Marsh Communities (MA)								
MAS2-1	S5	-	Cattail Mineral Shallow Marsh Type	Mid -Age	This community lacks a well-defined canopy.	This community lacks a well-defined sub-canopy.	Narrow-leaved cattail (*Typha angustifolia*), reed canary grass (*Phalaris arundinacea*), and common reed (*Phragmites australis*).	This community lacks a well-defined ground layer.
MAM2-2	S5		Reed-canary Grass Mineral Meadow Marsh	Mid-Age	This community lacks a well-defined canopy.	This community lacks a well-defined sub-canopy.	Reed canary grass	Reed canary grass
Swamp Communities (SW)								
SWT2	S5	MAM2-2	Mineral Thicket Swamp	Young	This community lacks a well-defined canopy	Gray dogwood), Tartarian Honeysuckle, Trembling Aspen (*Populus tremuloides*)	Reed canary grass Spotted jewelweed *(Impatiens capensis*), Sensitive Fern *(Onoclea sensibilis*)	Reed canary grass, (Spotted jewelweed, Sensitive Fern
Cultural Communities (CU)								
CUM1-1	-S5	MAM2	Dry – Moist Old Field Meadow Type	Young	Hybrid white willow (*Salix x fragilis*)	Red-osier dogwood (*Cornus sericea*), Tatarian honeysuckle, and black walnut (*Juglans nigra*).	Goldenrod, spotted jewelweed, aster (*Symphyotrichum* sp.), and thistle (*Cirsium* sp.).	Bluegrass (*Poa* sp.) and avens.

ELC Code	Dominant Species							
	Provincial Rank*	Complex	Vegetation/Ecosite Name	Community Age	Canopy	Sub-canopy	Understorey	Ground Layer
CUM1-1	S5		Dry – Moist Old Field Meadow Type	Young	This community lacks a well-defined canopy.	This community lacks a well-defined sub-canopy.	Goldenrod, aster (, and thistle .	Bluegrass and avens.
CUM1-1	S5	CUT1	Dry – Moist Old Field Meadow Type	Young	This community lacks a well-defined canopy.	Gray dogwood Common buckthorn	Goldenrod, aster and thistle (	Bluegrass .) and avens.

*Notes: *Provincial ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The following S-ranks are defined as follows:*

***S3** – Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.*
***S4** – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.*
***S5** – Secure—Common, widespread, and abundant in the nation or state/province.*
***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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).*

Wetland Communities

Wetlands are defined by the NDMNRF as “Lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophylic or water tolerant plants” (MNRF, 2013). These lands include ecosystems such as marshes, swamps, fens, bogs and open water communities.

Though there are no PSWs or Locally Significant Wetlands (LSW) present within the Study Area, as designated by NDMNRF the Tiffany Creek PSW Complex borders the northeastern limit of the Study Area within the regulated lands of the HCA. NPCA mapping matches NDMNRF with no regulated wetlands within the Study Area. Conservation Authorities regulate development within and adjacent to wetlands to ensure water sources and habitat are protected while also ensuring development does not occur in a high risk or hazardous area. The City of Hamilton also identifies wetlands and hydrologic features on Schedule B-4 of the UHOP, with a narrow unevaluated community identified east of Glancaster Road within the Hydro Corridor which has been identified as a Mineral Meadow Marsh (MAM2) identified from roadside during field investigations (refer to **Figure 2-03** and **Figure 4-03**).

During field investigations four wetland communities were identified within the Study Area. These include a Mineral Thicket Swamp – Reed Canary Meadow Marsh complex (SWT2/MAM2-2) north of Book Road East; a small Reed Canary Grass Mineral Meadow Marsh (MAM2-2) northwest of Kopperfield Lane along WC-05; and two Cattail Mineral Shallow Marshes (MAS2-1). Community descriptions for these wetland communities are provided in **Table 3-5** above in **Section 3.2.2.2**.

As described in the OWES Southern Manual (MNRF, 2013), wetlands smaller than 2 ha in size are not generally evaluated using OWES unless part of a larger complex. One MAS2-1 community at the intersection of Glancaster and Rymal Road West would benefit from additional assessment as it may be considered as part of the Tiffany Creek Wetland Complex. It conveys flows from WC-09 which continues to flow into the PSW. However, given its previous exclusion and surrounding development it is possible it arose as a result of stormwater management. Wetlands that are the result of stormwater management systems are typically excluded from evaluation and designation under OWES as they require regular maintenance activities. Further evaluation and consultation with the NDMNRF is recommended to confirm.

Other wetlands within the Study Area fall below the threshold for evaluation under OWES with the MAS2-1 community south of the entrance to Rehoboth United Reformer Church measuring only approximately 0.3 ha in size and not connected hydrologically to the Tiffany Creek PSW. The MAM2-2 (0.19 ha) near Kopperfield Lane and SWT2/MAM2-2 (0.4 ha) are both below the size threshold and dominated by invasive reed canary grass. Given the size of the wetlands and low quality of the vegetation present; these wetlands are not recommended for further OWES evaluation.

Botanical Inventory

Dry – Fresh Beech Deciduous Forest (FOD4-1)

A total of 72 taxa were identified within this community – eight of which could not be reliably identified to species level (i.e., wood fern [*Dryopteris* sp.], aster [*Symphyotrichum* sp.], goldenrod [*Solidago* sp.], currant [*Ribes* sp.], agrimony [*Agrimonia* sp.], avens [*Geum* sp.], rose [*Rosa* sp.], and sedge [*Carex* sp.]). Native species made up 76.4 % of species present. This community has an average CC of 4.08 (i.e., moderate sensitivity), with a FQI of 14.97. This community has moderate potential invasiveness, with a mean weediness of -2.22. This community is a facultative community, with an average wetness value of 1.47. Butternut (*Juglans cinerea*), an Endangered species under the ESA, was identified in this community.

Dry – Moist Old Field Meadow (CUM1-1) with Mineral Meadow Marsh (MAM2) complex

A total of 59 taxa were identified within this community – 14 of which could not be reliably identified to species level (i.e., aster, goldenrod, currant, avens, rose, sedge, beggar-ticks [*Bidens* sp.], thistle [*Cirsium* sp.], cherry [*Prunus* sp.], willow [*Salix* sp.], bulrush [*Schoenoplectus* sp.], rush [*Juncus* sp.], lily [*Lilium* sp.], and bluegrass [*Poa* sp.]). Native species made up 42.4 % of species present. This community has an average CC of 2.29 (i.e., lowest sensitivity), with a FQI of 7.57. This community has moderate potential invasiveness, with a mean weediness of -1.95. This community is a facultative community, with an average wetness value of 0.11.

Cattail Mineral Shallow Marsh (MAS2-1)

A total of 34 taxa were identified within this community – one of which could not be reliably identified to species level (i.e., willow). Native species made up 55.9 % of species present. This community has an average CC of 2.89 (i.e., lowest sensitivity), with a FQI of 7.42. This community has moderate potential invasiveness, with a mean weediness of -2.00. This community is a facultative community, with an average wetness value of -0.88. This community has two locally uncommon species including purplestem angelica (*Angelica atropurpurea*) and inland sedge (*Carex interior*).

Dry – Fresh Oak – Hickory Deciduous Forest (FOD2-2)

A total of 65 taxa were identified within this community – five of which could not be reliably identified to species level (i.e., goldenrod, currant, hawthorn [*Crataegus* sp.], cherry, and greenbrier [*Smilax* sp.]). Native species made up 73.8 % of species present. This community has an average CC of 4.40 (i.e., moderate sensitivity), with a FQI of 14.54. This community has moderate potential invasiveness, with a mean weediness of -2.08. This community is a facultative community, with an average wetness value of 1.47. A dead Butternut sapling, an Endangered species under the ESA, was identified at the edge of this community.

Dry – Moist Old Field Meadow (CUM1-1)

A total of 42 taxa were identified within this community – four of which could not be reliably identified to species level (i.e., aster, thistle, goldenrod, and bluegrass). Native species made up 50.0 % of species present. This community has an average CC of 1.90 (i.e., lowest sensitivity), with a FQI of 6.32. This community has moderate potential invasiveness, with a mean weediness of -1.69. This community is a facultative community, with an average wetness value of 1.24.

Dry – Moist Old Field Meadow (CUM1-1) / Mineral Cultural Thicket (CUT1)

A total of 36 taxa were identified within this community – six of which could not be reliably identified to species level (i.e., elderberry [*Sambucus* sp.], aster, goldenrod, hawthorn, rose, and bluegrass). Native species made up 47.2% of species present. This community has an average CC of 2.59 (i.e., lowest sensitivity), with a FQI of 6.63. This community has moderate potential invasiveness, with a mean weediness of -1.92. This community is a facultative community, with an average wetness value of 1.13.

Reed-canary Grass Mineral Meadow Marsh (MAM2-2)

A total of 29 taxa were identified within this community – three of which could not be reliably identified to species level (i.e., aster, goldenrod, and willow). Native species made up 51.7% of species present. This community has an average CC of 1.87 (i.e., lowest sensitivity), with a FQI of 5.29. This community has moderate potential invasiveness, with a mean weediness of -2.00. This community is a facultative community, with an average wetness value of 0.04.

Mineral Thicket Swamp (SWT2) / Reed-canary Grass Mineral Meadow Marsh (MAM2-2)

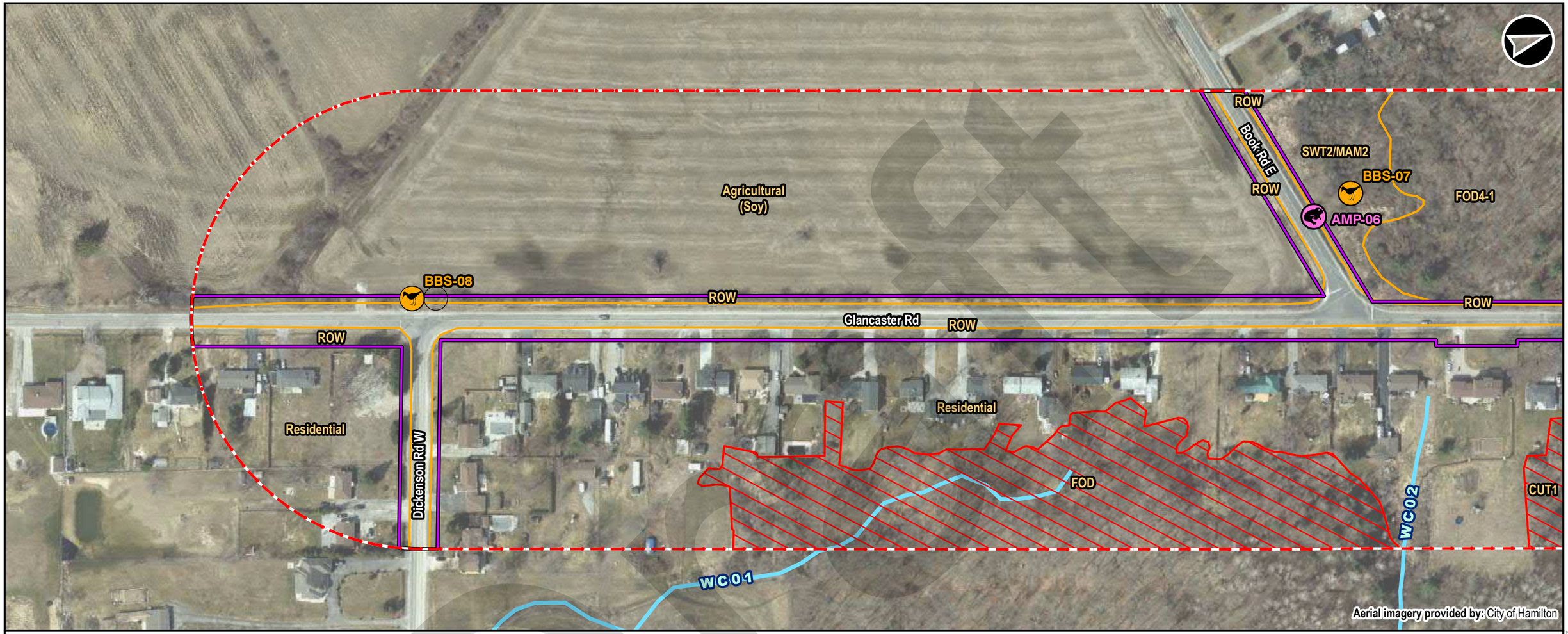
A total of 48 taxa were identified within this community – five of which could not be reliably identified to species level (i.e., rose, willow, sedge, bulrush, and rush). Native species made up 68.8% of species present. This

community has an average CC of 3.16 (i.e., lowest sensitivity), with a FQI of 10.21. This community has moderate potential invasiveness, with a mean weediness of -2.30. This community is a facultative community, with an average wetness value of -0.71.

Municipal Right-of-way

A total of 23 taxa were identified within this community – two of which could not be reliably identified to species level (i.e., goldenrod and avens). Native species made up 47.8% of species present. This community has an average CC of 1.45 (i.e., lowest sensitivity), with a FQI of 4.00. This community has moderate potential invasiveness, with a mean weediness of -1.90. This community is a facultative community, with an average wetness value of 1.29.

A list of vascular plant species observed within each vegetation community is provided in **Appendix E**.



ELC Code Description

CUT1: Mineral Cultural Thicket Ecosite

FOD: Deciduous Forest

FOD4-1: Dry – Fresh Beech Deciduous Forest

ROW: Right of Way

Residential: Residential

SWT2/MAM2: Mineral Thicket Swamp with Reed-canary Grass Mineral Meadow Marsh

Legend

Study Area

Right of Way Limits

Field Identified Ecological Features

Breeding Bird Station

Amphibian Station

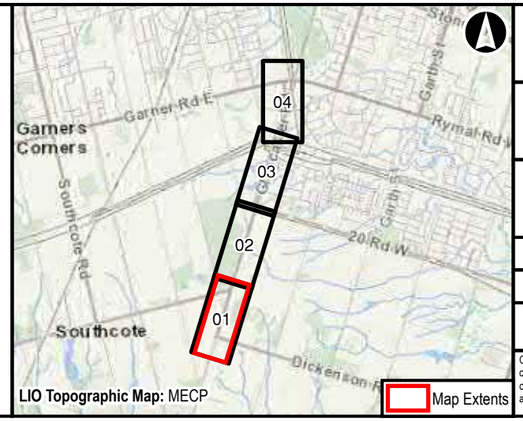
ELC Source

Assessed with aerial photo interpretation

AECOM Field Collection - 2021

Aquatic Thermal Regimes

Unknown Thermal Regime



Glancaster Road Class EA

Ecological Land Classification (ELC)

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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P:60637047	Rev:00	

AECOM

Figure: 4-01

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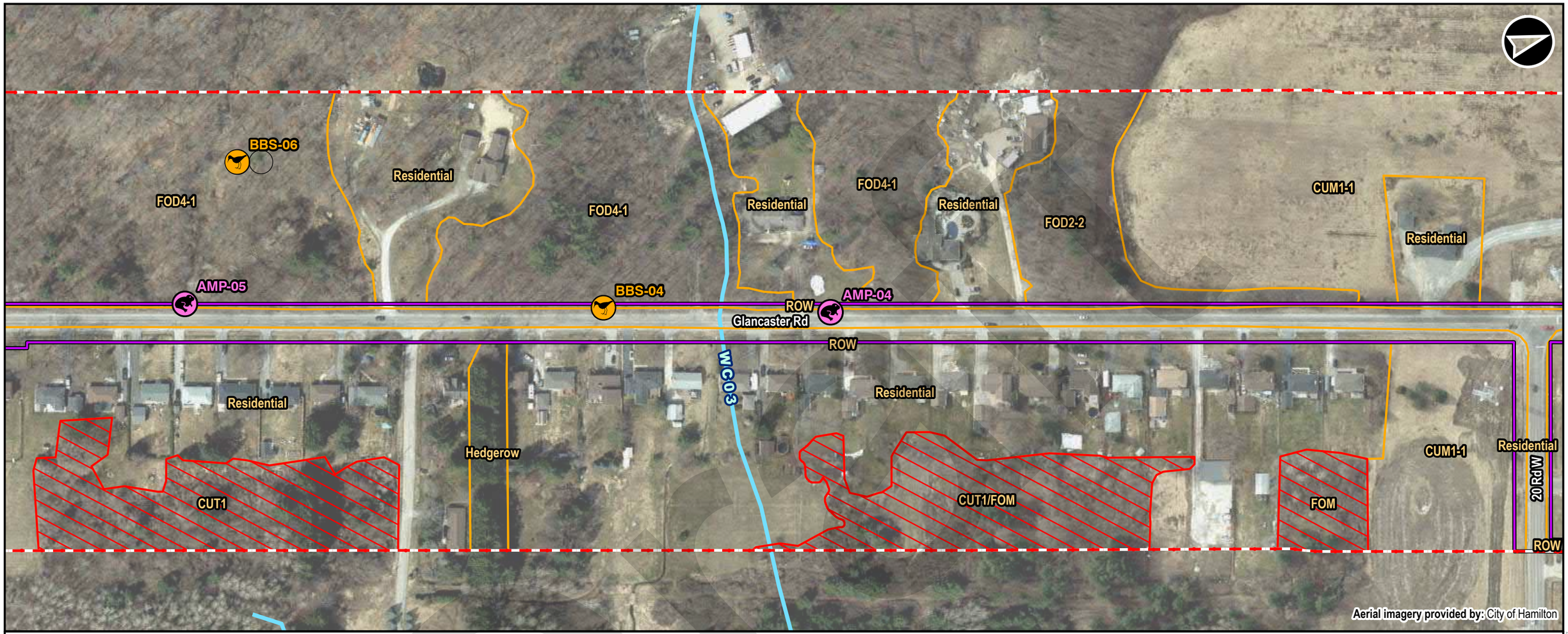


ELC Code Description

CUM1-1: Dry – Moist Old Field Meadow

CUT1: Mineral Cultural Thicket Ecosite

CUT1/FOM: Mineral Cultural Thicket / Mixed Forest

FOD2-2: Dry – Fresh Oak – Hickory Deciduous Forest

FOD4-1: Dry – Fresh Beech Deciduous Forest

FOM: Mixed Forest

Hedgerow: Hedgerow

ROW: Right of Way

Residential: Residential

Legend

Study Area

Right of Way Limits

Field Identified Ecological Features

Breeding Bird Station

Amphibian Station

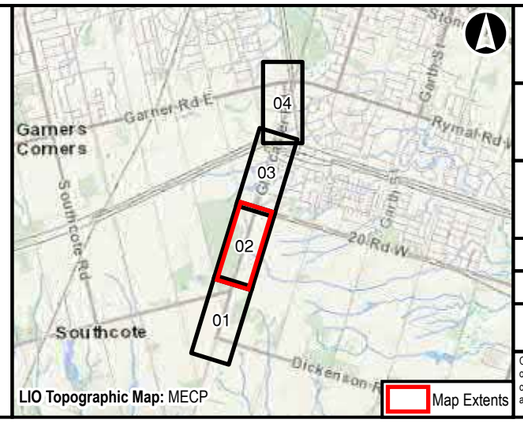
ELC Source

Assessed with aerial photo interpretation

AECOM Field Collection - 2021

Aquatic Thermal Regimes

Unknown Thermal Regime



Glancaster Road Class EA

Ecological Land Classification (ELC)

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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P:60637047	Rev:00	

AECOM

Figure: 4-02

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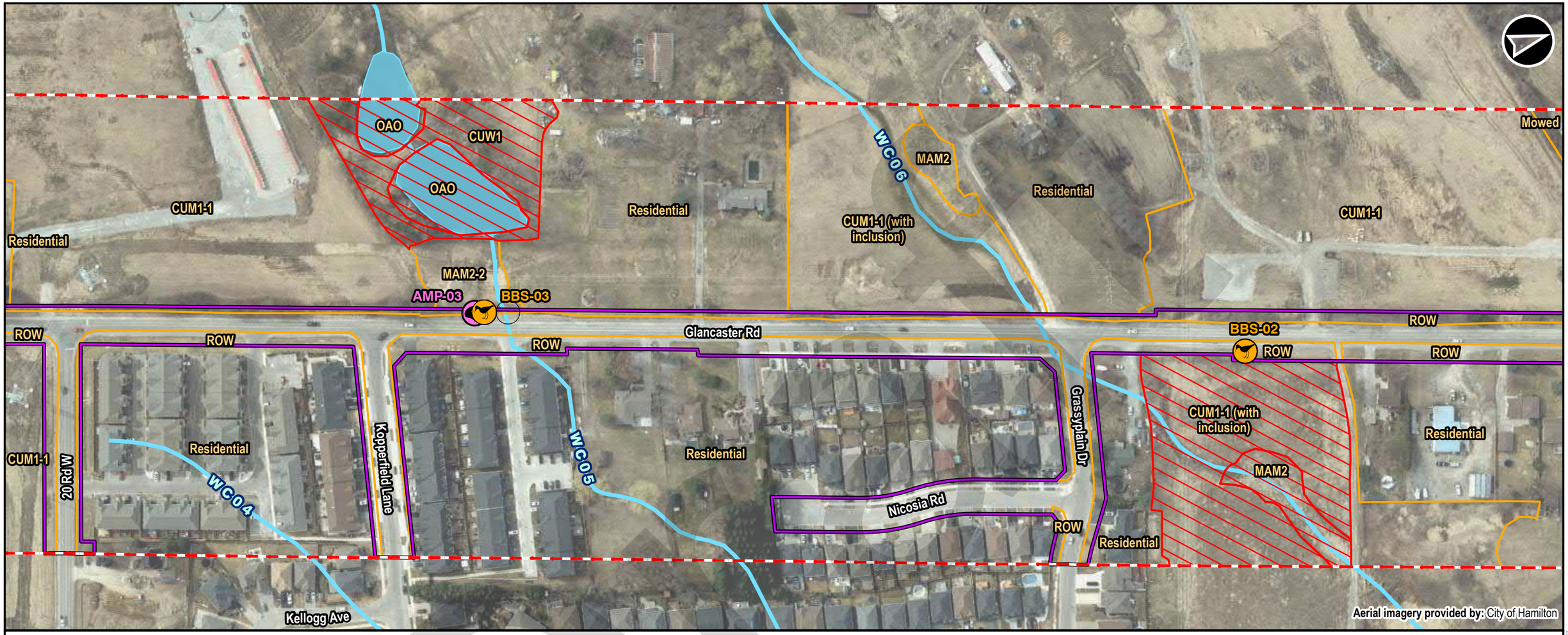


ELC Code Description

CUM1-1: Dry – Moist Old Field Meadow

CUM1-1 (with inclusion): Dry – Moist Old Field Meadow with Mineral Meadow Marsh inclusion

CUW1: Mineral Cultural Woodland Ecosite

MAM2: Mineral Meadow Marsh

MAM2-2: Reed-canary Grass Mineral Meadow Marsh

Mowed: Mowed

OAO: Open Aquatic

ROW: Right of Way

Residential: Residential

Legend

Study Area

Right of Way Limits

Field Identified Ecological Features

Breeding Bird Station

Amphibian Station

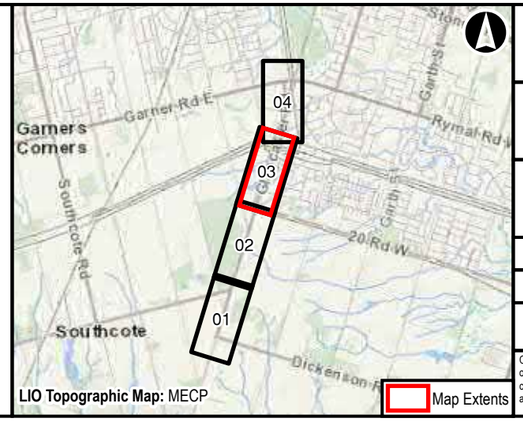
ELC Source

Assessed with aerial photo interpretation

AECOM Field Collection - 2021

Aquatic Thermal Regimes

Unknown Thermal Regime



Glancaster Road Class EA

Ecological Land Classification (ELC)

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NAD 1983 UTM Zone 17N

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AECOM

Figure: 4-03

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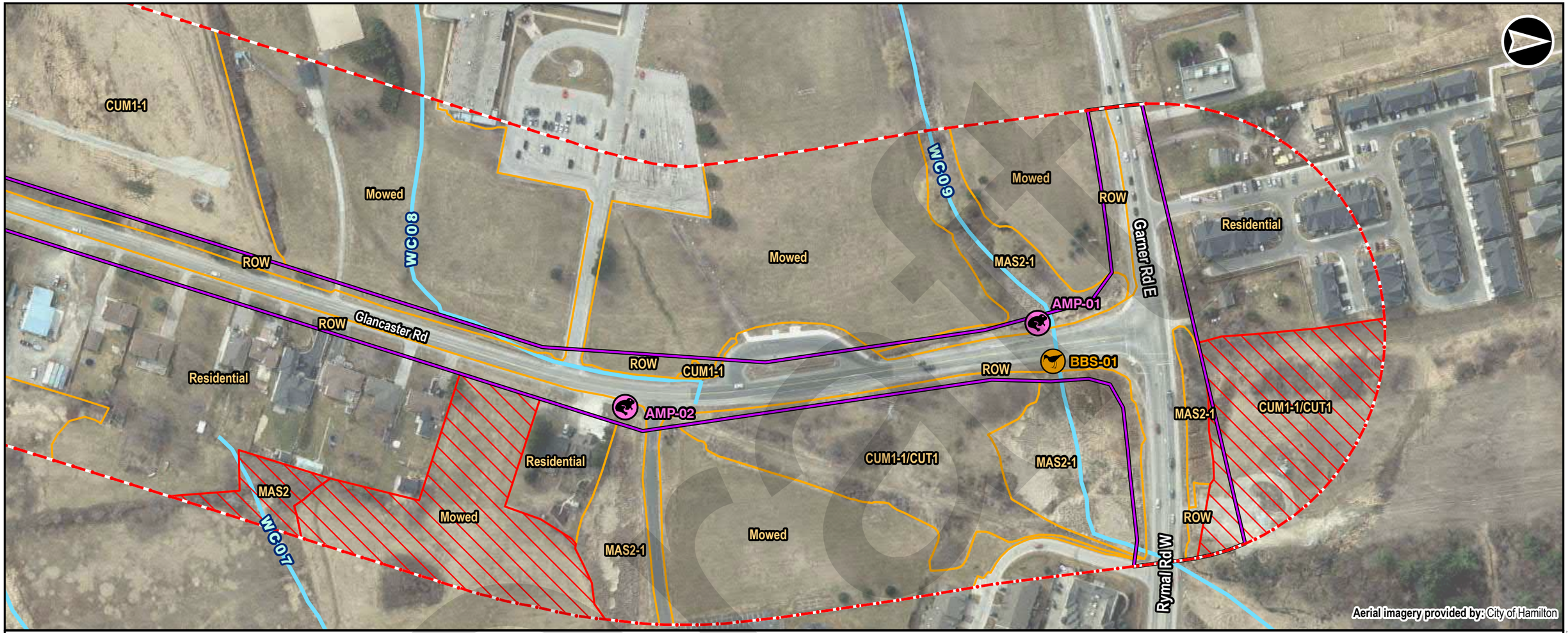


ELC Code Description

CUM1-1: Dry – Moist Old Field Meadow

CUM1-1/CUT1: Dry – Moist Old Field Meadow with Mineral Cultural Thicket complex

MAS2: Mineral Shallow Marsh Ecosite

MAS2-1: Cattail Mineral Shallow Marsh

Mowed: Mowed

ROW: Right of Way

Residential: Residential

Legend

Study Area

Right of Way Limits

Field Identified Ecological Features

Breeding Bird Station

Amphibian Station

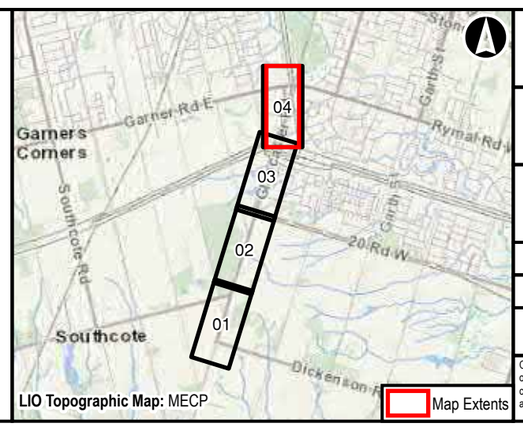
ELC Source

Assessed with aerial photo interpretation

AECOM Field Collection - 2021

Aquatic Thermal Regimes

Unknown Thermal Regime



Glancaster Road Class EA

Ecological Land Classification (ELC)

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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AECOM

Figure: 4-04

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3.2.3 Breeding Birds

3.2.3.1 Methods

Various protocols were adapted to design the breeding bird survey methods for the Study Area, utilizing both area searches and stationary point count surveys. Seven point-count stations were surveyed, located at least 200 m apart to maintain a degree of separation and reduce the chances of double counting individual birds. Survey station locations are shown on **Figure 4**. Each station was surveyed twice during breeding bird season (May 24 – July 10). Two survey dates are recommended as they typically provide data that more accurately reflects the number of species and birds utilizing the habitat at each station (EC-CWS, 2009). Surveys were completed between 5:00 am and 10:00 am under appropriate weather conditions (i.e., no precipitation, calm to light wind (EC-CWS, 2009). Each point-count consisted of a 10-minute survey, recording the time, species, breeding evidence and individual bird movement within a 100 m radius. Birds observed beyond 100 m or as flyovers were recorded as incidental observations.

3.2.3.2 Results

Breeding bird surveys were conducted on May 31 and June 22, 2021. A total of 35 bird species were identified within the Study Area. The most abundant species being Red-winged Blackbird, American Robin (*Turdus migratorius*), and Song Sparrow (*Melospiza melodia*). One species, Barn Swallow, is listed as Threatened under the ESA. Two SOCC were also observed, Eastern Wood Pewee (*Contopus Virens),* and Wood Thrush *(Hylocicla mustelina*). Five birds were recorded that are also considered to be uncommon to the Hamilton Area, including the Eastern Towhee (*Pipilio erythrophthalmus*), Brown Thrasher (*Toxostoma rufum*), Wood Thrush, Alder Flycatcher (*Empidonax alnorum*) and Great Blue Heron (*Ardea herodias)* according to HCA's 2013 Bird Checklist. The remaining species are considered common and tolerant of disturbance with the majority of recorded birds protected under the MBCA A summary of breeding bird survey results is provided in **Appendix F** and the locations of each breeding bird station are provided on **Figure 4**.

Barn Swallow

One individual was observed within suitable foraging habitat (i.e., CUM1-1), within 100 m of Station BBS-03 on June 22, 2021 (round 2).

Eastern Wood-Pewee

Several males were heard singing on both visits within suitable habitat (i.e., FOD4-1), within 100 m of Station BBS-06.

Wood Thrush

A single male was heard calling within 100 m of Station BBS-04 and BBS-06 on May 31, 2021 (round 1) within suitable habitat (i.e., FOD4-1).

SAR and SAR habitat, and SWH, including SOCC habitat, are further discussed in **Sections 3.3 and 3.4**.

3.2.4 Amphibians

3.2.4.1 Methods

The purpose of amphibian breeding surveys is to identify species composition, including presence or absence of any significant species of calling anurans (e.g., frogs and toads) within the Study Area. The Marsh Monitoring Program Participant's Handbook for Surveying Amphibians (2008) provides standardized field methods for audio-surveys of breeding anurans within the province. In order to detect both early and late anuran breeders, three site visits were conducted at the wetland communities during the breeding season. In accordance with the protocol, surveys did not begin until at least one-half hour after sunset and were completed before midnight during suitable weather conditions (winds less than 19 km/hr and minimum night-time air temperatures of at least 5°C for the first

survey, 10°C for the second survey and 17°C for the third survey). Species observed and call frequency were recorded by biologists during each three-minute point count. The frequency categories of anuran calls are:

0 – None heard
1 – Individuals can be counted, calls not overlapping
2 – Numbers of some individuals can be estimated or counted, others overlapping
3 – Full chorus, calls continuous and overlapping, and individuals not distinguishable

Amphibian breeding surveys were completed on the evenings of April 15, May 17, and June 15, 2021 at six survey stations within the Study Area under appropriate weather conditions. Survey station locations are shown on **Figure 4**.

3.2.4.2 Results

A brief summary of the survey conditions and results is provided in **Table 3-6**. The locations of each station are provided in **Figure 4**. Background noise at stations was generally considered to be moderate to high due to traffic along Glancaster Road. Most stations had low activity, none reaching a full chorus or call code 3 for any one species, based on this none of the features assessed would be confirmed significant amphibian habitat based on the SWH 7E criteria.

Table 3-6: Summary of Amphibian Breeding Survey Conditions and Results

Monitoring Station	Date, Time, and Weather Conditions	Amphibian Night Call Survey Results		
		Round 1	*Round 2*	*Round 3*
AMP_01	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	20:26 – 20:30	21:02 – 21:05	21:33 – 21:36
	Beaufort Wind Scale	2	0	0
	Cloud Cover (%):	95	0	10
	Background Noise:	3	3	3
	Air Temperature (°C):	6	18	19
	Precipitation:	None	None	None
	Results < 100 m:	No amphibians heard calling.	No amphibians heard calling.	No amphibians heard calling.
	> 100 m:	None	None	None
AMP_02	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	20:33 – 20:36	21:12 – 21:15	21:40 – 21:43
	Beaufort Wind Scale	3	1	0
	Cloud Cover (%):	95	0	0
	Background Noise:	3	3	2
	Air Temperature (°C):	5	18	19
	Precipitation:	None	None	None
	Results < 100 m:	No amphibians heard calling.	No amphibians heard calling.	No amphibians heard calling.
	> 100 m:	None	None	None
AMP_03	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	20:42 – 20:45	21:02 – 21:05	21:33 – 21:36
	Beaufort Wind Scale	2	0	0
	Cloud Cover (%):	95	0	10
	Background Noise:	3	3	3
	Air Temperature (°C):	6	18	19
	Precipitation:	None	None	None
	Results < 100 m:	Spring Peeper: 4 individuals, call code 2	Spring Peeper: 4 individuals, call code 2	Green Frog: 3 individuals, call code 2
	> 100 m:	None	Gray Treefrog: 1 individual, call code 1	None
AMP_04	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	20:50 – 20:53	21:39 – 21:42	22:02 – 22:05

Monitoring Station	Date, Time, and Weather Conditions	Amphibian Night Call Survey Results		
		Round 1	*Round 2*	*Round 3*
	Beaufort Wind Scale	2	0	0
	Cloud Cover (%):	95	0	0
	Background Noise:	2	2	2
	Air Temperature (°C):	4	15	16
	Precipitation:	None	None	None
	Results < 100 m:	None	Spring Peeper: 2 individuals, call code 2	No amphibians heard calling.
	> 100 m:	Spring Peeper: 4 individuals, call code 2	None.	None.
AMP_05	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	20:56 – 21:00	21:52 – 21:55	22:11 – 22:14
	Beaufort Wind Scale	1	0	0
	Cloud Cover (%):	95	0	0
	Background Noise:	3	2	2
	Air Temperature (°C):	4	15	16
	Precipitation:	None	None	None
	Results < 100 m:	None	American Toad: 1 individual, call code 2	No amphibians heard calling.
	> 100 m:	Spring Peeper: 1 individual, call code 1	Spring Peeper: 3 individuals, call code 2	None
AMP_06	*Date:*	April 15, 2021	May 17, 2021	June 15, 2021
	Start – End Time	21:03 – 21:08	22:01 – 22:04	22:18 – 22:21
	Beaufort Wind Scale	2	0	1
	Cloud Cover (%):	95	0	0
	Background Noise:	2	2	3
	Air Temperature (°C):	4	15	16
	Precipitation:	None	None	None
	Results < 100 m:	No amphibians heard calling.	American Toad: 4 individuals, call code 2	No amphibians heard calling.
	> 100 m:	None	Spring Peeper: 4 individuals, call code 2	None

Notes: Background noise is indicated using the following background noise codes reproduced the Marsh Monitoring Program Participants Handbook BSC, 2008)
0 – No appreciable effect (e.g., owl calling)
1 – Slightly affecting sampling (e.g., distant traffic, dog barking, car passing
2 – Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3 – Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4 – Profoundly affecting samplings (e.g., continuous traffic passing, construction noise)

3.2.5 Reptiles

3.2.5.1 Methods

The purpose of the surveys was to assess potential presence and use of the area by snakes as requested by the City of Hamilton. Area searches for snakes were conducted within areas of suitable habitat within the Study Area following the methods outlined in Survey Protocol for Ontario's Species at Risk Snakes (MNRF, 2016). Five rounds of visual encounter surveys were conducted under suitable weather conditions (i.e., sunny, warm temperatures). Five rounds were completed instead of the ten rounds, as five rounds are the minimum number of site visits as per the Survey Protocol for Ontario's Species at Risk Snakes (MNRF, 2016) which was deemed sufficient especially there were no records of any SAR or SOCC snakes identified through the background information review (refer to **Section 3.1.2.6** and **3.1.2.7**). The location and species of snakes observed during the area search were documented.

3.2.5.2 Results

A single snake was observed through these surveys on May 20, 2021 basking along the north shoulder of Book Road East. The Eastern Gartersake (*Thamophis sirtalis*) is a widespread and tolerant species present through most of Ontario. A brief summary of the survey conditions and results is provided in **Table 3-7**.

Table 3-7: Summary of Snake Survey Conditions and Results

Parcel ID	ELC Community	Results				
		Round 1	Round 2	Round 3	Round 4	Round 5
Date:		August 31, 2020	October 6, 2020	April 7, 2021	May 20, 2021	June 22, 2021
Time		9:30 – 16:00	8:50 – 14:00	9:00 – 13:00	8:25 – 11:25	7:15 – 9:00
Beaufort Wind Scale:		2	5	3	1	1
Cloud Cover (%):		15	50	0	100	15
Air Temperature (°C):		15-24	8-18	8-16	17-27	11-15
Precipitation:		None	None	None	None	None
170810039	MAM / MAS / CUM	No snakes observed	No snakes observed	No snakes observed	No snakes observed	No snakes observed
170820033	FOD4-1	No snakes observed	No snakes observed	No snakes observed	Eastern Gartersnake (*Thamnophis sirtalis*)	No snakes observed
170820033	SWT2 / MAM2	No snakes observed	No snakes observed	No snakes observed	No snakes observed	No snakes observed

3.2.6 Incidental Wildlife

3.2.6.1 Methods

Incidental wildlife observations were recorded during all field investigations. Incidental observations noted include species sightings, tracks, scat, as well as any other wildlife activity.

3.2.6.2 Results

A total of 13 species were observed incidentally, including one SOCC (Monarch). Refer to **Table 3-8** for additional details pertaining to incidentally observed wildlife.

Table 3-8: Incidentally Observed Wildlife in the Study Area

Taxa	Common Name	Latin Name	S-Rank[1]	ESA Status[2]
Amphibians	American Toad	*Anaxyrus americanus*	S5	-
Birds	American Goldfinch	*Spinus tristis*	S5	-
	American Robin	*Turdus migratorius*	S5	-
	American Woodcock	*Scolopax minor*	S4B	-
	Black-capped Chickadee	*Poecile atricapillus*	S5	-
	Mallard	*Anas platyrhynchos*	S5	-
	Northern Flicker	*Colaptes auratus*	S5	-
	Red-tailed Hawk	*Buteo jamaicensis*	S5	NAR
	Red-winged Blackbird	*Agelaius phoeniceus*	S5	-
	Turkey Vulture	*Cathartes aura*	S5B, S3N	-
	Yellow-bellied Flycatcher	*Empidonax flaviventris*	S5B	-
Insects	Darner	Aeshnidae sp.	-	-
	Monarch	*Danaus plexippus*	S2N,S4B	SC

3.3 Species at Risk Assessment

A habitat screening was undertaken to determine potential SAR occurrence within the Study Area by comparing SAR identified through background data sources to existing habitat features. For the purposes of this screening, species identified as Endangered or Threatened under the ESA are considered SAR. Species listed as Special

Concern under the ESA are considered SOCC and are addressed through the SWH screening exercise (**Section 3.4**). Refer to **Figure 5** for mapped potential SAR habitat.

3.3.1 Methods

A background review was conducted for SAR and SAR habitat in accordance with the methods identified in **Section 3.1.2.6**. Following which, a SAR habitat assessment was completed to determine the presence of suitable habitat for each SAR identified based on the habitat present onsite. This assessment was completed using aerial photo interpretation to delineate habitat communities in the Study Area and was further refined after ELC community delineation during field investigation. The probability of SAR occurrence within the Study Area was determined based on the following rankings:

- **Low Probability:** neither species nor suitable habitat observed through field investigations but there is a known species record in the general area;
- **Medium Probability:** species not observed; however, potentially suitable habitat identified through field investigations and there is a known species record in the general area; and
- **High Probability:** good quality habitat identified (e.g., sufficiently large areas of suitable vegetation and presence of key features such as nesting sites), and species observed in the Study Area either through current or previous field investigations.

Appendix G provides the habitat assessment for SAR in the Study Area and includes their habitat preferences and assessment of potential occurrence in the Study Area.

3.3.2 Results

A total of 15 SAR has been recorded or have known species ranges within or in the vicinity of the Study Area or are considered potentially present in the Hamilton Area based on agency consultation and background information review. The SAR screening (**Appendix G**) identified the following seven SAR with high to medium probability of occurring in the Study Area:

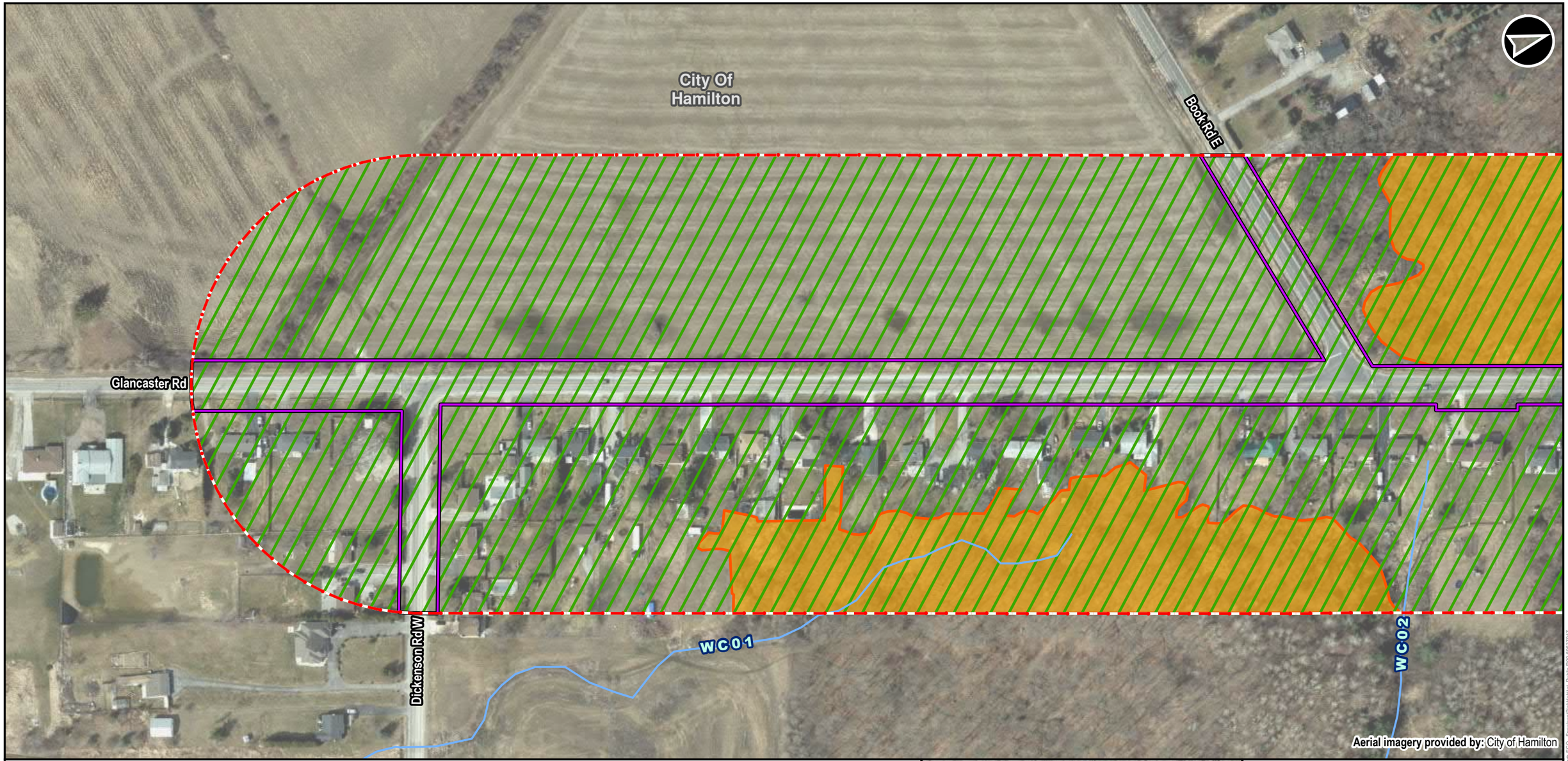
- **High Probability of Occurrence:**
  - **Barn Swallow** [source: OBBA and eBird records] – This species is listed as Threatened in Ontario. Barn Swallows occur in close association with human-made structures, building their cup-shaped mud nests almost exclusively on structures such as open barns, under bridges and in culverts (MECP, 2019a). Anthropogenic structures, especially barns, that may provide suitable nesting habitat are present within the Study Area. Furthermore, this species was observed foraging in suitable habitat (cultural meadow) during field investigations. No nests were observed during field investigations; however, surveys were limited to roadside inspection through much of the Study Area.
  - **Butternut** [source: NHIC] – This species is listed as Endangered in Ontario. Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams but is also found on well-drained gravel sites and rarely on dry rocky soil (Poisson and Ursic, 2013). This species does not grow well in the shade and is most often found in sunny openings and near forest edges (Poisson and Ursic, 2013). Eight Butternuts were observed in and across from the FOD4-1 community during field investigations, these are shown on **Figure 5.** In addition a dead Butternut was also observed at the edge of the FOD2-2 community. As a general rule the 25 m buffer around a butternut is considered as the Critical Root Zone and protected as regulated habitat under the ESA; this area is considered to have the lowest threshold for alterations. The 25-50 m buffer around the tree is also protected as this is the area of

dispersal and seedling establishment, however this buffer is considered to have a moderate threshold to alterations. These buffers are shown on **Figure 5.**

- **Medium Probability of Occurrence:**
  - **Chimney Swift** [Source: OBBA records] – This species is listed as Threatened in Ontario. Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests (MECP, 2019b). Today, they are more likely to be found in and around urban settlements where they nest and roost in chimneys and other manmade structures. Suitable chimneys may be present within the Study Area; however, none were observed in the proposed ROW.
  - **Tri-colored Bat** [source: BCI Range Maps] – This species is listed as Endangered in Ontario. They live in forested habitats, forming day roosts and maternity colonies in older forest within foliage or in high tree cavities, occasionally also in barns or other man-made structures (MECP, 2019c). This species forages over water and along streams in forests (MECP, 2019c). Deciduous forest and buildings within the Study Area provide potentially suitable habitat for this species (all mapped FOD communities).
  - **Little Brown Myotis** [source: BCI Range Maps] – This species is listed as Endangered in Ontario. Roosts and maternity colonies of Little Brown Myotis may occur in manmade structures (attics, abandoned buildings, barns), rock crevices, behind loose or flaking bark, or within tree cavities (COSEWIC, 2013; MECP, 2019d). Little Brown Myotis forages over water, rivers, and open areas within forests (e.g., gaps, edges; COSEWIC, 2013). Deciduous forest and buildings within the Study Area provide potentially suitable habitat for this species (all mapped FOD communities).
  - **Northern Myotis** [source: BCI Range Maps] – This species is listed as Endangered in Ontario. They are associated with forest habitats roosting under loose bark or in tree cavities (MECP, 2019e). Deciduous forest within the Study Area provide potentially suitable habitat for this species (all mapped FOD communities).
  - **Eastern Small-footed Myotis** [source: BCI Range Map] – This species is listed as Endangered in Ontario. Eastern Small-Footed Myotis roosts in a variety of habitats, including under rocks and bridges and in rock outcrops, caves, mines, and hollow trees. Individuals may change their roosting location daily (MECP, 2019f). This species hibernates in caves and abandoned mines, preferring colder, drier sites and showing strong hibernation site fidelity. Deciduous forest and buildings within the Study Area provide potentially suitable habitat for this species (all mapped FOD communities).

The following SAR were identified as having a low probability to occur due to lack of suitable habitat present within the Study Area:

- Barn Owl
- Bank Swallow
- Bobolink
- Eastern Meadowlark
- Louisiana Waterthrush
- Northern Bobwhite
- Yellow-breasted Chat
- Jefferson Salamander



Legend

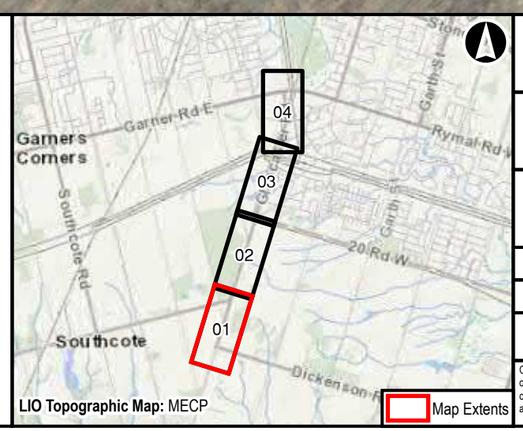
- Study Area
- Right of Way Limits

Field Identified Ecological Features

- Butternut Tree General Occurance — A total of 9 Butternuts occur within this area; exact locations have been obscured
- Suitable Bat SAR Habitat

Base Layers

- Municipal Boundary
- Watercourse



Glancaster Road Class EA

Species at Risk and Habitat

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Figure: 4-01

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City Of Hamilton

Glancaster Rd

WC 0-3

20 Rd W

Aerial imagery provided by: City of Hamilton

Legend

Study Area

Right of Way Limits

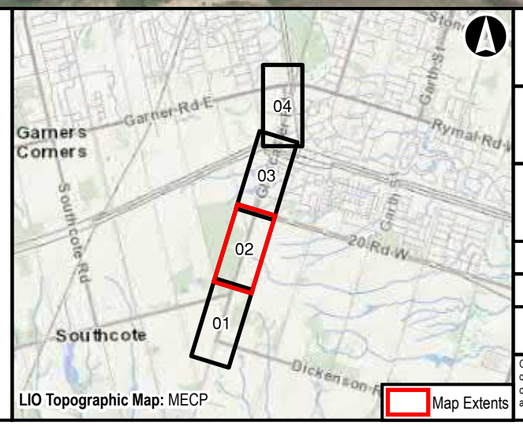
Field Identified Ecological Features

Butternut Tree General Occurance	A total of 9 Butternuts occur within this area; exact locations have been obscured
Barn Swallow Foraging General Occurance	One Barn Swallow observed foraging in this area
Suitable Bat SAR Habitat	

Base Layers

Municipal Boundary

Watercourse



Glancaster Road Class EA

Species at Risk and Habitat

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Figure: 4-02

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Legend

Study Area

Right of Way Limits

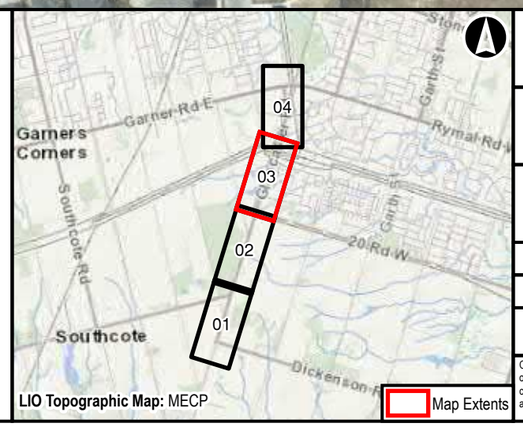
Field Identified Ecological Features

Butternut Tree General Occurance	A total of 9 Butternuts occur within this area; exact locations have been obscured
Barn Swallow Foraging General Occurance	One Barn Swallow observed foraging in this area

Base Layers

Municipal Boundary

Watercourse



Glancaster Road Class EA

Species at Risk and Habitat

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Figure: 4-03

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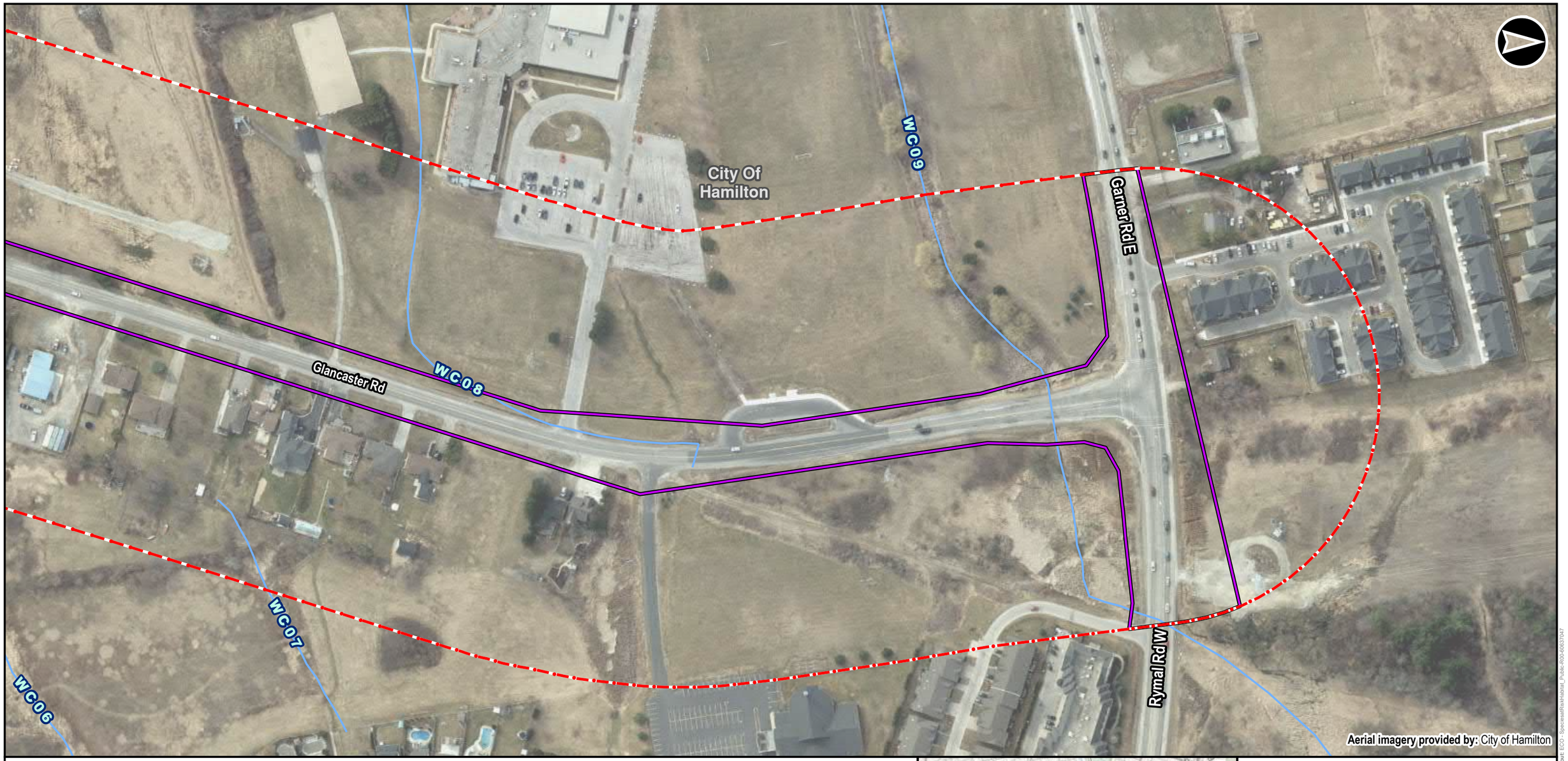

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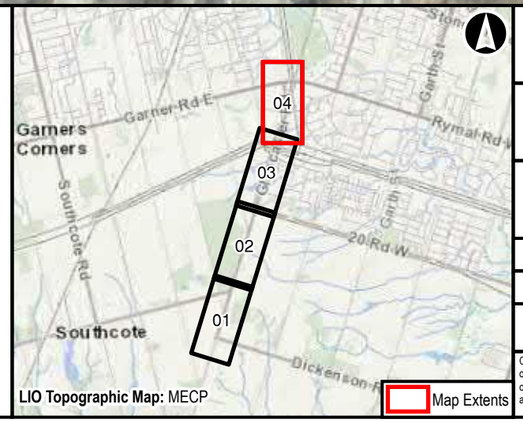
Study Area

Right of Way Limits

Base Layers

Municipal Boundary

Watercourse



Glancaster Road Class EA

Species at Risk and Habitat

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Figure: 4-04

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3.4 Significant Wildlife Habitat Assessment

A SWH screening exercise was conducted using the SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015a) to determine the presence of candidate or confirmed SWH, including the habitat of SOCC (**Appendices F1** and **F2**). The Ecoregion 7E Schedule includes descriptions of the different wildlife habitat types, indicator species, and criteria to determine significance. **Methods**

The presence of candidate SWH was identified through a preliminary assessment using background data and air photo interpretation. The presence or absence of candidate or confirmed SWH within the Study Area was further refined by comparing habitat and indicator species criteria against existing conditions based on ELC, botanical inventory, breeding birds, anuran call surveys, snake surveys and incidental wildlife.

3.4.2 Results

The preliminary SWH screening exercise identified several preliminary SWH types within the Study Area (**Appendix H1** and **H2**). Field investigations, including ELC, botanical inventories, breeding bird surveys, amphibian breeding surveys further refined this total to one candidate SWH and three confirmed SWH; these are mapped on **Figure 6**. Full results of the SWH screening are provided in **Appendix H1** and **H2**.

3.4.2.1 Seasonal Concentration Areas

The following are the candidate SWH identified within the Study Area:

- **Bat Maternity Colonies** – bat species may use deciduous forest (FOD) communities for maternity roost habitat, where tree cavities or loose bark are present. Forested areas within the Study Area presented suitable characteristics for use by bats, but no acoustic monitoring was completed at this stage. This is recommended for completion as part of Detailed Design Phase.

The following are confirmed SWH identified within the Study Area:

- **Deer Overwintering Area** – Deer overwintering and congregation areas are tracked by the MNDMNRF across Ontario. White-tailed Deer (*Odocoileus virginianus)* utilize large woodlots with suitable areas of cover, food and adjacent natural lands. The deciduous forest north of Book Road East is tracked as deer overwintering shown on **Figure 6.**

There was no other candidate or confirmed SWH under Seasonal Concentration Areas.

3.4.2.2 Rare Vegetation Communities

A single community, Dry – Fresh Oak – Hickory Deciduous Forest (FOD2-2), was identified as being S3S4 provincially. An S3 ranking is indicative of a vulnerable population (between 20-100 occurrences) while S4 are apparently secure (more than 100 occurrences) though uncommon.

There was no other candidate or confirmed SWH under Rare Vegetation Communities.

3.4.2.3 Specialized Habitats for Wildlife

There was no candidate or confirmed SWH identified within the Study Area under Specialized Habitats for Wildlife.

3.4.2.4 Habitats of Species of Conservation Concern

The following SOCC were not detected during field surveys but have suitable habitat within the Study Area. They are considered candidate SWH:

- **Candidate Habitat for SOCC: Snapping Turtle** - This species is listed as Special Concern in Ontario, it was not observed during surveys however may use the open aquatic habitat present within the Study Area.

The following are the confirmed SWH identified within the Study Area:

- **Habitat for SOCC: Monarch** – This species is listed as Special Concern in Ontario and was observed in cultural meadow (CUM) communities throughout the Study Area during the field investigations. Caterpillars feed on milkweed (*Asclepias* spp.) and are confined to meadows or open areas where these plants grow (MECP, 2019g). Common milkweed (*Asclepias syriaca*) was observed within cultural meadow (CUM) communities during field investigations; as such, these communities are considered confirmed SWH.
- **Habitat for SOCC: Wood Thrush –** This species is listed as Special Concern in Ontario and was detected at BBS -04 and BBS-06 within the Dry – Fresh Beech Deciduous Forest Community. The Wood Thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees, or shrubs, usually in Sugar Maple or American Beech (NDMRF, 2021a).
- **Habitat for SOCC: Eastern Wood Pewee –** This species is listed as Special Concern in Ontario and was detected at BBS-06 within the Dry – Fresh Beech Deciduous Forest community. The Eastern Wood-pewee lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understorey vegetation (NDMNRF, 2021b).

There was no other candidate or confirmed SWH under Habitat of SOCC within the Study Area.

3.4.2.5 Animal Movement Corridors

Continuous corridors (unbroken by roads, residential areas and water) linking significant natural areas within a municipality may be considered SWH especially when they provide cover at different heights for wildlife to use. Though a Hydro Corridor runs roughly east to west crossing the Study Area it is bisected by Glancaster Road and generally runs perpendicular to the local core areas. While wildlife likely use these features, there are no SWH animal movement corridors in the Study Area.

3.5 Linkage Assessment

The City of Hamilton's Natural Heritage System consists of Core Areas, which represent significant natural features (i.e. watercourses, wetlands, significant woodlands), supported by Linkages. Linkages are remnant natural areas in the landscape (i.e., riparian areas and hedgerows) that ecologically connect Core Areas, by providing avenues that facilitate movement of plants (e.g., propagules) and animals in response to life cycle requirements or environmental changes; thereby, enhancing biodiversity and resiliency of the Natural Heritage System (City of Hamilton, 2015b). Linkages support the ecological function of Core Areas by increasing their size and buffering them from adjacent land uses. Linkages can also be important natural features on their own, or degraded habitat which can be improved through restoration.

3.5.1 Methods

The purpose of a Linkage Assessment is to establish existing conditions and assess the ecological functions of a potential Linkage. An assessment of the ecological function was completed in accordance with the Natural Heritage Reference Manual (MNRF, 2010) and Linkage Assessment Guidelines (City of Hamilton, 2015b), using the results of background information review and field investigations.

3.5.2 Results

The Linkages within the Study Area, as depicted in Schedule B of the UHOP, connect a core area north of the Study Area to a core area within the south of the Study Area at Book Road East along the west side of Glancaster Road; this path roughly overlaps with portions of the hydro corridor extending north and south. Mapped as a contiguous strip on **Figure 3,** ELC on **Figure 4** demonstrate a more fragmented path with cultural meadows, residential and maintained areas (refer to **Section 3.2.2.2** for community descriptions) separated by mowed and maintained properties of institutional and residential buildings. Extending outside of the Study Area the linkages generally follow the path of the Hydro corridor to the east and west maintaining connections to other core areas. Watercourses are considered core areas in and of themselves while the riparian habitat can function as a linkage facilitating movement and use for larger species. Within the Study Area the linkages are generally consistent with the ELC. The main linkage along Glancaster Road based on Schedule B of the UHOP, 2013 above was generally consistent with those linkages depicted in the Schedule B2 for the AEGD with the exception of lands south of Twenty Road West, which on the AEGD Schedule B2 are mapped as a single core areas. Since the AEGD Schedule B2 is dated from 2009, Schedule B of the UHOP, which is dated as 2021, supersedes the linkages and core areas shown in the AEGD Schedule B2 and are considered to be the most up to date delineations.

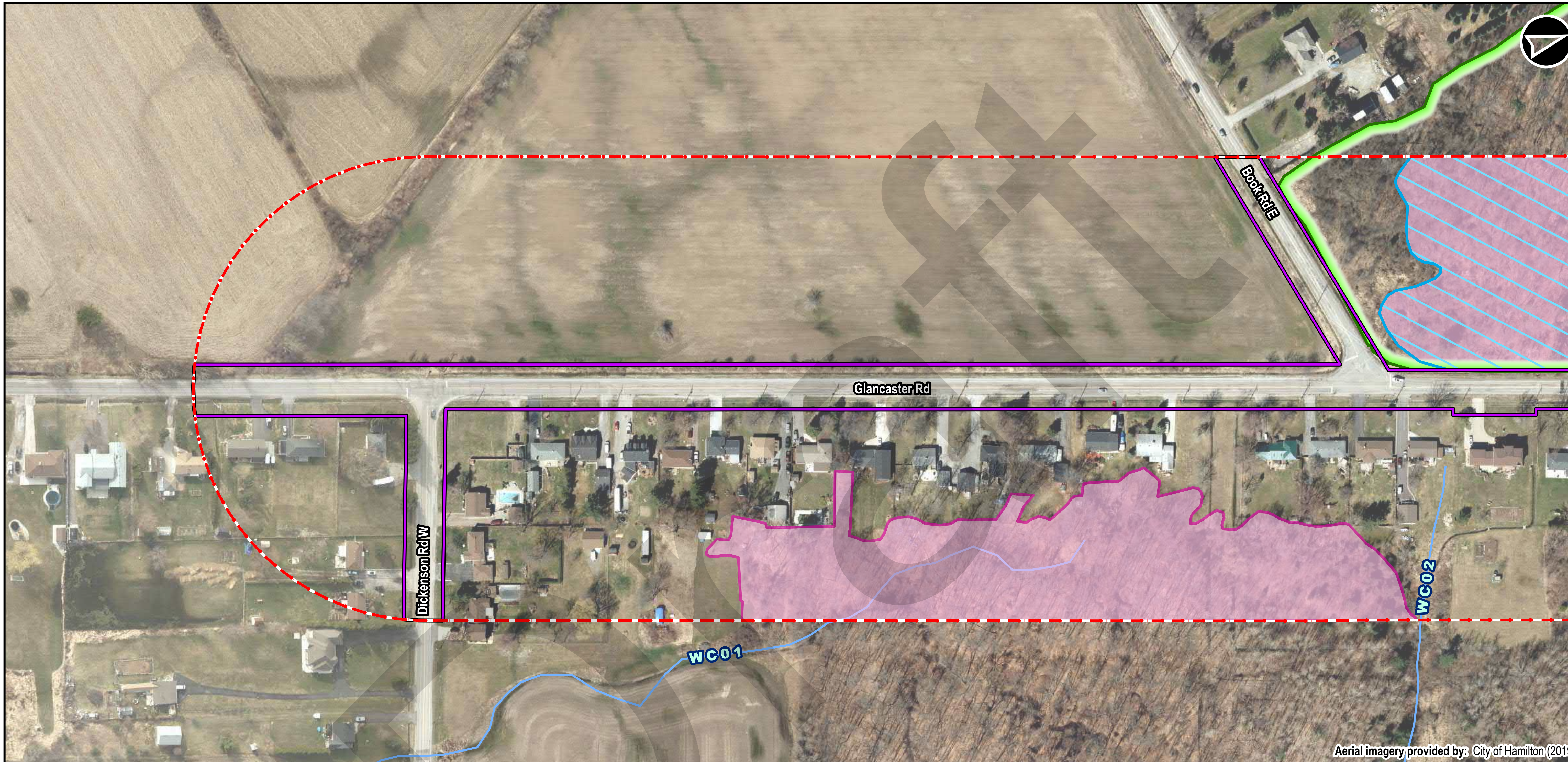
Vegetation communities within the linkages are highly influenced by anthropogenic activities including periodic mowing and other maintenance activities (e.g., tree and shrub clearing). The Linkage within the Study Area is fragmented by residential land uses. Vegetation communities identified within the Study Area, that were not identified in the UHOP and which could be considered for inclusion into the Linkage feature, include the following:

- **Cultural Communities (i.e., CUM1, CUT1)**:
  Cultural vegetation communities including Cultural Meadow, and Cultural Thicket were identified throughout the Study Area (refer to **Figure 4**). These communities are fragmented by residential lands uses. Cultural Meadows were identified as confirmed SWH for Monarch. Within several cultural meadow communities, a transition to more cultural thicket habitat is occurring. This vegetation diversity may provide linkage opportunities for terrestrial wildlife such as medium sized mammals (e.g., racoons, coyote) and larger mammals (i.e., deer). This vegetation also provides perching and nests habitat for birds.
- **Reed Canary Grass Mineral Meadow Marsh (MAM2)**:
  This community was not identified as SWH however it provides naturalized vegetation and permits linkage between other linkage features and Core Natural Areas to the north of the Study Area.
- **Associated Riparian Vegetation**
  Riparian corridor along WC-06 provides a Linkage opportunity. These may permit movement of wildlife from urbanized or residential areas into the other linkages and the Core Natural Feature both within and outside of the Study Area. Some terrestrial wildlife such as amphibians, turtles, medium sized mammals and larger mammals may prefer to move along a watercourses edges or banks rather than exposing themselves in more open habitats like the Cultural Meadow noted above. Other riparian areas assessed within the Study Area, such as WC-09, may provide some linkage, but are considered to have limited functionality due to reduced, patchy and/or maintained riparian vegetation.

The current condition of the linkages within the Study Area largely consists of regenerating cultural habitats or remnant natural vegetation communities that are degraded as evidenced by an abundance of non-native species observed during field investigations. A total of 35 avian species were detected during breeding bird surveys, and a total of four amphibian species during amphibian call count surveys. In addition, one amphibian, one reptile, and two insect species were identified incidentally during field investigations. Wildlife species using the linkages, including the SOCC Barn Swallow and Monarch, are tolerant of urban disturbance. The linkages provide supporting habitat to the nearby Core Areas by providing foraging, resting, or dispersal areas for wildlife in the Core Area. The results of the Linkage Assessment are provided in **Table 3-9.**

Table 3-9: Study Area Linkages Assessment Summary

Linkage Characteristic	Evidence
Ecological Function	The linkages are ecologically functional, providing breeding habitat or facilitates local movement of terrestrial wildlife; however, movement corridors may not be of significant ecological value at this time.
Size and Scale	The dimensions of the linkages may be appropriate to the scale of planning as identified in the UHOP, and generally extends between Book Road E and Garner Road linking two core areas; however, significant fragmentation and distance between core areas occurs on a landscape level to the east and west beyond the Study Area.
Redundancy	The overall linkages provide alternative pathways to Core Areas that occur within and beyond the Study Area.
Stepping Stones	Linkages within the Study Area consists of habitat patches that may provide temporary refuge and facilitate local movement. These habitat patches are mostly separated by residential properties.
Ecological Appropriateness	The mapped Linkage does not currently reflect a natural relationship between Core Areas being connected.
Suitability of the Path	Linkages provide opportunities for some species to move successfully; however, existing infrastructure and development may already impede less mobile species on a landscape level.
Surrounding Land Uses	The linkages within the Study Area are mostly surrounded by residential areas, which may permit terrestrial wildlife movement and dispersal for highly mobile wildlife.
Connection to Landforms and Areas with High Restoration Potential	Land within the Study Area and on the greater landscape currently supporting agricultural activities may be restored or rehabilitated to provide habitat for terrestrial wildlife in the future.
Connecting Core Areas	Linkages in the Study Area provide access to the Core Areas associated with SWH identified during Field Investigation.
Water Features	The linkages contain some riparian habitat



Legend

Study Area

Right of Way Limits

Confirmed SWH

Special Concern and Rare Wildlife Species (Wood Thrush and Eastern Wood-Pewee)

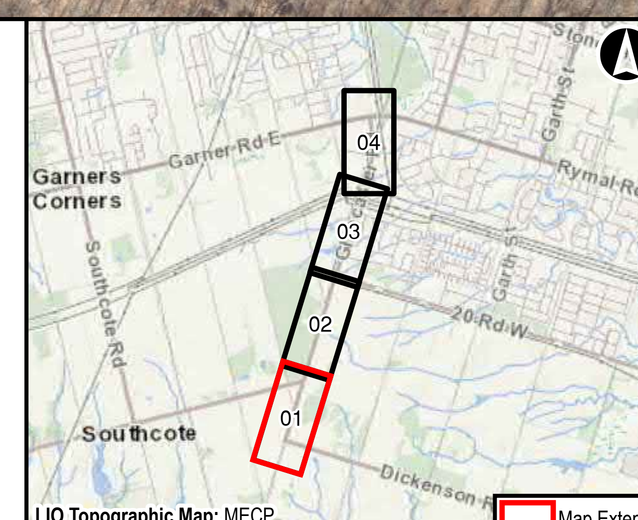
Deer Overwintering Area

Candidate SWH

Bat Maternity Colonies

Hamilton Water Features

Watercourse



Glancaster Road Class EA

Significant Wildlife Habitat

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NAD 1983 UTM Zone 17N

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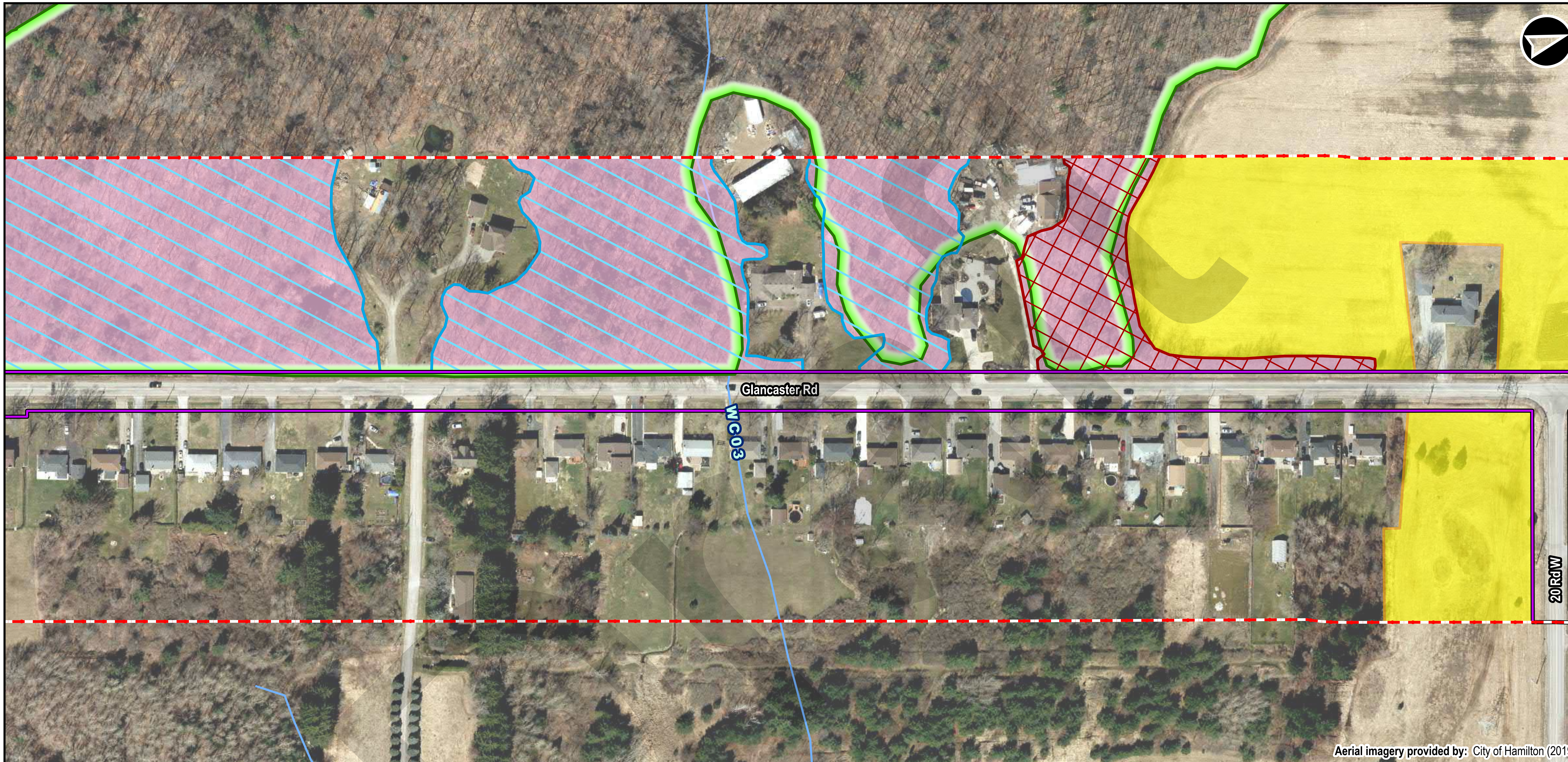
Figure: 6-01



Legend

- Study Area
- Right of Way Limits

Confirmed SWH

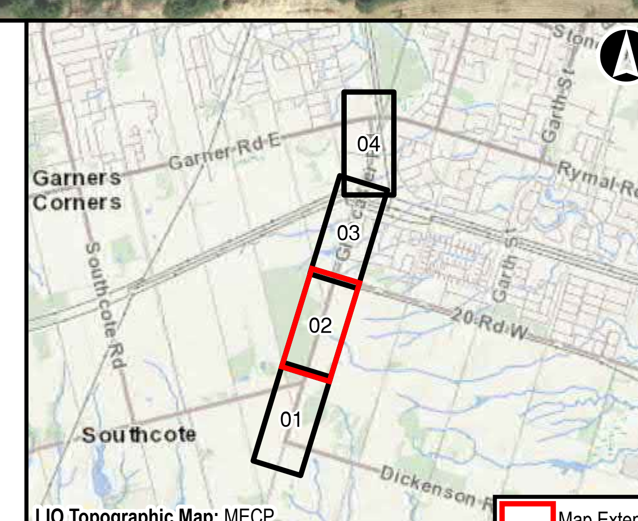
- Special Concern and Rare Wildlife Species (Wood Thrush and Eastern Wood-Pewee)
- Rare Vegetation Community (Dry – Fresh Oak – Hickory Deciduous Forest)
- Deer Overwintering Area
- Special Concern and Rare Wildlife Species (Monarch)

Candidate SWH

- Bat Maternity Colonies

Hamilton Water Features

- Watercourse



Glancaster Road Class EA

Significant Wildlife Habitat

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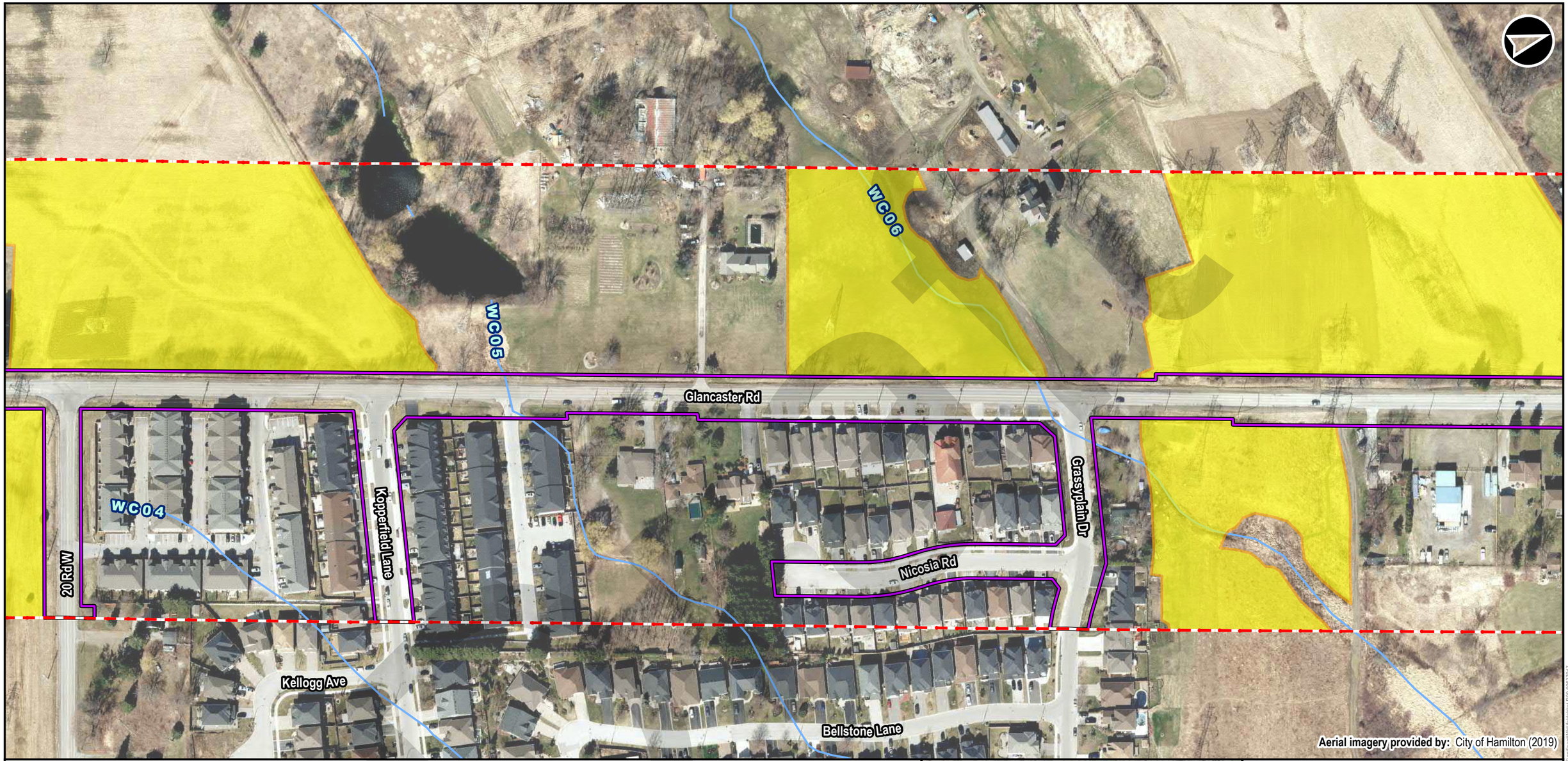
Figure: 6-02



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Study Area

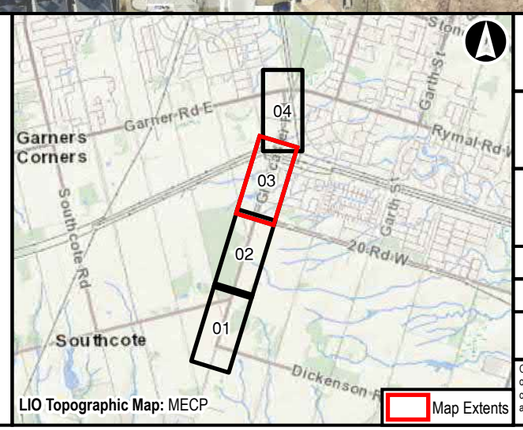
Right of Way Limits

Confirmed SWH

Special Concern and Rare Wildlife Species (Monarch)

Hamilton Water Features

Watercourse



LIO Topographic Map: MECP

Glancaster Road Class EA

Significant Wildlife Habitat

0 10 20 40 60 80 100 120 140 M

NAD 1983 UTM Zone 17N

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Figure: 6-03

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WC08
WC07
WC06
WC09
Glancaster Rd
Garner Rd E
Rymal Rd W

Aerial imagery provided by: City of Hamilton (2019)

Legend

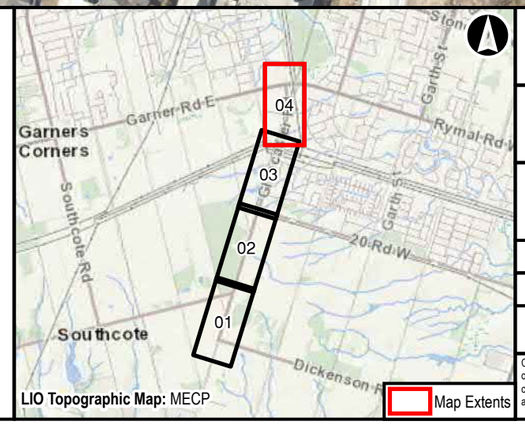
- Study Area
- Right of Way Limits

Confirmed SWH

- Deer Overwintering Area
- Special Concern and Rare Wildlife Species (Monarch)

Hamilton Water Features

- Watercourse



LIO Topographic Map: MECP

Glancaster Road Class EA

Significant Wildlife Habitat

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NAD 1983 UTM Zone 17N

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4. Assessment of Significance

Natural features are assessed using federal, provincial and local legislation policies and evaluation systems. The following provides a summary of significant features identified within the Study Area.

4.1 Federal

The majority of avian species nesting within the Study Area are afforded protection under the MBCA.

The Federal SARA applies to federal lands, federally regulated projects, or SAR birds receiving protection under the MBCA. It should be noted that Barn Swallow, and Wood Thrush which are designated as Threatened under the SARA, and Eastern Wood-Pewee, which are designated as Special Concern, were observed within the Study Area. Barn Swallow are also designated as Threatened under the ESA, they will be further addressed in **Section 4.2**. Wood Thrush and Eastern Wood-Pewee receive protection under the MBCA and their habitat is designated as SWH addressed further in **Section 4.2.**

4.2 Provincial

Provincially recognized features and species were identified within the Study Area during field investigations. They include:

- Barn Swallow, listed as Threatened under the ESA, was observed foraging within the Study Area. No nests were observed on anthropogenic structures; however, suitable nesting habitat may occur elsewhere within the Study Area.
- Butternut, listed as Endangered under the ESA, was observed within the Dry – Fresh Beech Deciduous Forest Type (FOD4-1), and Dry – Fresh Oak – Hickory Deciduous Forest Type (FOD2-2).
- Candidate habitat for bat SAR is present within the Study Area (refer to **Figure 5**); however, targeted surveys were not performed for this EIS as these are best deferred to detailed design when impacts to habitat are better defined.
- Significant Wildlife Habitat – one Candidate SWH (Bat Maternity Colonies) and four Confirmed SWH (Monarch Habitat, Wood Thrush Habitat, Eastern Wood-Pewee Habitat and Deer Overwintering) were identified within the Study Area.
- Significant Woodland under the PPS; and,
- HCA and NPCA Regulation Limits.

4.3 Municipal

Features and functions of the City's Natural Heritage System within the Study Area include:

- Linkages as defined by Schedule B of the UHOP;
- Core Natural Areas as defined by Schedule B of the UHOP including;
    - Significant Woodland;
    - Unevaluated wetlands;
    - Significant woodlands as per Schedule B-2 of the UHOP
    - Ponds;
    - Key Hydrological Features Streams as defined by Schedule B-2 of the UHOP. These features were identified as contributing fish habitat.

- Species at Risk habitat for Barn Swallow, Butternut, Chimney Swift, Tri-coloured myotis, Little Brown Myotis, Northern Myotis and Eastern Small-footed Myotis; and
- Significant Wildlife Habitat for bat maternity colonies, deer overwintering, and species of conservation concern including Snapping Turtles, Monarch, Wood Thrush and Eastern Wood-Pewee..

5. Additional Surveys and Next Steps

Assessment of potential impacts as result of the proposed works and identification of appropriate avoidance and mitigation measures, including setbacks, and monitoring plan will be provided for the City of Hamilton at the next iteration of this report.

The following recommendations are for additional surveys and next steps based on the existing conditions documented herein. These should be undertaken in consultation with appropriate agencies, and during the Detail Design phase of the Project.

- **Bat Acoustic Surveys –** Depending on the proposed impacts to the deciduous forest communities along Glancaster Road and Book Road East at detailed design, an acoustic monitoring survey should be completed to confirm any impacts to bat SAR habitat which may occur in the area and facilitate necessary permits. MECP should be consulted to confirm survey methodology and permitting requirements.
- **Barn Swallow Nesting Surveys -** Although no nests were identified during field investigations, all buildings and culverts to be impacted by proposed works should be examined, both internally and externally, prior to construction for use as nesting structures by this species. These surveys should be completed during the appropriate season immediately prior to commencement of construction.
- **Tree Inventory and Butternut Health Assessment -** Complete a tree inventory including hawthorn identification to species level and Butternut Health Assessment (BHA) during the Detail Design stage of the Project in accordance with the City of Hamilton's tree by-laws to quantify and assess trees which might require removal or may be damaged. The tree inventory will confirm the presence and health of Butternut within or adjacent to the proposed ROW. Any ground disturbance work within 50 m of a pure butternut will require a BHA and potentially a permit or authorization if impacts cannot be avoided. The tree inventory will also gather information on hawthorns identified to species level within the proposed areas of impact to ensure any provincially rare (S1, S2 or S3) species are protected.
- **Prepare a Tree Preservation, Maintenance and Replacement Plan** – Prepare a tree preservation, maintenance and replacement plan at the Detail Design phase of the Project, with HCA, in order to offset tree removals, limit or prevent tree injury or mortality, and ensure compliance with arboriculture best practices. This report shall be reviewed by the City. If necessary.
- **Fish community sampling** – at Detail Design phase of the project, fish community assessments should be completed (where appropriate) once permission to enter has been obtained for lands beyond the municipal ROW and the Hydro One lands..

6. Summary and Conclusions

The following Natural Heritage features, SAR, SAR habitat and SWH are or may be present within the Study Area:

- Birds and their nests, protected under the MBCA;
- Potentially suitable habitat for, Barn Swallow, Butternut, Little Brown Myotis, Eastern Small-footed Myotis, Tricoloured Bat and Northern Myotis, all of which are protected under the ESA;
- Confirmed and candidate SWH types which are afforded protection under both the PPS and the UHOP, these include: Monarch habitat, Wood Thrush Habitat, eastern Wood-pewee habitat and Bat Maternity Colonies;
- Linkages and Key Hydrological features afforded protection under the UHOP; and,
- Contributing fish habitat (AECOM 2021).

Based on the results of field investigations and development of this report, the following additional field investigations are recommended during Detail Design, where impacts are anticipated:

- Survey of anthropogenic structures for evidence of Barn Swallow nests;
- Acoustic survey to assess the presence of bat SAR within affected forest communities;
- Tree inventory in accordance with the City of Hamilton's tree by-laws to quantify and assess trees which might require removal or may be damaged.
- Tree Inventory as well as assessment of Butternut Health and consultation with MECP to determine if permits would be required;
- During detailed design identify Hawthorn's to species level to capture any locally or provincially rare trees for protection;,
- Fish community assessments in relevant watercourses once permission to enter has been given to confirm fish community assemblage identified in background review;

An impact assessment and recommendations for the protection of the natural features will be developed when preliminary designs have been determined and further refined with Detailed Design.

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Appendix A

Agency Correspondence

From: Adam Aldworth
To: MacKay Ward, Jessica
Cc: Jason Culp; David Deluce
Subject: [EXTERNAL] RE: Glancaster Road EA - Information Request & COVID-19 Safety Protocols
Date: Friday, September 18, 2020 8:23:50 AM
Attachments: image001.png

Hi Jessica,

Sorry for the delay responding to your information request for this project. Below is the information the NPCA has on file for this area:

- Natural Heritage Mapping can be accessed through the NPCA website at: https://gis-npca-camaps.opendata.arcgis.com/
- It would be pertinent to review the 20 Mile Creek Watershed Plan: https://npca.ca/images/uploads/common/NPCA-Watershed-Plan-20Mile-Creek.pdf
- The watercourses have been further assessed in the AEGD Subwatershed Plan (https://www.hamilton.ca/sites/default/files/media/browser/2017-08-04/aegd-update-subwatershed-stormwater-master-pan.pdf) as being supporting/contributing fish habitat or seasonal/warmwater fish habitat.

The majority of this project falls within the 20 Mile Creek Watershed, however the watershed divide between 20 Mile Creek and The Welland River occurs along Glancaster Road just north of Book Road. Mapping of the watershed boundaries can be found at the link provided above on the NPCA website.

I hope this information is useful.

Adam

From: MacKay Ward, Jessica <Jessica.MacKayWard@aecom.com>
Sent: August 27, 2020 1:06 PM
To: Jason Culp <jculp@npca.ca>; Adam Aldworth <aaldworth@npca.ca>
Cc: Naderi, Armin <Armin.Naderi@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Fazio, Margaret <Margaret.Fazio@hamilton.ca>
Subject: Glancaster Road EA - Information Request & COVID-19 Safety Protocols

Hi Jason and Adam,

Thank you for accommodating yesterday's meeting and the upcoming site visit within your busy schedules. Please find attached an information request letter for the Glancaster Road EA, which includes a summary of our preliminary natural heritage background information review for the Study Area.

Also attached is AECOM's Pandemic Procedure, Precautions for Coronavirus Task Hazzard

Assessment (THA) Form, and Coronavirus Vehicle Cleaning THA Form. Kindly review these in advance of Monday's site visit. In order to help prevent the spread of COVID-19, AECOM staff will travel to the site in separate vehicles, will maintain physical distancing (2 m), and will wear a non-medical mask if 2 m separation cannot be maintained while conducting field work.

We kindly request NPCA to convey any expectations in relation to the July/August botanical inventory and July/August site visit in support of the headwater drainage feature assessment in advance of Monday or acknowledge that these field surveys will proceed as planned and any additional information required will be captured during the fall 2020 and/or spring 2021 field investigations.

Many thanks,

Jessica

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Senior Project Manager / Senior Ecologist
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From:	Oaks, Colin
To:	MacKay Ward, Jessica
Cc:	Jamieson, Nora; McDonell, Lesley
Subject:	[EXTERNAL] RE: Glancaster Road EA - Information Request & COVID-19 Safety Protocols
Date:	Thursday, September 3, 2020 3:11:11 PM
Attachments:	image001.png

Hi Jessica,

We only have 1 set of fish records for that section of Tiffany Creek. They come from a 1992 Fisheries Assessment of Tiffany Creek between Golf Links Road and Highway 53 that the City(Regional Municipality of Hamilton-Wentworth at the time) had done by Cam Portt and Associates. It looks like they sampled the 50m reach just downstream of Garner Rd. and caught >100 Brook Stickleback (Culaea inconstans) and 1 Fathead Minnow (Pimephales promelas). As we observed on the site visit the creek in the reach through the school property is intermittent. Please let me know if you have any questions or concerns.

Sincerely,

Colin Oaks

From: Jamieson, Nora
Sent: August 27, 2020 1:40 PM
To: McDonell, Lesley <Lesley.McDonell@conservationhamilton.ca>; Oaks, Colin <coaks@conservationhamilton.ca>
Subject: RE: Glancaster Road EA - Information Request & COVID-19 Safety Protocols

Hi Lesley & Colin,
Lesley can you provide Jessica with requirements for summer (it's a little) and fall botanical inventories i.e. timing between both inventories, and the NAI database cost, etc.?
Colin can you respond to HDF requirements and fisheries assessments? Do you have any fish data for this area.
Thanks.

From: MacKay Ward, Jessica <Jessica.MacKayWard@aecom.com>
Sent: Thursday, August 27, 2020 1:12 PM
To: Jamieson, Nora <Nora.Jamieson@conservationhamilton.ca>; McDonell, Lesley <Lesley.McDonell@conservationhamilton.ca>; Oaks, Colin <coaks@conservationhamilton.ca>
Cc: Naderi, Armin <Armin.Naderi@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Fazio, Margaret <Margaret.Fazio@hamilton.ca>
Subject: Glancaster Road EA - Information Request & COVID-19 Safety Protocols

Hi Nora, Lesley, and Colin,

Thank you for accommodating yesterday's meeting and the upcoming site visit within your busy schedules. Please find attached an information request letter for the Glancaster Road EA, which includes a summary of our preliminary natural heritage background information review for the Study

Area.

Also attached is AECOM's Pandemic Procedure, Precautions for Coronavirus Task Hazzard Assessment (THA) Form, and Coronavirus Vehicle Cleaning THA Form. Kindly review these in advance of Monday's site visit. In order to help prevent the spread of COVID-19, AECOM staff will travel to the site in separate vehicles, will maintain physical distancing (2 m), and will wear a non-medical mask if 2 m separation cannot be maintained while conducting field work.

We kindly request HCA to convey any expectations in relation to the July/August botanical inventory and July/August site visit in support of the headwater drainage feature assessment in advance of Monday or acknowledge that these field surveys will proceed as planned and any additional information required will be captured during the fall 2020 and/or spring 2021 field investigations.

Many thanks,

Jessica

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Appendix B

Field Staff Curriculum Vitae

Adam Egan, B.Sc.

Terrestrial Ecologist

Education

Bachelor of Science in Environmental Sciences, Major; Ecology
University of Guelph, 2017

Years of Experience

With AECOM: 3

With Other Firms: 2

Role on this Project

Junior Ecologist

Area of Expertise

Fisheries collection techniques, sampling and assessment.

Fish salvage/rescue

Wildlife population assessments

Construction monitoring and wildlife relocation

Training and Certifications

Class 2 Electrofishing Certification

OSHA 10-hour construction safety training

UTV operation certification

Standard First Aid and CPR level C

Wilderness First Aid

Professional History

Adam is a Junior Ecologist in AECOM's Environmental Group. Adam has a variety of experience leading and performing aquatic assessments, fish salvages for different construction projects, and fisheries population assessments for a variety of different species across Ontario. Adam has experience construction monitoring on a variety of different projects including highway expansions, wind farms, and natural gas pipelines. Species that Adam has performed population assessments on include Lake Sturgeon, Walleye, Black Crappie, and Smallmouth Bass. He has experience with a variety of netting protocols, tagging procedures, as well as collecting different aging samples. Adam has done work with several different Species at Risk including Lake Sturgeon, habitat assessments of Barn Swallows as well as monitoring for Blanding's Turtle, Spotted Turtle, Whip-poor-will, Common Nighthawk, Kirtland's Warbler, Hognose Snake and Massasauga Rattlesnake. He has also performed population assessments for a variety of terrestrial wildlife in Ontario. He also has practical experience in aquatic monitoring techniques such as benthic invertebrate identification and collection methods as well as water chemical and physical testing. Adam has experience performing field work in remote areas of the country such as Marten Falls First Nation, ON, and Faro Mine, YT. Adam's combined experience with AECOM and the Ministry of Natural Resources and Forestry (MNRF) has provided him with experience following protocols and guidelines.

Project Experience

Infrastructure

Transportation

Ministry of Transpiration, Highway 401 Maitland Road Interchange to Highway 16 Interchange Preliminary Design and Environmental Assessment, Maitland, ON: Adam led field investigations including aquatic habitat assessments to collect existing condition status on water features and water crossing structures throughout the proposed project area.

Ministry of Transpiration, Highway 401 West Widening, Milton, ON: Adam was a lead environmental monitor for the technical adviser team. He performed site inspections, wrote reports, and flagged environmental concerns for the contractor and Ministry of Transportation.

Ministry of Transpiration, GTA West Transportation Corridor Route Planning and Environmental Assessment, Brampton, ON: Performed field investigations including fluvial and aquatic habitat assessments on water features that are flowing through the proposed project area.

Ministry of Transpiration, Highway 403 and Highway 6 Improvements, Hamilton, ON: Performed field investigations including aquatic habitat assessments on water features and water crossing structures for the highway 403 and highway 6 interchange.

Marten Falls First Nation, Marten Falls Community Access Road Environmental Assessment, Marten Falls, ON: Performed northern ecological land classification and set up bird and bat acoustic monitors on different proposed routes for the community access road. Travelled by helicopter to different points in the Hudson Bay lowlands to perform assessment.

MNRF, Roads Inventory Project, North Bay District, ON: Was a lead on project, responsible for leading staff out to perform inventories and assessments of roads and water crossings. Collected and managed data then reported bi-weekly to regional office on progress of the project.

Trout Unlimited Canada, Culvert Assessment Protocol Development, Guelph, ON: Performed research and field work to develop water crossing assessment protocol. Adam also performed a data analysis on data from Credit Valley Conservation in order to develop an effective protocol.

VIA Rail, QMOT VIA Rail, Toronto, ON: Conducted field investigations including aquatic habitat assessments to collect existing condition status on water features and water crossing structures for the VIA Rail line.

Resource Extraction

Crown-Indigenous Relations and Northern Affairs Canada, Faro Mine Rehabilitation, Faro, YT: Monitored and consulted for a stream diversion on the Faro Mine site. Adam also was responsible for ensuring that no fish were trapped in the original channel after the water was diverted and monitoring the diversion of the channel.

Energy

Enbridge, Owen Sound Phase 4 Reinforcement, Owen Sound, ON: Conducted fish salvages on multiple water crossings for the installation of the natural gas pipeline.

Nigig Power Corporation, Wind Farm Project at Henvey Inlet First Nation, Georgian Bay, ON: Developed and updated protocols for field work to be done on the project. Adam also acted as a Qualified Biologist and performed several fish rescues, site inspections and wildlife relocations.

Union Gas, Stratford Reinforcement Project, Stratford, ON: Developed safe work plans for environmental monitoring and surveys that will be performed on site.

Union Gas, Sudbury Lateral Pipeline Replacement, Sudbury, ON: Developed protocols for environmental monitoring and survey work on the project. Planned and coordinated staff involvement with field work for the project. Adam also performed several fish rescues and wildlife relocations.

Other Infrastructure Projects

MNRF, Net Lake Dam Repair, Net Lake, North Bay District, ON: Assisted regional engineer with dam repair. A temporary berm was created to hold water away from work area. Coordinated with welder, steal provider, and Temagami First Nation to perform project.

Population Monitoring

Fisheries

MNRF, Fall Walleye Index Netting, Lake Nipissing, ON: Performed walleye population assessment to investigate population decline and decline in body size. This involved setting a variety of gill nets with a variety of mesh sizes at different depths. Sampling involved collecting measurements of the fish and aging structures including scales, otoliths, and cleithrum for all sportfish caught.

MNRF, Lake Sturgeon Population Monitoring, Rainy River, Rainy River, ON: Performed Lake Sturgeon population assessment to observe recovery of Lake Sturgeon population. This involved setting gill netting as well as catching by hand of Lake Sturgeon in stream. Processing included collecting length and weight measurements as well as tagging the fish to observe recapture rates in later months.

MNRF, Black Crappie Population Assessment, Big Sawbill Lake, Rainy River District, ON: Performed Black Crappie population assessments to observe the population and compare to other lakes. Involved setting near shore community index netting to trap the fish. Then to process them we took length and weight measurements, a dorsal fin clip for aging, and marked the fish to observe recapture rates in later months.

MNRF, Smallmouth Bass Population Assessment, Rainy Lake, Rainy River District, ON: Performed Smallmouth Bass population assessment to monitor Rainy Lake population. To do this fish were collected from anglers of the Fort Frances Bass Championship. This involved Collect length and weight data, as well as dorsal fins for aging structures.

Wildlife

MNRF, Bear Wire Hair Trap Project, North Bay District, ON: Lead students out to perform baited station set up, rebaiting, and takedown. Project assessed bear population in the district. Adam Collected hair samples from barbed wire to perform DNA testing in order to identify individuals.

Forest Monitoring

MNRF, Silviculture Effectiveness Monitoring: Performed silviculture effectiveness monitoring on a number of different cut blocks in the district. Data was collected and reported back to District Forester.

- North Bay District, ON
- Rainy River District, ON

Heather Hughes, M.Res., B.Sc., CAN-CIESC

Ecologist

Education

M.Res. Ecology; Postgraduate Certificate Ecosystem Restoration; B.Sc. Environmental Sciences – Ecology

Years of Experience

With AECOM: 2+
With Other Firms: 7

Role on this Project

Ecologist (Kitchener)

Areas of Expertise

Species at Risk Surveys

Breeding Bird Surveys

Herpetofauna Surveys

Ecological Land Classification (ELC)

Habitat and Vegetation Restoration

Training and Certifications

Certified Inspector of Sediment and Erosion Control (CISEC), 2019

OSHA 40-Hour Hazardous Waste Worker, Refresher, 2018

Ontario Wetland Evaluation System (OWES), 2018

Ontario Reptile and Amphibian Survey Course (2017)

Ecological Land Classification (ELC), 2013

Professional History

Heather is an ecologist and environmental monitor with over nine years of experience. As an ecologist with construction operations she may be called upon to complete nest sweeps or assist in the management and training on project sites with Species at Risk (SAR). In completing existing conditions and environmental assessments Heather's experience includes amphibian and reptile surveys, breeding bird surveys, Species at Risk (SAR) surveys, and habitat and vegetation restoration. Through all phases of a project, from pre-construction, startup, to restoration, her training and experience work with the Project Team to keep things on track and identify concerns early in the planning process. As a Certified Inspector of Sediment and Erosion Control (CISEC) Heather applies her experience and training to ensure appropriate measures are applied to the protection of sensitive natural areas during construction mitigation planning.

Project Experience

Existing Conditions and Environmental Assessments

Ecologist. Pre-demolition Species At Risk Assessment | Metrolinx | Hamilton, ON | 2021. Heather led field activities and reporting completing species at risk assessments on buildings set for demolition. This included evaluation of the buildings for evidence of bat roosting or potential access points of SAR bats as well as assessment of chimneys for evidence of use or suitability for Chimney Swift.

Ecologist. Bradford Bypass | Ministry of Transportation | Bradford, ON | 2021. Heather led and completed field surveys and reporting for breeding bird surveys across the Study Area for the proposed Bradford Bypass environmental assessment and impact assessment. She also assisted in the completion field activities including vegetation inventory, SAR screening, ELC, and incidental wildlife observations.

Ecologist. Highway 401: Highway 16 Interchange to Maitland Road Interchange Preliminary Design | Ministry of Transportation | Maitland ON | 2021. Heather led and completed field surveys and reporting for breeding bird surveys across the Study Area for the proposed Bradford Bypass environmental assessment and impact assessment. She also assisted in the completion field activities including vegetation inventory, SAR screening, ELC, and incidental wildlife observations.

Ecologist. Highway 400 10 Structures | Ministry of Transportation | Port Severn, ON | 2021. Heather led and completed field surveys and reporting for ELC, and SAR habitat assessments for the rehabilitation of ten structures along the Highway 400.

Ecologist. Glancaster Road Environmental Assessment | City of Hamilton | Hamilton ON | 2021 Heather led field activities related to a Class EA for a proposed road widening. Field activities included breeding bird survey, vegetation inventory, SAR screening, ELC, and incidental wildlife observations. She also led preparation of the report.

Ecologist. Empey Street Wastewater Pumping Station Upgrades Municipal Class Environmental Assessment | City of Brantford | Brantford, ON | 2021. Heather led and completed field surveys and reporting for the Municipal Class Environmental Assessment Natural Environment Existing Conditions Report. Field Activities included ELC, vegetation inventory, SAR screening and incidental wildlife observations.

Ecologist. Mine Decommissioning and Closure Plan | Windsor Salt | Windsor, ON | 2018 – 2019. To facilitate the development of a closure plan and develop plans for rehabilitation of the lands around the Windsor Salt Mine, Heather lead a team completing snake coverboard surveys around the lands. Responsibilities included a desktop review of available secondary source information on existing environmental conditions, preparing an animal care protocol and other submissions required for the Wildlife Scientific Collectors Permit, leading the surveys, and preparing reports at the completion of work.

Ecologist. Stream Alteration/Restoration Scoped Environmental Impact Study (EIS) | Toronto and Region Conservation Authority (TRCA) | Markham, ON | 2017 – 2018. Heather assisted in preparing a Scoped EIS for proposed stream alteration and restoration works to protect existing infrastructure within the City of Markham. Responsibilities included a desktop review of available secondary source information on existing environmental conditions, preparing existing conditions descriptions of the affected areas, and assessing potential impacts and suitable mitigation measures to offset the proposed works.

Ecologist. Stream Alteration/Restoration Scoped EIS | TRCA | Richmond Hill, ON | 2017 – 2018. Heather assisted in preparing a Scoped EIS for proposed stream alteration and restoration works to protect existing infrastructure within the City of Richmond Hill. Responsibilities included a desktop review of available secondary source information on existing environmental conditions, preparing existing conditions descriptions of the affected areas, and assessing potential impacts and suitable mitigation measures to offset the proposed works.

Ecologist. Terrestrial Ecosystem Existing Conditions and Impact Assessment | MTO | Parry Sound, ON | 2017-2018 Heather worked as part of a team to complete field surveys and reporting for proposed widening and maintenance works of Highway 400 south of Parry Sound and other Ministry controlled roads north east of Parry Sound. Works included breeding bird surveys, wildlife assessments and ecological land classification of the subject lands.

Ecologist. Stormwater Management Pond Retrofit Class Environmental Assessment (EA) | Town of Caledon | Caledon, ON | 2017. Heather assisted with field activities related to a Class EA for a proposed stormwater management pond retrofit. Field activities included breeding bird survey, vegetation inventory, SAR screening, ELC, and incidental wildlife observations. She also assisted in preparing data for the report.

Ecologist. Stoney Creek Regional Facility EA | Terrapure Environmental | Stoney Creek, ON | 2017. Heather completed grassland breeding bird surveys to determine the presence and abundance of the eastern meadowlark (a species at risk) on target lands, for use in the EA of the site.

Ecologist. Snow Disposal Facility Scoped EIS | City of Guelph | Guelph, ON | 2017. Heather assisted with field activities related to a Scoped EIS for a proposed snow disposal facility. The proposed location was adjacent to a Provincially Significant Wetland (PSW) and required special considerations. Field activities included breeding bird survey, vegetation inventory, SAR screening, ELC, and incidental wildlife observations. Heather also assisted in preparing data for the report.

Terrestrial Field Ecologist. Brantford-Kirkwall Pipeline EA | Union Gas | Brantford and Kirkwall, ON | 2014. Heather assisted in completing field surveys and reporting as part of the EA for the proposed installation of a natural gas pipeline from Brantford to Kirkwall, Ontario. Field surveys included visual encounter surveys for snakes, basking surveys for turtles, SAR salamander trapping surveys, amphibian call count surveys, grassland breeding bird surveys, and vegetation inventories and categorization as per ELC.

Terrestrial Field Ecologist. Pipeline EA | Confidential Client | Ontario | 2013 – 2014. Heather completed field surveys to assess habitat and use by various species at risk along the pipeline corridor. Field surveys included vegetation inventories as per ELC, visual encounter surveys for snakes, basking surveys for turtles, and grassland breeding bird surveys.

Terrestrial Ecologist. Line 9 Integrity Digs | Enbridge | Ontario | 2013 – 2014. The urgent nature of the integrity digs necessitated rapid completion of habitat assessments for species at risk via desktop review. Using aerial photography, site photos and site notes provided by those supervising construction, Heather was part of a team of ecologists to efficiently complete desktop screenings and provide construction constraints to identify all suitable habitats of species at risk most likely to be present at the site location.

Terrestrial Field Ecologist. Energy East Pipeline EA | TransCanada | Cornwall, ON | 2013 – 2014. Heather worked as part of a team of ecologists to complete field surveys along the section of pipeline stretching from Ontario's western to eastern border for this large-scale EA. She completed breeding bird surveys, marsh monitoring callback surveys, amphibian surveys, and vegetation inventories as per ELC.

Terrestrial Field Ecologist. Grand River Renewable Energy EA | Samsung Energy | ON | 2012 – 2014. Heather led a team in completing amphibian surveys following marsh monitoring protocol methods and assisted with vegetation inventories as per ELC for the EA for project approvals. During construction, she applied her experience with breeding birds to complete nest searches prior to vegetation removal.

Construction

Environmental Monitor, Watson Park Watermain Replacement | City of London | London, ON | 2021. Heather worked as part of a team to inspect compliance of environmental controls and operations in replacement of a watermain segment crossing a small creek within the City of London. As part of these operations she completed inspections of erosion and sediment control, daily reports, and nest sweeps for migratory birds prior to vegetation clearing within the breeding bird window.

Ecologist. Queen Elizabeth Way Credit River Bridge | Ministry of Transportation | Mississauga ON | 2020- Present. AECOM is part of the EDCO partnership for the design, build and finance of the QEW/Credit River Improvement project. Heather works as part of the team to provide guidance and site assistance in completing construction activities in accordance with the environmental mitigation measures committed to in the contract documents and project permits. This includes field visits to confirm the limits of clearing around protected areas, organization of the Scientific Collectors Permit for wildlife relocations and annual reporting or vegetation monitoring.

Ecologist. Highway 401 Expansion Project, Technical Advisor | Ministry of Transportation |, Milton/Mississauga, ON | 2019 - Present Environmental monitoring lead for highway widening between Credit River and Regional Road 25 in Milton. Heather provides technical advisory services to MTO to assess contractor consistency with environmental commitments outlined in the Terrestrial Framework, Species at Risk Framework, the MECP Letter of Advice for Bat SAR and the Project Agreement. In addition to field inspections, Heather completes reviews of environmental submittals to look at erosion and sediment control measures [2019 - Present].

Environmental Scientist. Lock 45 Trent-Severn Waterway | Soletanche Bachy Canada | Port-Severn, ON | 2018-2019. Prior to project startup Heather independently prepared the Site-Specific Environmental Management Plan (SSEMP) related to installation of the cofferdams and planned restoration works of the Lock 45 for senior review and approval. Using her attention to detail she combined the relevant constraints from several background documents to form a cohesive guidance document on a quick timeline to meet and exceed the standards of Parks Canada. She also applied her technical expertise of Species at Risk (SAR) to the preparation of training and reference documents for Site staff. During construction, Heather was on Site when needed as an Environmental Professional providing monitoring of the water quality and working with the team to address any concerns as they arise.

Environmental Scientist. Locks 23, 24, 25 Trent-Severn Waterway | EBC | Peterborough, ON | 2018-2019 Working quickly and directly with the client Heather modified the provided Environmental Management Plans to reflect the Site-Specific constraints for proposed construction to meet and exceed the standards of Parks Canada. Applying her technical experience with SAR she prepared training and reference documents specific to the habitat available at site. During construction, Heather was called to Site as needed as the Qualified Professional to provide guidance and monitoring on erosion and sediment control and other environmental concerns.

Terrestrial Field Ecologist. Kingsbridge Wind Farm | Capital Power | Ashfield-Colborne-Wawanosh, ON | 2014. As a condition of construction for the Kingsbridge Wind Farm, an overall benefits permit for species at risk bobolink and eastern meadowlark habitat was required. Heather prepared the permit application, assisted in selecting suitable fields as compensatory habitat, and completed grassland breeding bird surveys to assess use by the target species.

Terrestrial Field Ecologist. West Side Waterloo | Greyerbiehl, Clair Creek Meadows, and Vista Hills | Waterloo, ON | 2012 – 2014. As part of construction compliance at the active housing development, Heather completed spring and fall monitoring of vegetation communities and sediment and erosion control measures installed on site. She was responsible for scheduling the necessary field days around other commitments, completing reporting and determining when a monitoring location could be removed from annual checks.

Terrestrial Field Ecologist. Carriage Crossing Development | Activa | Waterloo, ON | 2012 – 2014. As with the project above Heather completed spring and fall monitoring of vegetation communities and sediment and erosion control measures installed on Site. She was responsible for scheduling the necessary field days, completing reporting and eliminating stations as construction progressed.

Terrestrial Field Ecologist. Port Dover and Nanticoke Wind Farm | Capital Power | Haldimand and Norfolk Counties, ON | 2012 – 2014. Heather completed ongoing environmental monitoring during construction activities across the site, including nest searches prior to vegetation clearing during nesting season, bald eagle nest monitoring and movement surveys, and general monitoring of exclusion and erosion fencing around project footprints and nearby natural features.

Terrestrial Field Ecologist. Gosfield Wind Farm | Brookfield Renewable Power | Kingsville, ON | 2013. To ensure those searching the Gosfield wind farm were effective at finding possible bird and bat mortalities, Heather completed searcher efficiency testing. As part of this process, she tracked the numbers to ensure they did not fall below accepted efficiency thresholds for inclusion in reporting.

Terrestrial Field Ecologist. Comber Wind Farm | Brookfield Renewable Power | Lakeshore, ON | 2013. In compliance with

the Renewable Energy Act, Heather completed mortality monitoring and data entry of Comber wind farm during the fall season. She also assisted in testing search efficacy of other field staff and the analysis and reporting of results.

Terrestrial Field Ecologist. Grand Valley Wind Farm Phase 2 Monitoring | Grand Valley Wind | Grand Valley, ON | 2012 – 2013. In compliance with the renewable energy act, Heather was responsible for the mortality monitoring and data entry for the Grand Valley wind farm (phase 2). As part of this process, she assisted in the analysis and reporting of the data.

Restoration

Environmental Scientist. Rifle Range Decommissioning | QM Environmental | Niagara-on-the-Lake, ON | 2018. Under the guidance of senior staff, Heather applied her knowledge of sensitive communities and native plants to develop a planting plan and select seed mixes which would meet regulatory commitments and develop into suitable habitat for targeted species at risk. Heather was also the ecologist on site during removal of a potential snake hibernacula to ensure individuals could be recovered and relocated.

Environmental Scientist. Waterloo Landfill | Regional Municipality of Waterloo | Waterloo, ON | 2017 – 2018. Heather was the ecologist on site during revegetation plantings for a stormwater area and wetland. She provided guidance on plant spacing, or moving of plants when required to provide the best habitat for birds and mammals using the site or highest survival rate of plants. After construction, her attention to detail and collection of notes was used to produce the as built drawings for submission to the client and a warranty inspection the following year. Under the guidance of senior staff, Heather developed the planting plan and selected recommended plants for installation at an additional stormwater area being designed on the same property.

Environmental Scientist. Post-Construction Restoration Plantings | Holden Mine | Washington | 2017. Heather was part of a team providing quality assurance and quality control of trees and shrubs during the restoration plantings at the Holden Mine Legacy site. Day to day responsibilities included working closely with contractors providing plant materials and those planting them and providing daily feedback on any concerns at the end of day status meeting. After the seasons planting completed, she assisted in completing density plots creating a baseline to monitor survival of trees.

Publications

"Effects of temporary captivity on ranging behavior in urban red foxes (*Vulpes vulpes*)", Applied Animal Behaviour Science, Vol. 181, pp 82-190 (with B. Tolhurst, A. Grogan and D. Scott)

Kasey McKenzie

Ecologist

Education

Diploma, Ecosystem Management Technology -Biodiversity/Restoration Ecology/Conservation, Sir Sandford Fleming College, 2014

Years of Experience

With AECOM: 1.5
With Other Firms: 0

Role on this Project

Ecologist

Area of Expertise

Species at Risk Surveys

Urban Forestry

Rare Plant Surveys

Herpetofauna Surveys

Ecological Land Classification

Training and Certifications

Ontario Reptile and Amphibian Survey Course

Ontario Benthics Biomonitoring Network Certification

Professional History

Ms. McKenzie is an ecologist with an interest in species at risk, restoration, and herpetofauna. She has contributed to subdivision, industrial, highway, and wind energy projects. Ms. McKenzie's projects have included terrestrial field work, such as wildlife surveys, ecological land classification, species at risk habitat surveys and rare plant surveys. She has also contributed to data analysis and the preparation of natural heritage assessment reports, environmental impact studies and environmental assessments.

Ms. McKenzie also has previous experience with species at risk in Ontario, as well as urban forestry and invasive species.

Project Experience

Ontario Ministry of Transportation, GTA West Corridor Stage 2, Toronto, Ontario. Completed the significant wildlife habitat evaluation, species at risk habitat evaluation and edited the net effects tables and comparative evaluation tables.

Pattern Energy Group Ltd, Henvey Inlet First Nation - Wind Energy Centre Environmental Assessment, Parry Sound, Ontario. Conducted field investigations for the Henvey Inlet Wind Project which is proposed to be constructed in the Parry Sound District. Field investigations completed included ecological land classification, rare plant surveys, old growth forest surveys (tree coring) and various significant wildlife habitat surveys (turtle basking, snake hibernacula, bat maternity roosting, amphibian breeding etc). Kasey also contributed to data analysis, the natural heritage assessment report, species at risk permitting report, environmental impact study, and the environmental assessment.

Sifton Properties Ltd., Victoria On The River Environmental Impact Statement, London, Ontario. Coordinated all terrestrial field work for 2016, as well as prepared the environmental impact study.

Niagara Region, Dominion Road Reconstruction, Fort Erie, Ontario. Completed the ecological land classification for the natural areas associated with the road widening, as well as the existing conditions memo.

City of Toronto, Stormwater Management Pond Facility Condition Assessments, Toronto, Ontario. Completed species at risk habitat screenings and the ecology sections for stormwater management pond assessment reports.

City of London, Baker Lands Wetland Delineation and Environmental Impact Statement, London, Ontario. Coordinated and completed a background review, terrestrial field investigations, and reporting of industrial lands. Field investigations included ecological land classification, amphibian call surveys, breeding bird surveys, snake cover board surveys, incidental wildlife, a fish habitat assessment, and a butterfly survey. Reporting included a description of existing terrestrial conditions, impact assessment, and proposed mitigation measures.

Sifton Properties Ltd., Brantford Residential Subdivision Preliminary Design, Brantford, Ontario. Coordinated and completed all 2016 field work which included snake cover board surveys, breeding bird surveys, amphibian call surveys, floral inventories, and an aquatic habitat assessment. Currently updating and preparing the environmental impact study report, which includes evaluation of potential impacts and recommendations for suitable mitigation measures.

City of London, North Huron Land Status Report, London, Ontario. Assisted with snake coverboard surveys, as well as an ecological land classification.

Torys LLP, Settlers Landing Wind Park, Toronto, Ontario. Assembled multiple literature reviews and photo logs for witness statements.

City of Port Colborne, East Side Employment Lands Servicing, Port Colborne, Ontario. Completed the ecological land classification for the natural areas within the study area, as well as the natural heritage review

Mikayla Reid, B. Sc., G.I.T.

Fluvial Geomorphologist In Training

Education

Bachelor of Science, Environmental Geoscience (Honours), Brock University

Years of Experience

With AECOM: 1
With Other Firms: 1.5

Role on this Project

Fluvial Geomorphologist in Training

Professional Affiliations

Association of Professional Geoscientists of Ontario

Training and Certifications

Ontario Stream Assessment Protocol – Headwater Drainage Feature Assessment Course

Repairing Incised and Degraded Watercourses – Natural Channel Design Course

Professional History

Mikayla Reid is a Fluvial Geomorphologist in Training registered as a Geoscientist in Training with the Association of Professional Geoscientists on Ontario. She has a cumulative 1.5 years of experience with the Department of Fisheries and Oceans Canada as a Tides and Water Levels Assistant and Entomogen Inc. as part of the Storm Water Management Field Crew. Mikayla is currently accumulating fluvial geomorphology desk based and field based experience through her current role at AECOM. She has contributed to several channel rehabilitation, realignment and natural channel designs and meander belt assessment projects, often in support of Municipal Class Environmental Assessments. Mikayla has also gained experience with restoration projects including storm sewer sampling and groundwater sampling at waste management sites.

Project Experience

Municipal Class Environmental Assessment

City of Hamilton, Twenty Road East and Upper Red Hill Valley Parkway Extensions Municipal Class EA Phases 3 and 4. Project team member assisting with field investigations, data analysis and reporting. The study builds upon several previously completed Municipal Class EA processes that identified the need for transportation network improvements required to support future industrial development. Project challenges include disruption to natural features and water courses, considering meander belts and downstream impacts. (September 2018 – present)

York Region and Lake Simcoe Region Conservation Authority (LSRCA) Phosphorus Removal Demonstration Project – Storm Water Management Pond Retrofit Municipal Class EA. Responsible for assisting with field reconnaissance as well as preparation of an existing conditions report for a Storm Water Management Pond Retrofit. Project is following the Schedule A+ Municipal Class EA planning process and included a public information centre to explain proposed impacts to Tamarac Green Park (change from dry pond to constructed wetland, loss of trees, relocation of playground). Provided input into the geomorphological constrains to design a long term solution that will improve both sediment and water quality from a geomorphological perspective. (September 2018 – present)

Town of Whitby, Lynde Creek Master Drainage Plan Update – Municipal Class EA. Technical support for Town of Whitby/Central Lake Ontario Conservation Authority (CLOCA) Drainage Plan Update for the Lynde Creek Watershed. Assisted with field reconnaissance and reporting for a detailed update to the existing erosion inventory and fluvial geomorphic works completed in previous studies. The Lynde Creek Watershed, including its tributaries, has a total drainage area of 130 km^2. It is predominately located in the Town of Whitby and also extends into adjacent municipalities to the north and west. The study will update the original 1988 Master Drainage Plan and consider a number of additional reports that have been prepared since 1988. The purpose of this update is to provide guidance to both the Town of Whitby, CLOCA and other affected municipalities in continued management of the Lynde Creek watershed and stream corridors, in terms of flows and erosion, resources protection and development. The study will also support watershed management objectives as directed by the 2012 Lynde Creek Watershed Plan (CLOCA). The Class EA study will follow the Class EA Schedule B requirements (Master Plan Approach #2) of the Municipal Class EA document. (May 2018 – present)

Channel Rehabilitation, Realignment and Natural Channel Design

Stormwater Management Facility Pond 27-2 Feasibility Study, Richmond Hill, ON. Responsible for assisting with fluvial geomorphological field investigations and desktop analyses for a Reach in the vicinity of SWMF 27-2, with a focus on sediment

management and opportunities to work with natural creek processes. Recommendations to protect enhance or restore stream morphology and maintain channel processes and functions were provided to inform design alternatives. (July 2018 – present)

Cedarvale Well Field Upgrades and Riffle Design, Halton Region, Georgetown, ON. Project team member responsible for assisting with fluvial geomorphological field investigations and desktop analyses for a Reach in Silver Creek to assist in the detailed design and construction of a backwater riffle-crest in order to eliminate a perched culvert condition. This benefits and improves migration opportunity for fish and would be suitable as an overall benefit for Redside Dace. (July 2018)

Silver Creek Impact Assessment, Halton Region, Georgetown, ON. Assisted with fluvial geomorphological field investigations and desktop analysis to characterize existing conditions of the creek and determine potential impacts of reduced flows on creek morphology with proposed plans for wastewater diversion from the Georgetown WWTP. (November, 2018)

McGillivray Road Realignment, Ministry of Transportation, Vaughan, ON. Project team member responsible for assisting in conducting the desktop assessment and field reconnaissance to aid in the completion of detailed design services of the proposed Highway 427, McGillivray Road realignment. Detailed fluvial geomorphic designs and assessments were completed at both main crossings. (June 2018)

Airport Road, Ministry of Transportation, West Humber, ON. Project team member responsible for the report on existing conditions and completing field reconnaissance. The channel design incorporated the southernmost channel that flows south of Eagle Trace Drive and Whitwell Drive and runs parallel to Airport Road for approximately 175 m and was identified for potential realignment and design. (May 2018)

Bonar Creek, City of Toronto, Toronto, ON. As part of the natural channel design to the proposed outlet of the Bonar Creek Stormwater Management Facility (BCSWMF) into Mimico Creek, responsibilities included conducting a desktop assessment and background review as well as field reconnaissance to determine existing conditions at the site. This will aid in the future channel design processes. (September, 2018)

Meander Belt Assessments

North Huron Industrial Lands, Thames River Conservation Authority, London, ON. Project team member responsible for conducting existing conditions and field reconnaissance. Assisted in a Meander Belt Assessment to help with future design and to avoid potential impacts of development pressures at the site. (January 2019 – present)

Ninth Line, Halton Region, Milton, ON. Project team member responsible for assisting in a Meander Belt Assessment in the support of a proposed Road Widening along Ninth Line between 10 Side Road and Steeles Avenue for a new road crossing. Natural Channel Design and Rehabilitation will also be completed at this location. (September 2018 – present).

Highway 401 – OE, Ministry of Transportation, Milton, ON. Project team member responsible for assisting in a Meander Belt Assessment in support of proposed Road widening at Highway 401 and Regional Road 25 in support of Redside Dace protected and contributing habitat. (August 2018)

Highway 48th and 19th Street, Ministry of Transportation, Markham, ON. Project team member responsible for assisting in compiling a desktop review and field reconnaissance as part of a meander belt assessment in support of proposed improvements at the intersection of Highway 48 and 19th Avenue as well as assist in providing fluvial geomorphological input for culvert rehabilitation. (May 2018)

Waste Management Monitoring

Wentworth Waste Management Facility Storm Water Monitoring, Brampton, ON. Project team member responsible for assisting in conducting storm sewer sampling for the Waste Management Site in Brampton, Ontario. This was conducted in order to monitor the discharge from the Wentworth Waste Management Facility site to the storm sewers. This monitoring was conducted as part of the Stormwater Management Monitoring Program that was developed in 2002. (August 2018)

Lynn River and Big Creek Surface Water Monitoring Program, Norfolk County, Simcoe, ON. Project team member responsible for assisting in field reconnaissance data and laboratory data input, compilation and assessment. This data is part of a water quality monitoring programme for the Long Point Regional Conservation Authority (LPRCA). (June 2018 – present).

Nataliya Simonova, M.Sc., Ph.D

Terrestrial Ecologist

Education

MSc, Botany (Biology Teacher Education), Kuybyshev State Pedagogical Institute USSR (now Samara State University), 1991

PhD, Biology (Ecology), Institute of Ecology of Volga Basin now Russian Academy of Science), 2001

Years of Experience

With AECOM:	5.5
With Other Firms:	19

Role on this Project

Terrestrial Ecologist (Kitchener)

Areas of Expertise

Environmental Impact Studies

Natural Heritage Assessments

Environmental Field Surveys

Professional Affiliations

Member, Field Botanists of Ontario

Member, Society for Ecological Restoration (SER)

Training and Certifications

Ecological Land Classification, 2013

Ecosystem Restoration, 2014

Ontario Reptile and Amphibian Survey Course, 2016

Ontario Wetland Evaluation System, 2017

NHIC/ MNRF Data Sensitivity Training, 2017

Standard First Aid with CPRA+AED, 2019

General Arts and Science: English Language Studies, 2011

Professional History

Nataliya Simonova is a terrestrial ecologist with AECOM's Ecological Services Group working in Kitchener, Ontario. While at AECOM, she has contributed to a number of projects, including large scale highway expansions, renewable energy developments and a number of smaller scale transportation and infrastructure rehabilitation projects Her involvement in these projects has included: terrestrial fieldwork, data analysis and report writing.

Nataliya Simonova has knowledge and experience in diagnostic environmental assessment, monitoring of ecosystem, wetland evaluation, and field identification of flora (trees, shrubs, herbaceous plants including grasses, sedges and common invasive species). Her experience has involved a combination of terrestrial vegetation assessment and wildlife surveys. Dr. Simonova has also assisted in performing ecological land classification field work, species-at-risk permitting, herpetofauna survey, species-at-risk surveys, tree inventories and preservation plans, as well as provides support during construction providing guidance for proper tree maintenance. She has also analyzed data collection of ELC and plant list.

Project Experience

Environmental Assessment

Union Gas, Beachville Expansion, Tavistock, Ontario (Terrestrial Ecologist) Conducted terrestrial field investigations ecological land classification (ELC) in the project study area. Analyzed a data collection of ELC and plant list.

Union Gas, Sudbury Lateral Pipeline (Terrestrial Ecologist) Conducted terrestrial field investigations in the project study area. Analyzed a data collection and plant list.

GE Capital, Forefront & Edmonton Oil, Welland, Ontario (Terrestrial Ecologist) Assisted with data analysis.

City of London, Baker Lands Wetland Delineation and Environmental Impact Statement, London, Ontario(Terrestrial Ecologist) Performed background information research using the Natural Heritage Information Centre's (NHIC) Biodiversity explorer, as well as prepared a species at risk (SAR) table which outlines the species, its preferred habitat, and when species was last observed. Assisted in performing terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list.

City of Toronto, Stormwater Management Pond Facility Condition Assessments, Toronto, Ontario (Terrestrial Ecologist) Performing terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Data collection analyzing of ELC and plant list. Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance.

Halton, Regional Municipality of, Cedarvale Well Field Upgrade, Georgetown, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigations ecological land classification (ELC) and species-at-risk permitting, herpetofauna

surveys, and species-at-risk surveys in the project study area. Analyzed a data collection of ELC and plant list, and performed environmental impact statement report writing.

Sifton Properties Ltd., Victoria on the River Environmental Impact Statement, London, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigations ecological land classification (ELC) and herpetofauna surveys, and species-at-risk surveys in the project study area. Analyzed a data collection of ELC and plant list, and performed environmental impact statmeent report writing.

City of London, North Huron Land Status Report, London, Ontario (Terrestrial Ecologist). Performed terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list.

Sifton Properties Ltd., Brantford Residential Subdivision Preliminary Design, Brantford, Ontario (Terrestrial Ecologist). Performed terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area, herpetofauna surveys, and species at risk surveys. Analyzed a data collection of ELC and plant list and performed environmental impact statement report writing.

Sifton Properties Ltd., Old Victoria - High Density, London, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigations ecological land classification (ELC) and herpetofauna surveys, and species-at-risk surveys in the project study area. Analyzed a data collection of ELC and plant list, and performed environmental impact statement report writing.

City of London, Huron Road Species At Risk Assessment, London, Ontario (Terrestrial Ecologist). Performed tree inventories and preservation plans, as well as provided support during construction including guidance for proper tree maintenance in the development limits. Data collection analyzing.

City of London, North Huron Land Status Report, London, Ontario(Terrestrial Ecologist). Performed terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list.

Regional Municipality of York, Administrative Centre Annex with Provincial Offences Act Courts, Newmarket, Ontario (Terrestrial Ecologist). Assisted with data analysis and rehabilitation management plan writing.

GE Canada, 2016 Phase II Environmental Site Assessments, Welland and Strathroy, Ontario (Terrestrial Ecologist). Assisted with data analysis.

City of London, Kiwanis Park Pathway Detailed Design, London, Ontario (Terrestrial Ecologist). Conducted significant wildlife habitat assessment and species at risk surveys within the project study area. Rehabilitation plan writing.

Sifton Properties Ltd., Riverbend South Environmental Management Plan, London, Ontario (Terrestrial Ecologist) Assisted in preparation of a 3-year monitoring program which tracks potential impacts that development of farmland may have on the associated woodland and cultural plantation. Five plots were constructed in randomly selected areas, where vegetation communities will be closely monitored as well as tree health. Assisted in the completion of field investigations, which included the data collection of detailed plant lists and tree inventory.

Corporation of the City of London, Tributary C Construction and Post- development Phase Monitoring, London, Ontario (Terrestrial Ecologist). Assisted in preparation of 3-year monitoring program which tracks potential impacts to wetland vegetation communities within the representative wetland communities along Tributary C. Twenty (20) random quadrats were established where vegetation communities will be closely monitored. Lead in the completion of vegetation field investigations, which included the data collection of detailed plant lists and tree inventory. Analyzed data collection and report writing.

Corporation of the City of London, Project Dodge: 1577 and 1687 Wilton Grove Road Baseline Vegetation and Buffer Monitoring, Pre-Construction Phase, London, Ontario (Terrestrial Ecologist). Assisted in preparation three year wetland monitoring program which will be conducted to determine if there are any negative impacts to the Westminster Provincially Significant Wetland (PSW) as a result of the adjacent manufacturing development and associated stormwater management facilities. This program includes monitoring the wetland using five permanent quadrat sampling, wetland boundary delineation as well as species-specific surveys for skunk cabbage. Lead in the completion of vegetation field investigations, which included the data collection of detailed plant lists and tree inventory. Analyzed data collection and report writing.

Renewable Energy

Henvey Inlet First Nation, Henvey Inlet First Nation - Wind Energy Centre Environmental Assessment, Parry Sound, Ontario (Terrestrial Ecologist) Conducted ecological land classification, significant wildlife habitat assessment, and species at risk surveys within the project study area. Lead botanical surveys for bog plant species Branched Bartonia according to Ministry of Natural Resources protocol. Rrehabilitation management plan writing. Lead salvage of vegetation. Participated in data analysis.

Torys LLP, Settlers Landing Wind Park, Toronto, Ontario (Terrestrial Ecologist) Performing terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list. Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance.

Ministry of Transportation

Highways 6 & 401 improvements from Hamilton North Limits to Guelph South Limits including the new alignment of a segment of Highway 6 (G.W.P 3042-14-00), in the Township of Puslinch (Terrestrial Ecologist) Conducted terrestrial field investigations for the ecosystem's component of the project. Field investigations included identification of Species at Risk & Significant Wildlife Habitat and Ecological Land Classification during the 2017 field season in order analyzed a data collection of ELC and plant list.

City of Markham, Verclaire Gate Bridge Rouge River Crossing - Part A, Markham, Ontario (Terrestrial Ecologist) Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance. Township of LaSalle: Environmental Screening and MNRF Permitting for Various Road Improvement

Ontario Ministry of Transportation - Central Region, Greater Toronto Area West 400 Highway - Stage 2, Caledon, Ontario (Terrestrial Ecologist) Conducted terrestrial field investigations ecological land classification and species at risk permitting, herpetofauna surveys, species at risk surveys for the GTA West 400 series highway, and conducted data analysis.

Greater Toronto Area (GTA) West Transportation Corridor, Halton/Peel Townships, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigations ecological land classification and species at risk permitting, herpetofauna surveys, species at risk surveys for the GTA West 400 series highway, and conducted data analysis.

Ministry of Transportation, Highway 401 and Hwy 6, Guelph, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigation SAR surveys including Jefferson Salamander, Blanding's Turtle and. bat SAR habitat assessment, acoustic monitoring.

Southdale Road West Improvements – Pine Valley to Colonel Talbot Road, City of London (Terrestrial Ecologist) Performed background information research using the Natural Heritage Information Centre's (NHIC) Biodiversity explorer, as well as prepared a species at risk (SAR) table which outlines the species, its preferred habitat, and when species was last observed. Assisted in performing terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list.

City of London, Huron Road Species At Risk Assessment, London, Ontario (Terrestrial Ecologist). Performed tree inventories and preservation plans, as well as provided support during construction including guidance for proper tree maintenance in the development limits. Data collection analyzing.

City of London, Western Road and Sarnia Road/Philip Aziz Avenue Improvements - Environmental Ass, London, Ontario (Terrestrial Ecologist). Conducted terrestrial field investigations ecological land classification (ELC) and species-at-risk permitting, herpetofauna surveys, and species-at-risk surveys in the project study area. Analyzed a data collection of ELC and plant list.

City of London, Victoria Bridge Environmental Impact Study Report. (Terrestrial Ecologist) Conducted terrestrial field investigations ecological land classification (ELC) and species-at-risk permitting, herpetofauna surveys, and species-at-risk surveys in the project study area. Analyzed a data collection of ELC and plant list. Assisted with the completion of impact assessment and preparation of an EIS report.

Stouffville Road Environmental Assessment - Yonge Street to Highway 404, Markham, Ontario (Terrestrial Ecologist) Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance.

Metrolinx

Metrolinx, Kitchener Corridor Expansion 2019-2020 - TPAP Tree Inventory, Kitchener, Ontario. Conducted the arborist field work and data collection of tree health assessment.

Metrolinx, GO Transit - Bala Bridge Replacements, Toronto, Ontario (Terrestrial Ecologist). Conducted ecological land classification, significant wildlife habitat assessment, and species at risk surveys within the project study area. Analyzed a data collection of ELC and plant list. Assisted with tree inventories.

Regional Municipality of York, Stouffville Road Environmental Assessment - Yonge Street to Highway 404, Markham, Ontario (Terrestrial Ecologist). Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance.

Metrolinx, GO Rail Service Expansion - Lakeshore East Rail Corridor, Toronto, Ontario (Terrestrial Ecologist). Performed delineation and mapping of vegetation community using ecological land classification (ELC).

Metrolinx, Stouffville Rail Corridor Expansion - Second Track, Scarborough, Ontario (Terrestrial Ecologist). Assisted with tree inventories and preservation plans, as well as providing support during construction including guidance for proper tree maintenance.

Metrolinx, Burloak Drive Grade Separation Environmental Assessment and Design, Oakville, Ontario (Terrestrial Ecologist) . Performed background information research using the Natural Heritage Information Centre's (NHIC) Biodiversity explorer, as well as prepared a species at risk (SAR) table which outlines the species, its preferred habitat, and when species was last observed. Assisted in performing terrestrial site investigations using ecological land classification (ELC) to characterize vegetation communities in the project study area. Analyzed a data collection of ELC and plant list. Assisted with tree inventories and environmental impact statement report writing.

Nathaniel DeCarlo, MES

Ecologist

Education

Master of Environmental Studies, University of Waterloo, 2017

Ecosystem Management Technology Advanced Diploma, Fleming College, 2014

Honours Bachelor of Science in Wildlife Biology, University of Guelph, 2013

Years of Experience

With AECOM: 4
With Other Firms: 3

Role on this Project

Ecologist (Kitchener)

Area of Expertise

Project planning and coordination

Ecosystem and habitat classification

Policy, permitting and reporting

Impact assessments

Training and Certifications

Class 2 Electrofishing – Crew Leader

Reptile and Amphibian Survey Course

Standard First Aid and CPR-C

Canadian Safety Council UTV & Snowmobile Certification

OSHA 10 & 30 Hour Construction Industry Outreach Training Courses

Ministry of Labour 5-Step Supervisor Training

START Supervisor Training

Field Safety Trainer 2020

Professional History

Nathaniel (Nathan) DeCarlo is an ecologist with a strong background in terrestrial and aquatic ecology, with an emphasis project coordination and implementation. Nathan is a graduate from the University of Guelph and Waterloo with a Bachelor's degree in Wildlife Biology and a Masters of Environmental Studies, respectively, as well as Fleming College with an advanced diploma in Ecosystem Management Technology. Nathan has the education and experience to contribute to various projects in a meaningful way including field assessment, project planning and coordination, reporting processes, and providing presentations. Nathan has worked extensively on an array of development projects, with specific experience in the municipal sector, including background review, site assessment, impact studies, as well as extensive experience in environmental monitoring during the construction phase. Nathan has worked in a supervisory role within AECOM, and exhibits strong leadership as well as enthusiasm and positivity within a team setting. Nathan has been recognized for health and safety on-site, and brings a wealth of ecological and environmental knowledge to the projects he is involved with.

Project Experience

Municipal

United Counties of Leeds and Grenville, Four Lane Upgrade of County Road 43, Kemptville, Ontario. Preliminary species-at-risk screening and reporting for both the provincial and federal agencies. Contributed to Environmental Impact Study including SAR observation protocols, Post Effectiveness Monitoring Plan, and Environmental Management Plans

City of London, W12A Landfill Expansion, London, Ontario. Conducted Ecological Land Classification, Species at Risk habitat assessments, and Significant Wildlife Habitat assessments. Drafted Preliminary SAR Screening Memorandum.

City of London, Kilworth Bridge Rehabilitation, London, Ontario. Conducted SAR habitat assessments, Ecological Land Classification, barn swallow nest surveys, and aquatic habitat assessments. Aided in scoping and drafting of an Environmental Impact Statement.

City of London, Watson Street EIS, London, Ontario. Conducted wildlife and SAR vegetation sweeps ahead of construction activities. Conducted site meeting with City of London staff, arborists, and contractor.

City of London, Mud Creek Channel Restoration Phase 2 Detailed Design, London, Ontario. Drafted and submitted Preliminary SAR Screening Memorandum to confirm workplan and permitting requirements.

City of London, Hyde Park SAR Screening, London, Ontario. Aided in drafting a SAR Screening Technical Memorandum.

City of Woodstock, Woodstock Stormwater Facility Sediment Removals, Woodstock, Ontario. Compiled information for and submitted multiple Wildlife Scientific Collector's Authorization applications and a License to Collect Fish for Scientific Purposes.

Municipality of Middlesex Centre, Middlesex Stormwater Facility Sediment Removal, Ilderton, Ontario. Compiled information for and submitted multiple Wildlife Scientific Collector's Authorization applications and a License to Collect Fish for Scientific Purposes. Conducted fish and reptile salvage for SWM facility sediment removal.

City of Woodstock, Corlett Industrial Development, Woodstock, Ontario. Conducted Ecological Land Classification, Blanding's Turtle targeted surveys, and amphibian call surveys.

City of Pickering, Walnut Lane Road Extension, Pickering, Ontario. Prepared the Terms of Reference and aided in reporting for EIS.

York Region, York Region Phosphorus Removal Demonstration Project, East Gwillimbury, Ontario. Conducted terrestrial conditions reporting. Provided input for the existing terrestrial conditions for a Site Investigation Report for the Lake Simcoe Region Conservation Authority.

Township of Centre Wellington, Centre Wellington Water Supply Management Plan, Centre Wellington, Ontario. Conducted background screening (i.e., SAR, SWH) and Natural Heritage Background Review reporting.

City of Cambridge, Elgin Street North Environmental Impact Study, Cambridge, Ontario. Conducted fish habitat assessments for a proposed sewer outlet structure to Mill Creek.

Transportation

Metrolinx, Kitchener Corridor Expansion 2019-2020 - TPAP Environmental Assessments, Kitchener, Ontario. Conducted terrestrial and aquatic ecological monitoring including the setup and collection of bat acoustic monitors and fish community surveys. Supported existing conditions reporting including species at risk and significant wildlife habitat screening using field data and aerial photography. Aided in the reporting of results from baseline monitoring (i.e., ELC, breeding bird surveys). **Metrolinx, Ontario Line North, South, and West Subway Projects, Toronto, Ontario.** Conducted terrestrial monitoring including bat exit surveys and the setup and collection of bat acoustic monitors.

Windsor-Detroit Bridge Authority, Gordie Howe International Bridge, Windsor, Ontario. Aided in preparing the Sediment and Erosion Control, Wildlife and Species-at-Risk, and Vegetation and Invasive Species Environmental Monitoring and Management Plans. Conducted health, safety, and training tracking including the organization and tracking of health and safety training compliance for AECOM staff on the project, Site Induction training, and Species at Risk Awareness training.

Ministry of Transportation, QEW Credit River Improvement Project, Mississauga, Ontario. Drafted, submitted, and procured an approved Wildlife Scientific Collector's Authorization and associated Animal Care Protocol for wildlife relocation and turtle nest relocation. Conducted fish and wildlife salvages utilizing electrofishing and seine nets, as well as turbidity monitoring. Provided technical expertise for wildlife exclusion and sediment and erosion control measures.

Ministry of Transportation, Stage 2: GTA West Transportation Corridor Route Planning and Environmental Assessment Study, Greater Toronto Area, Ontario. Conducted terrestrial and aquatic monitoring and data management including breeding bird surveys, Ecological Land Classification, amphibian call surveys, fish habitat assessment, and fish community surveys. Co-ordinated data analysis, fieldwork reporting, and wildlife crossing identification. Drafted fieldwork summary memorandums, provided technical expertise as a terrestrial specialist, conducted wildlife crossing input, and coordinated fieldwork and reporting tasks.

Ministry of Transportation, Highway 403/6 Grindstone, Burlington/Dundas, Ontario. Conducted terrestrial monitoring including breeding bird surveys and Ecological Land Classification.

Ministry of Transportation, Highway 401/6 Improvements, Puslinch & Guelph, Ontario. Conducted terrestrial ecological monitoring including Jefferson Salamander surveys and habitat, species-at-risk turtle surveys, insect trapping, and breeding bird surveys. Aided in reporting of Jefferson Salamander field results.

Energy

Enbridge (Union Gas) Pipeline, Sarnia Storage Enhancement Project, Sarnia, Ontario. Provided terrestrial natural heritage input (including impact assessment) to the Environmental Report and Information Gathering Form. Conducted species-at-risk habitat assessments, Ecological Land Classification and botanical inventory, bat acoustic monitoring and extensive Butler's gartersnake coverboard surveys.

Enbridge (Union Gas) Pipeline, Beachville Expansion & Kingsville Reinforcement, Stratford/Kingsville, Ontario. Compiled and organized data for vegetation and bat surveys for reporting. Acquired MNRF authorization for turtle nest relocation. Conducted turtle nest relocations and releases.

Enbridge (Union Gas) Pipeline, Sudbury Lateral Pipeline, Sudbury; Owen Sound Lateral Replacement: Conducted fish salvages, using minnow traps, fyke nets, and electrofishing. Conduct area searches ahead of construction activity for SAR

species, including monitoring turtle traps. Obtained an amendment to the Wildlife Scientific Collector's Authorization for turtle nest salvage and transport including an approved Animal Care Protocol.

Pattern Energy Group Ltd., Henvey Inlet Wind, Parry Sound, Ontario. Acted as Lead Environmental Monitor consisting of the following:

- Coordinated dozens of environmental monitors and biologists during construction phase and work as health and safety lead for field staff;
- Coordinated construction activities with the client and contractor on a daily basis and act as Environmental trainer for site staff, contractors, and visitors; and
- Acted as on-site point of contact for ecology and environmental issues for monitors and biologists.

Acted as Qualified Biologist consisting of the following:

- Conducted fish salvages at proposed water crossings using electrofishing and monitored the installation of the culverts;
- Monitored for SAR ahead of vegetation crews and blasting activities as well as general monitoring for compliance with the SARA Permit and EA obligations;
- Performed species relocation on-site for SAR and Non-SAR reptiles;
- Conducted ongoing habitat assessments such as bat crevices/trees, micrositing for SAR habitat, and SAR reptile hibernacula and gestation site; and
- Assessed sediment and erosion control and the ecological impact of spills on habitat.

Residential

Sifton Properties Ltd., Hardy Road, Brantford, Ontario. Conducted terrestrial ecological monitoring including spring vegetation monitoring (transects, quadrats), bat acoustic monitoring, species-at-risk snake surveys, turtle and turtle nesting surveys. Contributed to terrestrial baseline conditions reporting.

Sifton Properties Ltd., High Density, London, Ontario. Aided in the organization of field program. Conducted SAR snake surveys.

2081788 Ontario Corporation, Broos Subdivision Phase 2, Ayr, Ontario. Conducted SAR screening/background review and aided in reporting for EIS.

Technical

Toronto and Region Conservation Authority, Natural Systems Climate Change Adaptation, Greater Toronto Area, Ontario. Conducted technical research, site visits, and reporting on best practices for climate change adaptation and application of best practices to case studies within TRCA jurisdiction.

City of London, Environmental Management Guidelines Update, London, Ontario. Conducted consultation meeting with stakeholders. Conducted background review of policy and scientific literature related to ecological buffers, evaluation of natural heritage feature significance, ecological compensation, and general best practices for environmental management of natural heritage systems for the update. Aided in the drafting of the updated Environmental Management Guideline documents.

Publications

DeCarlo, N., Oelbermann, M., & Gordon, A.M. (2019). Carbon dioxide emissions: spatiotemporal variation in a young and mature riparian forest. Ecological Engineering, 138:353-361.

DeCarlo, N., Oelbermann, M., & Gordon, A.M. (2019). Spatial and temporal variation in soil nitrous oxide emissions from a rehabilitated and undisturbed riparian forest. Journal of Environmental Quality, 48:624-633.

Awards

AECOM Impact Assessment & Permitting – Challenge Coin; AECOM Safety Award – Silver Coin – Henvey Inlet Wind

Olivia Butty, Hon. B.Sc.

Aquatic Ecologist

Education

Honours Bachelor of Science, Marine & Freshwater Biology, University of Guelph, 2015

Years of Experience

With AECOM: 4
With Other Firms: 2

Role on this Project

Aquatic Ecologist

Areas of Expertise

Environmental Permitting

Aquatic Species at Risk

Field Assessments

Training and Certifications

MTO Fisheries Assessment Specialist (2019)

MTO/DFO/MNRF Fisheries Protocol (2018)

Identification of Ontario Minnows, Royal Ontario Museum (2018)

Identification of Ontario Species at Risk, Royal Ontario Museum (2019)

UTRCA Erosion and Sediment Control Workshop (2018)

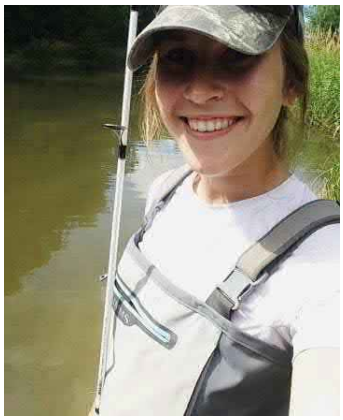
Class 2 Electrofishing Recertification (2017)

Small Vessel Operator Proficiency (2014)

Marine radio operator (2013)

Small Non-Pleasure Vessel Basic Safety (2012)

VHF Operators Training (2012)



Professional History

Olivia is an Aquatic Ecologist on AECOM's Water & Natural Resources Team and is based in the Guelph, Ontario office. She has a focused background in aquatic ecology in both the mining and construction sectors. She is experienced in the design and implementation of field studies and preparation of technical reports for a range of environmental projects including environmental assessments, impact assessment and mitigation, baseline studies, environmental impact statements, environmental effects monitoring, fisheries/habitat compensation strategies, Species at Risk screenings, overall benefit studies and environmental (including SAR) permitting and approvals.

Project Experience

Fish and Fish Habitat Assessments

Township of Centre Wellington, 20th Sideroad Structure 27-WG, Elora: Provincial and federal SAR permitting; conducted eDNA and conventional sampling targeting Redside Dace in Irvine Creek Watershed.

Fisheries and Oceans Canada, Redside Dace Sampling in the Irvine Creek Watershed: Field lead. Provincial and federal SAR permitting.

Ontario Ministry of Transportation, Highway 401 East Bound Core and Collector Lanes between Neilson Road and Whites Road, City of Pickering: Field lead. Fish and fish habitat existing conditions and impact assessment report for the reconstruction of a portion of Highway 401, including the rehabilitation of two structural culverts over Petticoat Creek and two bridges over the Rouge River in the City of Pickering.

Ontario Ministry of Transportation, Highways 6 and 401 Improvements, Hamilton to Guelph: Field lead. Fish and fish habitat existing conditions and impact assessment report at 56 watercourses within the project area. Environmental permitting.

Ontario Ministry of Transportation, Highway 401 OE, Milton to Mississauga: Assessed and reported aquatic habitat conditions at watercourses within the project area to determine existing conditions and assess impacts.

Ontario Ministry of Transportation, Highways 9 and 26 Culvert Rehabilitation: Assessed and reported aquatic habitat conditions at watercourses within the project area.

Ontario Ministry of Transportation, Highway QEW Task 8: Field lead. Fish and fish habitat existing conditions and impact assessment report at watercourses within the project area.

Ontario Ministry of Transportation, Highway QEW North Shore: Assessed and reported aquatic habitat conditions at watercourses within the project area to determine existing conditions and assess impacts.

Ontario Ministry of Transportation, Highways 9 and 26 Culvert Rehabilitation: Undertook impact assessments on 5 watercrossings within the Hwy 9 & 26 project limits.

Ontario Ministry of Transportation, Highway 401 OE, Milton to Mississauga: Undertook impact assessments on 22 watercrossings within the Hwy 6 & 401 project limits.

Ontario Ministry of Transportation, Porcupine River Culvert Rehabilitation: Completed DFO Pathways of Effects process for culvert rehabilitation and partial removal.

Ontario Ministry of Transportation, Highway 403 & Highway 6 Preliminary Design: Field lead. Fish and fish habitat existing conditions at 18 at water crossings within the Hwy 6 & 403 project limits; preparation of technical report.

Ontario Ministry of Transportation, Highway 403 & Eglinton East Culvert: Field lead. Fish and fish habitat existing conditions at water crossings within the project limits; preparation of technical report.

Metrolinx, Kitchener Corridor Expansion: Field lead. Assessed aquatic habitat conditions at 45 watercourse crossings within the project area and reported within an impact assessment report.

Metrolinx, King City GO Station Improvements, King City: Assessed aquatic habitat conditions at watercourses within the project area and reported within a Natural Environment Report. Environmental permitting.

Metrolinx, Lakeshore LSE, Scarborough: Conducted species-at-risk mussel presence/absence survey.

Metrolinx, Union Station Bus Terminal, Toronto: Reported aquatic habitat conditions and species-at-risk limitations within a Natural Environment Report.

Metrolinx, Kitchener Expansion: Field lead. Lead aquatic field studies and reported aquatic habitat conditions and impact assessment at 90 sites within the Study Area. Environmental permitting.

Metrolinx, Ontario Line Lead aquatic field studies and reported aquatic habitat conditions and impact assessment at 90 sites within the Study Area.

Region of Halton, Emergency Cross Culvert Rehabilitation and Slope Stabilization, Milton: Assessed aquatic habitat conditions at location of proposed works and reported within a technical memo.

Region of Halton, Silver Creek WWTP Impact Assessment, Georgetown: Assessed and reported aquatic habitat conditions at five reaches of Silver Creek within the project area.

Region of Peel, The Gore Road Improvements Between Queen Street East and Castlemore Road, Brampton: Assessed aquatic habitat conditions within the project area; prepared natural environment preservation and planning memorandum.

Enbridge, Owen Sound Lateral Replacement, Durham: Assessed and reported aquatic habitat conditions at watercourses within the project area to create an Aquatic Technical Report. Environmental permitting.

Enbridge Stratford Reinforcement Project, Zorra Township, Ontario. Field lead. Assessed and reported aquatic habitat conditions at watercourses within the project area to create an Aquatic Technical Report. Environmental permitting.

City of Hamilton, Twenty Road URVHP Extensions: Field lead. Assessed aquatic habitat and headwater features within the study area. Reported findings and recommendations within a technical memo; performed amphibian surveys.

City of Kitchener, Sandrock Bridge Replacement*:* Completed impact assessment and DFO Pathways of Effects process for the proposed replacement of the bridge crossing Sandrock Creek with a new clear span bridge.

City of London, W12 Landfill EA and REA, London: Assessed aquatic habitat conditions at watercourses within the project area.

City of London, South London Wastewater Servicing, London: Assessed aquatic habitat conditions at watercourses within the project area.

City of London, 187 Byron Ave, London: Field lead. Assessed aquatic habitat conditions at watercourses within the project area and reported within an Environmental Impact Study.

Evaluation of Habitat Restoration Activities for Species at Risk Fishes
Conducted 3 years of bi-annual large-scale fisheries sampling and habitat assessment program. Species present included: Pugnose Shiner, Lake Chubsucker, Grass Pickerel and Warmouth.

Distribution of Spotted Gar adults and juveniles in Rondeau Bay, Long Point Bay and Hamilton Harbour Watershed:
Conducted eDNA water sampling and fish and habitat assessments at 98 sites within Rondeau Bay and its tributaries, Long Point Bay and its tributaries, Cootes Paradise and Hamilton Harbour. Methods included:

- eDNA sample collection and filtration
- Spawning surveys
- Spawning habitat assessments
- Juvenile habitat assessments

Mining Specific

North American Palladium:
Environmental Effects Monitoring
Conducted cycle 5 of environmental effects monitoring, including water chemistry, benthic community, sediment toxicity, fisheries sampling (community, tissue toxicity, fecundity) and aquatic habitat assessments.

Mount Polley Gold Mine:
Post-Spill Monitoring
Conducted two series of fisheries inventories (community, tissue toxicity, fecundity) and aquatic habitat assessments at 2 affected lakes, 2 affected watercourses and 3 reference locations following Mount Polley dam collapse disaster.
Additionally: benthic community, water chemistry and sediment toxicity sampling.

Mount Polley Gold Mine:
Environmental Effects Monitoring
Conducted cycle 1 of environmental effects monitoring, including water chemistry, sediment toxicity, benthic community, 24h benthic depuration, fisheries sampling (community, tissue toxicity, fecundity, spawning and larval surveys) and aquatic habitat assessments.

Brunswick 12 Mine:
Environmental Effects Monitoring
Conducted environmental effects monitoring, including water chemistry, sediment toxicity, benthic community, fisheries inventory and aquatic habitat assessments on 5 reference, 5 near-field and 5 far-field watercourses.

Faro Mine Complex, Fish Salvage, Yukon: AECOM field lead on a team of stakeholders at large-scale fish salvage within 3 km isolated reach of affected watercourse.

Musselwhite
Environmental Effects Monitoring
Prepared mandatory EEM electronic reporting documents for Musselwhite.

TECK Elk Valley
Local and Regional Aquatic Effects Monitoring Program
Conducted multi disciplinary reference area sampling (fisheries, benthic community, periphyton, water quality) for TECK operations within the Elk Valley area.

Environmental Monitoring

Enbridge, Owen Sound Phase 4 Reinforcement Project, Owen Sound: Lead ecologist at fish removals in isolated work areas. Environmental permitting.

Township of Centre Wellington, 20th Sideroad Structure 27-WG, Elora: Conducted fish removals in isolated work areas and submitted results to MNRF.

Municipality of Chatham-Kent, Thamesville Bridge EA, Thamesville: Conducted fish removals in isolated work areas and submitted results to MNRF.

CER, Henvey Inlet Wind Energy Centre, Henvey Inlet: Monitored culvert installations for DFO permit compliance and conducted fish removals in isolated work areas; monitored installation of species-at-risk exclusion fencing; conducted species-at-risk sweeps and relocations prior to vegetation clearing; conducted pre- and post-blast species-at-risk sweeps.

Union Gas, Sudbury Lateral Pipeline, Sudbury: Conducted breeding bird sweeps prior to vegetation clearing and fish removals in isolated work areas.

City of London, Tributary C Spawning Surveys: Field lead. Conducted brook trout spawning surveys in 2018 and 2019 season; post-survey reporting.

Triton Engineering, 20th Sideroad Structure 27-WG, Elora: Conducted environmental monitoring and fish salvage to support construction.

Appendix C

Field Notes

C.1 Fish Habitat Assessment

Butty, Olivia

From: Butty, Olivia
Sent: Tuesday, October 6, 2020 11:05 AM
To: Aberdein, Andrew
Subject: Glancaster EA field results

Wc01- assessed at Dickinson rd outside of study area from ROW; wet meadow, channel not defined, wet for about 10 m either side or road, no flow

Wc02- assessed from ROW, dry

Wc03- assessed from ROW; east side dry with perched cuvlert and piped under lawn; west side wet at culvert, no flow, poorly defined channel through residential property

Wc04- assessed from ROW on Kopperfield Rd; buried through residential neighbourhood

Wc05- assessed from ROW; us wet in culvert, poorly defined channel through meadow species; ds buried under residential neighborhood

Wc06- assessed from ROW, field upstream no defined channel with minimal standing water in roadside ditch and new hydro road crossing on us side; ds has water and defined channel on parcel 16901001 but no pte; fish this site further ds with hydro one access next year

Wc07- did not assess, no PTE; revisit with hydro one PTE

Wc-08- mowed swale no watercourse

Wc09- pools only at culvert Crossing glancaster; Efish 200V 30A 25% 2 brook stickleback; pools at culvert crossing Rymal, no PTE to enter wetland (hydro one)

C.2 Ecological Land Classification Notes

ELC Community Description and Classification

Site: Gloucester Rd | Polygon: 7

Surveyor(s): KM | Date: Aug 31/20 | Time start: 3:30pm finish: 4:15pm

UTMZ: | UTMZ: | UTMN:

Polygon Description

System	Substrate	Topographic Feature	Plant Form	Community
☒ Terrestrial	☐ Organic	☐ Lacustrine	☐ Plankton	☐ Lake
☐ Wetland	☒ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☐ Aquatic	☐ Parent Min.	☐ Bottomland	☐ Floating-LVD	☐ River
Site	☐ Acidic Bedrk	☐ Terrace	☒ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☐ Valley Slope	☒ Forb	☐ Marsh
☐ Shallow Water	☐ Carb. Bedrk	☒ Tableland	☐ Lichen	☐ Swamp
☒ Surficial Dep.		☐ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☒ Deciduous	☐ Bog
History		☐ Talus	☒ Coniferous	☐ Barren
☒ Natural		☐ Crevice/Cave	☐ Mixed	☐ Meadow
☐ Cultural		☐ Alvar		☐ Prairie
Cover		☐ Rockland		☐ Thicket
☐ Open		☐ Beach / Bar		☐ Savannah
☐ Shrub		☐ Sand Dune		☐ Woodland
☒ Treed		☐ Bluff		☒ Forest
				☐ Plantation

Stand Description

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp) (>> Much Greater Than; > Greater Than; = About Equal To)
1	2	4	FAGGRAN >> OSTVIRG > CARCORD > QUERUBR
2	3	4	OSTVIRG > FRAAMER > FAGGRAN > CARCORD
3	4	4	RHACATH > VIBLIPA > LONTART
4	5	4	FRAAMER > CIRLUTE > SOL SP > GEUM SP

HT Codes: 7 <0.2m 6 >0.2-0.5m 5 >0.5-1m 4 >1-2m 3 >2-6m 2 >6-25m 1 >25m
CVR Codes: 0 = none 1 0% - 10% 2 10 - 25% 3 25 - 60% 4 > 60%

Stand Composition:	Size Class Analysis:	<10	10-24	25-50	>50
	Standing Snags:	A	O	O	R
BA:	Deadfall / Logs:	A	O	R	N

Abundance Codes: N = None R = Rare O = Occasional A = Abundant

Com. Age: ☐ Pioneer ☐ Young ☐ Mid-Age ☒ Mature ☐ Old Growth

Ecosite:	CR4 - FRESH DECIDUOUS FOREST	Code:	FOD4
Vegetation Type:	Dry - Fresh Beech Deciduous Forest	Code:	FOD4-1
Inclusion:		Code:	
Complex:		Code:	

Community Profile Diagram/Comments

Notes: large dead ashes, save potential pooling areas.

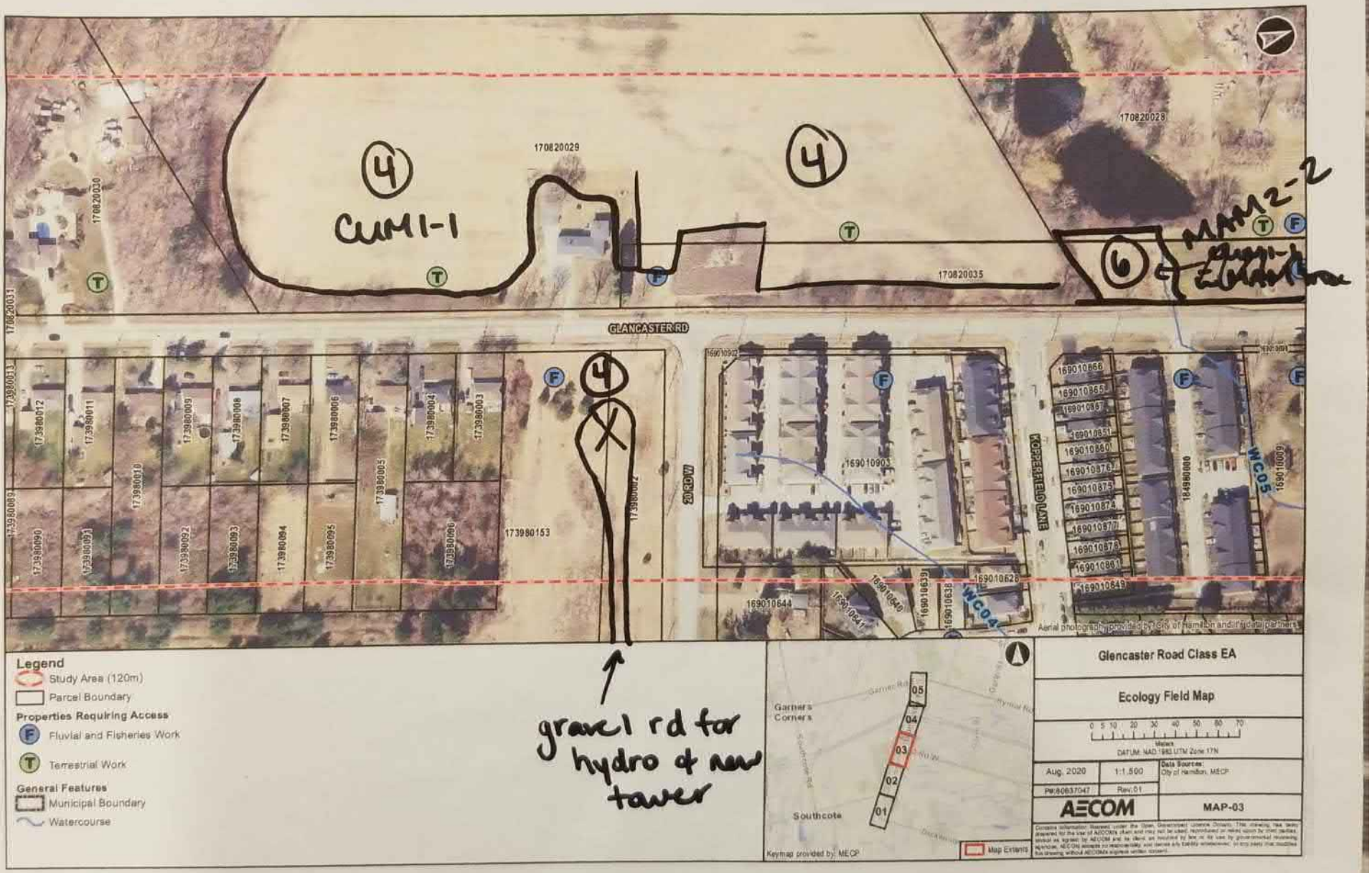
Tree Tally by Species

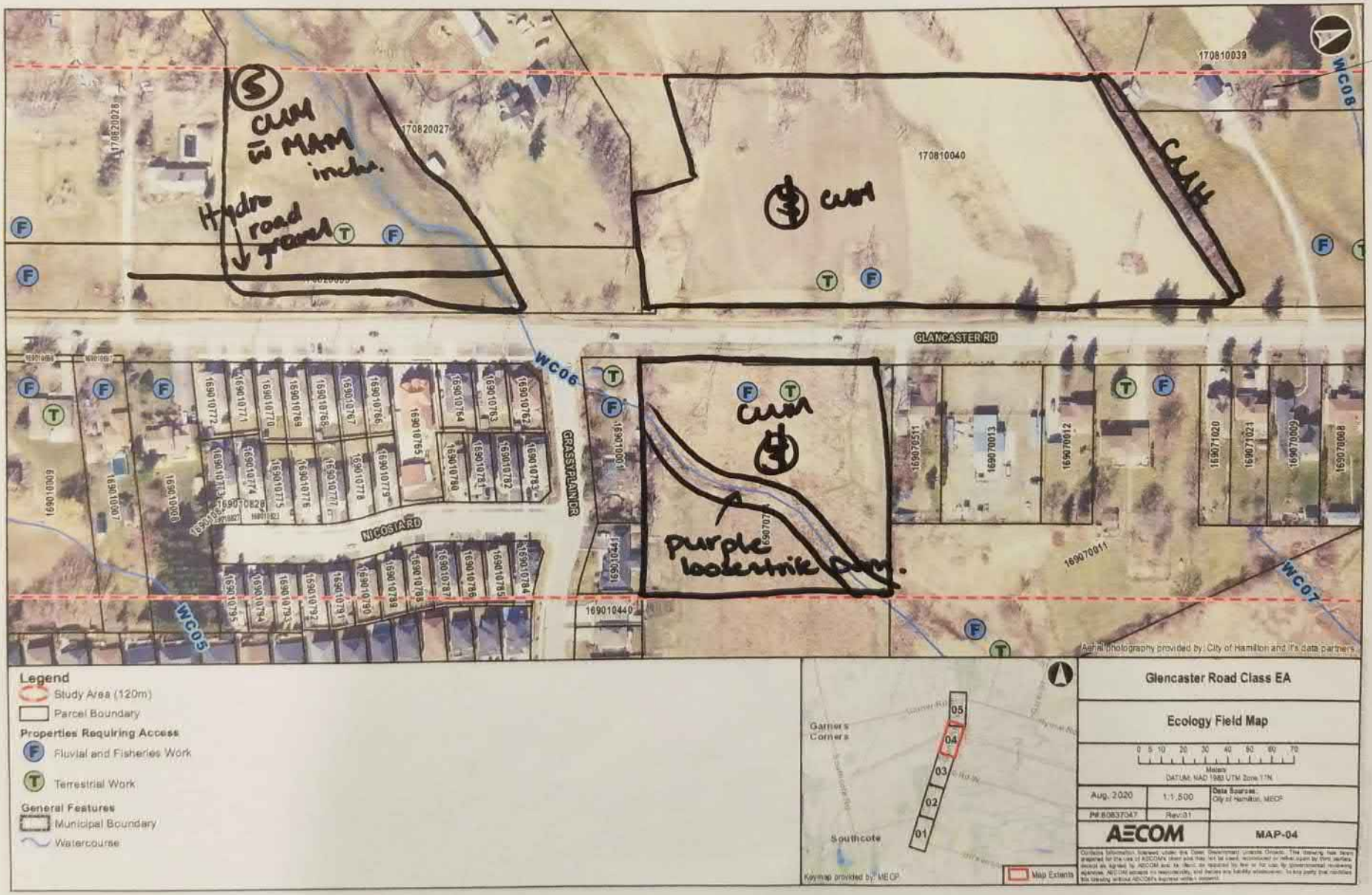
Prism Factor: 2

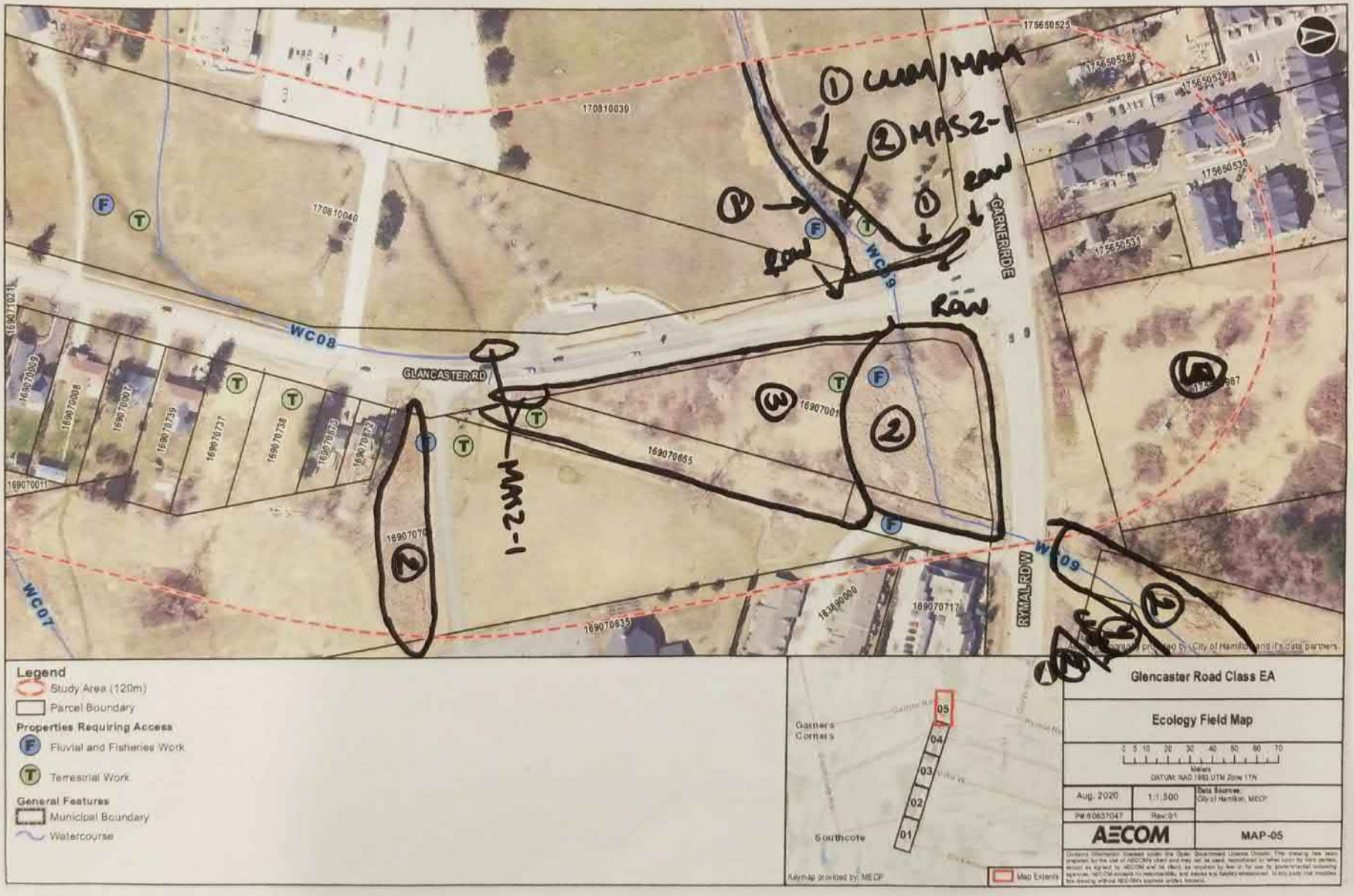
Species	Tally 1	Tally 2	Tally 3	Tally 4	Total	Rel. Avg.
Total						100
Basal Area (BA)						
Dead						

Soils Ontario and ELC Soils Description

									Summary
Site Metrics		Pit/Auger #							
	UTM	Zone							Moisture Regime
		Easting							
		Northing							
	Slope	Position							
		Aspect							Drainage
		Percent							
		Slope Length							
Depth to...		Mottles							
		Gley							Effective Texture (indicate below)
		Water Table							
		Carbonates							
		Bedrock							
Soil Horizon Description	1	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	2	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	3	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	4	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
		% Surface Stone/Rock							
		Moisture Regime							
		Drainage							







ELC Community Description and Classification

Site: Glancaster Rd	Polygon: 1	
Surveyor(s): Kacy Mckenzie	Date: Oct 6/20	Time start: 900am finish: 930am
UTMZ:	UTMZ:	UTMN:

Polygon Description

System	Substrate	Topographic Feature	Plant Form	Community
☒ Terrestrial	☐ Organic	☐ Lacustrine	☐ Plankton	☐ Lake
☐ Wetland	☒ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☐ Aquatic	☐ Parent Min.	☐ Bottomland	☐ Floating-LVD.	☐ River
Site	☐ Acidic Bedrk	☐ Terrace	☒ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☒ Valley Slope	☒ Forb	☒ Marsh
☐ Shallow Water	☐ Carb. Bedrk	☐ Tableland	☐ Lichen	☐ Swamp
☒ Surficial Dep.		☐ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☒ Deciduous	☐ Bog
History		☐ Talus	☐ Coniferous	☐ Barren
☐ Natural		☐ Crevice/Cave	☐ Mixed	☒ Meadow
☒ Cultural		☐ Alvar		☐ Prairie
Cover		☐ Rockland		☐ Thicket
☒ Open		☐ Beach / Bar		☐ Savannah
☐ Shrub		☐ Sand Dune		☐ Woodland
☐ Treed		☐ Bluff		☐ Forest
				☐ Plantation

Stand Description

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp) (>> Much Greater Than; > Greater Than; = About Equal To)
1	2	2	SALIX BE
2	4	2	CORSER1 > LONTART > JUGNIGR
3	5	4	SA SP > IMPCAPE > SYM SP > CIR SP
4	6	4	POASP > CEUM SP

HT Codes: 7 <0.2m 6 >0.2-0.5m 5 >0.5-1m 4 >1-2m 3 >2-6m 2 >6-25m 1 >25m
CVR Codes: 0 = none 1 0% - 10% 2 10 - 25% 3 25 - 60% 4 > 60%

Stand Composition:	Size Class Analysis:	<10	10-24	25-50	>50
	Standing Snags:	N	N	N	N
BA:	Deadfall / Logs:	N	N	N	N

Abundance Codes: N = None R = Rare O = Occasional A = Abundant

Com. Age: ☐ Pioneer ☒ Young ☐ Mid-Age ☐ Mature ☐ Old Growth

Ecosite:	Mineral Cultural Meadow	Code:	CUM1
Vegetation Type:	Dry-Moist Old Field Meadow	Code:	CUM1-1
Inclusion:		Code:	
Complex:	Mineral Meadow Marsh	Code:	MAM2

Community Profile Diagram/Comments

Notes:

Tree Tally by Species

Prism Factor: 2

Species	Tally 1	Tally 2	Tally 3	Tally 4	Total	Rel. Avg.
Total						100
Basal Area (BA)						
Dead						

Soils Ontario and ELC Soils Description

						Summary
Site Metrics		Pit/Auger #				
	UTM	Zone				Moisture Regime
		Easting				
		Northing				
	Slope	Position				
		Aspect				Drainage
		Percent				
		Slope Length				
Depth to...		Mottles				
		Gley				
		Water Table				Effective Texture (indicate below)
		Carbonates				
		Bedrock				

Soil Horizon Description								
1	Depth from zero		% CF		% CF		% CF	% CF
	Texture							
2	Depth from zero		% CF		% CF		% CF	% CF
	Texture							
3	Depth from zero		% CF		% CF		% CF	% CF
	Texture							
4	Depth from zero		% CF		% CF		% CF	% CF
	Texture							
	% Surface Stone/Rock							
Moisture Regime								
Drainage								

ELC Community Description and Classification

Site: Lancaster Rd		Polygon: 2	
Surveyor(s): Lacey McKenzie	Date: Oct 6/20	Time start:	930 am
		finish:	945 am
UTMZ:	UTMZ:	UTMN:	

Polygon Description

System	Substrate	Topographic Feature	Plant Form	Community
☐ Terrestrial	☐ Organic	☐ Lacustrine	☐ Plankton	☐ Lake
☐ Wetland	☒ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☒ Aquatic	☐ Parent Min.	☒ Bottomland	☐ Floating-LVD	☐ River
Site	☐ Acidic Bedrk	☐ Terrace	☒ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☐ Valley Slope	☒ Forb	☒ Marsh
☒ Shallow Water	☐ Carb. Bedrk	☐ Tableland	☐ Lichen	☐ Swamp
☐ Surficial Dep.		☐ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☐ Deciduous	☐ Bog
History		☐ Talus	☐ Coniferous	☐ Barren
☒ Natural		☐ Crevice/Cave	☐ Mixed	☐ Meadow
☐ Cultural		☐ Alvar		☐ Prairie
Cover		☐ Rockland		☐ Thicket
☒ Open		☐ Beach / Bar		☐ Savannah
☐ Shrub		☐ Sand Dune		☐ Woodland
☐ Treed		☐ Bluff		☐ Forest
				☐ Plantation

Stand Description

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp) (>> Much Greater Than; > Greater Than; = About Equal To)
1	4	4	TYPANGU >> PHAARUN > PHRAUST
2			
3			
4			

HT Codes: 7 <0.2m 6 >0.2-0.5m 5 >0.5-1m 4 >1-2m 3 >2-6m 2 >6-25m 1 >25m
CVR Codes: 0 = none 1 0% - 10% 2 10 - 25% 3 25 - 60% 4 > 60%

Stand Composition:	Size Class Analysis:	R	<10	R	10-24	R	25-50	N	>50
	Standing Snags:	R	<10	N	10-24	N	25-50	N	>50
BA:	Deadfall / Logs:	R	<10	N	10-24	N	25-50	N	>50

Abundance Codes: N = None R = Rare O = Occasional A = Abundant

Com. Age: ☐ Pioneer ☐ Young ☒ Mid-Age ☐ Mature ☐ Old Growth

Ecosite:	Mineral Shallow Marsh	Code:	MAS2
Vegetation Type:	Cattail Mineral Shallow Marsh	Code:	MAS2-1
Inclusion:		Code:	
Complex:		Code:	

Community Profile Diagram/Comments

Notes:

Tree Tally by Species

Prism Factor: 2

Species	Tally 1	Tally 2	Tally 3	Tally 4	Total	Rel. Avg.
Total						100
Basal Area (BA)						
Dead						

Soils Ontario and ELC Soils Description

									Summary
Site Metrics		Pit/Auger #							
	UTM	Zone							Moisture Regime
		Easting							
		Northing							
	Slope	Position							
		Aspect							Drainage
		Percent							
		Slope Length							
Depth to...		Mottles							
		Gley							Effective Texture (indicate below)
		Water Table							
		Carbonates							
		Bedrock							
Soil Horizon Description	1	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	2	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	3	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	4	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
		% Surface Stone/Rock							
	Moisture Regime								
	Drainage								

ELC Community Description and Classification

Site: Glancaster Rd		Polygon: 9	
Surveyor(s): Kate McKenzie	Date: Oct 6/20	Time start:	1:00pm
		finish:	1:30pm
UTMZ:	UTMZ:	UTMN:	

Polygon Description

System	Substrate	Topographic Feature	Plant Form	Community
☒ Terrestrial	☐ Organic	☐ Lacustrine	☐ Plankton	☐ Lake
☐ Wetland	☒ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☐ Aquatic	☐ Parent Min.	☐ Bottomland	☐ Floating-LVD.	☐ River
Site	☐ Acidic Bedrk	☐ Terrace	☐ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☐ Valley Slope	☒ Forb	☐ Marsh
☐ Shallow Water	☐ Carb. Bedrk	☒ Tableland	☐ Lichen	☐ Swamp
☒ Surficial Dep.		☐ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☒ Deciduous	☐ Bog
History		☐ Talus	☐ Coniferous	☐ Barren
☐ Natural		☐ Crevice/Cave	☐ Mixed	☐ Meadow
☐ Cultural		☐ Alvar		☐ Prairie
Cover		☐ Rockland		☐ Thicket
☐ Open		☐ Beach / Bar		☐ Savannah
☐ Shrub		☐ Sand Dune		☐ Woodland
☒ Treed		☐ Bluff		☒ Forest
				☐ Plantation

Stand Description

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp) (>> Much Greater Than; > Greater Than; = About Equal To)
1	2	4	QUERUBR > CARCVAT > TILAMER > ACESACC
2	3	4	TILAMER > ACESACC > CARCVAT
3	4	3	RHACATH > FRAAMER > LONTART > CORRACE
4			

HT Codes: 7 <0.2m 6 >0.2-0.5m 5 >0.5-1m 4 >1-2m 3 >2-6m 2 >6-25m 1 >25m
CVR Codes: 0 = none 1 0% - 10% 2 10 - 25% 3 25 - 60% 4 > 60%

Stand Composition:	Size Class Analysis:	<10	10-24	25-50	>50
	Standing Snags:	A	A	O	O
BA:	Deadfall / Logs:	O	R	N	N

Abundance Codes: N = None R = Rare O = Occasional A = Abundant

Com. Age: ☐ Pioneer ☐ Young ☐ Mid-Age ☒ Mature ☐ Old Growth

Ecosite:	Dry Fresh Oak - Maple - Hickory	Code:	FOD2
Vegetation Type:	DRY - Fresh Oak - Hickory Deciduous Forest	Code:	FOD2-2
Inclusion:		Code:	
Complex:		Code:	

Community Profile Diagram/Comments

Notes: Edge Survey

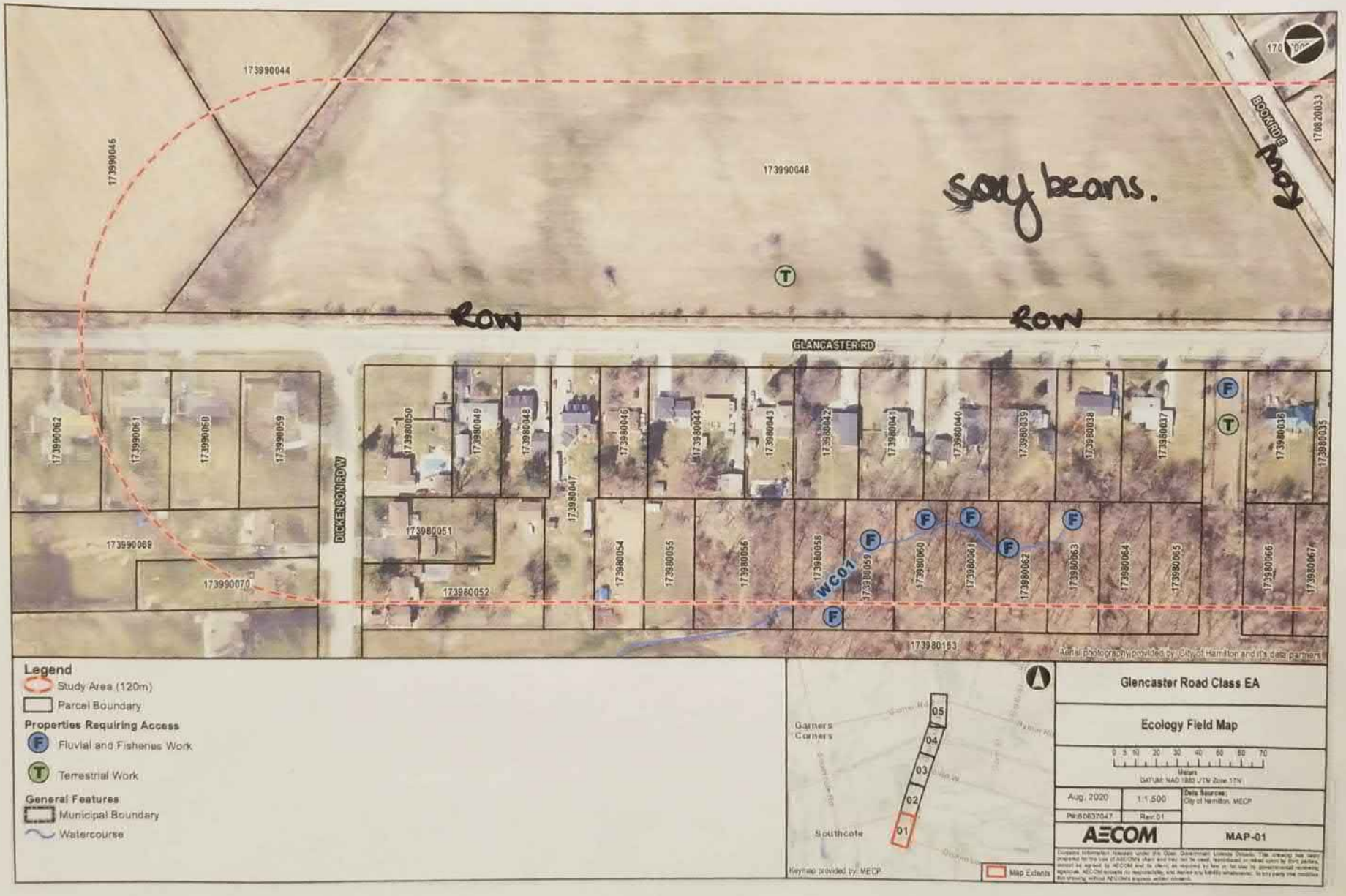
Tree Tally by Species

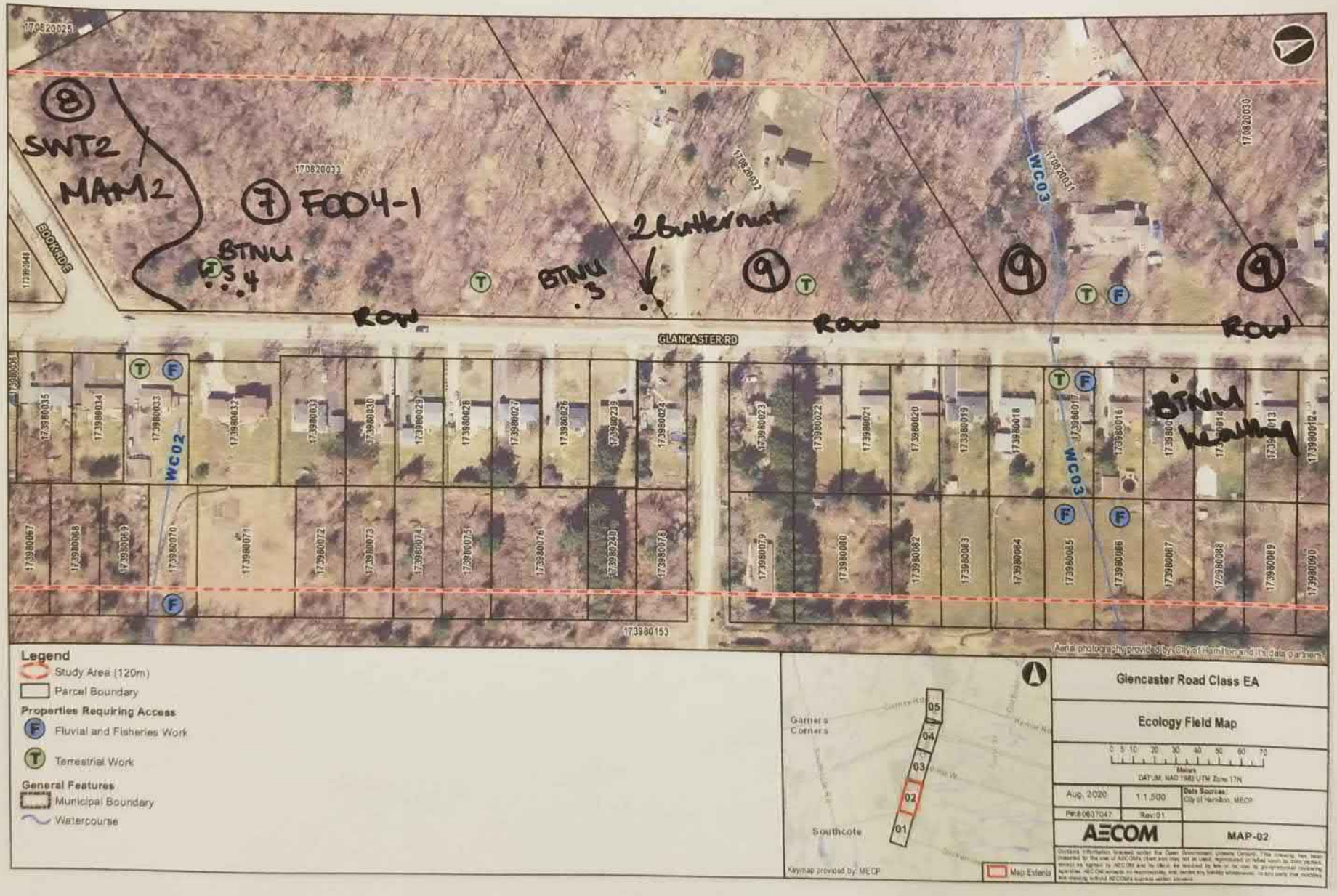
Prism Factor: 2

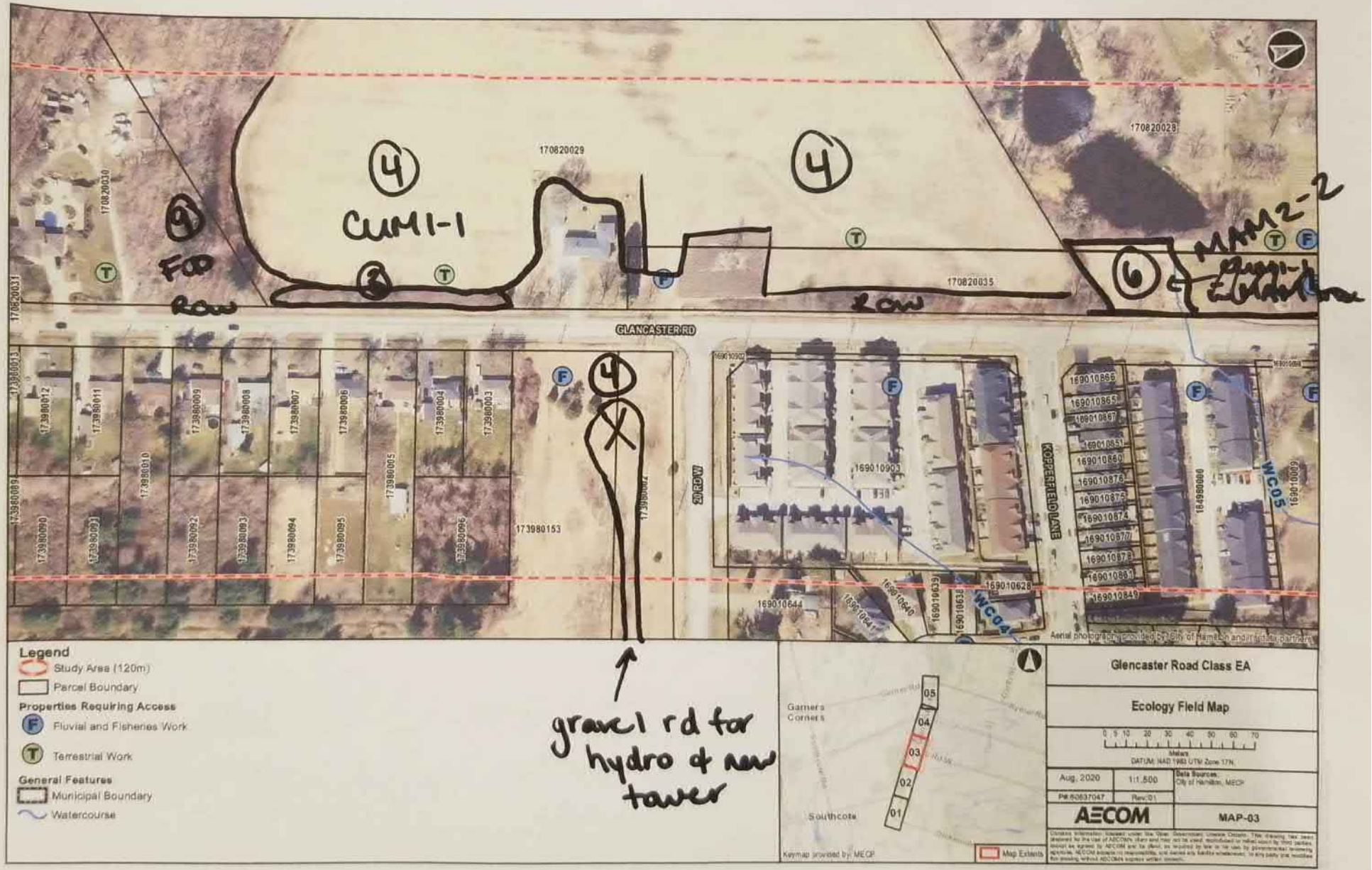
Species	Tally 1	Tally 2	Tally 3	Tally 4	Total	Rel. Avg.
Total						100
Basal Area (BA)						
Dead						

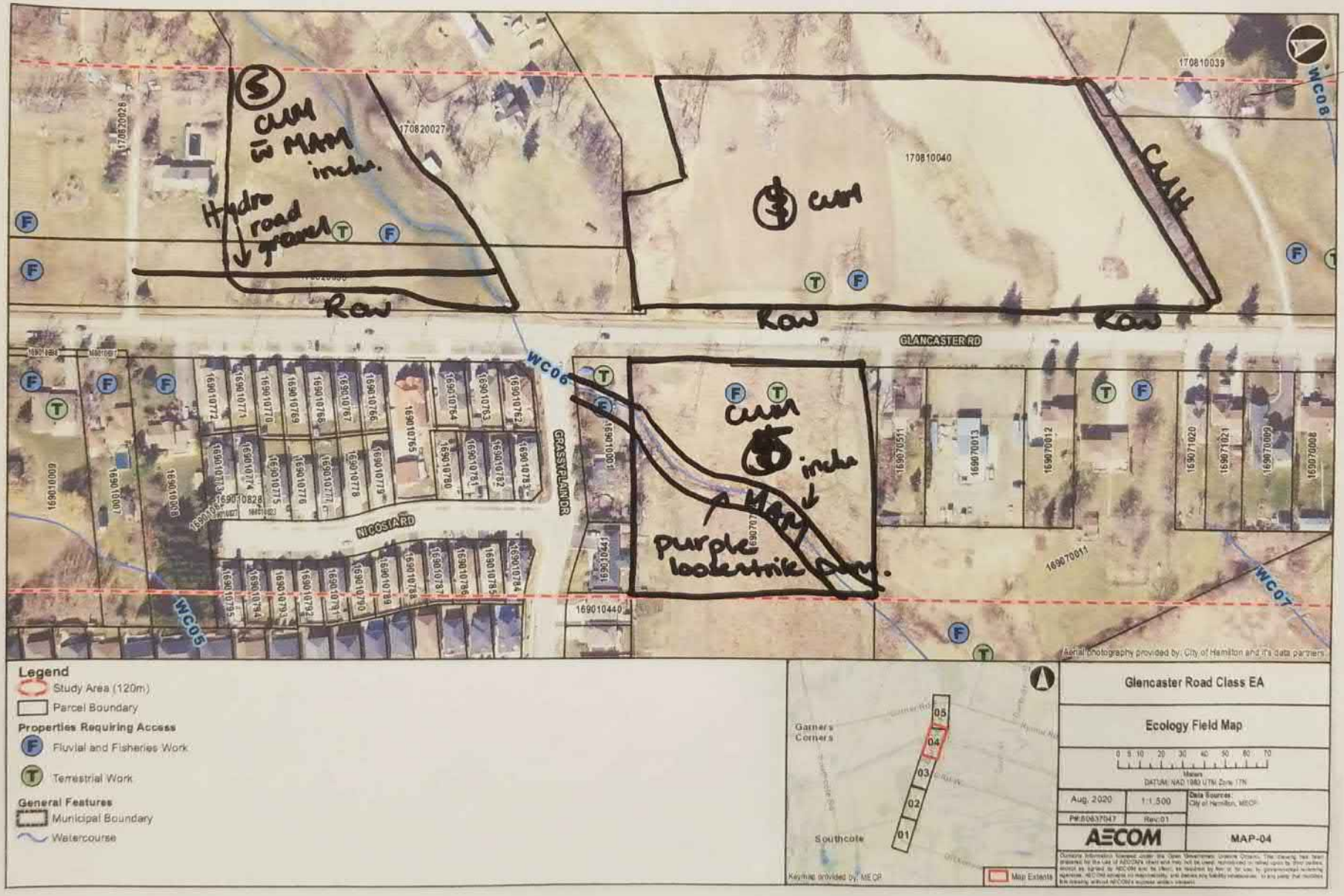
Soils Ontario and ELC Soils Description

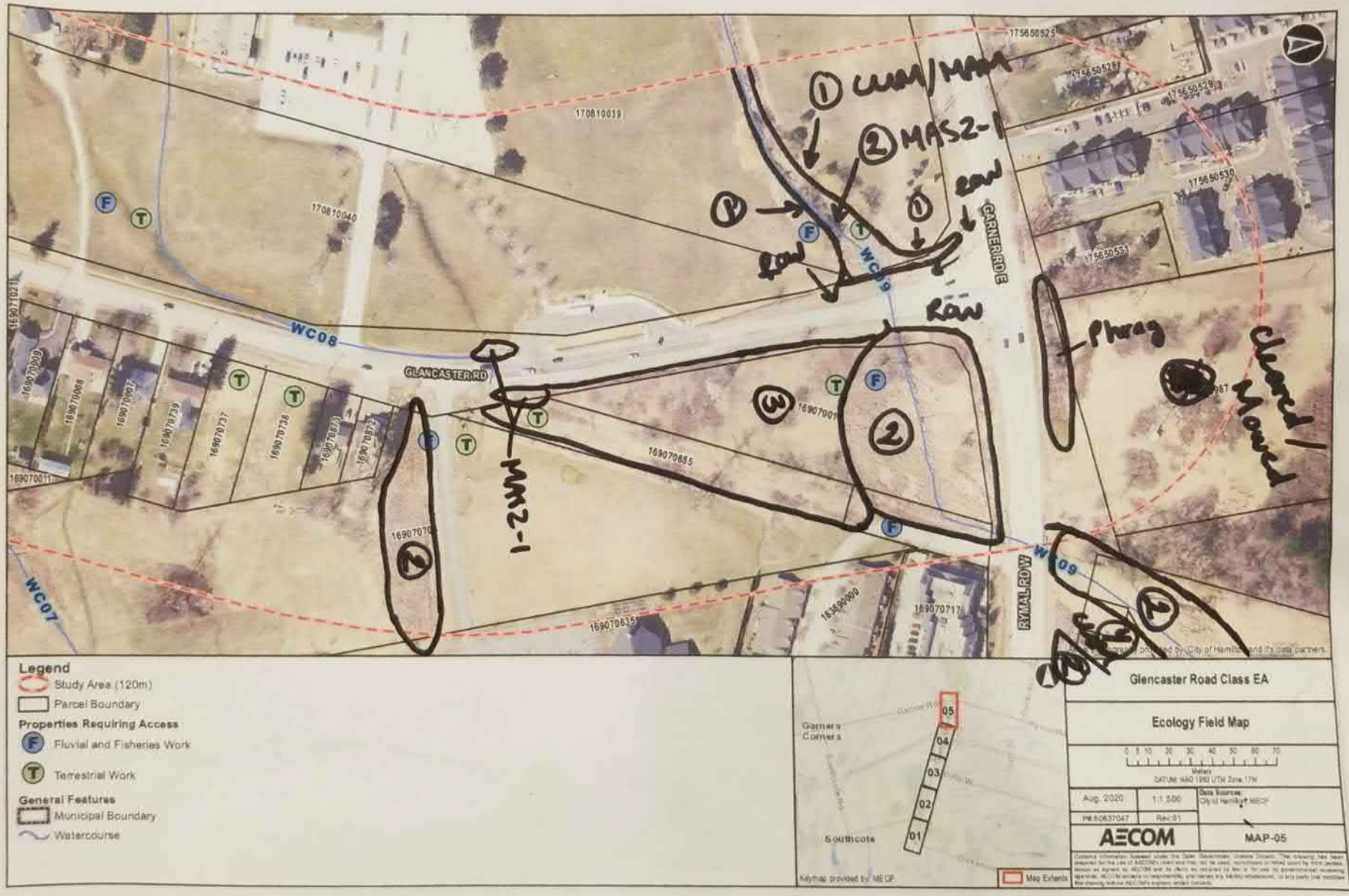
									Summary
Site Metrics		Pit/Auger #							
	UTM	Zone							Moisture Regime
		Easting							
		Northing							
	Slope	Position							
		Aspect							Drainage
		Percent							
		Slope Length							
Depth to...		Mottles							Effective Texture (indicate below)
		Gley							
		Water Table							
		Carbonates							
		Bedrock							
Soil Horizon Description	1	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	2	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	3	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
	4	Depth from zero		% CF		% CF		% CF	% CF
		Texture							
		% Surface Stone/Rock							
		Moisture Regime							
		Drainage							











C.3 Botanical Inventories

Plant Species List

Trees & Shrubs – Conifers	1	2	3	4	5	6
Balsam Fir (*Abies balsamea*)						
Common Juniper (*Juniperus communis*)						
Eastern Red Cedar (*Juniperus virginiana*)						
Tamarack (*Larix laricina*)						
Norway Spruce (*Picea abies*)						
White Spruce (*Picea glauca*)						
Black Spruce (*Picea mariana*)						
Jack Pine (*Pinus banksiana*)						
Red Pine (*Pinus resinosa*)						
Eastern White Pine (*Pinus strobus*)						
Scotch Pine (*Pinus sylvestris*)						
Canada Yew (*Taxus canadensis*)						
Eastern White Cedar (*Thuja occidentalis*)						
Eastern Hemlock (*Tsuga canadensis*)						

Deciduous	1	2	3	4	5	6
Manitoba Maple (*Acer negundo*)				R		
Black Maple (*Acer nigrum*)						
Norway Maple (*Acer platanoides*)						
Red Maple (*Acer rubrum*)						
Silver Maple (*Acer saccharinum*)						
Freeman's Maple (*Acer X freemanii*)						
Sugar Maple (*Acer saccharum*)						
Mountain Maple (*Acer spicatum*)						
Speckled Alder (*Alnus incana*)						
Downy Serviceberry (*Amelanchier arborea*)						
Serviceberry (*Amelanchier sanguinea*)						
Yellow Birch (*Betula alleghaniensis*)						
White Birch (*Betula papyrifera*)						
European Birch (*Betula pendula*)						
Blue Beech (*Carpinus caroliniana*)						
Bitternut hickory (*Carya cordiformis*						
Shagbark Hickory (*Carya ovata*)			U			
Climbing Bittersweet (*Celastrus scandens*)						
Common Hackberry (*Celtis occidentalis*)						
Buttonbush (*Cephalanthus occidentalis*)						
Alt.-leaved Dogwood (*Cornus alternifolia*)						
Silky Dogwood (*Cornus amomum*)						
Bunchberry (*Cornus canadensis*)						
Gray dogwood (*Cornus racemosa*)	U	U	F	U	U	
Round-leaved Dogwood (*Cornus rugosa*)						
Red-osier Dogwood (*Cornus sericea*)	U				U	U
American Hazel (*Corylus americana*)						
Beaked Hazel (*Corylus cornuta*)						
Cockspur Thorn (*Crataegus crus-galli*)						
English Hawthorn (*Crataegus monogyna*)						
Large-fruited Thorn (*Crataegus punctata*)						
Crataegus sp			U			
Crataegus						
Bush Honeysuckle (*Diervilla lonicera*)						
Russian Olive (*Elaeagnus angustifolia*)						
Autumn Olive (*Elaeagnus umbellata*)						
Run. Strawberry-bush (*Euonymus obovata*)						
American Beech (*Fagus grandifolia*)						
Glossy Buckthorn (*Frangula alnus*)						
Virginia strawberry (*Fragaria virginiana*)						
White Ash (*Fraxinus americana*)			U			
Black Ash (*Fraxinus nigra*)						
Green Ash (*Fraxinus pennsylvanica*)						
Witch-hazel (*Hamamelis virginiana*)						
Winterberry (*Ilex verticillata*)						
Butternut (*Juglans cinerea*)						
Black Walnut (*Juglans nigra*)	F	U			R	
Common Privet (*Ligustrum vulgare*)						
Spicebush (*Lindera benzoin*)						
Fly Honeysuckle (*Lonicera canadensis*)						
Glaucous Honeysuckle (*Lonicera dioica*)						
Morrow's Honeysuckle (*Lonicera morrowii*)						
Tartarian Honeysuckle (*Lonicera tatarica*)	U		U		U	
Common Apple (*Malus pumila*)						
White Mulberry (*Morus alba*)						
Sweet Gale (*Myrica gale*)						
Ironwood (*Ostrya virginiana*)						
Thicket-creeper (*Parthenocissus inserta*)	U					
Ninebark (*Physocarpus opulifolius*)						
Balsam Poplar (*Populus balsamifera*)			U			
Eastern Cottonwood (*Populus deltoides*)						
Large-tooth Aspen (*Populus grandidentata*)						
Trembling Aspen (*Populus tremuloides*)				R		
Sweet Cherry (*Prunus avium*)						
Pin Cherry (*Prunus pensylvanica*)						
Black Cherry (*Prunus serotina*)						
Choke Cherry (*Prunus virginiana*)						
Prunus sp					U	

Tree & Shrubs – Deciduous	1	2	3	4	5	6
White Oak (*Quercus alba*)						
Bur Oak (*Quercus macrocarpa*)						
Red Oak (*Quercus rubra*)			U			
Alder Buckthorn (*Rhamnus alnifolia*)						
Common Buckthorn (*Rhamnus cathartica*)	R		U			
Smooth Sumac (*Rhus glabra*)						
Staghorn Sumac (*Rhus hirta*)			U	U		
Wild Black Currant (*Ribes americanum*)						
Prickly Gooseberry (*Ribes cynosbati*)						
Swamp Black Currant (*Ribes lacustre*)						
Red Currant (*Ribes rubrum*)						
Ribes						
Black Locust (*Robinia pseudo-acacia*)						
Prickly Rose (*Rosa acicularis*)						
Smooth Rose (*Rosa blanda*)						
Multiflora Rose (*Rosa multiflora*)						
Rosa sp	U		U			
Com. Blackberry (*Rubus allegheniensis*)						
Wild Red Raspberry (*Rubus idaeus*)						
Black Raspberry (*Rubus occidentalis*)	U					
Purple-fl. Raspberry (*Rubus odoratus*)						
Dwarf Raspberry (*Rubus pubescens*)						
Rubus						
Peach-leaved Willow (*Salix amygdaloides*)						
Bebb's Willow (*Salix bebbiana*)						
Pussy Willow (*Salix discolor*)						
Missouri Willow (*Salix eriocephala*)						
Sandbar Willow (*Salix exigua*)						
Shining Willow (*Salix lucida*)						
Black Willow (*Salix nigra*)						
Slender Willow (*Salix petiolaris*)						
Salix sp						U
Hybrid Crack Willow (*Salix X rubens*)	U	U			U	
Black-berried Elder (*Sambucus nigra*)						
Red-berried Elder (*Sambucus racemosa*)						
Buffaloberry (*Shepherdia canadensis*)						
Eur. Mountain Ash (*Sorbus aucuparia*)						
Narrow Meadow-sweet (*Spiraea alba*)						
Common Lilac (*Syringa vulgaris*)						
Basswood (*Tilia americana*)			U			
Poison-ivy (*Toxicodendron rydbergii*)						
Climbing Poison-ivy (*Toxicodendron radicans*)						
White Elm (*Ulmus americana*)						
Siberian Elm (*Ulmus pumila*)						
Slippery Elm (*Ulmus rubra*)						
Low Blueberry (*Vaccinium angustifolium*)						
Maple-leaf Viburnum (*Viburnum acerifolium*)						
Hobblebush (*Viburnum lantanoides*)						
Nannyberry (*Viburnum lentago*)						
Guelder-Rose (*Viburnum opulus*)						
Downy Arrow-wood (*Vib. rafinesquianum*)						
Riverbank Grape (*Vitis riparia*)	U		F			
Am. Prickly-ash (*Zanthoxylum americanum*)						
Sambucus sp			U			

Ferns & Allies	1	2	3	4	5	6
Lady Fern (*Athyrium filix-femina*)						
Rattlesnake Fern (*Botrychium virginianum*)						
Bulbet Bladder Fern (*Cystopteris bulbifera*)						
Spin. Wood Fern (*Dryopteris carthusiana*)						
Crested Wood Fern (*Dryopteris cristata*)						
Marginal Wood Fern (*Dryopteris marginalis*)						
Dryopteris						
Ostrich Fern (*Matteuccia struthiopteris*)						
Sensitive Fern (*Onoclea sensibilis*)						
Cinnamon Fern (*Osmunda cinnamomea*)						
Interrupted Fern (*Osmunda claytoniana*)						
Royal Fern (*Osmunda regalis*)						
Christmas Fern (*Polystichum acrostichoides*)						
Eastern Bracken-fern (*Pteridium aquilinum*)						
Marsh Fern (*Thelypteris palustris*)						
Field Horsetail (*Equisetum arvense*)						
Scouring-rush (*Equisetum hyemale*)						
Variegated Horsetail (*Equisetum variegatum*)						
Equisetum						
Ground-cedar(*Lycopodium digitatum*)						
Shining Clubmoss (*Lycopodium lucidulum*)						
Ground-pine (*Lycopodium obscurum*)						

Graminoids – Grasses	1	2	3	4	5	6
Giant Redtop (*Agrostis gigantea*)						
Redtop (*Agrostis stolonifera*)						
Awnless Brome (*Bromus inermis*)				D		
Bromus						
Blue-joint Grass (*Calamagrostis canadensis*)						
Orchard Grass (*Dactylis glomerata*)				D		
Poverty Oat Grass (*Danthonia spicata*)						
Quack Grass (*Elymus repens*)						
Virginia Wild Rye (*Elymus virginicus*)						
Elymus						
Fowl Manna Grass (*Glyceria striata*)						
Glyceria						
Rice Cut Grass (*Leersia oryzoides*)						
Tall Fescue (*Lolium arundinaceum*)						
Muhlenbergia						
Witch-grass (*Panicum capillare*)						
Panicum						
Reed Canary Grass (*Phalaris arundinacea*)	D	F		U	F	D
Timothy (*Phleum pratense*)						
Common Reed (*Phragmites australis*)					U	
Canada Blue Grass (*Poa compressa*)						
Fowl Meadow Grass (*Poa palustris*)						
Kentucky Bluegrass (*Poa pratensis*)						
Yellow Foxtail (*Setaria pumila*)						
Green Foxtail (*Setaria viridis*)						
Poa sp	D		F	D	F	

Sedges	1	2	3	4	5	6
Drooping Wood Sedge (*Carex arctata*)						
Golden-fruited Sedge (*Carex aurea*)						
Graceful Sedge (*Carex gracillima*)						
Inland Sedge (*Carex interior*)						
Bladder Sedge (*Carex intumescens*)						
Lake-bank Sedge (*Carex lacustris*)						
Hop Sedge (*Carex lupulina*)						
Pennsylvania Sedge (*Carex pensylvanica*)						
Awl-fruited Sedge (*Carex stipata*)						
Fox Sedge (*Carex vulpinoidea*)						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Cyperus						
Redroot Spike-rush (*Eleocharis erythropoda*)						
Eleocharis						
Hard-stem Bulrush (*Schoenoplectus acutus*)						
Three-square Bulrush (*Sch. pungens*)						
Soft-stem Bulrush (*Sch. tabernaemontani*)						
Dark-green Bulrush (*Scirpus atrovirens*)						
Wool-grass (*Scirpus cyperinus*)						

Other Graminoids	1	2	3	4	5	6
Broad Bur-reed (*Sparganium eurycarpum*)						
Narrow-leaved Cattail (*Typha angustifolia*)		D			F	F
Broad-leaved Cattail (*Typha latifolia*)						
Broad-leaved Cattail (*Typha X glauca*)						
Articulated Rush (*Juncus articulatus*)						
Soft Rush (*Juncus effusus*)						
Path Rush (*Juncus tenuis*)						
Juncus						
Juncus						

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Project: Glancaster Rd	1 CUMI-1 / MAM2	4 CUMI-1	
Date: Oct 6/20	2 MAS2-1	5 CUMI-1 w MAM inclu	
Surveyors: Kasey McKinnon	3 CUT1 / CUMI-1?	6 MAM2-2	

Dicot Herbs - Asteraceae	1	2	3	4	5	6
Common Yarrow (*Achillea millefolium*)						
White Snakeroot (*Ageratina altissima*)						
Com. Ragweed (*Ambrosia artemisiifolia*)						
Giant Ragweed (*Ambrosia trifida*)						

Dicot Herbs	1	2	3	4	5	6
Shepherd's Purse (*Capsella bursa-pastoris*)						
Cutleaf Toothwort (*Cardamine concatenata*)						
Toothwort (*Cardamine diphylla*)						
Penn. Bitter-cress (*Cardamine pensylvanica*)						

Dicot Herbs	1	2	3	4	5	6
Kidney-leaf Buttercup (*Ranunculus abortivus*						
Tall Buttercup (*Ranunculus acris*)						
Hooked Buttercup (*Ranunculus recurvatus*)						
Ranunculus						

Plant Species List

Species	1	2	3	4	5	6
Field Pussytoes (Antennaria neglecta)						
Antennaria						
Common Burdock (Arctium minus)	U					
Nodding Beggar-ticks (Bidens cernua)						
Devil's Beggar-ticks (Bidens frondosa)						
Spotted Knapweed (Centaurea biebersteinii)						
Brown Knapweed (Centaurea jacea)						
Chicory (Cichorium intybus)						
Canada Thistle (Cirsium arvesnse)						
Bull Thistle (Cirsium vulgare)						
Horseweed (Conyza canadensis)						
Daisy Fleabane (Erigeron annus)						
Philadelphia Fleabane (Erig. philadelphicus)						
Erigeron						
Joe-pye-weed (Eupatorium maculatum)						
Boneset (Eupatorium perfoliatum)						
Large-leaved Aster (Eurybia macrophylla)						
Flat-top Goldenrod (Euthamia graminifolia)	R	R				
Orange Hawkweed (Hieracium aurantiacum)						
Field Hawkweed (Hieracium caespitosum)						
Hieracium						
Elecampane (Inula helenium)						
Prickly Lettuce (Lactuca serriola)						
Lactuca						
Ox-eye Daisy (Leucanthemum vulgare)						
Pineapple-weed (Matricaria discoidea)						
Tall White Lettuce (Prenanthes altissima)						
Black-eyed Susan (Rudbeckia hirta)						
Tall Goldenrod (Solidago altissima)	D	U		D		
Blue-stem Goldenrod (Solidago caesia)						
Canada Goldenrod (Solidago canadensis)						
Zig-zag Goldenrod (Solidago flexicaulis)						
Giant Goldenrod (Solidago gigantea)						
Early Goldenrod (Solidago juncea)						
Gray Goldenrod (Solidago nemoralis)						
Solidago sp			D		D	F
Field Sow-thistle (Sonchus arvensis)						
Sonchus						
Heart-leaf Aster (Symph. cordifolium)						
Heath Aster (Symphyotrichum ericoides)						
Tall White Aster (Symph. lanceolatum)						
Calico Aster (Symphyotrichum lateriflorum)						
New England Aster (Symph. novae-angliae)	F		U	U	U	U
Purple-stem Aster (Symph. puniceus)						
Common Tansy (Tanacetum vulgare)						
Common Dandelion (Taraxacum officinale)						
Com. Goatsbeard (Tragopogon pratensis)						
Coltsfoot (Tussilago farfara)	F				F	
Symph sp	F		F	F	F	F
Bidens sp	U					
Cirsium sp	D			F		
Other Dicot Herbs						
White Baneberry (Actaea pachypoda)						
Red Baneberry (Actaea rubra)						
Tall Agrimony (Agrimonia gryposepala)						
Garlic Mustard (Alliaria petiolata)						
Green Amaranth (Amaranthus retroflexus)						
Hog-peanut (Amphicarpa bracteata)						
Pearly Everlasting (Anaphalis margaritacea)						
Canada Anemone (Anemone canadensis)						
Ivy Hepatica (Anemone acutiloba)						
Thimbleweed (Anemone virginiana)						
Purple Angelica (Angelica atropurpurea)						
Indian Hemp (Apocynum cannabinum)						
Wild Sarsaparilla (Aralia nudicaulis)						
Spikenard (Aralia racemosa)						
Wild Ginger (Asarum canadense)						
Swamp Milkweed (Asclepias incarnata)						
Common Milkweed (Asclepias syriaca)	U					U
Yellow Rocket (Barbarea vulgaris)						
False Nettle (Boehmeria cylindrica)						
Black Mustard (Brassica nigra)						
Marsh-marigold (Calthe palustris)						
Creeping Bellflower (Campanula rapunculoides)						

Species	1	2	3	4	5	6
Cardamine						
Blue Cohosh (Caulophyllum thalictroides)						
Mouse-ear Chickweed (Cerastium fontanum)						
Turtlehead (Chelone glabra)						
Spotted Water-hemlock (Cicuta maculata)						
Water-hemlock (Cicuta virosa)						
Enchanter's Nightshade (Circaea lutetiana)	U					
Carolina Spring Beauty (Claytonia caroliniana)						
Virginia Spring Beauty (Claytonia virginica)						
Virgin's-bower (Clematis virginiana)						
Field Bindweed (Convolvulus arvensis)						
Dog-strangling Vine (Cynanchum rossicum)						
Wild Carrot (Daucus carota)	F			F	F	
Deptford Pink (Dianthus armeria)						
Squirrel-corn (Dicentra canadensis)						
Dutchman's-breeches (Dicentra cucullaria)						
Wild Teasel (Dipsacus fullonum)						
Wild Cucumber (Echinocystis lobata)	F			F		
Viper's Bugloss (Echium vulgare)						
Northern Willow-herb (Epilobium ciliatum)						
Hairy Willow-herb (Epilobium hirsutum)						
Small-fl. Willow-herb (Epilobium parviflorum)						
Epilobium						
Worm Mustard (Erysimum cheiranthoides)						
Euphorbia						
Virginia Strawberry (Fragaria virginiana)						
Hemp Nettle (Galeopsis tetrahit)						
Wild Madder (Galium mollugo)						
Marsh Bedstraw (Galium palustre)						
Sweet-scented Bedstraw (Galium triflorum)						
Galium						
Spotted Geranium (Geranium maculatum)						
Herb-robert (Geranium robertianum)						
Yellow Avens (Geum aleppicum)						
White Avens (Geum canadense)						
Urban Avens (Geum urbanum)						
Dame's Rocket (Hesperis matronalis)						
Virg. Water-leaf (Hydrophyllum virginianum)						
Com. St. John's-wort (Hypericum perforatum)						
Spotted Jewelweed (Impatiens capensis)	F				F	F
Wood Nettle (Laportea canadensis)						
Motherwort (Leonurus cardiaca)						
Field Peppergrass (Lepidium campestre)						
Eur. Gromwell (Lithospermum officinale)						
Butter & Eggs (Linaria vulgaris)						
Great Lobelia (Lobelia siphilitica)				U		
Lobelia						
Cut-leaf Bugleweed (Lycopus americanus)						
Northern Bugleweed (Lycopus uniflorus)						
Fringed Loosestrife (Lysimachia ciliata)						
Moneywort (Lysimachia nummularia)						
Lysimachia						
Purple Loosestrife (Lythrum salicaria)					F	F
Black Medick (Medicago lupulina)						
Alfalfa (Medicago sativa)						
White Sweet-clover (Melilotus alba)						
Yellow Sweet-clover (Melilotus officinalis)						
Wild Mint (Mentha arvensis)						
Wild Bergamot (Monarda fistulosa)						
Small Forget-me-not (Myosotis laxa)						
Forget-me-not (Myosotis scorpioides)						
Water-cress (Nasturtium officinale)						
Com. Evening-primrose (Oenothera biennis)						
Sweet-cicely (Osmorhiza berterii)						
Yellow Wood-sorrel (Oxalis stricta)						
Wild Parsnip (Pastinaca sativa)						
English Plantain (Plantago lanceolata)						
Common Plantain (Plantago major)						
Rugel's Plantain (Plantago rugelii)						
May-apple (Podophyllum peltatum)						
Pale Smartweed (Polygonum lapathifolium)						
Lady's-thumb (Polygonum persicaria)						
Virginia Knotweed (Polygonum virginianum)						
Polygonum						
Polygonum						
Rough Cinquefoil (Potentilla norvegica)						
Rough-fruited Cinquefoil (Potentilla recta)						
Common Cinquefoil (Potentilla simplex)						
Potentilla						
Heal-all (Prunella vulgaris)						
Shinleaf (Pyrola elliptica)						
Geum sp	F				U	
Mentha aquatica	U	F				

Species	1	2	3	4	5	6
Sheep Sorrel (Rumex acetosella)						
Curly-leaf Dock (Rumex crispus)						
Bitter Dock (Rumex obtusifolius)					F	
Bloodroot (Sanguinaria canadense)						
Black Snakeroot (Sanicula marilandica)						
Bouncing Bet (Saponaria officinalis)						
Marsh Skullcap (Scutellaria galericulata)						
Mad Dog Skullcap (Scutellaria lateriflora)						
White Campion (Silene latifolia)						
Bladder Campion (Silene vulgaris)						
Hemlock Water-parsnip (Sium suave)						
Bitter Nightshade (Solanum dulcamara)						
Black Nightshade (Solanum ptychanthum)					U	
Grassleaf Stitchwort (Stellaria graminea)						
Common Chickweed (Stellaria media)						
Early Meadow-rue (Thalictrum dioicum)						
Tall Meadow-rue (Thalictrum pubescens)						
Field Penny-cress (Thlaspi arvense)						
Foamflower (Tiarella cordifolia)						
Star-flower (Trientalis borealis)						
Red Clover (Trifolium pratense)						
White Clover (Trifolium repens)						
Trifolium						
Stinging Nettle (Urtica dioica)						
Greater Bladderwort (Utricularia vulgaris)						
Common Mullein (Verbascum thapsus)						
Blue Vervain (Verbena hastata)						
White Vervain (Verbena urticifolia)						
Water Speedwell (Veron. anagallis-aquatica)						
Common Speedwell (Veronica officinalis)						
Veronica						
Cow Vetch (Vicia cracca)						
Vicia						
Periwinkle (Vinca minor)						
Dog Violet (Viola conspersa)						
Yellow Violet (Viola pubescens)						
Com. Blue Violet (Viola sororia)						
Viola						
Monocot Herbs						
Water-plantain (Alisma plantago-aquatica)						
Wild Leek (Allium tricoccum)						
Jack-in-the-pulpit (Arisaema triphyllum)						
Asparagus (Asparagus officinalis)						
Wild Calla (Calla palustris)						
Bluebead-lily (Clintonia borealis)						
Garden Lily-of-valley (Convallaria majalis)						
Yel. Lady's Slipper (Cypripedium parviflora)						
Canada Waterweed (Elodea canadensis)						
Helleborine (Epipactis helleborine)						
Yellow Trout Lily (Erythronium americanum)						
Blue-flag Iris (Iris versicolor)						
Orange Day Lily (Hemerocallus fulva)						
Lesser Duckweed (Lemna minor)						
Starry Duckweed (Lemna trisulca)						
Wild Lily-of-valley (Maianthemum canadense)						
False Solom Seal (Maianthemum racemosum)						
Star False Solomon (Maianthemum stellatum)						
True Solomon Seal (Polygonatum pubescens)						
Pickerel-weed (Pontederia cordata)						
Curly-leaf Pondweed (Potamogeton crispus)						
Sago Pondweed (Potamogeton pectinatus)						
Potamogeton						
Potamogeton						
Broad-leaved Arrowhead (Sagittaria latifolia)						
Blue-eyed-grass (Sisyrinchium montanum)						
Herb. Carrion Flower (Smilax herbacea)						
Bristly Greenbrier (Smilax hispida)						
Nodding Ladies' Tresses (Spiranthes cernua)						
Rose Twisted-stalk (Streptopus lanceolatus)						
Skunk-cabbage (Symplocarpus foetidus)						
Purple Trillium (Trillium erectum)						
White Trillium (Trillium grandiflorum)						
Large-flowered Bellwort (Uvularia grandiflora)						

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum
F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover
U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)
R - Rare: represented in the polygon by less than about five individuals or small clumps

Project: Lancaster Rd	1 CUM1-1 / MAM2	4 CUM1-1	
Date: Oct 6/20	2 MAS2-1	5 CUM1-1 w MAM incl.	
Surveyors: Lacey McKenzie	3 CUT1 / CUM1-1	6 MAM2-2	

Trees & Shrubs	1	2	3	4	5	6
Conifers						
Balsam Fir (*Abies balsamea*)						
Common Juniper (*Juniperus communis*)						
Eastern Red Cedar (*Juniperus virginiana*)						
Tamarack (*Larix laricina*)						
Norway Spruce (*Picea abies*)						
White Spruce (*Picea glauca*)						
Black Spruce (*Picea mariana*)						
Jack Pine (*Pinus banksiana*)						
Red Pine (*Pinus resinosa*)						
Eastern White Pine (*Pinus strobus*)		R	R			
Scotch Pine (*Pinus sylvestris*)						
Canada Yew (*Taxus canadensis*)						
Eastern White Cedar (*Thuja occidentalis*)						
Eastern Hemlock (*Tsuga canadensis*)						
Deciduous						
Manitoba Maple (*Acer negundo*)						
Black Maple (*Acer nigrum*)						
Norway Maple (*Acer platanoides*)						
Red Maple (*Acer rubrum*)						
Silver Maple (*Acer saccharinum*)						
Freeman's Maple (*Acer X freemanii*)						
Sugar Maple (*Acer saccharum*)			D			
Mountain Maple (*Acer spicatum*)						
Speckled Alder (*Alnus incana*)						
Downy Serviceberry (*Amelanchier arborea*)						
Serviceberry (*Amelanchier sanguinea*)						
Yellow Birch (*Betula alleghaniensis*)						
White Birch (*Betula papyrifera*)						
European Birch (*Betula pendula*)						
Blue Beech (*Carpinus caroliniana*)						
Bitternut hickory (*Carya cordiformis*	D					
Shagbark Hickory (*Carya ovata*)	R		D			
Climbing Bittersweet (*Celastrus scandens*)						
Common Hackberry (*Celtis occidentalis*)						
Buttonbush (*Cephalanthus occidentalis*)						
Alt.-leaved Dogwood (*Cornus alternifolia*)						
Silky Dogwood (*Cornus amomum*)						
Bunchberry (*Cornus canadensis*)						
Gray dogwood (*Cornus racemosa*)	U	D	F	X		
Round-leaved Dogwood (*Cornus rugosa*)						
Red-osier Dogwood (*Cornus sericea*)	U	D		X		
American Hazel (*Corylus americana*)						
Beaked Hazel (*Corylus cornuta*)						
Cockspur Thorn (*Crataegus crus-galli*)						
English Hawthorn (*Crataegus monogyna*)						
Large-fruited Thorn (*Crataegus punctata*)						
Crataegus sp			U			
Crataegus						
Bush Honeysuckle (*Diervilla lonicera*)						
Russian Olive (*Elaeagnus angustifolia*)						
Autumn Olive (*Elaeagnus umbellata*)						
Run. Strawberry-bush (*Euonymus obovata*)						
American Beech (*Fagus grandifolia*)						
Glossy Buckthorn (*Frangula alnus*)						
Virginia strawberry (*Fragaria virginiana*)						
White Ash (*Fraxinus americana*)		R	F			
Black Ash (*Fraxinus nigra*)						
Green Ash (*Fraxinus pennsylvanica*)						
Witch-hazel (*Hamamelis virginiana*)						
Winterberry (*Ilex verticillata*)						
Butternut (*Juglans cinerea*)	R					
Black Walnut (*Juglans nigra*)			R			
Common Privet (*Ligustrum vulgare*)						
Spicebush (*Lindera benzoin*)						
Fly Honeysuckle (*Lonicera canadensis*)						
Glaucous Honeysuckle (*Lonicera dioica*)						
Morrow's Honeysuckle (*Lonicera morrowii*)						
Tartarian Honeysuckle (*Lonicera tatarica*)	F		F	X		
Common Apple (*Malus pumila*)						
White Mulberry (*Morus alba*)						
Sweet Gale (*Myrica gale*)						
Ironwood (*Ostrya virginiana*)						
Thicket-creeper (*Parthenocissus inserta*)						
Ninebark (*Physocarpus opulifolius*)	R					
Balsam Poplar (*Populus balsamifera*)						
Eastern Cottonwood (*Populus deltoides*)						
Large-tooth Aspen (*Populus grandidentata*)						
Trembling Aspen (*Populus tremuloides*)			R			
Sweet Cherry (*Prunus avium*)						
Pin Cherry (*Prunus pensylvanica*)						
Black Cherry (*Prunus serotina*)						
Choke Cherry (*Prunus virginiana*)						
Prunus sp			Y			

Tree & Shrubs	1	2	3	4	5	6
Deciduous						
White Oak (*Quercus alba*)						
Bur Oak (*Quercus macrocarpa*)						
Red Oak (*Quercus rubra*)	U		D	X		
Alder Buckthorn (*Rhamnus alnifolia*)						
Common Buckthorn (*Rhamnus cathartica*)	F	F	F	X		
Smooth Sumac (*Rhus glabra*)						
Staghorn Sumac (*Rhus hirta*)				X		
Wild Black Currant (*Ribes americanum*)						
Prickly Gooseberry (*Ribes cynosbati*)						
Swamp Black Currant (*Ribes lacustre*)						
Red Currant (*Ribes rubrum*)						
Ribes sp	U		R			
Black Locust (*Robinia pseudo-acacia*)						
Prickly Rose (*Rosa acicularis*)						
Smooth Rose (*Rosa blanda*)						
Multiflora Rose (*Rosa multiflora*)						
Rosa sp	U	U				
Com. Blackberry (*Rubus allegheniensis*)						
Wild Red Raspberry (*Rubus idaeus*)						
Black Raspberry (*Rubus occidentalis*)	U					
Purple-fl. Raspberry (*Rubus odoratus*)						
Dwarf Raspberry (*Rubus pubescens*)						
Rubus						
Peach-leaved Willow (*Salix amygdaloides*)						
Bebb's Willow (*Salix bebbiana*)						
Pussy Willow (*Salix discolor*)						
Missouri Willow (*Salix eriocephala*)						
Sandbar Willow (*Salix exigua*)						
Shining Willow (*Salix lucida*)						
Black Willow (*Salix nigra*)						
Slender Willow (*Salix petiolaris*)						
Salix sp		R				
Hybrid Crack Willow (*Salix X rubens*)						
Black-berried Elder (*Sambucus nigra*)						
Red-berried Elder (*Sambucus racemosa*)						
Buffaloberry (*Shepherdia canadensis*)						
Eur. Mountain Ash (*Sorbus aucuparia*)						
Narrow Meadow-sweet (*Spiraea alba*)						
Common Lilac (*Syringa vulgaris*)						
Basswood (*Tilia americana*)	U		D			
Poison-ivy (*Toxicodendron rydbergii*)			U			
Climbing Poison-ivy (*Toxicodendron radicans*)						
White Elm (*Ulmus americana*)		R	R			
Siberian Elm (*Ulmus pumila*)						
Slippery Elm (*Ulmus rubra*)						
Low Blueberry (*Vaccinium angustifolium*)						
Maple-leaf Viburnum (*Viburnum acerifolium*)						
Hobblebush (*Viburnum lantanoides*)						
Nannyberry (*Viburnum lentago*)						
Guelder-Rose (*Viburnum opulus*)						
Downy Arrow-wood (*Vib. rafinesquianum*)						
Riverbank Grape (*Vitis riparia*)	F	F	U	X		
Am. Prickly-ash (*Zanthoxylum americanum*)						
Viburnum trilobum		R				
Ferns & Allies						
Lady Fern (*Athyrium filix-femina*)						
Rattlesnake Fern (*Botrychium virginianum*)						
Bulbet Bladder Fern (*Cystopteris bulbifera*)						
Spin. Wood Fern (*Dryopteris carthusiana*)						
Crested Wood Fern (*Dryopteris cristata*)						
Marginal Wood Fern (*Dryopteris marginalis*)						
Dryopteris sp	U					
Ostrich Fern (*Matteuccia struthiopteris*)						
Sensitive Fern (*Onoclea sensibilis*)	U					
Cinnamon Fern (*Osmunda cinnamomea*)						
Interrupted Fern (*Osmunda claytoniana*)						
Royal Fern (*Osmunda regalis*)						
Christmas Fern (*Polystichum acrostichoides*)						
Eastern Bracken-fern (*Pteridium aquilinum*)						
Marsh Fern (*Thelypteris palustris*)						
Field Horsetail (*Equisetum arvense*)						
Scouring-rush (*Equisetum hyemale*)						
Variegated Horsetail (*Equisetum variegatum*)						
Equisetum						
Ground-cedar (*Lycopodium digitatum*)						
Shining Clubmoss (*Lycopodium lucidulum*)						
Ground-pine (*Lycopodium obscurum*)						

Graminoids	1	2	3	4	5	6
Grasses						
Giant Redtop (*Agrostis gigantea*)						
Redtop (*Agrostis stolonifera*)						
Awnless Brome (*Bromus inermis*)				X		
Bromus						
Blue-joint Grass (*Calamagrostis canadensis*)						
Orchard Grass (*Dactylis glomerata*)				X		
Poverty Oat Grass (*Danthonia spicata*)						
Quack Grass (*Elymus repens*)						
Virginia Wild Rye (*Elymus virginicus*)						
Elymus						
Fowl Manna Grass (*Glyceria striata*)						
Glyceria						
Rice Cut Grass (*Leersia oryzoides*)						
Tall Fescue (*Lolium arundinaceum*)						
Muhlenbergia						
Witch-grass (*Panicum capillare*)						
Panicum						
Reed Canary Grass (*Phalaris arundinacea*)		D		X		
Timothy (*Phleum pratense*)						
Common Reed (*Phragmites australis*)				X		
Canada Blue Grass (*Poa compressa*)						
Fowl Meadow Grass (*Poa palustris*)						
Kentucky Bluegrass (*Poa pratensis*)				X		
Yellow Foxtail (*Setaria pumila*)						
Green Foxtail (*Setaria viridis*)						
Sedges						
Drooping Wood Sedge (*Carex arctata*)						
Golden-fruited Sedge (*Carex aurea*)						
Graceful Sedge (*Carex gracillima*)						
Inland Sedge (*Carex interior*)						
Bladder Sedge (*Carex intumescens*)						
Lake-bank Sedge (*Carex lacustris*)						
Hop Sedge (*Carex lupulina*)						
Pennsylvania Sedge (*Carex pensylvanica*)						
Awl-fruited Sedge (*Carex stipata*)						
Fox Sedge (*Carex vulpinoidea*)						
Carex sp	F	F				
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Cyperus						
Redroot Spike-rush (*Eleocharis erythropoda*)						
Eleocharis						
Hard-stem Bulrush (*Schoenoplectus acutus*)						
Three-square Bulrush (*Sch. pungens*)						
Soft-stem Bulrush (*Sch. tabernaemontani*)						
Dark-green Bulrush (*Scirpus atrovirens*)						
Wool-grass (*Scirpus cyperinus*)						
Other Graminoids						
Broad Bur-reed (*Sparganium eurycarpum*)						
Narrow-leaved Cattail (*Typha angustifolia*)		U		X		
Broad-leaved Cattail (*Typha latifolia*)						
Broad-leaved Cattail (*Typha X glauca*)						
Articulated Rush (*Juncus articulatus*)						
Soft Rush (*Juncus effusus*)						
Path Rush (*Juncus tenuis*)						
Juncus sp		D				
Juncus						

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R - Rare: represented in the polygon by less than about five individuals or small clumps

Project: Glancaster Rd	7	F004-1	4 (Ron ?)
Date: Oct 6/20	8	SWT2 / MAM2	5
Surveyors: Kasey McKenzie	9	F002-2	6

Dicot Herbs - Asteraceae	1	2	3	4	5	6
Common Yarrow (*Achillea millefolium*)				X		
White Snakeroot (*Ageratina altissima*)						
Com. Ragweed (*Ambrosia artemisiifolia*)						
Giant Ragweed (*Ambrosia trifida*)						
Field Pussytoes (*Antennaria neglecta*)						
Artemisia						
Common Burdock (*Arctium minus*)				X		
Nodding Beggar-ticks (*Bidens cernua*)						
Devil's Beggar-ticks (*Bidens frondosa*)						
Spotted Knapweed (*Centaurea biebersteinii*)						
Brown Knapweed (*Centaurea jacea*)						
Chicory (*Cichorium intybus*)						
Canada Thistle (*Cirsium arvesnse*)						
Bull Thistle (*Cirsium vulgare*)						
Horseweed (*Conyza canadensis*)						
Daisy Fleabane (*Erigeron annus*)						
Philadelphia Fleabane (*Erig. philadelphicus*)						
Erigeron						
Joe-pye-weed (*Eupatorium maculatum*)						
Boneset (*Eupatorium perfoliatum*)						
Large-leaved Aster (*Eurybia macrophylla*)						
Flat-top Goldenrod (*Euthamia graminifolia*)						
Orange Hawkweed (*Hieracium aurantiacum*)						
Field Hawkweed (*Hieracium caespitosum*)						
Hieracium						
Elecampane (*Inula helenium*)						
Prickly Lettuce (*Lactuca serriola*)						
Lactuca						
Ox-eye Daisy (*Leucanthemum vulgare*)						
Pineapple-weed (*Matricaria discoidea*)						
Tall White Lettuce (*Prenanthes altissima*)						
Black-eyed Susan (*Rudbeckia hirta*)						
Tall Goldenrod (*Solidago altissima*)						
Blue-stem Goldenrod (*Solidago caesia*)						
Canada Goldenrod (*Solidago canadensis*)						
Zig-zag Goldenrod (*Solidago flexicaulis*)						
Giant Goldenrod (*Solidago gigantea*)						
Early Goldenrod (*Solidago juncea*)						
Gray Goldenrod (*Solidago nemoralis*)						
Solidago sp			R	X		
Field Sow-thistle (*Sonchus arvensis*)						
Sonchus						
Heart-leaf Aster (*Symph. cordifolium*)						
Heath Aster (*Symphyotrichum ericoides*)						
Tall White Aster (*Symph. lanceolatum*)						
Calico Aster (*Symphyotrichum lateriflorum*)						
New England Aster (*Symph. novae-angliae*)		F	R	X		
Purple-stem Aster (*Symph. puniceus*)	R					
Common Tansy (*Tanacetum vulgare*)						
Common Dandelion (*Taraxacum officinale*)				X		
Com. Goatsbeard (*Tragopogon pratensis*)						
Coltsfoot (*Tussilago farfara*)						
Symph sp	U					

Other Dicot Herbs	1	2	3	4	5	6
White Baneberry (*Actaea pachypoda*)						
Red Baneberry (*Actaea rubra*)						
Tall Agrimony (*Agrimonia gryposepala*)		U				
Garlic Mustard (*Alliaria petiolata*)						
Green Amaranth (*Amaranthus retroflexus*)						
Hog-peanut (*Amphicarpa bracteata*)						
Pearly Everlasting (*Anaphalis margaritacea*)						
Canada Anemone (*Anemone canadensis*)						
Ivy Hepatica (*Anemone acutiloba*)						
Thimbleweed (*Anemone virginiana*)						
Purple Angelica (*Angelica atropurpurea*)						
Indian Hemp (*Apocynum cannabinum*)						
Wild Sarsaparilla (*Aralia nudicaulis*)						
Spikenard (*Aralia racemosa*)						
Wild Ginger (*Asarum canadense*)						
Swamp Milkweed (*Asclepias incarnata*)						
Common Milkweed (*Asclepias syriaca*)				X		
Yellow Rocket (*Barbarea vulgaris*)						
False Nettle (*Boehmeria cylindrica*)						
Black Mustard (*Brassica nigra*)						
Marsh-marigold (*Caltha palustris*)						
Creeping Bellflower (*Campanula rapunculoides*)						
Agrimonia sp	R					
Asparagus officinalis		R				

Dicot Herbs	1	2	3	4	5	6
Shepherd's Purse (*Capsella bursa-pastoris*)						
Cutleaf Toothwort (*Cardamine concatenata*)						
Toothwort (*Cardamine diphylla*)						
Penn. Bitter-cress (*Cardamine pensylvanica*)						
Cardamine						
Blue Cohosh (*Caulophyllum thalictroides*)						
Mouse-ear Chickweed (*Cerastium fontanum*)						
Turtlehead (*Chelone glabra*)						
Spotted Water-hemlock (*Cicuta maculata*)						
Water-hemlock (*Cicuta virosa*)						
Enchanter's Nightshade (*Circaea lutetiana*)						
Carolina Spring Beauty (*Claytonia caroliniana*)						
Virginia Spring Beauty (*Claytonia virginica*)						
Virgin's-bower (*Clematis virginiana*)						
Field Bindweed (*Convolvulus arvensis*)						
Dog-strangling Vine (*Cynanchum rossicum*)						
Wild Carrot (*Daucus carota*)		F		X		
Deptford Pink (*Dianthus armeria*)						
Squirrel-corn (*Dicentra canadensis*)						
Dutchman's-breeches (*Dicentra cucullaria*)						
Wild Teasel (*Dipsacus fullonum*)				X		
Wild Cucumber (*Echinocystis lobata*)						
Viper's Bugloss (*Echium vulgare*)						
Northern Willow-herb (*Epilobium ciliatum*)						
Hairy Willow-herb (*Epilobium hirsutum*)						
Small-fl. Willow-herb (*Epilobium parviflorum*)						
Epilobium						
Worm Mustard (*Erysimum cheiranthoides*)						
Euphorbia						
Virginia Strawberry (*Fragaria virginiana*)	U					
Hemp Nettle (*Galeopsis tetrahit*)						
Wild Madder (*Galium mollugo*)	U					
Marsh Bedstraw (*Galium palustre*)						
Sweet-scented Bedstraw (*Galium triflorum*)						
Galium						
Spotted Geranium (*Geranium maculatum*)						
Herb-robert (*Geranium robertianum*)	U					
Yellow Avens (*Geum aleppicum*)						
White Avens (*Geum canadense*)						
Urban Avens (*Geum urbanum*)						
Dame's Rocket (*Hesperis matronalis*)						
Virg. Water-leaf (*Hydrophyllum virginianum*)						
Com. St. John's-wort (*Hypericum perforatum*)						
Spotted Jewelweed (*Impatiens capensis*)	U					
Wood Nettle (*Laportea canadensis*)						
Motherwort (*Leonurus cardiaca*)						
Field Peppergrass (*Lepidium campestre*)						
Eur. Gromwell (*Lithospermum officinale*)						
Butter & Eggs (*Linaria vulgaris*)						
Great Lobelia (*Lobelia siphilitica*)						
Lobelia						
Cut-leaf Bugleweed (*Lycopus americanus*)						
Northern Bugleweed (*Lycopus uniflorus*)						
Fringed Loosestrife (*Lysimachia ciliata*)						
Moneywort (*Lysimachia nummularia*)						
Lysimachia						
Purple Loosestrife (*Lythrum salicaria*)		F				
Black Medick (*Medicago lupulina*)						
Alfalfa (*Medicago sativa*)						
White Sweet-clover (*Melilotus alba*)						
Yellow Sweet-clover (*Melilotus officinalis*)						
Wild Mint (*Mentha arvensis*)						
Wild Bergamot (*Monarda fistulosa*)		F				
Small Forget-me-not (*Myosotis laxa*)						
Forget-me-not (*Myosotis scorpioides*)						
Water-cress (*Nasturtium officinale*)						
Com. Evening-primrose (*Oenothera biennis*)						
Sweet-cicely (*Osmorhiza berteroi*)						
Yellow Wood-sorrel (*Oxalis stricta*)						
Wild Parsnip (*Pastinaca sativa*)						
English Plantain (*Plantago lanceolata*)						
Common Plantain (*Plantago major*)						
Rugel's Plantain (*Plantago rugelii*)						
May-apple (*Podophyllum peltatum*)						
Pale Smartweed (*Polygonum lapathifolium*)						
Lady's-thumb (*Polygonum persicaria*)						
Virginia Knotweed (*Polygonum virginianum*)						
Polygonum						
Polygonum						
Rough Cinquefoil (*Potentilla norvegica*)						
Rough-fruited Cinquefoil (*Potentilla recta*)						
Common Cinquefoil (*Potentilla simplex*)	U					
Potentilla						
Heal-all (*Prunella vulgaris*)						
Shinleaf (*Pyrola elliptica*)						
Epifagus virginiana	U					
Euonymus obovatus	R					
Geum sp	F			X		
Dioscorea villosa			R			

Dicot Herbs	1	2	3	4	5	6
Kidney-leaf Buttercup (*Ranunculus abortivus*)						
Tall Buttercup (*Ranunculus acris*)						
Hooked Buttercup (*Ranunculus recurvatus*)						
Ranunculus						
Sheep Sorrel (*Rumex acetosella*)						
Curly-leaf Dock (*Rumex crispus*)						
Bitter Dock (*Rumex obtusifolius*)						
Bloodroot (*Sanginaria canadense*)						
Black Snakeroot (*Sanicula marilandica*)						
Bouncing Bet (*Saponaria officinalis*)						
Marsh Skullcap (*Scutellaria galericulata*)						
Mad Dog Skullcap (*Scutellaria lateriflora*)						
White Campion (*Silene latifolia*)						
Bladder Campion (*Silene vulgaris*)						
Hemlock Water-parsnip (*Sium suave*)						
Bitter Nightshade (*Solanum dulcamara*)						
Black Nightshade (*Solanum ptychanthum*)						
Grassleaf Stitchwort (*Stellaria graminea*)						
Common Chickweed (*Stellaria media*)						
Early Meadow-rue (*Thalictrum dioicum*)						
Tall Meadow-rue (*Thalictrum pubescens*)						
Field Penny-cress (*Thlaspi arvense*)						
Foamflower (*Tiarella cordifolia*)						
Star-flower (*Trientalis borealis*)						
Red Clover (*Trifolium pratense*)						
White Clover (*Trifolium repens*)						
Trifolium						
Stinging Nettle (*Urtica dioica*)	R					
Greater Bladderwort (*Utricularia vulgaris*)						
Common Mullein (*Verbascum thapsus*)						
Blue Vervain (*Verbena hastata*)						
White Vervain (*Verbena urticifolia*)						
Water Speedwell (*Veron. anagallis-aquatica*)						
Common Speedwell (*Veronica officinalis*)						
Veronica						
Cow Vetch (*Vicia cracca*)				X		
Vicia						
Periwinkle (*Vinca minor*)						
Dog Violet (*Viola conspersa*)						
Yellow Violet (*Viola pubescens*)						
Com. Blue Violet (*Viola sororia*)						
Viola						
Smilax sp			R			

Monocot Herbs	1	2	3	4	5	6
Water-plantain (*Alisma plantago-aquatica*)						
Wild Leek (*Allium tricoccum*)						
Jack-in-the-pulpit (*Arisaema triphyllum*)						
Asparagus (*Asparagus officinalis*)						
Wild Calla (*Calla palustris*)						
Bluebead-lily (*Clintonia borealis*)						
Garden Lily-of-valley (*Convallaria majalis*)						
Yel. Lady's Slipper (*Cypripedium parviflora*)						
Canada Waterweed (*Elodea canadensis*)						
Helleborine (*Epipactis helleborine*)						
Yellow Trout Lily (*Erythronium americanum*)						
Blue-flag Iris (*Iris versicolor*)						
Orange Day Lily (*Hemerocallus fulva*)						
Lesser Duckweed (*Lemna minor*)						
Starry Duckweed (*Lemna trisulca*)						
Wild Lily-of-valley (*Maianthemum canadense*)						
False Solom Seal (*Maianthemum racemosum*)	U					
Star False Solomon (*Maianthemum stellatum*)						
True Solomon Seal (*Polygonatum pubescens*)						
Pickerel-weed (*Pontederia cordata*)						
Curly-leaf Pondweed (*Potamogeton crispus*)						
Sago Pondweed (*Potamogeton pectinatus*)						
Potamogeton						
Potamogeton						
Broad-leaved Arrowhead (*Sagittaria latifolia*)						
Blue-eyed-grass (*Sisyrinchium montanum*)						
Herb. Carrion Flower (*Smilax herbacea*)						
Bristly Greenbrier (*Smilax hispida*)						
Nodding Ladies' Tresses (*Spiranthes cernua*)						
Rose Twisted-stalk (*Streptopus lanceolatus*)						
Skunk-cabbage (*Symplocarpus foetidus*)						
Purple Trillium (*Trillium erectum*)						
White Trillium (*Trillium grandiflorum*)						
Large-flowered Bellwort (*Uvularia grandiflora*)						

D - **Dominant**: represented by large numbers, generally forming >10% ground cover or >25% vegetation cover in any one stratum
F - **Fairly common (=Abundant in ELC)**: generally widespread represented by fairly large numbers of individual clumps, usually forming >10% ground cover
U - **Uncommon (=Occasional in ELC)**: present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)
R - **Rare**: represented in the polygon by less than about five individuals or small clumps

Project: Glancaster Rd	7 FOD4-1	4	ROW
Date: Oct 6/20	8 SWT2/MAM2	5	
Surveyors: Kasey McKenzie	9 FOD2-2	6	

Scanned with CamScanner

Plant Species List

Species	1	2	3	4	5	6
Field Pussytoes (*Antennaria neglecta*)						
Artemisia						
Common Burdock (*Arctium minus*)						
Nodding Beggar-ticks (*Bidens cernua*)						
Devil's Beggar-ticks (*Bidens frondosa*)	U					
Spotted Knapweed (*Centaurea biebersteinii*)						
Brown Knapweed (*Centaurea jacea*)				F		
Chicory (*Cichorium intybus*)			U	U		
Canada Thistle (*Cirsium arvesnse*)	F			F		U
Bull Thistle (*Cirsium vulgare*)						
Horseweed (*Conyza canadensis*)						
Daisy Fleabane (*Erigeron annus*)						
Philadelphia Fleabane (*Erig. philadelphicus*)						
Erigeron						
Joe-pye-weed (*Eupatorium maculatum*)						
Boneset (*Eupatorium perfoliatum*)						
Large-leaved Aster (*Eurybia macrophylla*)						
Flat-top Goldenrod (*Euthamia graminifolia*)		R				
Orange Hawkweed (*Hieracium aurantiacum*)						
Field Hawkweed (*Hieracium caespitosum*)						
Hieracium						
Elecampane (*Inula helenium*)						
Prickly Lettuce (*Lactuca serriola*)						
Lactuca						
Ox-eye Daisy (*Leucanthemum vulgare*)						
Pineapple-weed (*Matricaria discoidea*)						
Tall White Lettuce (*Prenanthes altissima*)						
Black-eyed Susan (*Rudbeckia hirta*)						
Tall Goldenrod (*Solidago altissima*)						
Blue-stem Goldenrod (*Solidago caesia*)						
Canada Goldenrod (*Solidago canadensis*)						
Zig-zag Goldenrod (*Solidago flexicaulis*)						
Giant Goldenrod (*Solidago gigantea*)						
Early Goldenrod (*Solidago juncea*)						
Gray Goldenrod (*Solidago nemoralis*)						
Solidago sp	D		D	D		U
Field Sow-thistle (*Sonchus arvensis*)			U	U		
Sonchus						
Heart-leaf Aster (*Symph. cordifolium*)						
Heath Aster (*Symphyotrichum ericoides*)						
Tall White Aster (*Symph. lanceolatum*)						
Calico Aster (*Symphyotrichum lateriflorum*)						
New England Aster (*Symph. novae-angliae*)						
Purple-stem Aster (*Symph. puniceus*)						
Common Tansy (*Tanacetum vulgare*)						
Common Dandelion (*Taraxacum officinale*)						
Com. Goatsbeard (*Tragopogon pratensis*)						
Coltsfoot (*Tussilago farfara*)						
Symphyotrichum sp	D		F	F		
Other Dicot Herbs						
White Baneberry (*Actaea pachypoda*)						
Red Baneberry (*Actaea rubra*)						
Tall Agrimony (*Agrimonia gryposepala*)						
Garlic Mustard (*Alliaria petiolata*)	F					
Green Amaranth (*Amaranthus retroflexus*)						
Hog-peanut (*Amphicarpa bracteata*)						
Pearly Everlasting (*Anaphalis margaritacea*)						
Canada Anemone (*Anemone canadensis*)						
Ivy Hepatica (*Anemone acutiloba*)						
Thimbleweed (*Anemone virginiana*)						
Purple Angelica (*Angelica atropurpurea*)						
Indian Hemp (*Apocynum cannabinum*)						
Wild Sarsaparilla (*Aralia nudicaulis*)						
Spikenard (*Aralia racemosa*)						
Wild Ginger (*Asarum canadense*)						
Swamp Milkweed (*Asclepias incarnata*)						
Common Milkweed (*Asclepias syriaca*)	U			F		
Yellow Rocket (*Barbarea vulgaris*)						
False Nettle (*Boehmeria cylindrica*)						
Black Mustard (*Brassica nigra*)						
Marsh-marigold (*Caltha palustris*)						
Creeping Bellflower (*Campanula rapunculoides*)						

Species	1	2	3	4	5	6
Cardamine						
Blue Cohosh (*Caulophyllum thalictroides*)						
Mouse-ear Chickweed (*Cerastium fontanum*)						
Turtlehead (*Chelone glabra*)						
Spotted Water-hemlock (*Cicuta maculata*)						
Water-hemlock (*Cicuta virosa*)						
Enchanter's Nightshade (*Circaea lutetiana*)						
Carolina Spring Beauty (*Claytonia caroliniana*)						
Virginia Spring Beauty (*Claytonia virginica*)						
Virgin's-bower (*Clematis virginiana*)						
Field Bindweed (*Convolvulus arvensis*)						
Dog-strangling Vine (*Cynanchum rossicum*)						
Wild Carrot (*Daucus carota*)	U		F	F	U	
Deptford Pink (*Dianthus armeria*)						
Squirrel-corn (*Dicentra canadensis*)						
Dutchman's-breeches (*Dicentra cucullaria*)						
Wild Teasel (*Dipsacus fullonum*)	U		F	U		U
Wild Cucumber (*Echinocystis lobata*)						
Viper's Bugloss (*Echium vulgare*)						
Northern Willow-herb (*Epilobium ciliatum*)						
Hairy Willow-herb (*Epilobium hirsutum*)						
Small-fl. Willow-herb (*Epilobium parviflorum*)						
Epilobium						
Worm Mustard (*Erysimum cheiranthoides*)						
Euphorbia						
Virginia Strawberry (*Fragaria virginiana*)						
Hemp Nettle (*Galeopsis tetrahit*)						
Wild Madder (*Galium mollugo*)						
Marsh Bedstraw (*Galium palustre*)						
Sweet-scented Bedstraw (*Galium triflorum*)						
Galium						
Spotted Geranium (*Geranium maculatum*)						
Herb-robert (*Geranium robertianum*)						
Yellow Avens (*Geum aleppicum*)						
White Avens (*Geum canadense*)						
Urban Avens (*Geum urbanum*)						
Dame's Rocket (*Hesperis matronalis*)						
Virg. Water-leaf (*Hydrophyllum virginianum*)						
Com. St. John's-wort (*Hypericum perforatum*)						
Spotted Jewelweed (*Impatiens capensis*)	F	F			U	F
Wood Nettle (*Laportea canadensis*)						
Motherwort (*Leonurus cardiaca*)						
Field Peppergrass (*Lepidium campestre*)						
Eur. Gromwell (*Lithospermum officinale*)						
Butter & Eggs (*Linaria vulgaris*)						
Great Lobelia (*Lobelia siphilitica*)						
Lobelia						
Cut-leaf Bugleweed (*Lycopus americanus*)						
Northern Bugleweed (*Lycopus uniflorus*)						
Fringed Loosestrife (*Lysimachia ciliata*)						
Moneywort (*Lysimachia nummularia*)						
Lysimachia						
Purple Loosestrife (*Lythrum salicaria*)	U	F	U	U		F
Black Medick (*Medicago lupulina*)						
Alfalfa (*Medicago sativa*)						
White Sweet-clover (*Melilotus alba*)						
Yellow Sweet-clover (*Melilotus officinalis*)						
Wild Mint (*Mentha arvensis*)						
Wild Bergamot (*Monarda fistulosa*)						
Small Forget-me-not (*Myosotis laxa*)						
Forget-me-not (*Myosotis scorpioides*)						
Water-cress (*Nasturtium officinale*)						
Com. Evening-primrose (*Oenothera biennis*)						
Sweet-cicely (*Osmorhiza berterii*)						
Yellow Wood-sorrel (*Oxalis stricta*)						
Wild Parsnip (*Pastinaca sativa*)						
English Plantain (*Plantago lanceolata*)						
Common Plantain (*Plantago major*)						
Rugel's Plantain (*Plantago rugelii*)						
May-apple (*Podophyllum peltatum*)						
Pale Smartweed (*Polygonum lapathifolium*)						
Lady's-thumb (*Polygonum persicaria*)						
Virginia Knotweed (*Polygonum virginianum*)						
Polygonum						
Polygonum						
Rough Cinquefoil (*Potentilla norvegica*)						
Rough-fruited Cinquefoil (*Potentilla recta*)						
Common Cinquefoil (*Potentilla simplex*)						
Potentilla						
Heal-all (*Prunella vulgaris*)						
Shinleaf (*Pyrola elliptica*)						
Geum sp	U					
Lotus corniculatus				F		

Species	1	2	3	4	5	6
Sheep Sorrel (*Rumex acetosella*)						
Curly-leaf Dock (*Rumex crispus*)			U		F	
Bitter Dock (*Rumex obtusifolius*)						
Bloodroot (*Sanginaria canadense*)						
Black Snakeroot (*Sanicula marilandica*)						
Bouncing Bet (*Saponaria officinalis*)						
Marsh Skullcap (*Scutellaria galericulata*)						
Mad Dog Skullcap (*Scutellaria lateriflora*)						
White Campion (*Silene latifolia*)						
Bladder Campion (*Silene vulgaris*)						
Hemlock Water-parsnip (*Sium suave*)						
Bitter Nightshade (*Solanum dulcamara*)		U				
Black Nightshade (*Solanum ptychanthum*)						
Grassleaf Stitchwort (*Stellaria graminea*)						
Common Chickweed (*Stellaria media*)						
Early Meadow-rue (*Thalictrum dioicum*)						
Tall Meadow-rue (*Thalictrum pubescens*)						
Field Penny-cress (*Thlaspi arvense*)						
Foamflower (*Tiarella cordifolia*)						
Star-flower (*Trientalis borealis*)						
Red Clover (*Trifolium pratense*)						
White Clover (*Trifolium repens*)						
Trifolium						
Stinging Nettle (*Urtica dioica*)						
Greater Bladderwort (*Utricularia vulgaris*)						
Common Mullein (*Verbascum thapsus*)						
Blue Vervain (*Verbena hastata*)	U					
White Vervain (*Verbena urticifolia*)						
Water Speedwell (*Veron. anagallis-aquatica*)						
Common Speedwell (*Veronica officinalis*)						
Veronica						
Cow Vetch (*Vicia cracca*)	U					
Vicia						
Periwinkle (*Vinca minor*)						
Dog Violet (*Viola conspersa*)						
Yellow Violet (*Viola pubescens*)						
Com. Blue Violet (*Viola sororia*)						
Viola						
Lily sp?	R					
Monocot Herbs						
Water-plantain (*Alisma plantago-aquatica*)						
Wild Leek (*Allium tricoccum*)						
Jack-in-the-pulpit (*Arisaema triphyllum*)						
Asparagus (*Asparagus officinalis*)						
Wild Calla (*Calla palustris*)						
Bluebead-lily (*Clintonia borealis*)						
Garden Lily-of-valley (*Convallaria majalis*)						
Yel. Lady's Slipper (*Cypripedium parviflora*)						
Canada Waterweed (*Elodea canadensis*)						
Helleborine (*Epipactis helleborine*)						
Yellow Trout Lily (*Erythronium americanum*)						
Blue-flag Iris (*Iris versicolor*)						
Orange Day Lily (*Hemerocallis fulva*)						
Lesser Duckweed (*Lemna minor*)						
Starry Duckweed (*Lemna trisulca*)						
Wild Lily-of-valley (*Maianthemum canadense*)						
False Solom Seal (*Maianthemum racemosum*)						
Star False Solomon (*Maianthemum stellatum*)						
True Solomon Seal (*Polygonatum pubescens*)						
Pickerel-weed (*Pontederia cordata*)						
Curly-leaf Pondweed (*Potamogeton crispus*)						
Sago Pondweed (*Potamogeton pectinatus*)						
Potamogeton						
Potamogeton						
Broad-leaved Arrowhead (*Sagittaria latifolia*)						
Blue-eyed-grass (*Sisyrinchium montanum*)						
Herb. Carrion Flower (*Smilax herbacea*)						
Bristly Greenbrier (*Smilax hispida*)						
Nodding Ladies' Tresses (*Spiranthes cernua*)						
Rose Twisted-stalk (*Streptopus lanceolatus*)						
Skunk-cabbage (*Symplocarpus foetidus*)						
Purple Trillium (*Trillium erectum*)						
White Trillium (*Trillium grandiflorum*)						
Large-flowered Bellwort (*Uvularia grandiflora*)						

*D - **Dominant**: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum*
*F - **Fairly common (=Abundant in ELC)**: generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover*
*U - **Uncommon (=Occasional in ELC)**: present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)*
*R - **Rare**: represented in the polygon by less than about five individuals or small clumps*

Project: Gloucester Rd — 1) CUMI-1 / MAM; 4) CUMI-1
Date: Aug 31/20 — 2) MAS2-1; 5) CUMI-1 ~ MAM incl?
Surveyors: Kasey + Mikayla — 3) CUMI-1 / CUT1; 6) MAM2-2

Plant Species List

Trees & Shrubs	1	2	3	4	5	6
Conifers						
Balsam Fir *(Abies balsamea)*						
Common Juniper *(Juniperus communis)*						
Eastern Red Cedar *(Juniperus virginiana)*						
Tamarack *(Larix laricina)*						
Norway Spruce *(Picea abies)*						
White Spruce *(Picea glauca)*				R		
Black Spruce *(Picea mariana)*						
Jack Pine *(Pinus banksiana)*						
Red Pine *(Pinus resinosa)*						
Eastern White Pine *(Pinus strobus)*				R		
Scotch Pine *(Pinus sylvestris)*						
Canada Yew *(Taxus canadensis)*						
Eastern White Cedar *(Thuja occidentalis)*						
Eastern Hemlock *(Tsuga canadensis)*						
Deciduous						
Manitoba Maple *(Acer negundo)*				R		
Black Maple *(Acer nigrum)*						
Norway Maple *(Acer platanoides)*						
Red Maple *(Acer rubrum)*						
Silver Maple *(Acer saccharinum)*						
Freeman's Maple *(Acer X freemanii)*						
Sugar Maple *(Acer saccharum)*						
Mountain Maple *(Acer spicatum)*						
Speckled Alder *(Alnus incana)*						
Downy Serviceberry *(Amelanchier arborea)*						
Serviceberry *(Amelanchier sanguinea)*						
Yellow Birch *(Betula alleghaniensis)*						
White Birch *(Betula papyrifera)*						
European Birch *(Betula pendula)*						
Blue Beech *(Carpinus caroliniana)*						
Bitternut hickory *(Carya cordiformis*						
Shagbark Hickory *(Carya ovata)*						
Climbing Bittersweet *(Celastrus scandens)*						
Common Hackberry *(Celtis occidentalis)*						
Buttonbush *(Cephalanthus occidentalis)*						
Alt.-leaved Dogwood *(Cornus alternifolia)*						
Silky Dogwood *(Cornus amomum)*						
Bunchberry *(Cornus canadensis)*						
Gray dogwood *(Cornus racemosa)*	U					
Round-leaved Dogwood *(Cornus rugosa)*						
Red-osier Dogwood *(Cornus sericea)*	F		F			
American Hazel *(Corylus americana)*						
Beaked Hazel *(Corylus cornuta)*						
Cockspur Thorn *(Crataegus crus-galli)*						
English Hawthorn *(Crataegus monogyna)*						
Large-fruited Thorn *(Crataegus punctata)*						
Crataegus						
Crataegus						
Bush Honeysuckle *(Diervilla lonicera)*						
Russian Olive *(Elaeagnus angustifolia)*						
Autumn Olive *(Elaeagnus umbellata)*						
Run. Strawberry-bush *(Euonymus obovata)*						
American Beech *(Fagus grandifolia)*						
Glossy Buckthorn *(Frangula alnus)*						
Virginia strawberry *(Fragaria virginiana)*						
White Ash *(Fraxinus americana)*						
Black Ash *(Fraxinus nigra)*						
Green Ash *(Fraxinus pennsylvanica)*						
Witch-hazel *(Hamamelis virginiana)*						
Winterberry *(Ilex verticillata)*						
Butternut *(Juglans cinerea)*						
Black Walnut *(Juglans nigra)*	U					
Common Privet *(Ligustrum vulgare)*						
Spicebush *(Lindera benzoin)*						
Fly Honeysuckle *(Lonicera canadensis)*						
Glaucous Honeysuckle *(Lonicera dioica)*						
Morrow's Honeysuckle *(Lonicera morrowii)*						
Tartarian Honeysuckle *(Lonicera tatarica)*	U					
Common Apple *(Malus pumila)*						
White Mulberry *(Morus alba)*						
Sweet Gale *(Myrica gale)*						
Ironwood *(Ostrya virginiana)*						
Thicket-creeper *(Parthenocissus inserta)*						
Ninebark *(Physocarpus opulifolius)*						
Balsam Poplar *(Populus balsamifera)*						
Eastern Cottonwood *(Populus deltoides)*						
Large-tooth Aspen *(Populus grandidentata)*						
Trembling Aspen *(Populus tremuloides)*				R		
Sweet Cherry *(Prunus avium)*						
Pin Cherry *(Prunus pensylvanica)*						
Black Cherry *(Prunus serotina)*						
Choke Cherry *(Prunus virginiana)*						
Prunus						

Tree & Shrubs	1	2	3	4	5	6
Deciduous						
White Oak *(Quercus alba)*						
Bur Oak *(Quercus macrocarpa)*						
Red Oak *(Quercus rubra)*						
Alder Buckthorn *(Rhamnus alnifolia)*						
Common Buckthorn *(Rhamnus cathartica)*	U					
Smooth Sumac *(Rhus glabra)*	R	F	U			
Staghorn Sumac *(Rhus hirta)*						
Wild Black Currant *(Ribes americanum)*						
Prickly Gooseberry *(Ribes cynosbati)*						
Swamp Black Currant *(Ribes lacustre)*						
Red Currant *(Ribes rubrum)*						
Ribes sp	R					
Black Locust *(Robinia pseudo-acacia)*						
Prickly Rose *(Rosa acicularis)*						
Smooth Rose *(Rosa blanda)*						
Multiflora Rose *(Rosa multiflora)*						
Rosa						
Com. Blackberry *(Rubus allegheniensis)*						
Wild Red Raspberry *(Rubus idaeus)*						
Black Raspberry *(Rubus occidentalis)*	U					
Purple-fl. Raspberry *(Rubus odoratus)*						
Dwarf Raspberry *(Rubus pubescens)*						
Rubus						
Peach-leaved Willow *(Salix amygdaloides)*						
Bebb's Willow *(Salix bebbiana)*						
Pussy Willow *(Salix discolor)*						
Missouri Willow *(Salix eriocephala)*						
Sandbar Willow *(Salix exigua)*						
Shining Willow *(Salix lucida)*						
Black Willow *(Salix nigra)*						
Slender Willow *(Salix petiolaris)*						
Salix sp	U	U				
Hybrid Crack Willow *(Salix X rubens)*						
Black-berried Elder *(Sambucus nigra)*						
Red-berried Elder *(Sambucus racemosa)*						
Buffaloberry *(Shepherdia canadensis)*						
Eur. Mountain Ash *(Sorbus aucuparia)*						
Narrow Meadow-sweet *(Spiraea alba)*						
Common Lilac *(Syringa vulgaris)*						
Basswood *(Tilia americana)*						
Poison-ivy *(Toxicodendron rydbergii)*						
Climbing Poison-ivy *(Toxicodendron radicans)*						
White Elm *(Ulmus americana)*						
Siberian Elm *(Ulmus pumila)*						
Slippery Elm *(Ulmus rubra)*						
Low Blueberry *(Vaccinium angustifolium)*						
Maple-leaf Viburnum *(Viburnum acerifolium)*						
Hobblebush *(Viburnum lantanoides)*						
Nannyberry *(Viburnum lentago)*						
Guelder-Rose *(Viburnum opulus)*	R					
Downy Arrow-wood *(Vib. rafinesquianum)*						
Riverbank Grape *(Vitis riparia)*	U		F	U		
Am. Prickly-ash *(Zanthoxylum americanum)*						

Ferns & Allies	1	2	3	4	5	6
Lady Fern *(Athyrium filix-femina)*						
Rattlesnake Fern *(Botrychium virginianum)*						
Bulbet Bladder Fern *(Cystopteris bulbifera)*						
Spin. Wood Fern *(Dryopteris carthusiana)*						
Crested Wood Fern *(Dryopteris cristata)*						
Marginal Wood Fern *(Dryopteris marginalis)*						
Dryopteris						
Ostrich Fern *(Matteuccia struthiopteris)*						
Sensitive Fern *(Onoclea sensibilis)*						
Cinnamon Fern *(Osmunda cinnamomea)*						
Interrupted Fern *(Osmunda claytoniana)*						
Royal Fern *(Osmunda regalis)*						
Christmas Fern *(Polystichum acrostichoides)*						
Eastern Bracken-fern *(Pteridium aquilinum)*						
Marsh Fern *(Thelypteris palustris)*						
Field Horsetail *(Equisetum arvense)*						
Scouring-rush *(Equisetum hyemale)*						
Variegated Horsetail *(Equisetum variegatum)*						
Equisetum						
Ground-cedar *(Lycopodium digitatum)*						
Shining Clubmoss *(Lycopodium lucidulum)*						
Ground-pine *(Lycopodium obscurum)*						

Graminoids	1	2	3	4	5	6
Grasses						
Giant Redtop *(Agrostis gigantea)*						
Redtop *(Agrostis stolonifera)*			F			
Awnless Brome *(Bromus inermis)*						
Bromus						
Blue-joint Grass *(Calamagrostis canadensis)*						
Orchard Grass *(Dactylis glomerata)*				F		
Poverty Oat Grass *(Danthonia spicata)*						
Quack Grass *(Elymus repens)*						
Virginia Wild Rye *(Elymus virginicus)*						
Elymus						
Fowl Manna Grass *(Glyceria striata)*					F	
Glyceria						
Rice Cut Grass *(Leersia oryzoides)*						
Tall Fescue *(Lolium arundinaceum)*						
Muhlenbergia						
Witch-grass *(Panicum capillare)*						
Panicum						
Reed Canary Grass *(Phalaris arundinacea)*	U	U	U	U	F	D
Timothy *(Phleum pratense)*						
Common Reed *(Phragmites australis)*		F	U	U		F
Canada Blue Grass *(Poa compressa)*						
Fowl Meadow Grass *(Poa palustris)*						
Kentucky Bluegrass *(Poa pratensis)*	F			D		
Yellow Foxtail *(Setaria pumila)*						
Green Foxtail *(Setaria viridis)*						
Echinochloa crusgalli > any near rd						
Poa sp					F	
Sedges						
Drooping Wood Sedge *(Carex arctata)*						
Golden-fruited Sedge *(Carex aurea)*						
Graceful Sedge *(Carex gracillima)*						
Inland Sedge *(Carex interior)*						
Bladder Sedge *(Carex intumescens)*						
Lake-bank Sedge *(Carex lacustris)*						
Hop Sedge *(Carex lupulina)*						
Pennsylvania Sedge *(Carex pensylvanica)*						
Awl-fruited Sedge *(Carex stipata)*						
Fox Sedge *(Carex vulpinoidea)*						
Carex sp					F	
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Cyperus						
Redroot Spike-rush *(Eleocharis erythropoda)*						
Eleocharis						
Hard-stem Bulrush *(Schoenoplectus acutus)*						
Three-square Bulrush *(Sch. pungens)*						
Soft-stem Bulrush *(Sch. tabernaemontani)*						
Dark-green Bulrush *(Scirpus atrovirens)*						
Wool-grass *(Scirpus cyperinus)*						
Sch. sp					U	
Other Graminoids						
Broad Bur-reed *(Sparganium eurycarpum)*						
Narrow-leaved Cattail *(Typha angustifolia)*			D	R	F	
Broad-leaved Cattail *(Typha latifolia)*						
Broad-leaved Cattail *(Typha X glauca)*						
Articulated Rush *(Juncus articulatus)*						
Soft Rush *(Juncus effusus)*						
Path Rush *(Juncus tenuis)*						
Juncus sp					U	
Juncus						

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Project:

Date:

Surveyors

1 CUM1-1 / MAM2

2 MAS2-1

3 CUM1-1 / CUT1

4 CUM1-1

5 CUM1-1 w MAM incl. ?

6 MAM2-2

Dicot Herbs - Asteraceae	1	2	3	4	5	6
Common Yarrow *(Achillea millefolium)*						
White Snakeroot *(Ageratina altissima)*						
Com. Ragweed *(Ambrosia artemisiifolia)*						
Giant Ragweed *(Ambrosia trifida)*						

Dicot Herbs	1	2	3	4	5	6
Shepherd's Purse *(Capsella bursa-pastoris)*						
Cutleaf Toothwort *(Cardamine concatenata)*						
Toothwort *(Cardamine diphylla)*						
Penn. Bitter-cress *(Cardamine pensylvanica)*						

Dicot Herbs	1	2	3	4	5	6
Kidney-leaf Buttercup *(Ranunculus abortivus)*						
Tall Buttercup *(Ranunculus acris)*						
Hooked Buttercup *(Ranunculus recurvatus)*						
Ranunculus						

Plant Species List

Trees & Shrubs – Conifers	1	2	3	4	5	6
Balsam Fir (*Abies balsamea*)						
Common Juniper (*Juniperus communis*)						
Eastern Red Cedar (*Juniperus virginiana*)						
Tamarack (*Larix laricina*)						
Norway Spruce (*Picea abies*)						
White Spruce (*Picea glauca*)						
Black Spruce (*Picea mariana*)						
Jack Pine (*Pinus banksiana*)						
Red Pine (*Pinus resinosa*)						
Eastern White Pine (*Pinus strobus*)	R	R				
Scotch Pine (*Pinus sylvestris*)						
Canada Yew (*Taxus canadensis*)						
Eastern White Cedar (*Thuja occidentalis*)						
Eastern Hemlock (*Tsuga canadensis*)						

Trees & Shrubs – Deciduous	1	2	3	4	5	6
Manitoba Maple (*Acer negundo*)						
Black Maple (*Acer nigrum*)						
Norway Maple (*Acer platanoides*)						
Red Maple (*Acer rubrum*)						
Silver Maple (*Acer saccharinum*)						
Freeman's Maple (*Acer X freemanii*)						
Sugar Maple (*Acer saccharum*)						
Mountain Maple (*Acer spicatum*)						
Speckled Alder (*Alnus incana*)						
Downy Serviceberry (*Amelanchier arborea*)						
Serviceberry (*Amelanchier sanguinea*)						
Yellow Birch (*Betula alleghaniensis*)						
White Birch (*Betula papyrifera*)						
European Birch (*Betula pendula*)						
Blue Beech (*Carpinus caroliniana*)						
Bitternut hickory (*Carya cordiformis*	F					
Shagbark Hickory (*Carya ovata*)	U					
Climbing Bittersweet (*Celastrus scandens*)						
Common Hackberry (*Celtis occidentalis*)						
Buttonbush (*Cephalanthus occidentalis*)						
Alt.-leaved Dogwood (*Cornus alternifolia*)						
Silky Dogwood (*Cornus amomum*)						
Bunchberry (*Cornus canadensis*)						
Gray dogwood (*Cornus racemosa*)		D				
Round-leaved Dogwood (*Cornus rugosa*)		F				
Red-osier Dogwood (*Cornus sericea*)						
American Hazel (*Corylus americana*)						
Beaked Hazel (*Corylus cornuta*)						
Cockspur Thorn (*Crataegus crus-galli*)						
English Hawthorn (*Crataegus monogyna*)						
Large-fruited Thorn (*Crataegus punctata*)						
Crataegus						
Crataegus						
Bush Honeysuckle (*Diervilla lonicera*)						
Russian Olive (*Elaeagnus angustifolia*)						
Autumn Olive (*Elaeagnus umbellata*)						
Run. Strawberry-bush (*Euonymus obovata*)	D					
American Beech (*Fagus grandifolia*)						
Glossy Buckthorn (*Frangula alnus*)						
Virginia strawberry (*Fragaria virginiana*)						
White Ash (*Fraxinus americana*)	D	U				
Black Ash (*Fraxinus nigra*)						
Green Ash (*Fraxinus pennsylvanica*)						
Witch-hazel (*Hamamelis virginiana*)						
Winterberry (*Ilex verticilata*)						
* Butternut (*Juglans cinerea*) *	R					
Black Walnut (*Juglans nigra*)						
Common Privet (*Ligustrum vulgare*)						
Spicebush (*Lindera benzoin*)						
Fly Honeysuckle (*Lonicera canadensis*)						
Glaucous Honeysuckle (*Lonicera dioica*)						
Morrow's Honeysuckle (*Lonicera morrowii*)	F	F				
Tartarian Honeysuckle (*Lonicera tatarica*)						
Common Apple (*Malus pumila*)						
White Mulberry (*Morus alba*)						
Sweet Gale (*Myrica gale*)						
Ironwood (*Ostrya virginiana*)	D					
Thicket-creeper (*Parthenocissus inserta*)		U				
Ninebark (*Physocarpus opulifolius*)						
Balsam Poplar (*Populus balsamifera*)						
Eastern Cottonwood (*Populus deltoides*)						
Large-tooth Aspen (*Populus grandidentata*)						
Trembling Aspen (*Populus tremuloides*)	U					
Sweet Cherry (*Prunus avium*)						
Pin Cherry (*Prunus pensylvanica*)						
Black Cherry (*Prunus serotina*)	R					
Choke Cherry (*Prunus virginiana*)						
Prunus						

Tree & Shrubs – Deciduous	1	2	3	4	5	6
White Oak (*Quercus alba*)						
Bur Oak (*Quercus macrocarpa*)						
Red Oak (*Quercus rubra*)	F					
Alder Buckthorn (*Rhamnus alnifolia*)						
Common Buckthorn (*Rhamnus cathartica*)	F	F				
Smooth Sumac (*Rhus glabra*)						
Staghorn Sumac (*Rhus hirta*)						
Wild Black Currant (*Ribes americanum*)						
Prickly Gooseberry (*Ribes cynosbati*)						
Swamp Black Currant (*Ribes lacustre*)						
Red Currant (*Ribes rubrum*)						
Ribes sp	U					
Black Locust (*Robinia pseudo-acacia*)						
Prickly Rose (*Rosa acicularis*)						
Smooth Rose (*Rosa blanda*)						
Multiflora Rose (*Rosa multiflora*)	F					
Rosa						
Com. Blackberry (*Rubus allegheniensis*)	U					
Wild Red Raspberry (*Rubus idaeus*)						
Black Raspberry (*Rubus occidentalis*)						
Purple-fl. Raspberry (*Rubus odoratus*)						
Dwarf Raspberry (*Rubus pubescens*)						
Rubus						
Peach-leaved Willow (*Salix amygdaloides*)						
Bebb's Willow (*Salix bebbiana*)						
Pussy Willow (*Salix discolor*)						
Missouri Willow (*Salix eriocephala*)						
Sandbar Willow (*Salix exigua*)						
Shining Willow (*Salix lucida*)						
Black Willow (*Salix nigra*)						
Slender Willow (*Salix petiolaris*)						
Salix sp		U				
Hybrid Crack Willow (*Salix X rubens*)						
Black-berried Elder (*Sambucus nigra*)						
Red-berried Elder (*Sambucus racemosa*)						
Buffaloberry (*Shepherdia canadensis*)						
Eur. Mountain Ash (*Sorbus aucuparia*)						
Narrow Meadow-sweet (*Spiraea alba*)						
Common Lilac (*Syringa vulgaris*)						
Basswood (*Tilia americana*)	U					
Poison-ivy (*Toxicodendron rydbergii*)	UU	U				
Climbing Poison-ivy (*Toxicodendron radicans*)						
White Elm (*Ulmus americana*)	U	U				
Siberian Elm (*Ulmus pumila*)						
Slippery Elm (*Ulmus rubra*)						
Low Blueberry (*Vaccinium angustifolium*)						
Maple-leaf Viburnum (*Viburnum acerifolium*)						
Hobblebush (*Viburnum lantanoides*)						
Nannyberry (*Viburnum lentago*)						
Guelder-Rose (*Viburnum opulus*)						
Downy Arrow-wood (*Vib. rafinesquianum*)						
Riverbank Grape (*Vitis riparia*)	F	F				
Am. Prickly-ash (*Zanthoxylum americanum*)						

Ferns & Allies	1	2	3	4	5	6
Lady Fern (*Athyrium filix-femina*)						
Rattlesnake Fern (*Botrychium virginianum*)						
Bulbet Bladder Fern (*Cystopteris bulbifera*)						
Spin. Wood Fern (*Dryopteris carthusiana*)						
Crested Wood Fern (*Dryopteris cristata*)	R					
Marginal Wood Fern (*Dryopteris marginalis*)						
Dryopteris						
Ostrich Fern (*Matteuccia struthiopteris*)						
Sensitive Fern (*Onoclea sensibilis*)	R	F				
Cinnamon Fern (*Osmunda cinnamomea*)						
Interrupted Fern (*Osmunda claytoniana*)						
Royal Fern (*Osmunda regalis*)						
Christmas Fern (*Polystichum acrostichoides*)						
Eastern Bracken-fern (*Pteridium aquilinum*)						
Marsh Fern (*Thelypteris palustris*)						
Field Horsetail (*Equisetum arvense*)						
Scouring-rush (*Equisetum hyemale*)						
Variegated Horsetail (*Equisetum variegatum*)						
Equisetum						
Ground-cedar (*Lycopodium digitatum*)						
Shining Clubmoss (*Lycopodium lucidulum*)						
Ground-pine (*Lycopodium obscurum*)						

Graminoids – Grasses	1	2	3	4	5	6
Giant Redtop (*Agrostis gigantea*)						
Redtop (*Agrostis stolonifera*)						
Awnless Brome (*Bromus inermis*)						
Bromus						
Blue-joint Grass (*Calamagrostis canadensis*)						
Orchard Grass (*Dactylis glomerata*)						
Poverty Oat Grass (*Danthonia spicata*)						
Quack Grass (*Elymus repens*)						
Virginia Wild Rye (*Elymus virginicus*)						
Elymus						
Fowl Manna Grass (*Glyceria striata*)		F				
Glyceria						
Rice Cut Grass (*Leersia oryzoides*)						
Tall Fescue (*Lolium arundinaceum*)						
Muhlenbergia						
Witch-grass (*Panicum capillare*)						
Panicum						
Reed Canary Grass (*Phalaris arundinacea*)		F				
Timothy (*Phleum pratense*)						
Common Reed (*Phragmites australis*)						
Canada Blue Grass (*Poa compressa*)						
Fowl Meadow Grass (*Poa palustris*)						
Kentucky Bluegrass (*Poa pratensis*)						
Yellow Foxtail (*Setaria pumila*)						
Green Foxtail (*Setaria viridis*)						

Sedges	1	2	3	4	5	6
Drooping Wood Sedge (*Carex arctata*)						
Golden-fruited Sedge (*Carex aurea*)						
Graceful Sedge (*Carex gracillima*)						
Inland Sedge (*Carex interior*)						
Bladder Sedge (*Carex intumescens*)						
Lake-bank Sedge (*Carex lacustris*)						
Hop Sedge (*Carex lupulina*)						
Pennsylvania Sedge (*Carex pensylvanica*)						
Awl-fruited Sedge (*Carex stipata*)						
Fox Sedge (*Carex vulpinoidea*)						
Carex sp	F	F				
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Carex						
Cyperus						
Redroot Spike-rush (*Eleocharis erythropoda*)						
Eleocharis						
Hard-stem Bulrush (*Schoenoplectus acutus*)						
Three-square Bulrush (*Sch. pungens*)						
Soft-stem Bulrush (*Sch. tabernaemontani*)						
Dark-green Bulrush (*Scirpus atrovirens*)						
Wool-grass (*Scirpus cyperinus*)		U				
Sch sp		U				

Other Graminoids	1	2	3	4	5	6
Broad Bur-reed (*Sparganium eurycarpum*)						
Narrow-leaved Cattail (*Typha angustifolia*)		F				
Broad-leaved Cattail (*Typha latifolia*)						
Broad-leaved Cattail (*Typha X glauca*)						
Articulated Rush (*Juncus articulatus*)						
Soft Rush (*Juncus effusus*)						
Path Rush (*Juncus tenuis*)						
Juncus sp		U				
Juncus						

D - **Dominant**: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum
F - **Fairly common (=Abundant in ELC)**: generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover
U - **Uncommon (=Occasional in ELC)**: present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)
R - **Rare**: represented in the polygon by less than about five individuals or small clumps

Project: Glancaster Rd	1	F004-1
Date: Aug 31/20	2	SWT2/MAM2
Surveyors: JKM	3	
	4	
	5	
	6	

Dicot Herbs - Asteraceae	1	2	3	4	5	6
Common Yarrow (*Achillea millefolium*)						
White Snakeroot (*Ageratina altissima*)						
Com. Ragweed (*Ambrosia artemisiifolia*)						
Giant Ragweed (*Ambrosia trifida*)						

Dicot Herbs	1	2	3	4	5	6
Shepherd's Purse (*Capsella bursa-pastoris*)						
Cutleaf Toothwort (*Cardamine concatenata*)						
Toothwort (*Cardamine diphylla*)						
Penn. Bitter-cress (*Cardamine pensylvanica*)						

Dicot Herbs	1	2	3	4	5	6
Kidney-leaf Buttercup (*Ranunculus abortivus*)						
Tall Buttercup (*Ranunculus acris*)						
Hooked Buttercup (*Ranunculus recurvatus*)						
Ranunculus						

Plant Species List

Field Pussytoes (*Antennaria neglecta*)	
Artemisia	
Common Burdock (*Arctium minus*)	
Nodding Beggar-ticks (*Bidens cernua*)	
Devil's Beggar-ticks (*Bidens frondosa*)	
Spotted Knapweed (*Centaurea biebersteinii*)	
Brown Knapweed (*Centaurea jacea*)	
Chicory (*Cichorium intybus*)	
Canada Thistle (*Cirsium arvesnse*)	
Bull Thistle (*Cirsium vulgare*)	
Horseweed (*Conyza canadensis*)	
Daisy Fleabane (*Erigeron annus*)	
Philadelphia Fleabane (*Erig. philadelphicus*)	
Erigeron	
Joe-pye-weed (*Eupatorium maculatum*)	U,F
Boneset (*Eupatorium perfoliatum*)	
Large-leaved Aster (*Eurybia macrophylla*)	
Flat-top Goldenrod (*Euthamia graminifolia*)	
Orange Hawkweed (*Hieracium aurantiacum*)	
Field Hawkweed (*Hieracium caespitosum*)	
Hieracium	
Elecampane (*Inula helenium*)	
Prickly Lettuce (*Lactuca serriola*)	
Lactuca	
Ox-eye Daisy (*Leucanthemum vulgare*)	
Pineapple-weed (*Matricaria discoidea*)	
Tall White Lettuce (*Prenanthes altissima*)	
Black-eyed Susan (*Rudbeckia hirta*)	
Tall Goldenrod (*Solidago altissima*)	
Blue-stem Goldenrod (*Solidago caesia*)	
Canada Goldenrod (*Solidago canadensis*)	
Zig-zag Goldenrod (*Solidago flexicaulis*)	
Giant Goldenrod (*Solidago gigantea*)	
Early Goldenrod (*Solidago juncea*)	
Gray Goldenrod (*Solidago nemoralis*)	
Solidago Sp	U,F
Field Sow-thistle (*Sonchus arvensis*)	
Sonchus	
Heart-leaf Aster (*Symph. cordifolium*)	
Heath Aster (*Symphyotrichum ericoides*)	
Tall White Aster (*Symph. lanceolatum*)	
Calico Aster (*Symphyotrichum lateriflorum*)	
New England Aster (*Symph. novae-angliae*)	
Purple-stem Aster (*Symph. puniceus*)	
Common Tansy (*Tanacetum vulgare*)	
Common Dandelion (*Taraxacum officinale*)	
Com. Goatsbeard (*Tragopogon pratensis*)	
Coltsfoot (*Tussilago farfara*)	
Sump sp	U
Achillea millefolium	

Other Dicot Herbs

White Baneberry (*Actaea pachypoda*)	
Red Baneberry (*Actaea rubra*)	
Tall Agrimony (*Agrimonia gryposepala*)	
Garlic Mustard (*Alliaria petiolata*)	U
Green Amaranth (*Amaranthus retroflexus*)	
Hog-peanut (*Amphicarpa bracteata*)	
Pearly Everlasting (*Anaphalis margaritacea*)	
Canada Anemone (*Anemone canadensis*)	
Ivy Hepatica (*Anemone acutiloba*)	
Thimbleweed (*Anemone virginiana*)	
Purple Angelica (*Angelica atropurpurea*)	
Indian Hemp (*Apocynum cannabinum*)	
Wild Sarsaparilla (*Aralia nudicaulis*)	
Spikenard (*Aralia racemosa*)	
Wild Ginger (*Asarum canadense*)	
Swamp Milkweed (*Asclepias incarnata*)	
Common Milkweed (*Asclepias syriaca*)	
Yellow Rocket (*Barbarea vulgaris*)	
False Nettle (*Boehmeria cylindrica*)	
Black Mustard (*Brassica nigra*)	
Marsh-marigold (*Caltha palustris*)	
Creeping Bellflower (*Campanula rapunculoides*)	

Cardamine	
Blue Cohosh (*Caulophyllum thalictroides*)	
Mouse-ear Chickweed (*Cerastium fontanum*)	
Turtlehead (*Chelone glabra*)	
Spotted Water-hemlock (*Cicuta maculata*)	
Water-hemlock (*Cicuta virosa*)	
Enchanter's Nightshade (*Circaea lutetiana*)	D
Carolina Spring Beauty (*Claytonia caroliniana*)	
Virginia Spring Beauty (*Claytonia virginica*)	
Virgin's-bower (*Clematis virginiana*)	
Field Bindweed (*Convolvulus arvensis*)	
Dog-strangling Vine (*Cynanchum rossicum*)	
Wild Carrot (*Daucus carota*)	
Deptford Pink (*Dianthus armeria*)	
Squirrel-corn (*Dicentra canadensis*)	
Dutchman's-breeches (*Dicentra cucullaria*)	
Wild Teasel (*Dipsacus fullonum*)	U
Wild Cucumber (*Echinocystis lobata*)	
Viper's Bugloss (*Echium vulgare*)	
Northern Willow-herb (*Epilobium ciliatum*)	
Hairy Willow-herb (*Epilobium hirsutum*)	
Small-fl. Willow-herb (*Epilobium parviflorum*)	
Epilobium	
Worm Mustard (*Erysimum cheiranthoides*)	
Euphorbia	
Virginia Strawberry (*Fragaria virginiana*)	U
Hemp Nettle (*Galeopsis tetrahit*)	
Wild Madder (*Galium mollugo*)	F
Marsh Bedstraw (*Galium palustre*)	
Sweet-scented Bedstraw (*Galium triflorum*)	
Galium	
Spotted Geranium (*Geranium maculatum*)	
Herb-robert (*Geranium robertianum*)	U
Yellow Avens (*Geum aleppicum*)	
White Avens (*Geum canadense*)	
Urban Avens (*Geum urbanum*)	
Dame's Rocket (*Hesperis matronalis*)	
Virg. Water-leaf (*Hydrophyllum virginianum*)	
Com. St. John's-wort (*Hypericum perforatum*)	
Spotted Jewelweed (*Impatiens capensis*)	
Wood Nettle (*Laportea canadensis*)	
Motherwort (*Leonurus cardiaca*)	
Field Peppergrass (*Lepidium campestre*)	
Eur. Gromwell (*Lithospermum officinale*)	
Butter & Eggs (*Linaria vulgaris*)	
Great Lobelia (*Lobelia siphilitica*)	
Lobelia	
Cut-leaf Bugleweed (*Lycopus americanus*)	
Northern Bugleweed (*Lycopus uniflorus*)	
Fringed Loosestrife (*Lysimachia ciliata*)	
Moneywort (*Lysimachia nummularia*)	
Lysimachia	
Purple Loosestrife (*Lythrum salicaria*)	U
Black Medick (*Medicago lupulina*)	
Alfalfa (*Medicago sativa*)	
White Sweet-clover (*Melilotus alba*)	
Yellow Sweet-clover (*Melilotus officinalis*)	
Wild Mint (*Mentha arvensis*)	
Wild Bergamot (*Monarda fistulosa*)	
Small Forget-me-not (*Myosotis laxa*)	
Forget-me-not (*Myosotis scorpioides*)	
Water-cress (*Nasturtium officinale*)	
Com. Evening-primrose (*Oenothera biennis*)	
Sweet-cicely (*Osmorhiza berterii*)	
Yellow Wood-sorrel (*Oxalis stricta*)	U
Wild Parsnip (*Pastinaca sativa*)	
English Plantain (*Plantago lanceolata*)	
Common Plantain (*Plantago major*)	
Rugel's Plantain (*Plantago rugelii*)	
May-apple (*Podophyllum peltatum*)	
Pale Smartweed (*Polygonum lapathifolium*)	
Lady's-thumb (*Polygonum persicaria*)	
Virginia Knotweed (*Polygonum virginianum*)	
Polygonum	
Polygonum	
Rough Cinquefoil (*Potentilla norvegica*)	
Rough-fruited Cinquefoil (*Potentilla recta*)	
Common Cinquefoil (*Potentilla simplex*)	U
Potentilla	
Heal-all (*Prunella vulgaris*)	
Shinleaf (*Pyrola elliptica*)	
Geum sp	F,U
Persicaria virginiana	F,D

Sheep Sorrel (*Rumex acetosella*)	
Curly-leaf Dock (*Rumex crispus*)	
Bitter Dock (*Rumex obtusifolius*)	
Bloodroot (*Sanguinaria canadense*)	
Black Snakeroot (*Sanicula marilandica*)	
Bouncing Bet (*Saponaria officinalis*)	
Marsh Skullcap (*Scutellaria galericulata*)	
Mad Dog Skullcap (*Scutellaria lateriflora*)	
White Campion (*Silene latifolia*)	
Bladder Campion (*Silene vulgaris*)	
Hemlock Water-parsnip (*Sium suave*)	
Bitter Nightshade (*Solanum dulcamara*)	
Black Nightshade (*Solanum ptychanthum*)	
Grassleaf Stitchwort (*Stellaria graminea*)	
Common Chickweed (*Stellaria media*)	
Early Meadow-rue (*Thalictrum dioicum*)	
Tall Meadow-rue (*Thalictrum pubescens*)	
Field Penny-cress (*Thlaspi arvense*)	
Foamflower (*Tiarella cordifolia*)	
Star-flower (*Trientalis borealis*)	
Red Clover (*Trifolium pratense*)	
White Clover (*Trifolium repens*)	
Trifolium	
Stinging Nettle (*Urtica dioica*)	
Greater Bladderwort (*Utricularia vulgaris*)	
Common Mullein (*Verbascum thapsus*)	
Blue Vervain (*Verbena hastata*)	
White Vervain (*Verbena urticifolia*)	
Water Speedwell (*Veron. anagallis-aquatica*)	
Common Speedwell (*Veronica officinalis*)	
Veronica	
Cow Vetch (*Vicia cracca*)	
Vicia	
Periwinkle (*Vinca minor*)	
Dog Violet (*Viola conspersa*)	
Yellow Violet (*Viola pubescens*)	
Com. Blue Violet (*Viola sororia*)	
Viola	

Monocot Herbs

Water-plantain (*Alisma plantago-aquatica*)	
Wild Leek (*Allium tricoccum*)	
Jack-in-the-pulpit (*Arisaema triphyllum*)	F
Asparagus (*Asparagus officinalis*)	
Wild Calla (*Calla palustris*)	
Bluebead-lily (*Clintonia borealis*)	
Garden Lily-of-valley (*Convallaria majalis*)	
Yel. Lady's Slipper (*Cypripedium parviflora*)	
Canada Waterweed (*Elodea canadensis*)	
Helleborine (*Epipactis helleborine*)	
Yellow Trout Lily (*Erythronium americanum*)	
Blue-flag Iris (*Iris versicolor*)	
Orange Day Lily (*Hemerocallus fulva*)	
Lesser Duckweed (*Lemna minor*)	
Starry Duckweed (*Lemna trisulca*)	
Wild Lily-of-valley (*Maianthemum canadense*)	
False Solom Seal (*Maianthemum racemosum*)	
Star False Solomon (*Maianthemum stellatum*)	
True Solomon Seal (*Polygonatum pubescens*)	
Pickerel-weed (*Pontederia cordata*)	
Curly-leaf Pondweed (*Potamogeton crispus*)	
Sago Pondweed (*Potamogeton pectinatus*)	
Potamogeton	
Potamogeton	
Broad-leaved Arrowhead (*Sagittaria latifolia*)	
Blue-eyed-grass (*Sisyrinchium montanum*)	
Herb. Carrion Flower (*Smilax herbacea*)	
Bristly Greenbrier (*Smilax hispida*)	
Nodding Ladies' Tresses (*Spiranthes cernua*)	
Rose Twisted-stalk (*Streptopus lanceolatus*)	
Skunk-cabbage (*Symplocarpus foetidus*)	
Purple Trillium (*Trillium erectum*)	
White Trillium (*Trillium grandiflorum*)	
Large-flowered Bellwort (*Uvularia grandiflora*)	

*D - **Dominant**: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum*

*F - **Fairly common (=Abundant in ELC)**: generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover*

*U - **Uncommon (=Occasional in ELC)**: present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)*

*R - **Rare**: represented in the polygon by less than about five individuals or small clumps*

Project:	1		4
Date:	2		5
Surveyors:	3		6

Spring flora-2021

Plant Species List
2012

Trees & Shrubs	1	2	3	4	5
Conifers					
Balsam Fir (*Abies balsamea*)					
Common Juniper (*Juniperus communis*)					
Eastern Red Cedar (*Juniperus virginiana*)					
Tamarack (*Larix laricina*)					
Norway Spruce (*Picea abies*)		R			
White Spruce (*Picea glauca*)					
Black Spruce (*Picea mariana*)					
Jack Pine (*Pinus banksiana*)					
Red Pine (*Pinus resinosa*)					
Eastern White Pine (*Pinus strobus*)					
Scotch Pine (*Pinus sylvestris*)					
Canada Yew (*Taxus canadensis*)					
Eastern White Cedar (*Thuja occidentalis*)					
Eastern Hemlock (*Tsuga canadensis*)					
Deciduous					
Manitoba Maple (*Acer negundo*)					
Black Maple (*Acer nigrum*)					
Norway Maple (*Acer platanoides*)					
Red Maple (*Acer rubrum*)					
Silver Maple (*Acer saccharinum*)					
Freeman's Maple (*Acer X freemanii*)					
Sugar Maple (*Acer saccharum*)					
Mountain Maple (*Acer spicatum*)					
Speckled Alder (*Alnus incana*)					
Downy Serviceberry (*Amelanchier arborea*)					
Serviceberry (*Amelanchier sanguinea*)					
Yellow Birch (*Betula alleghaniensis*)					
White Birch (*Betula papyrifera*)					
European Birch (*Betula pendula*)					
Blue Beech (*Carpinus caroliniana*)					
Bitternut hickory (*Carya cordiformis*					
Shagbark Hickory (*Carya ovata*)					
Climbing Bittersweet (*Celastrus scandens*)					
Common Hackberry (*Celtis occidentalis*)					
Buttonbush (*Cephalanthus occidentalis*)					
Alt.-leaved Dogwood (*Cornus alternifolia*)					
Silky Dogwood (*Cornus amomum*)					
Bunchberry (*Cornus canadensis*)					
Gray dogwood (*Cornus racemosa*)		R	D		R
Round-leaved Dogwood (*Cornus rugosa*)					
Red-osier Dogwood (*Cornus sericea*)				R	R
American Hazel (*Corylus americana*)					
Beaked Hazel (*Corylus cornuta*)					
Cockspur Thorn (*Crataegus crus-galli*)					
English Hawthorn (*Crataegus monogyna*)			R		
Large-fruited Thorn (*Crataegus punctata*)					
Crataegus					
Crataegus					
Bush Honeysuckle (*Diervilla lonicera*)					
Russian Olive (*Elaeagnus angustifolia*)					
Autumn Olive (*Elaeagnus umbellata*)					
Run. Strawberry-bush (*Euonymus obovata*)					
American Beech (*Fagus grandifolia*)					
Glossy Buckthorn (*Frangula alnus*)					
White Ash (*Fraxinus americana*)					
Black Ash (*Fraxinus nigra*)					
Green Ash (*Fraxinus pennsylvanica*)					
Witch-hazel (*Hamamelis virginiana*)					
Winterberry (*Ilex verticillata*)					
Butternut (*Juglans cinerea*)					
Black Walnut (*Juglans nigra*)		R			
Common Privet (*Ligustrum vulgare*)					
Spicebush (*Lindera benzoin*)					
Fly Honeysuckle (*Lonicera canadensis*)					
Glaucous Honeysuckle (*Lonicera dioica*)					
Morrow's Honeysuckle (*Lonicera morrowii*)					
Tartarian Honeysuckle (*Lonicera tatarica*)		R	R		R
Common Apple (*Malus pumila*)					
White Mulberry (*Morus alba*)					
Sweet Gale (*Myrica gale*)					
Ironwood (*Ostrya virginiana*)					
Thicket-creeper (*Parthenocissus inserta*)					
Ninebark (*Physocarpus opulifolius*)		R	R		
Balsam Poplar (*Populus balsamifera*)					
Eastern Cottonwood (*Populus deltoides*)					
Large-tooth Aspen (*Populus grandidentata*)					
Trembling Aspen (*Populus tremuloides*)					
Sweet Cherry (*Prunus avium*)					
Pin Cherry (*Prunus pensylvanica*)					
Black Cherry (*Prunus serotina*)				R	
Choke Cherry (*Prunus virginiana*)			R	R	
Prunus					

Tree & Shrubs	1	2	3	4	5
Deciduous					
White Oak (*Quercus alba*)					
Bur Oak (*Quercus macrocarpa*)					
Red Oak (*Quercus rubra*)				R	
Alder Buckthorn (*Rhamnus alnifolia*)					
Common Buckthorn (*Rhamnus cathartica*)			R		
Smooth Sumac (*Rhus glabra*)					
Staghorn Sumac (*Rhus hirta*)				R	
Wild Black Currant (*Ribes americanum*)		R			
Prickly Gooseberry (*Ribes cynosbati*)					
Swamp Black Currant (*Ribes lacustre*)					
Red Currant (*Ribes rubrum*)					
Ribes					
Black Locust (*Robinia pseudo-acacia*)					
Prickly Rose (*Rosa acicularis*)					
Smooth Rose (*Rosa blanda*)					
Multiflora Rose (*Rosa multiflora*)					
Rosa					
Com. Blackberry (*Rubus allegheniensis*)					
Wild Red Raspberry (*Rubus idaeus*)					
Black Raspberry (*Rubus occidentalis*)					
Purple-fl. Raspberry (*Rubus odoratus*)					
Dwarf Raspberry (*Rubus pubescens*)					
Rubus					
Peach-leaved Willow (*Salix amygdaloides*)					
Bebb's Willow (*Salix bebbiana*)					
Pussy Willow (*Salix discolor*)		R			
Missouri Willow (*Salix eriocephala*)					
Sandbar Willow (*Salix exigua*)					
Shining Willow (*Salix lucida*)					
Black Willow (*Salix nigra*)					
Slender Willow (*Salix petiolaris*)					
Salix x fragilis		O			
Hybrid Crack Willow (*Salix X rubens*)					
Black-berried Elder (*Sambucus nigra*)					
Red-berried Elder (*Sambucus racemosa*)					
Buffaloberry (*Shepherdia canadensis*)					
Eur. Mountain Ash (*Sorbus aucuparia*)					
Narrow Meadow-sweet (*Spiraea alba*)					
Common Lilac (*Syringa vulgaris*)					
Poison-ivy (*Toxicodendron rydbergii*)					
Climbing Poison-ivy (*Toxicodendron radicans*)					
White Elm (*Ulmus americana*)					
Siberian Elm (*Ulmus pumila*)					
Slippery Elm (*Ulmus rubra*)					
Low Blueberry (*Vaccinium angustifolium*)					
Maple-leaf Viburnum (*Viburnum acerifolium*)					
Hobblebush (*Viburnum lantanoides*)					
Nannyberry (*Viburnum lentago*)					
Guelder-Rose (*Viburnum opulus*)					
Downy Arrow-wood (*Vib. rafinesquianum*)					
Riverbank Grape (*Vitis riparia*)		O	O		R
Am. Prickly-ash (*Zanthoxylum americanum*)					
Ferns & Allies					
Lady Fern (*Athyrium filix-femina*)					
Rattlesnake Fern (*Botrychium virginianum*)					
Bulbet Bladder Fern (*Cystopteris bulbifera*)					
Spin. Wood Fern (*Dryopteris carthusiana*)					
Crested Wood Fern (*Dryopteris cristata*)					
Marginal Wood Fern (*Dryopteris marginalis*)					
Dryopteris					
Ostrich Fern (*Matteuccia struthiopteris*)					
Sensitive Fern (*Onoclea sensibilis*)					
Cinnamon Fern (*Osmunda cinnamomea*)					
Interrupted Fern (*Osmunda claytoniana*)					
Royal Fern (*Osmunda regalis*)					
Christmas Fern (*Polystichum acrostichoides*)					
Eastern Bracken-fern (*Pteridium aquilinum*)					
Marsh Fern (*Thelypteris palustris*)					
Field Horsetail (*Equisetum arvense*)				D	O
Scouring-rush (*Equisetum hyemale*)					
Variegated Horsetail (*Equisetum variegatum*)		O			
Equisetum					
Ground-cedar (*Lycopodium digitatum*)					
Shining Clubmoss (*Lycopodium lucidulum*)					
Ground-pine (*Lycopodium obscurum*)					

Graminoids	1	2	3	4	5
Grasses					
Giant Redtop (*Agrostis gigantea*)					
Redtop (*Agrostis stolonifera*)					
Awnless Brome (*Bromus inermis*)	A	O	O	A	A
Bromus					
Blue-joint Grass (*Calamagrostis canadensis*)					
Orchard Grass (*Dactylis glomerata*)	O		O	O	O
Poverty Oat Grass (*Danthonia spicata*)					
Quack Grass (*Elymus repens*)					
Virginia Wild Rye (*Elymus virginicus*)					
Elymus					
Fowl Manna Grass (*Glyceria striata*)					
Glyceria					
Rice Cut Grass (*Leersia oryzoides*)					
Tall Fescue (*Lolium arundinaceum*)					
Muhlenbergia					
Witch-grass (*Panicum capillare*)					
Panicum					
Reed Canary Grass (*Phalaris arundinacea*)	A	A	A	O	A
Timothy (*Phleum pratense*)					
Common Reed (*Phragmites australis*)		O			R
Canada Blue Grass (*Poa compressa*)					
Fowl Meadow Grass (*Poa palustris*)					
Kentucky Bluegrass (*Poa pratensis*)	A	R	A	A	A
Yellow Foxtail (*Setaria pumila*)					
Green Foxtail (*Setaria viridis*)					
FRAG VIR			O	O	R
Sedges					
Drooping Wood Sedge (*Carex arctata*)					
Golden-fruited Sedge (*Carex aurea*)					
Graceful Sedge (*Carex gracillima*)					
Inland Sedge (*Carex interior*)					
Bladder Sedge (*Carex intumescens*)					
Lake-bank Sedge (*Carex lacustris*)					
Hop Sedge (*Carex lupulina*)					
Pennsylvania Sedge (*Carex pensylvanica*)					
Awl-fruited Sedge (*Carex stipata*)					
Fox Sedge (*Carex vulpinoidea*)					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Cyperus					
Redroot Spike-rush (*Eleocharis erythropoda*)					
Eleocharis					
Hard-stem Bulrush (*Schoenoplectus acutus*)					
Three-square Bulrush (*Sch. pungens*)					
Soft-stem Bulrush (*Sch. tabernaemontani*)					
Dark-green Bulrush (*Scirpus atrovirens*)					
Wool-grass (*Scirpus cyperinus*)					
Other Graminoids					
Broad Bur-reed (*Sparganium eurycarpum*)					
Narrow-leaved Cattail (*Typha angustifolia*)					
Broad-leaved Cattail (*Typha latifolia*)		D			O
Broad-leaved Cattail (*Typha X glauca*)					
Articulated Rush (*Juncus articulatus*)					
Soft Rush (*Juncus effusus*)					
Path Rush (*Juncus tenuis*)					
Juncus					
Juncus					

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

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U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this category)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Map Number: Glancaster Rd
Date: 20/05/2021
Surveyors: NS

① CUM1-1 / MAM2
② MAS2-1
③ CUM1-1 / CUT1
④ CUM1-1
⑤ CUM1-1 / MAM2
⑥ MAM2-2

Plant Species List 2012

Spring flora - 2021

Dicot Herbs - Asteraceae	1	2	3	4	5
Common Yarrow (*Achillea millefolium*)	O	O		R	
White Snakeroot (*Ageratina altissima*)					
Com. Ragweed (*Ambrosia artemisiifolia*)					
Giant Ragweed (*Ambrosia trifida*)					
Field Pussytoes (*Antennaria neglecta*)					
Artemisia					
Common Burdock (*Arctium minus*)					
Nodding Beggar-ticks (*Bidens cernua*)					
Devil's Beggar-ticks (*Bidens frondosa*)					
Spotted Knapweed (*Centaurea biebersteinii*)					
Brown Knapweed (*Centaurea jacea*)					
Chicory (*Cichorium intybus*)					
Canada Thistle (*Cirsium arvesnse*)					
Bull Thistle (*Cirsium vulgare*)					
Horseweed (*Conyza canadensis*)					
Daisy Fleabane (*Erigeron annus*)					
Philadelphia Fleabane (*Erig. philadelphicus*)					
Erigeron					
Joe-pye-weed (*Eupatorium maculatum*)					
Boneset (*Eupatorium perfoliatum*)					
Large-leaved Aster (*Eurybia macrophylla*)					
Flat-top Goldenrod (*Euthamia graminifolia*)					
Orange Hawkweed (*Hieracium aurantiacum*)					
Field Hawkweed (*Hieracium caespitosum*)					
Hieracium					
Elecampane (*Inula helenium*)					
Prickly Lettuce (*Lactuca serriola*)					
Lactuca					
Ox-eye Daisy (*Leucanthemum vulgare*)					
Pineapple-weed (*Matricaria discoidea*)					
Tall White Lettuce (*Prenanthes altissima*)					
Black-eyed Susan (*Rudbeckia hirta*)					
Tall Goldenrod (*Solidago altissima*)					
Blue-stem Goldenrod (*Solidago caesia*)					
Canada Goldenrod (*Solidago canadensis*)					
Zig-zag Goldenrod (*Solidago flexicaulis*)					
Giant Goldenrod (*Solidago gigantea*)					
Early Goldenrod (*Solidago juncea*)					
Gray Goldenrod (*Solidago nemoralis*)					
Solidago SP	O			O	O
Field Sow-thistle (*Sonchus arvensis*)					
Sonchus					
Heart-leaf Aster (*Symph. cordifolium*)					
Heath Aster (*Symphyotrichum ericoides*)					
Tall White Aster (*Symph. lanceolatum*)					
Calico Aster (*Symphyotrichum lateriflorum*)					
New England Aster (*Symph. novae-angliae*)					
Purple-stem Aster (*Symph. puniceus*)					
Common Tansy (*Tanacetum vulgare*)					
Common Dandelion (*Taraxacum officinale*)	O	R	O	O	O
Com. Goatsbeard (*Tragopogon pratensis*)					
Coltsfoot (*Tussilago farfara*)	O	O	R	R	

Other Dicot Herbs
White Baneberry (*Actaea pachypoda*)
Red Baneberry (*Actaea rubra*)
Tall Agrimony (*Agrimonia gryposepala*)
Garlic Mustard (*Alliaria petiolata*)
Green Amaranth (*Amaranthus retroflexus*)
Hog-peanut (*Amphicarpa bracteata*)
Pearly Everlasting (*Anaphalis margaritacea*)
Canada Anemone (*Anemone canadensis*)
Ivy Hepatica (*Anemone acutiloba*)
Thimbleweed (*Anemone virginiana*)
Purple Angelica (*Angelica atropurpurea*)
Indian Hemp (*Apocynum cannabinum*)
Wild Sarsaparilla (*Aralia nudicaulis*)
Spikenard (*Aralia racemosa*)
Wild Ginger (*Asarum canadense*)
Swamp Milkweed (*Asclepias incarnata*)
Common Milkweed (*Asclepias syriaca*)
Yellow Rocket (*Barbarea vulgaris*)
False Nettle (*Boehmeria cylindrica*)
Black Mustard (*Brassica nigra*)
Marsh-marigold (*Caltha palustris*)
Creeping Bellflower (*Campanula rapunculoides*)

Dicot Herbs	1	2	3	4	5
Shepherd's Purse (*Capsella bursa-pastoris*)					
Cutleaf Toothwort (*Cardamine concatenata*)					
Toothwort (*Cardamine diphylla*)					
Penn. Bitter-cress (*Cardamine pensylvanica*)					
Cardamine					
Blue Cohosh (*Caulophyllum thalictroides*)					
Mouse-ear Chickweed (*Cerastium fontanum*)					
Turtlehead (*Chelone glabra*)					
Spotted Water-hemlock (*Cicuta maculata*)					
Water-hemlock (*Cicuta virosa*)					
Enchanter's Nightshade (*Circaea lutetiana*)					
Carolina Spring Beauty (*Claytonia caroliniana*)					
Virginia Spring Beauty (*Claytonia virginica*)					
Virgin's-bower (*Clematis virginiana*)					
Field Bindweed (*Convolvulus arvensis*)					
Dog-strangling Vine (*Cynanchum rosacum*)					
Wild Carrot (*Daucus carota*)	O		O	O	O
Deptford Pink (*Dianthus armeria*)					
Squirrel-corn (*Dicentra canadensis*)					
Dutchman's-breeches (*Dicentra cucullaria*)					
Wild Teasel (*Dipsacus fullonum*)	O	O	O	O	O
Wild Cucumber (*Echinocystis lobata*)					
Viper's Bugloss (*Echium vulgare*)					
Northern Willow-herb (*Epilobium ciliatum*)					
Hairy Willow-herb (*Epilobium hirsutum*)					
Small-fl. Willow-herb (*Epilobium parviflorum*)					
Epilobium					
Worm Mustard (*Erysimum cheiranthoides*)					
Euphorbia					
Hemp Nettle (*Galeopsis tetrahit*)					
Wild Madder (*Galium mollugo*)					
Marsh Bedstraw (*Galium palustre*)					
Sweet-scented Bedstraw (*Galium triflorum*)					
Galium					
Spotted Geranium (*Geranium maculatum*)					
Herb-robert (*Geranium robertianum*)				R	
Yellow Avens (*Geum aleppicum*)					
White Avens (*Geum canadense*)					
Urban Avens (*Geum urbanum*)					
Dame's Rocket (*Hesperis matronalis*)					
Virg. Water-leaf (*Hydrophyllum virginianum*)					
Com. St. John's-wort (*Hypericum perforatum*)					
Spotted Jewelweed (*Impatiens capensis*)		A		R	O
Wood Nettle (*Laportea canadensis*)					
Motherwort (*Leonurus cardiaca*)					
Field Peppergrass (*Lepidium campestre*)					
Eur. Gromwell (*Lithospermum officinale*)					
Butter & Eggs (*Linaria vulgaris*)					
Great Lobelia (*Lobelia siphilitica*)					
Lobelia					
Cut-leaf Bugleweed (*Lycopus americanus*)					
Northern Bugleweed (*Lycopus uniflorus*)					
Fringed Loosestrife (*Lysimachia ciliata*)					
Moneywort (*Lysimachia nummularia*)					
Lysimachia					
Purple Loosestrife (*Lythrum salicaria*)					
Black Medick (*Medicago lupulina*)					
Alfalfa (*Medicago sativa*)					
White Sweet-clover (*Melilotus alba*)					
Yellow Sweet-clover (*Melilotus officinalis*)					
Wild Mint (*Mentha arvensis*)					
Wild Bergamot (*Monarda fistulosa*)					
Small Forget-me-not (*Myosotis laxa*)					
Forget-me-not (*Myosotis scorpioides*)					
Water-cress (*Nasturtium officinale*)					
Com. Evening-primrose (*Oenothera biennis*)					
Sweet-cicely (*Osmorhize berteri*)					
Yellow Wood-sorrel (*Oxalis stricta*)					
Wild Parsnip (*Pastinaca sativa*)					
English Plantain (*Plantago lanceolata*)					
Common Plantain (*Plantago major*)					
Rugel's Plantain (*Plantago rugelii*)					
May-apple (*Podophyllum peltatum*)					
Pale Smartweed (*Polygonum lapathifolium*)					
Lady's-thumb (*Polygonum persicaria*)					
Virginia Knotweed (*Polygonum virginianum*)					
Polygonum					
Polygonum					
Rough Cinquefoil (*Potentilla norvegica*)					
Rough-fruited Cinquefoil (*Potentilla recta*)					
Common Cinquefoil (*Potentilla simplex*)					
Potentilla					
Heal-all (*Prunella vulgaris*)					
Shinleaf (*Pyrola elliptica*)					

Dicot Herbs	1	2	3	4	5
Kidney-leaf Buttercup (*Ranunculus abortivus*)					
Tall Buttercup (*Ranunculus acris*)					
Hooked Buttercup (*Ranunculus recurvatus*)					
Ranunculus					
Sheep Sorrel (*Rumex acetosella*)					
Curly-leaf Dock (*Rumex crispus*)					
Bitter Dock (*Rumex obtusifolius*)					
Bloodroot (*Sanguinaria canadense*)					
Black Snakeroot (*Sanicula marilandica*)					
Bouncing Bet (*Saponaria officinalis*)					
Marsh Skullcap (*Scutellaria galericulata*)					
Mad Dog Skullcap (*Scutellaria lateriflora*)					
White Campion (*Silene latifolia*)					
Bladder Campion (*Silene vulgaris*)					
Hemlock Water-parsnip (*Sium suave*)				O	
Bitter Nightshade (*Solanum dulcamara*)					
Black Nightshade (*Solanum ptychanthum*)					
Grassleaf Stitchwort (*Stellaria graminea*)					
Common Chickweed (*Stellaria media*)					
Early Meadow-rue (*Thalictrum dioicum*)					
Tall Meadow-rue (*Thalictrum pubescens*)					
Field Penny-cress (*Thlaspi arvense*)					
Foamflower (*Tiarella cordifolia*)					
Star-flower (*Trientalis borealis*)					
Red Clover (*Trifolium pratense*)					
White Clover (*Trifolium repens*)					
Trifolium					
Stinging Nettle (*Urtica dioica*)					
Greater Bladderwort (*Utricularia vulgaris*)					
Common Mullein (*Verbascum thapsus*)					
Blue Vervain (*Verbena hastata*)					
White Vervain (*Verbena urticifolia*)					
Water Speedwell (*Veron. anagallis-aquatica*)				O	
Common Speedwell (*Veronica officinalis*)					
Veronica					
Cow Vetch (*Vicia cracca*)					
Vicia					
Periwinkle (*Vinca minor*)					
Dog Violet (*Viola conspersa*)					
Yellow Violet (*Viola pubescens*)					
Com. Blue Violet (*Viola sororia*)					
Viola					

Monocot Herbs	1	2	3	4	5
Water-plantain (*Alisma plantago-aquatica*)					
Wild Leek (*Allium tricoccum*)					
Jack-in-the-pulpit (*Arisaema triphyllum*)					
Asparagus (*Asparagus officinalis*)					
Wild Calla (*Calla palustris*)					
Bluebead-lily (*Clintonia borealis*)					
Garden Lily-of-valley (*Convallaria majalis*)					R
Yel. Lady's Slipper (*Cypripedium parviflora*)					
Canada Waterweed (*Elodea canadensis*)					
Helleborine (*Epipactis helleborine*)					
Yellow Trout Lily (*Erythronium americanum*)					
Blue-flag Iris (*Iris versicolor*)					R
Orange Day Lily (*Hemerocallus fulva*)					
Lesser Duckweed (*Lemna minor*)					
Starry Duckweed (*Lemna trisulca*)					
Wild Lily-of-valley (*Maianthemum canadense*)					
False Solom Seal (*Maianthemum racemosum*)					
Star False Solomon (*Maianthemum stellatum*)					
True Solomon Seal (*Polygonatum pubescens*)					
Pickerel-weed (*Pontederia cordata*)					
Curly-leaf Pondweed (*Potamogeton crispus*)					
Sago Pondweed (*Potamogeton pectinatus*)					
Potamogeton					
Potamogeton					
Broad-leaved Arrowhead (*Sagittaria latifolia*)					
Blue-eyed-grass (*Sisyrinchium montanum*)					
Herb. Carrion Flower (*Smilax herbacea*)					
Bristly Greenbrier (*Smilax hispida*)					
Nodding Ladies' Tresses (*Spiranthes cernua*)					
Rose Twisted-stalk (*Streptopus lanceolatus*)					
Skunk-cabbage (*Symplocarpus foetidus*)				O	
Purple Trillium (*Trillium erectum*)					
White Trillium (*Trillium grandiflorum*)					
Large-flowered Bellwort (*Uvularia grandiflora*)					

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this category)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Map Number: Glancaster Rd	1	CUM1-1 / MAM2-2	4	CUM1-1 / MAM2-2	
Date: 20/05/2021	2	MAS2-1	5	MAM2-2	
Surveyors: NS	3	CUM1-1 / CUT1	6		

Pg 2

Plant Species List
2012

Spring flora - 2021

Trees & Shrubs	1	2	3	4	5
Conifers					
Balsam Fir *(Abies balsamea)*					
Common Juniper *(Juniperus communis)*					
Eastern Red Cedar *(Juniperus virginiana)*					
Tamarack *(Larix laricina)*					
Norway Spruce (Picea abies)					
White Spruce *(Picea glauca)*					
Black Spruce *(Picea mariana)*					
Jack Pine *(Pinus banksiana)*					
Red Pine *(Pinus resinosa)*					
Eastern White Pine *(Pinus strobus)*	R				
Scotch Pine *(Pinus sylvestris)*					
Canada Yew *(Taxus canadensis)*					
Eastern White Cedar *(Thuja occidentalis)*	R				
Eastern Hemlock *(Tsuga canadensis)*					
Deciduous					
Manitoba Maple *(Acer negundo)*					
Black Maple *(Acer nigrum)*					
Norway Maple *(Acer platanoides)*					
Red Maple *(Acer rubrum)*					
Silver Maple *(Acer saccharinum)*					
Freeman's Maple *(Acer X freemanii)*					
Sugar Maple *(Acer saccharum)*	O		O		
Mountain Maple *(Acer spicatum)*					
Speckled Alder *(Alnus incana)*					
Downy Serviceberry *(Amelanchier arborea)*					
Serviceberry *(Amelanchier sanguinea)*					
Yellow Birch *(Betula alleghaniensis)*					
White Birch *(Betula papyrifera)*					
European Birch *(Betula pendula)*					
Blue Beech *(Carpinus caroliniana)*					
Bitternut hickory *(Carya cordiformis*					
Shagbark Hickory *(Carya ovata)*	R		O		
Climbing Bittersweet *(Celastrus scandens)*					
Common Hackberry *(Celtis occidentalis)*					
Buttonbush *(Cephalanthus occidentalis)*					
Alt.-leaved Dogwood *(Cornus alternifolia)*					
Silky Dogwood *(Cornus amomum)*					
Bunchberry *(Cornus canadensis)*					
Gray dogwood *(Cornus racemosa)*	R	D	R		
Round-leaved Dogwood *(Cornus rugosa)*					
Red-osier Dogwood *(Cornus sericea)*					
American Hazel *(Corylus americana)*					
Beaked Hazel *(Corylus cornuta)*					
Cockspur Thorn *(Crataegus crus-galli)*					
English Hawthorn *(Crataegus monogyna)*					
Large-fruited Thorn *(Crataegus punctata)*	R	R	R		
Crataegus					
Crataegus					
Bush Honeysuckle *(Diervilla lonicera)*					
Russian Olive *(Elaeagnus angustifolia)*					
Autumn Olive *(Elaeagnus umbellata)*					
Run. Strawberry-bush *(Euonymus obovata)*	O	O	A		
American Beech *(Fagus grandifolia)*	R		A		
Glossy Buckthorn *(Frangula alnus)*					
White Ash *(Fraxinus americana)*	O		O		
Black Ash *(Fraxinus nigra)*					
Green Ash *(Fraxinus pennsylvanica)*					
Witch-hazel *(Hamamelis virginiana)*					
Winterberry *(Ilex verticilata)*					
Butternut *(Juglans cinerea)*	R		R		
Black Walnut *(Juglans nigra)*	R		R		
Common Privet *(Ligustrum vulgare)*	R	R	R		
Spicebush *(Lindera benzoin)*					
Fly Honeysuckle *(Lonicera canadensis)*					
Glaucous Honeysuckle *(Lonicera dioica)*					
Morrow's Honeysuckle *(Lonicera morrowii)*					
Tartarian Honeysuckle *(Lonicera tatarica)*	R	O	O		
Common Apple *(Malus pumila)*					
White Mulberry *(Morus alba)*					
Sweet Gale *(Myrica gale)*					
Ironwood *(Ostrya virginiana)*	R		R		
Thicket-creeper *(Parthenocissus inserta)*	R	R	R		
Ninebark *(Physocarpus opulifolius)*	R	R	O		
Balsam Poplar *(Populus balsamifera)*					
Eastern Cottonwood *(Populus deltoides)*					
Large-tooth Aspen *(Populus grandidentata)*					
Trembling Aspen *(Populus tremuloides)*	O	R			
Sweet Cherry *(Prunus avium)*					
Pin Cherry *(Prunus pensylvanica)*					
Black Cherry *(Prunus serotina)*	R		O		
Choke Cherry *(Prunus virginiana)*	O		O		
Prunus					

Tree & Shrubs	1	2	3	4	5
Deciduous					
White Oak *(Quercus alba)*					
Bur Oak *(Quercus macrocarpa)*					
Red Oak *(Quercus rubra)*	R		A		
Alder Buckthorn *(Rhamnus alnifolia)*					
Common Buckthorn *(Rhamnus cathartica)*	R	R	R		
Smooth Sumac *(Rhus glabra)*					
Staghorn Sumac *(Rhus hirta)*		R			
Wild Black Currant *(Ribes americanum)*		O			
Prickly Gooseberry *(Ribes cynosbati)*					
Swamp Black Currant *(Ribes lacustre)*					
Red Currant *(Ribes rubrum)*			R		
Ribes					
Black Locust *(Robinia pseudo-acacia)*					
Prickly Rose *(Rosa acicularis)*					
Smooth Rose *(Rosa blanda)*					
Multiflora Rose *(Rosa multiflora)*	R				
Rosa					
Com. Blackberry *(Rubus allegheniensis)*	R	R			
Wild Red Raspberry *(Rubus idaeus)*	R				
Black Raspberry *(Rubus occidentalis)*					
Purple-fl. Raspberry *(Rubus odoratus)*					
Dwarf Raspberry *(Rubus pubescens)*					
Rubus					
Peach-leaved Willow *(Salix amygdaloides)*					
Bebb's Willow *(Salix bebbiana)*					
Pussy Willow *(Salix discolor)*					
Missouri Willow *(Salix eriocephala)*					
Sandbar Willow *(Salix exigua)*		R			
Shining Willow *(Salix lucida)*					
Black Willow *(Salix nigra)*					
Slender Willow *(Salix petiolaris)*					
Salix					
Hybrid Crack Willow *(Salix X rubens)*					
Black-berried Elder *(Sambucus nigra)*					
Red-berried Elder *(Sambucus racemosa)*					
Buffaloberry *(Shepherdia canadensis)*					
Eur. Mountain Ash *(Sorbus aucuparia)*					
Narrow Meadow-sweet *(Spiraea alba)*					
Common Lilac *(Syringa vulgaris)*					
Poison-ivy *(Toxicodendron rydbergii)*					
Climbing Poison-ivy *(Toxicodendron radicans)*	R				
White Elm *(Ulmus americana)*	R		R		
Siberian Elm *(Ulmus pumila)*					
Slippery Elm *(Ulmus rubra)*					
Low Blueberry *(Vaccinium angustifolium)*					
Maple-leaf Viburnum *(Viburnum acerifolium)*					
Hobblebush *(Viburnum lantanoides)*					
Nannyberry *(Viburnum lentago)*					
Guelder-Rose *(Viburnum opulus)*					
Downy Arrow-wood *(Vib. rafinesquianum)*					
Riverbank Grape *(Vitis riparia)*	R	R	R		
Am. Prickly-ash *(Zanthoxylum americanum)*					
TILIAMER	R		O		
Ferns & Allies					
Lady Fern *(Athyrium filix-femina)*					
Rattlesnake Fern *(Botrychium virginianum)*					
Bulbet Bladder Fern *(Cystopteris bulbifera)*					
Spin. Wood Fern *(Dryopteris carthusiana)*					
Crested Wood Fern *(Dryopteris cristata)*			R		
Marginal Wood Fern *(Dryopteris marginalis)*					
Dryopteris					
Ostrich Fern *(Matteuccia struthiopteris)*					
Sensitive Fern *(Onoclea sensibilis)*	R	O	R		
Cinnamon Fern *(Osmunda cinnamomea)*					
Interrupted Fern *(Osmunda claytoniana)*					
Royal Fern *(Osmunda regalis)*					
Christmas Fern *(Polystichum acrostichoides)*					
Eastern Bracken-fern *(Pteridium aquilinum)*					
Marsh Fern *(Thelypteris palustris)*					
Field Horsetail *(Equisetum arvense)*					
Scouring-rush *(Equisetum hyemale)*					
Variegated Horsetail *(Equisetum variegatum)*		D			
Equisetum					
Ground-cedar *(Lycopodium digitatum)*					
Shining Clubmoss *(Lycopodium lucidulum)*					
Ground-pine *(Lycopodium obscurum)*					

Graminoids	1	2	3	4	5
Grasses					
Giant Redtop *(Agrostis gigantea)*					
Redtop *(Agrostis stolonifera)*					
Awnless Brome *(Bromus inermis)*					
Bromus					
Blue-joint Grass *(Calamagrostis canadensis)*					
Orchard Grass *(Dactylis glomerata)*					
Poverty Oat Grass *(Danthonia spicata)*					
Quack Grass *(Elymus repens)*					
Virginia Wild Rye *(Elymus virginicus)*					
Elymus					
Fowl Manna Grass *(Glyceria striata)*					
Glyceria					
Rice Cut Grass *(Leersia oryzoides)*					
Tall Fescue *(Lolium arundinaceum)*					
Muhlenbergia					
Witch-grass *(Panicum capillare)*					
Panicum					
Reed Canary Grass *(Phalaris arundinacea)*		O			
Timothy *(Phleum pratense)*					
Common Reed *(Phragmites australis)*					
Canada Blue Grass *(Poa compressa)*					
Fowl Meadow Grass *(Poa palustris)*					
Kentucky Bluegrass *(Poa pratensis)*					
Yellow Foxtail *(Setaria pumila)*					
Green Foxtail *(Setaria viridis)*					
Sedges					
Drooping Wood Sedge *(Carex arctata)*	R		O		
Golden-fruited Sedge *(Carex aurea)*					
Graceful Sedge *(Carex gracillima)*					
Inland Sedge *(Carex interior)*	R		O		
Bladder Sedge *(Carex intumescens)*					
Lake-bank Sedge *(Carex lacustris)*					
Hop Sedge *(Carex lupulina)*					
Pennsylvania Sedge *(Carex pensylvanica)*	O		O		
Awl-fruited Sedge *(Carex stipata)*		R			
Fox Sedge *(Carex vulpinoidea)*		O			
Carex albursina	R		O		
Carex stricta		O			
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Cyperus					
Redroot Spike-rush *(Eleocharis erythropoda)*					
Eleocharis					
Hard-stem Bulrush *(Schoenoplectus acutus)*					
Three-square Bulrush *(Sch. pungens)*					
Soft-stem Bulrush *(Sch. tabernaemontani)*					
Dark-green Bulrush *(Scirpus atrovirens)*					
Wool-grass *(Scirpus cyperinus)*					
Luzula acuminata			R		
Other Graminoids					
Broad Bur-reed *(Sparganium eurycarpum)*					
Narrow-leaved Cattail *(Typha angustifolia)*					
Broad-leaved Cattail *(Typha latifolia)*		R			
Broad-leaved Cattail *(Typha X glauca)*					
Articulated Rush *(Juncus articulatus)*					
Soft Rush *(Juncus effusus)*					
Path Rush *(Juncus tenuis)*					
Juncus					
Juncus					

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Map Number: Glancaster Rd	1	EOD4-1
Date: 20/05/2021	2	4 SWT2/MAM2-2
Surveyors: N'S	3	5 FOD2-2

Pg 1 of 2

Spring flora - 2021

Dicot Herbs - Asteraceae	1	2	3	4	5
Common Yarrow (*Achillea millefolium*)					
White Snakeroot (*Ageratina altissima*)					
Com. Ragweed (*Ambrosia artemisiifolia*)					
Giant Ragweed (*Ambrosia trifida*)					
Field Pussytoes (*Antennaria neglecta*)					
Artemisia					
Common Burdock (*Arctium minus*)					
Nodding Beggar-ticks (*Bidens cernua*)					
Devil's Beggar-ticks (*Bidens frondosa*)					
Spotted Knapweed (*Centaurea biebersteinii*)					
Brown Knapweed (*Centaurea jacea*)					
Chicory (*Cichorium intybus*)					
Canada Thistle (*Cirsium arvesnse*)					
Bull Thistle (*Cirsium vulgare*)					
Horseweed (*Conyza canadensis*)					
Daisy Fleabane (*Erigeron annus*)					
Philadelphia Fleabane (*Erig. philadelphicus*)					
Erigeron					
Joe-pye-weed (*Eupatorium maculatum*)					
Boneset (*Eupatorium perfoliatum*)					
Large-leaved Aster (*Eurybia macrophylla*)					
Flat-top Goldenrod (*Euthamia graminifolia*)					
Orange Hawkweed (*Hieracium aurantiacum*)					
Field Hawkweed (*Hieracium caespitosum*)					
Hieracium					
Elecampane (*Inula helenium*)					
Prickly Lettuce (*Lactuca serriola*)					
Lactuca					
Ox-eye Daisy (*Leucanthemum vulgare*)					
Pineapple-weed (*Matricaria discoidea*)					
Tall White Lettuce (*Prenanthes altissima*)					
Black-eyed Susan (*Rudbeckia hirta*)					
Tall Goldenrod (*Solidago altissima*)					
Blue-stem Goldenrod (*Solidago caesia*)					
Canada Goldenrod (*Solidago canadensis*)					
Zig-zag Goldenrod (*Solidago flexicaulis*)					
Giant Goldenrod (*Solidago gigantea*)					
Early Goldenrod (*Solidago juncea*)					
Gray Goldenrod (*Solidago nemoralis*)					
Solidago					
Field Sow-thistle (*Sonchus arvensis*)					
Sonchus					
Heart-leaf Aster (*Symph. cordifolium*)					
Heath Aster (*Symphyotrichum ericoides*)					
Tall White Aster (*Symph. lanceolatum*)					
Calico Aster (*Symphyotrichum lateriflorum*)					
New England Aster (*Symph. novae-angliae*)					
Purple-stem Aster (*Symph. puniceus*)					
Common Tansy (*Tanacetum vulgare*)					
Common Dandelion (*Taraxacum officinale*)					
Com. Goatsbeard (*Tragopogon pratensis*)					
Coltsfoot (*Tussilago farfara*)					
EURIMAC	R		O		

Other Dicot Herbs	1	2	3	4	5
White Baneberry (*Actaea pachypoda*)	R		O		
Red Baneberry (*Actaea rubra*)					
Tall Agrimony (*Agrimonia gryposepala*)					
Garlic Mustard (*Alliaria petiolata*)	O	O	O		
Green Amaranth (*Amaranthus retroflexus*)					
Hog-peanut (*Amphicarpa bracteata*)					
Pearly Everlasting (*Anaphalis margaritacea*)					
Canada Anemone (*Anemone canadensis*)					
Ivy Hepatica (*Anemone acutiloba*)					
Thimbleweed (*Anemone virginiana*)					
Purple Angelica (*Angelica atropurpurea*)					
Indian Hemp (*Apocynum cannabinum*)					
Wild Sarsaparilla (*Aralia nudicaulis*)					
Spikenard (*Aralia racemosa*)					
Wild Ginger (*Asarum canadense*)					
Swamp Milkweed (*Asclepias incarnata*)					
Common Milkweed (*Asclepias syriaca*)					
Yellow Rocket (*Barbarea vulgaris*)	R	O	R		
False Nettle (*Boehmeria cylindrica*)					
Black Mustard (*Brassica nigra*)					
Marsh-marigold (*Caltha palustris*)					
Creeping Bellflower (*Campanula rapunculoides*)					

Dicot Herbs	1	2	3	4	5
Shepherd's Purse (*Capsella bursa-pastoris*)					
Cutleaf Toothwort (*Cardamine concatenata*)					
Toothwort (*Cardamine diphylla*)					
Penn. Bitter-cress (*Cardamine pensylvanica*)					
Cardamine					
Blue Cohosh (*Caulophyllum thalictroides*)					
Mouse-ear Chickweed (*Cerastium fontanum*)					
Turtlehead (*Chelone glabra*)					
Spotted Water-hemlock (*Cicuta maculata*)					
Water-hemlock (*Cicuta virosa*)					
Enchanter's Nightshade (*Circaea lutetiana*)					
Carolina Spring Beauty (*Claytonia caroliniana*)					
Virginia Spring Beauty (*Claytonia virginica*)					
Virgin's-bower (*Clematis virginiana*)					
Field Bindweed (*Convolvulus arvensis*)					
Dog-strangling Vine (*Cynanchum rossicum*)					
Wild Carrot (*Daucus carota*)					
Deptford Pink (*Dianthus armeria*)					
Squirrel-corn (*Dicentra canadensis*)					
Dutchman's-breeches (*Dicentra cucullaria*)					
Wild Teasel (*Dipsacus fullonum*)					
Wild Cucumber (*Echinocystis lobata*)					
Viper's Bugloss (*Echium vulgare*)					
Northern Willow-herb (*Epilobium ciliatum*)					
Hairy Willow-herb (*Epilobium hirsutum*)					
Small-fl. Willow-herb (*Epilobium parviflorum*)					
Epilobium					
Worm Mustard (*Erysimum cheiranthoides*)					
Euphorbia					
Hemp Nettle (*Galeopsis tetrahit*)					
Wild Madder (*Galium mollugo*)					
Marsh Bedstraw (*Galium palustre*)					
Sweet-scented Bedstraw (*Galium triflorum*)					
Galium odoratum			R		
Spotted Geranium (*Geranium maculatum*)	O		O		
Herb-robert (*Geranium robertianum*)	R		R		
Yellow Avens (*Geum aleppicum*)	R		R		
White Avens (*Geum canadense*)					
Urban Avens (*Geum urbanum*)					
Dame's Rocket (*Hesperis matronalis*)					
Virg. Water-leaf (*Hydrophyllum virginianum*)	R		R		
Com. St. John's-wort (*Hypericum perforatum*)					
Spotted Jewelweed (*Impatiens capensis*)		A	R		
Wood Nettle (*Laportea canadensis*)					
Motherwort (*Leonurus cardiaca*)					
Field Peppergrass (*Lepidium campestre*)					
Eur. Gromwell (*Lithospermum officinale*)					
Butter & Eggs (*Linaria vulgaris*)					
Great Lobelia (*Lobelia siphilitica*)					
Lobelia					
Cut-leaf Bugleweed (*Lycopus americanus*)					
Northern Bugleweed (*Lycopus uniflorus*)					
Fringed Loosestrife (*Lysimachia ciliata*)					
Moneywort (*Lysimachia nummularia*)		R	R		
Lysimachia					
Purple Loosestrife (*Lythrum salicaria*)					
Black Medick (*Medicago lupulina*)					
Alfalfa (*Medicago sativa*)					
White Sweet-clover (*Melilotus alba*)					
Yellow Sweet-clover (*Melilotus officinalis*)					
Wild Mint (*Mentha arvensis*)					
Wild Bergamot (*Monarda fistulosa*)					
Small Forget-me-not (*Myosotis laxa*)					
Forget-me-not (*Myosotis scorpioides*)			R		
Water-cress (*Nasturtium officinale*)					
Com. Evening-primrose (*Oenothera biennis*)					
Sweet-cicely (*Osmorhiza berteri*)					
Yellow Wood-sorrel (*Oxalis stricta*)	R	R	O		
Wild Parsnip (*Pastinaca sativa*)					
English Plantain (*Plantago lanceolata*)					
Common Plantain (*Plantago major*)					
Rugel's Plantain (*Plantago rugelii*)					
May-apple (*Podophyllum peltatum*)	O		O		
Pale Smartweed (*Polygonum lapathifolium*)					
Lady's-thumb (*Polygonum persicaria*)					
Virginia Knotweed (*Polygonum virginianum*)					
Polygonum					
Polygonum					
Rough Cinquefoil (*Potentilla norvegica*)					
Rough-fruited Cinquefoil (*Potentilla recta*)			R		
Common Cinquefoil (*Potentilla simplex*)					
Potentilla					
Heal-all (*Prunella vulgaris*)					
Shinleaf (*Pyrola elliptica*)					

Dicot Herbs	1	2	3	4	5
Kidney-leaf Buttercup (*Ranunculus abortivus*)			R		
Tall Buttercup (*Ranunculus acris*)					
Hooked Buttercup (*Ranunculus recurvatus*)					
Ranunculus					
Sheep Sorrel (*Rumex acetosella*)					
Curly-leaf Dock (*Rumex crispus*)					
Bitter Dock (*Rumex obtusifolius*)					
Bloodroot (*Sanguinaria canadense*)			O		
Black Snakeroot (*Sanicula marilandica*)					
Bouncing Bet (*Saponaria officinalis*)					
Marsh Skullcap (*Scutellaria galericulata*)					
Mad Dog Skullcap (*Scutellaria lateriflora*)					
White Campion (*Silene latifolia*)					
Bladder Campion (*Silene vulgaris*)					
Hemlock Water-parsnip (*Sium suave*)					
Bitter Nightshade (*Solanum dulcamara*)					
Black Nightshade (*Solanum ptychanthum*)					
Grassleaf Stitchwort (*Stellaria graminea*)					
Common Chickweed (*Stellaria media*)					
Early Meadow-rue (*Thalictrum dioicum*)					
Tall Meadow-rue (*Thalictrum pubescens*)					
Field Penny-cress (*Thlaspi arvense*)					
Foamflower (*Tiarella cordifolia*)					
Star-flower (*Trientalis borealis*)					
Red Clover (*Trifolium pratense*)					
White Clover (*Trifolium repens*)					
Trifolium					
Stinging Nettle (*Urtica dioica*)					
Greater Bladderwort (*Utricularia vulgaris*)					
Common Mullein (*Verbascum thapsus*)					
Blue Vervain (*Verbena hastata*)					
White Vervain (*Verbena urticifolia*)					
Water Speedwell (*Veron. anagallis-aquatica*)					
Common Speedwell (*Veronica officinalis*)					
Veronica					
Cow Vetch (*Vicia cracca*)					
Vicia					
Periwinkle (*Vinca minor*)					
Dog Violet (*Viola conspersa*)					
Yellow Violet (*Viola pubescens*)					
Com. Blue Violet (*Viola sororia*)					
Viola					
GLEGHED		R	R		
~~F~~RAGVES	R		A		
Dioscorea vilosa			R		
Ajuga reptens			R		

Monocot Herbs	1	2	3	4	5
Water-plantain (*Alisma plantago-aquatica*)					
Wild Leek (*Allium tricoccum*)					
Jack-in-the-pulpit (*Arisaema triphyllum*)	O		O		
Asparagus (*Asparagus officinalis*)					
Wild Calla (*Calla palustris*)					
Bluebead-lily (*Clintonia borealis*)					
Garden Lily-of-valley (*Convallaria majalis*)					
Yel. Lady's Slipper (*Cypripedium parviflora*)					
Canada Waterweed (*Elodea canadensis*)					
Helleborine (*Epipactis helleborine*)					
Yellow Trout Lily (*Erythronium americanum*)	O		A		
Blue-flag Iris (*Iris versicolor*)			R		
Orange Day Lily (*Hemerocallus fulva*)					
Lesser Duckweed (*Lemna minor*)					
Starry Duckweed (*Lemna trisulca*)					
Wild Lily-of-valley (*Maianthemum canadense*)	R		O		
False Solom Seal (*Maianthemum racemosum*)	O		O		
Star False Solomon (*Maianthemum stellatum*)					
True Solomon Seal (*Polygonatum pubescens*)					
Pickerel-weed (*Pontederia cordata*)					
Curly-leaf Pondweed (*Potamogeton crispus*)					
Sago Pondweed (*Potamogeton pectinatus*)					
Potamogeton					
Potamogeton					
Broad-leaved Arrowhead (*Sagittaria latifolia*)					
Blue-eyed-grass (*Sisyrinchium montanum*)					
Herb. Carrion Flower (*Smilax herbacea*)					
Bristly Greenbrier (*Smilax hispida*)					
Nodding Ladies' Tresses (*Spiranthes cernua*)					
Rose Twisted-stalk (*Streptopus lanceolatus*)					
Skunk-cabbage (*Symplocarpus foetidus*)					
Purple Trillium (*Trillium erectum*)					
White Trillium (*Trillium grandiflorum*)	O		A		
Large-flowered Bellwort (*Uvularia grandiflora*)					

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Map Number: Glancaster Rd	7 FOD4-1	4
Date: 20/05/2021	8 SWT2 / MAMA-2	5
Surveyors: LS	9 FOD2-2	

C.4 Amphibian Surveys

AECOM

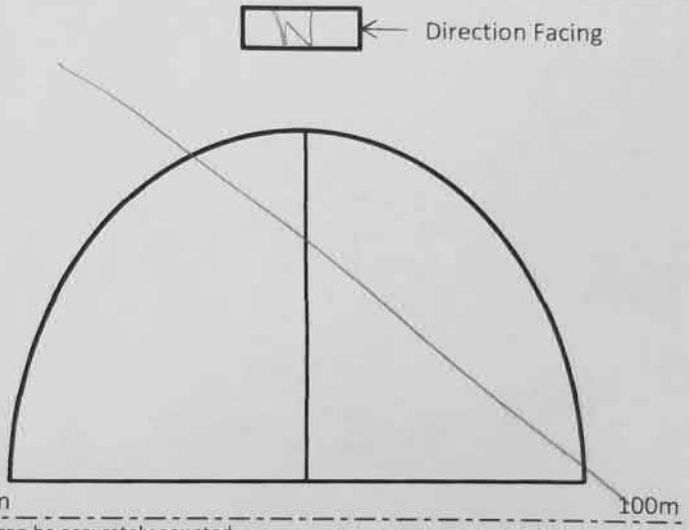
Amphibian - Frog - Data Form

Study Area: Glencaster Rd
GPS: (NAD 83) 17T AMP-01
Water Present (Y/N) Y

Date(yyyy-mm-dd): 2021-04-15 Visit #(1-3) 1
Field Staff (full name): Kasey McKenzie
Time Started: 5:26pm Time Finished: 9:30pm

Beaufort Wind Scale (0-6): 2 Cloud Cover (%): 95%
Background Noise Scale (0-4): 3 Temperature Celcius 6°C
Precipitation (None, fog, drizzle,or rain) None

Species	IN	OUT
NONE		X
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		



Code 1 - not simultaneous, number of individuals can be accurately counted
Code 2 - some call simultaneous, but number of individulas can be reliable estimated
Code 3 - *full chorus, call continuous, numbers of indiviudals cannot be reliably estimated*

Beaufort Wind Scale
0: 0-2 km/hr - calm
1: 3-5 km/hr - light air movement
2: 6-11km/hr - slight breeze - can feel on face
3: 12-19 km/hr- gentle breeze - leaves move on twigs
4: 20-30 km/hr -moderate breeze -small branch moves
5: 31-38 km/hr - fresh breeze - moderate branch moves
6: 39-49 km/hr - strong breeze - large branch moves

Background Noise Scale
0 - no appriciable effect
1 - slight - distant traffic (1 car)
2 - moderate -distant traffic (2-5 cars)
3 - serious -continuous traffic nearby (6-10 cars)
4- profound -continous traffic passing

AMTO - American Toad
BULL- Bullfrog
CHFR - Chorus Frog
MIFR - Mink Frog
GRTR-Gray Treefrog
GRFR-Green Frog
NLFR-N.Leopard Frog
PIFR-Pickeral Frog
SPPE-Spring Peeper
WOFR - Wood Frog

General Comments: woodcock, AMRO

AECOM

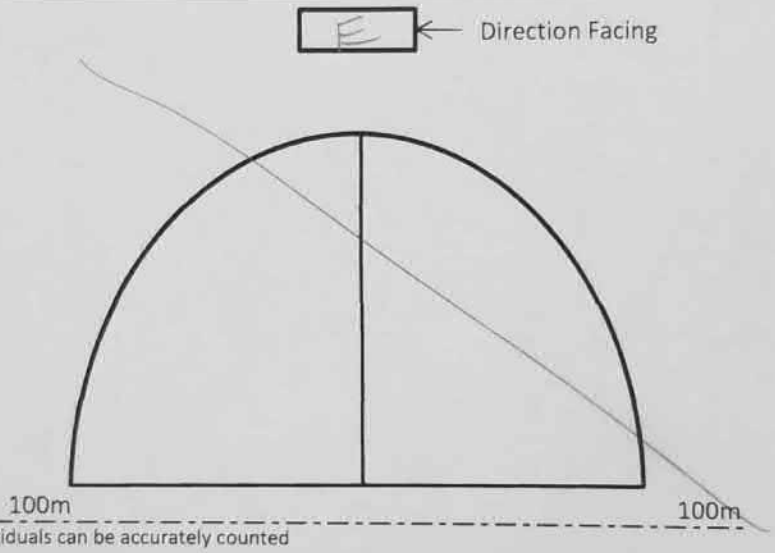
Amphibian - Frog - Data Form

Study Area: Lancaster Rd
GPS: (NAD 83) 17T AMP-02
Water Present (Y/N) Y

Date(yyyy-mm-dd): 2021-04-15 Visit #(1-3) 1
Field Staff (full name): Kasey McKenzie
Time Started: 8:33pm Time Finished: 8:54pm

Beaufort Wind Scale (0-6): 2 Cloud Cover (%): 95%
Background Noise Scale (0-4): 3 Temperature Celcius 5°C
Precipitation (None, fog, drizzle,or rain) none

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		



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	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale	**0** - no appriciable effect	**3** - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	**4**- profound -continous traffic passing
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AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
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CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

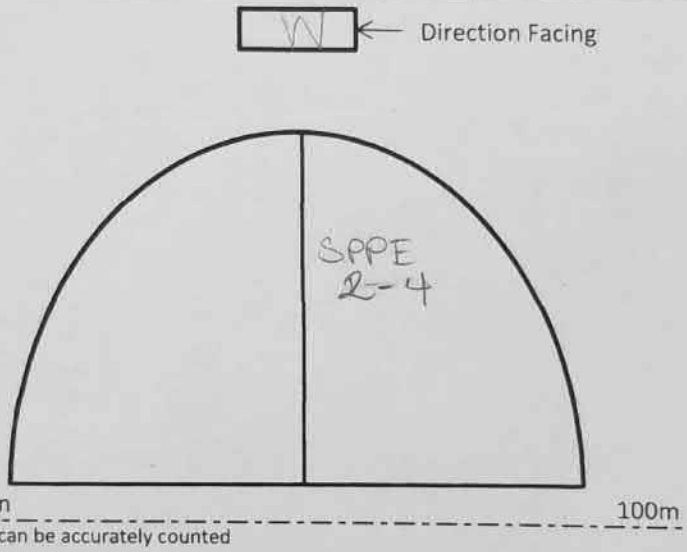
General Comments:

AECOM

Amphibian - Frog - Data Form

Study Area:	Glancaster Rd
GPS: (NAD 83)	17T TMP-03
Water Present (Y/N)	(Y)
Date(yyyy-mm-dd):	2021-04-15
Visit #(1-3)	1
Field Staff (full name):	Kasey McKenzie
Time Started:	8:42pm
Time Finished:	8:45pm
Beaufort Wind Scale (0-6):	2
Cloud Cover (%):	95%
Background Noise Scale (0-4):	3
Temperature Celcius	5°C
Precipitation (None, fog, drizzle,or rain)	none

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE	X	
WOFR		



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Background Noise Scale	**0** - no appriciable effect	**3** - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	**4**- profound -continous traffic passing
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AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments: sound like they're mostly in ponds further from road

AECOM

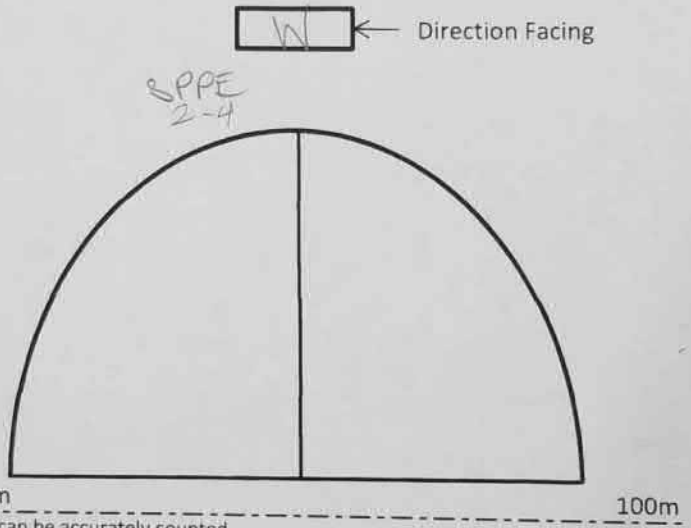
Amphibian - Frog - Data Form

Study Area: Blancastle Rd
GPS: (NAD 83) 17T AMP-04
Water Present (Y/N) Y

Date(yyyy-mm-dd): 2021-04-15 Visit #(1-3) 1
Field Staff (full name): Kasey McKenzie
Time Started: 8:50 pm Time Finished: 8:53 pm

Beaufort Wind Scale (0-6): 2 Cloud Cover (%): 95%
Background Noise Scale (0-4): 2 Temperature Celcius 4°C
Precipitation (None, fog, drizzle,or rain) none

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		X
WOFR		



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GRFR-Green Frog
NLFR-N.Leopard Frog
PIFR-Pickeral Frog
SPPE-Spring Peeper
WOFR - Wood Frog

General Comments:

AECOM

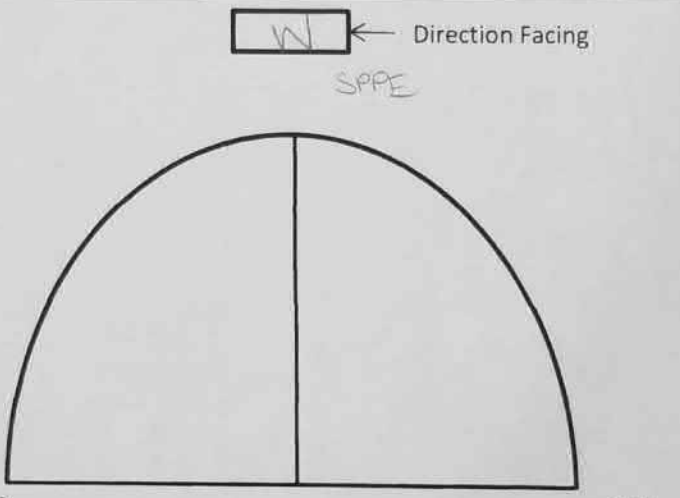
Amphibian - Frog - Data Form

Study Area: Glencaster Rd
GPS: (NAD 83) 17T AMP-05
Water Present (Y/N) Y

Date(yyyy-mm-dd): 2021-04-15 Visit #(1-3) 1
Field Staff (full name): Kasey McKenzie
Time Started: 8:54am Time Finished: 9:00am

Beaufort Wind Scale (0-6): 1 Cloud Cover (%): 95%
Background Noise Scale (0-4): 3 Temperature Celcius 4°C
Precipitation (None, fog, drizzle,or rain) none

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		X
WOFR		



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GRTR-Gray Treefrog
GRFR-Green Frog
NLFR-N.Leopard Frog
PIFR-Pickeral Frog
SPPE-Spring Peeper
WOFR - Wood Frog

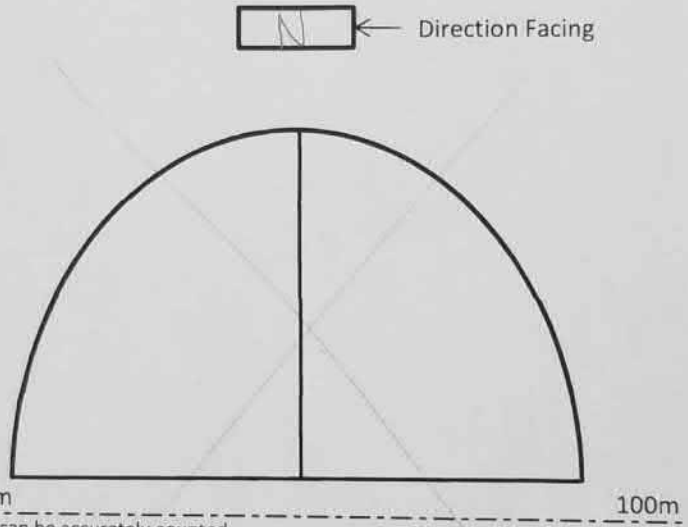
General Comments:

AECOM

Amphibian - Frog - Data Form

Study Area:	Glancaster Rd
GPS: (NAD 83) 17T	AMP-06
Water Present (Y/N)	(Y)
Date(yyyy-mm-dd):	2021-07-15
Visit #(1-3)	1
Field Staff (full name):	Kasey McKenzie
Time Started:	9:05pm
Time Finished:	9:08pm
Beaufort Wind Scale (0-6):	2
Cloud Cover (%):	95%
Background Noise Scale (0-4):	2
Temperature Celcius	4°C
Precipitation (None, fog, drizzle,or rain)	none

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		X
WOFR		



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	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale	**0** - no appriciable effect	**3** - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	**4**- profound -continous traffic passing
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AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments: SPPE calling from behind houses on Glancaster Rd to the east

AECOM

Amphibian - Frog - Data Form

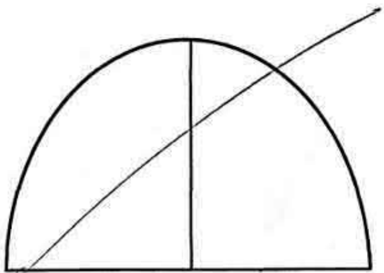
Study Area:	[illegible] Rd - ANR01
GPS: (NAD 83) -	17T lat/long: 43.2097, -79.9292
Water Present (Y/N)	Y

Date(yyyy-mm-dd):	2021-05-17	Visit #(1-3)	2
Field Staff (full name):	C. [illegible] & M. [illegible]		
Time Started:	9:02 am	Time Finished:	9:05am

Beaufort Wind Scale (0-6):	0	Cloud Cover (%):	0
Background Noise Scale (0-4):	3	Temperature Celcius	18
Precipitation (None (circled), fog, drizzle, or rain)			

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

SW ← Direction Facing



100m 100m

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Beaufort Wind Scale		
	0: 0-2 km/hr - calm	4: 20-30 km/hr - moderate breeze - small branch moves
	1: 3-5 km/hr - light air movement	5: 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr - gentle breeze - leaves move on twigs	

Background Noise Scale		
	0 - no appriciable effect	3 - serious - continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4 - profound - continous traffic passing
	2 - moderate - distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR - N.Leopard Frog
BULL - Bullfrog	GRTR - Gray Treefrog	PIFR - Pickeral Frog
CHFR - Chorus Frog	GRFR - Green Frog	SPPE - Spring Peeper
		WOFR - Wood Frog

General Comments:

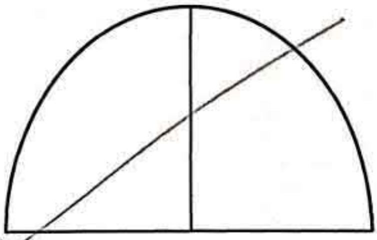
AECOM

Amphibian - Frog - Data Form

Study Area: Glancaster Rd - ANU-02	
GPS: ~~(NAD 83)~~ ~~17T~~ lat/long: 43.2080, -79.92850	
Water Present (Y/N): N	
Date(yyyy-mm-dd): 2021-05-17	Visit #(1-3): 2
Field Staff (full name): C. A[illegible] & M. Reid	
Time Started: 9:12 pm	Time Finished: 9:15 pm
Beaufort Wind Scale (0-6): 1	Cloud Cover (%): 0
Background Noise Scale (0-4): 3	Temperature Celcius: 18
Precipitation (None (circled), fog, drizzle, or rain)	

Species	IN	OUT
NONE	✓	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

Direction Facing: E



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Beaufort Wind Scale		
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	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale		
	0 - no appriciable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

AECOM

Amphibian - Frog - Data Form

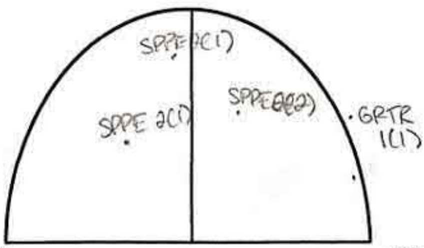
Study Area:	Glancaster Rd - AMP-03
GPS: (NAD 83) ~~17T~~	lat long 43.2008, -79.9319
Water Present (Y/N)	Y

Date(yyyy-mm-dd):	2021-05-17	Visit #(1-3)	2
Field Staff (full name):	C. Atkinson & M. Reid		
Time Started:	9:20pm	Time Finished:	9:29 pm

Beaufort Wind Scale (0-6):	1	Cloud Cover (%):	0
Background Noise Scale (0-4):	2	Temperature Celcius	15
Precipitation (None/fog, drizzle,or rain)	None (circled)		

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		1(1)
GRFR		
NLFR		
PIFR		
SPPE	2(4)	
WOFR		

W ← Direction Facing



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	1: 3-5 km/hr - light air movement	5 : 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale		
	0 - no appriciable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

AECOM

Amphibian - Frog - Data Form

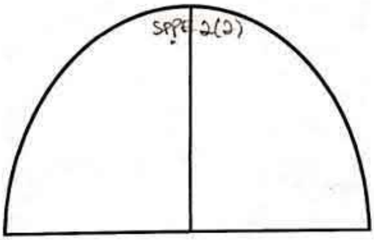
Study Area:	Glancaster Rd - AMP-04
GPS: ~~(NAD 83)~~ ~~17T~~	lat/long 43.1960, -79.7338
Water Present (Y/N)	Y

Date(yyyy-mm-dd): 2021-05-17	Visit #(1-3) 2
Field Staff (full name): C. Atkinson & M Redd	
Time Started: 9:29 pm	Time Finished: 9:42 pm

Beaufort Wind Scale (0-6): 0	Cloud Cover (%): 0
Background Noise Scale (0-4): 2	Temperature Celcius 15
Precipitation (None [circled], fog, drizzle, or rain)	

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE	2(2)	
WOFR		

W ← Direction Facing



100m　　100m

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Background Noise Scale	0 - no appriciable effect 1 - slight - distant traffic (1 car) 2 - moderate -distant traffic (2-5 cars)	3 - serious -continuous traffic nearby (6-10 cars) 4- profound -continous traffic passing

AMTO - American Toad BULL- Bullfrog CHFR - Chorus Frog	MIFR - Mink Frog GRTR-Gray Treefrog GRFR-Green Frog	NLFR-N.Leopard Frog PIFR-Pickeral Frog SPPE-Spring Peeper WOFR - Wood Frog

General Comments:

AECOM

Amphibian - Frog - Data Form

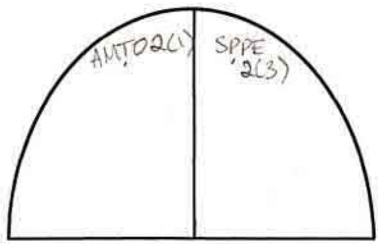
Study Area:	[illegible] KB-AMP-05
GPS: (NAD 83)	17T lat/long 43.1931, -79.9351
Water Present (Y/N)	Y

Date(yyyy-mm-dd):	2021-05-17	Visit #(1-3)	2
Field Staff (full name):	C. [illegible] & M. Reid		
Time Started:	9:52 pm	Time Finished:	9:55 pm

Beaufort Wind Scale (0-6):	0	Cloud Cover (%):	0
Background Noise Scale (0-4):	2	Temperature Celcius	15
Precipitation (None, fog, drizzle,or rain) — None circled			

Species	IN	OUT
NONE		
AMTO	2(1)	
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE	2(3)	
WOFR		

W ← Direction Facing



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Background Noise Scale	0 - no appriciable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
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AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
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CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

Pg 1 of 1

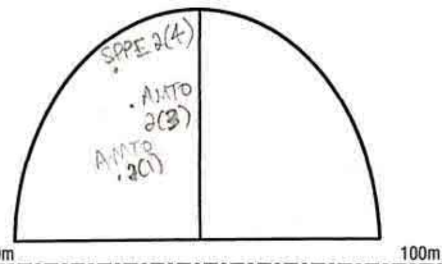
AECOM

Amphibian - Frog - Data Form

Study Area: Blanrager Rd - AMP-06	
GPS: (NAD 83) 17T lat/long 43.1916, -79.9366	
Water Present (Y/N) Y	
Date(yyyy-mm-dd): 2021-05-17	Visit #(1-3) 2
Field Staff (full name): C. Anderson & N. Reid	
Time Started: 10:01 pm	Time Finished: 10:04 pm
Beaufort Wind Scale (0-6): 0	Cloud Cover (%): 0
Background Noise Scale (0-4): 2	Temperature Celcius 15
Precipitation (None, fog, drizzle, or rain) — None circled	

Species	IN	OUT
NONE		
AMTO	2(4)	
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE	2(4)	
WOFR		

N ← Direction Facing



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CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

AECOM

Amphibian - Frog - Data Form

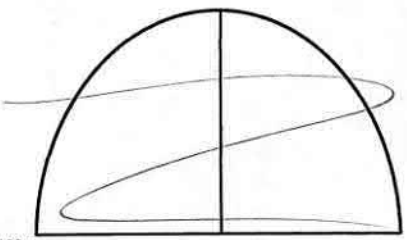
Study Area:	Concession Rd - AMD-01
GPS: ~~(NAD-83)~~ ~~177~~	43.2096, -79.9889
Water Present (Y/N)	unknown

Date(yyyy-mm-dd):	2021-05-15
Visit #(1-3)	3
Field Staff (full name):	C. Anderson, M. Reid
Time Started:	9:33 pm
Time Finished:	9:36 pm

Beaufort Wind Scale (0-6):	0
Cloud Cover (%):	10
Background Noise Scale (0-4):	3
Temperature Celcius	19
Precipitation (None, fog, drizzle, or rain)	

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

W ← Direction Facing



100m 100m

Code 1 - not simultaneous, number of individuals can be accurately counted
Code 2 - some call simultaneous, but number of individuals can be reliable estimated
Code 3 - full chorus, call continuous, numbers of individuals cannot be reliably estimated

Beaufort Wind Scale	0: 0-2 km/hr - calm	4: 20-30 km/hr -moderate breeze -small branch moves
	1: 3-5 km/hr - light air movement	5 : 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale	0 - no appriciable effect	3 - serious -continuous traffic nearby (5-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

AECOM

Amphibian - Frog - Data Form

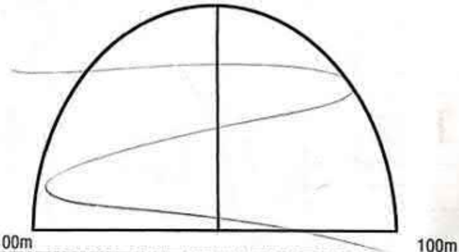
Study Area: Colancaster Rd - AMP-02
GPS: ~~(NAD 83)~~ ~~17T~~ 43.2079, -79.9885
Water Present (Y/N) Unknown

Date(yyyy-mm-dd): 2021-06-15 | Visit #(1-3) 3
Field Staff (full name): C. Atherton + M. Reva
Time Started: 9:40 pm | Time Finished: 9:43 pm

Beaufort Wind Scale (0-6): 0 | Cloud Cover (%): 0
Background Noise Scale (0-4): 2 | Temperature Celcius 19
Precipitation (None, fog, drizzle, or rain) — None circled

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

SE ← Direction Facing



100m 100m

Code 1 - not simultaneous, number of individuals can be accurately counted
Code 2 - some call simultaneous, but number of individulas can be reliable estimated
Code 3 - full chorus, call continuous, numbers of indiviudals cannot be reliably estimated

Beaufort Wind Scale	0: 0-2 km/hr - calm 1: 3-5 km/hr - light air movement 2: 6-11km/hr - slight breeze - can feel on face 3: 12-19 km/hr- gentle breeze - leaves move on twigs	4: 20-30 km/hr -moderate breeze -small branch moves 5 : 31-38 km/hr - fresh breeze - moderate branch moves 6: 39-49 km/hr - strong breeze - large branch moves

Background Noise Scale	0 - no appriciable effect 1 - slight - distant traffic (1 car) 2 - moderate -distant traffic (2-5 cars)	3 - serious -continuous traffic nearby (6-10 cars) 4- profound -continous traffic passing

AMTO - American Toad BULL- Bullfrog CHFR - Chorus Frog	MIFR - Mink Frog GRTR-Gray Treefrog GRFR-Green Frog	NLFR-N.Leopard Frog PIFR-Pickeral Frog SPPE-Spring Peeper WOFR - Wood Frog

General Comments:

Pg 1 of 1

AECOM

Amphibian - Frog - Data Form

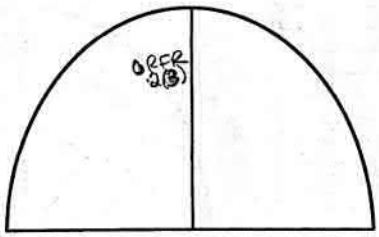
Study Area: Manchester RA - AMP-03
GPS: (NAD 83) ~~17T 43.8010, -79.9317~~ 43.8010, -79.9317
Water Present (Y/N) unknown

Date(yyyy-mm-dd): 2021-06-15 Visit #(1-3) 3
Field Staff (full name): C. Atherton & W. Reid
Time Started: 9:54 pm Time Finished: 9:57 pm

Beaufort Wind Scale (0-6): 0 Cloud Cover (%): 0
Background Noise Scale (0-4): 2 Temperature Celcius 19
Precipitation (None, fog, drizzle, or rain)

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR	2(3)	
NLFR		
PIFR		
SPPE		
WOFR		

NW ← Direction Facing



100m 100m

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Background Noise Scale	0 - no appriclable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

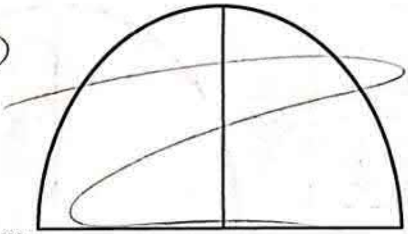
AECOM

Amphibian - Frog - Data Form

Study Area: Glencaster Rd - AMP-04	
GPS: ~~(NAD 83)~~ 17T 43.1959, -79.9343	
Water Present (Y/N) unknown	
Date(yyyy-mm-dd): 2021-06-15	Visit #(1-3) 3
Field Staff (full name): C. Atherton & M. Reid	
Time Started: 10:02 pm	Time Finished: 10:05 pm
Beaufort Wind Scale (0-6): 0	Cloud Cover (%): 0
Background Noise Scale (0-4): 2	Temperature Celcius 16
Precipitation (None, fog, drizzle, or rain) — None circled	

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

NW ← Direction Facing



100m 100m

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Background Noise Scale	0 - no appriciable effect	3 - serious - continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound - continous traffic passing
	2 - moderate - distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

Pg 1 of 1

AECOM

Amphibian - Frog - Data Form

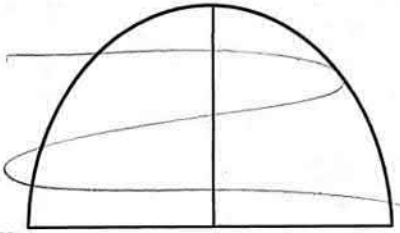
Study Area:	Chromcaster PA - NW-05
GPS: (~~NAD 83~~) ~~17T~~	43.1930, -79.9355
Water Present (Y/N)	unknown

Date(yyyy-mm-dd): 2021-06-15	Visit #(1-3) 3
Field Staff (full name):	C. Atherton & N. Reid
Time Started: 10:11 pm	Time Finished: 10:19 pm

Beaufort Wind Scale (0-6): 0	Cloud Cover (%): 0
Background Noise Scale (0-4): 2	Temperature Celcius 16
Precipitation (None, fog, drizzle, or rain)	

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		

NW ← Direction Facing



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Code 3 - full chorus, call continuous, numbers of individuals cannot be reliably estimated

Beaufort Wind Scale	0: 0-2 km/hr - calm	4: 20-30 km/hr -moderate breeze -small branch moves
	1: 3-5 km/hr - light air movement	5 : 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale	0 - no appriciable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

AECOM

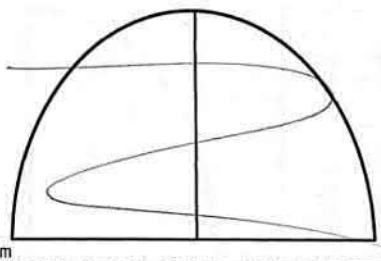
Amphibian - Frog - Data Form

Study Area:	Dionne's Cr Rd - AMO-06
GPS: (NAD 83)	17T 42.1918, -79.9367
Water Present (Y/N)	unknown

Date(yyyy-mm-dd):	2021-06-15
Visit #(1-3)	3
Field Staff (full name):	C. Atherton & L. Reid
Time Started:	10:18 pm
Time Finished:	10:31 pm

Beaufort Wind Scale (0-6):	1
Cloud Cover (%):	0
Background Noise Scale (0-4):	2
Temperature Celcius	16
Precipitation (None, fog, drizzle, or rain)	

Species	IN	OUT
NONE	X	
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		



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	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
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Background Noise Scale	0 - no appriciable effect	3 - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	4- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

AMTO - American Toad	MIFR - Mink Frog	NLFR-N.Leopard Frog
BULL- Bullfrog	GRTR-Gray Treefrog	PIFR-Pickeral Frog
CHFR - Chorus Frog	GRFR-Green Frog	SPPE-Spring Peeper
		WOFR - Wood Frog

General Comments:

C.5 Breeding Bird Surveys

AECOM

Breeding Bird Survey Point Count

Site Details		
Project: 60637047	Point ID: BBS-01	Round #: 1

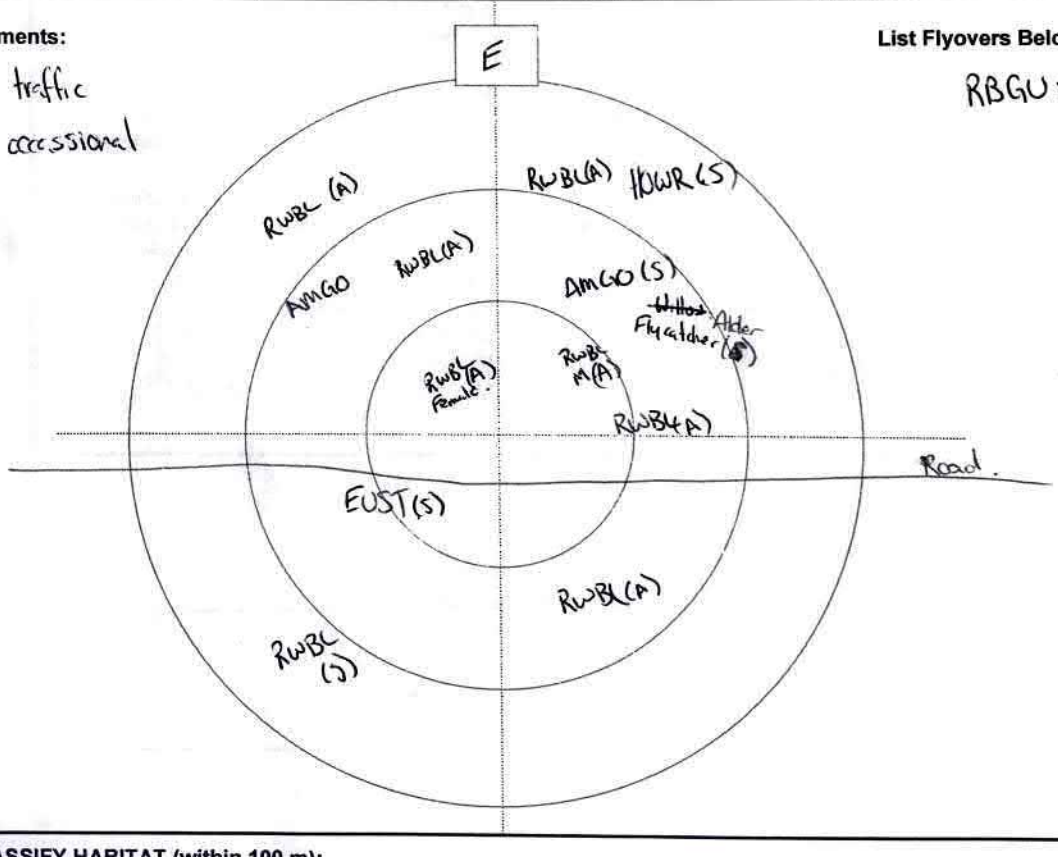
Survey Conditions			
Surveyors: H. Hughes M. Reid		Date: May 31, 2021	
Temperature: 8°C	Wind: 0-1	Cloud: 0%	Precipitation: None
Start Time: 5:51	End Time: 5:56	43.209845 Easting: Northing: 79.929005	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE):

Comments:

light traffic from occassional car

List Flyovers Below:

RBGU x3



CLASSIFY HABITAT (within 100 m):

Swamp cattails + phragmites.

Fitzbew

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed

X – Species observed in its breeding season (no evidence of breeding).

Possible

H – Species observed in its breeding season in suitable nesting habitat.

S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable

P – Pair observed in their breeding season in suitable nesting habitat

T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.

D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.

V – Visiting probable nesting site

A – Agitated behaviour or anxiety calls of an adult

B – Brood patch on adult female or cloacal protuberance on adult male

N – Nest-building or excavation of nest hole.

Confirmed Breeding

DD – Distraction display or injury feigning

NU – Used nest or egg shell found (occupied or laid within the period of the study)

FY – Recently fledged young or downy young, including young incapable of sustained flight

AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.

FS – Adult carrying fecal sac

CF – Adults Carrying Food for Young

NE – Nest containing eggs.

NY – Nest with young seen or heard.

SAR Observations:

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

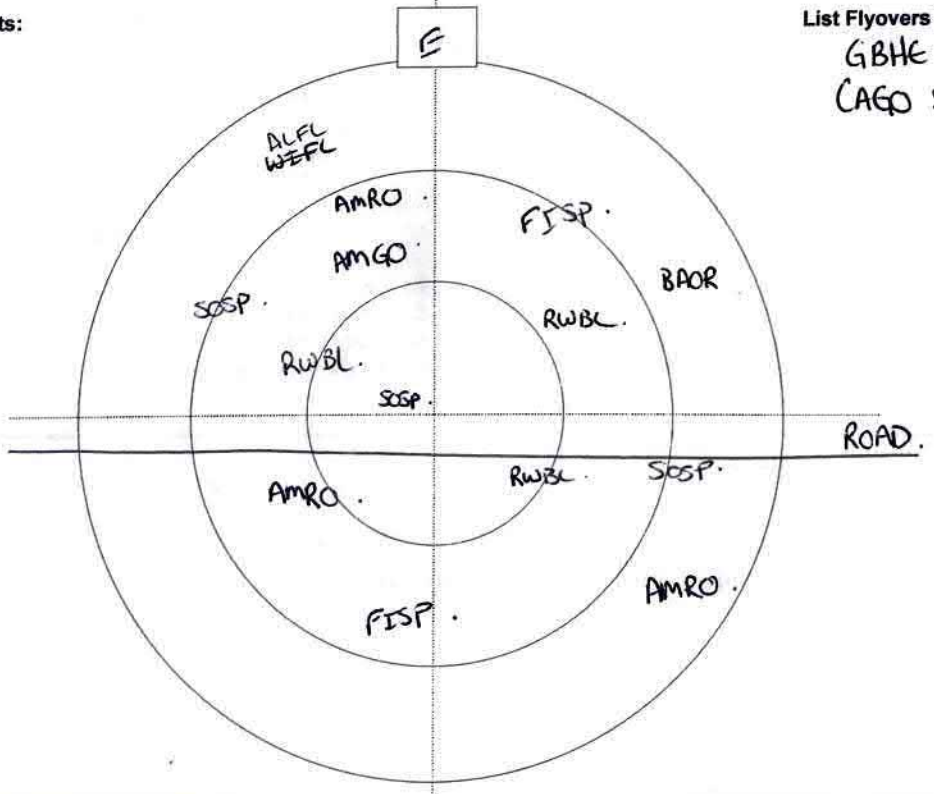
Site Details			
Project: 60637047	Point ID: BBS-02.		Round #: 1
Survey Conditions			
Surveyors: H. Hughes, M Reid		Date: May 31, 2021	
Temperature: 10°C	Wind: 0-1	Cloud: 10%	Precipitation: /
Start Time: 7:20.	End Time: 7:25.	Easting: 43.204316 Northing: -79.430012	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE):

Comments:

traffic.

List Flyovers Below:

GBHE
CAGO x12.



CLASSIFY HABITAT (within 100 m):

Residential to either side. Hydro right of way. shrub/meadow mix.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
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FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

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Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

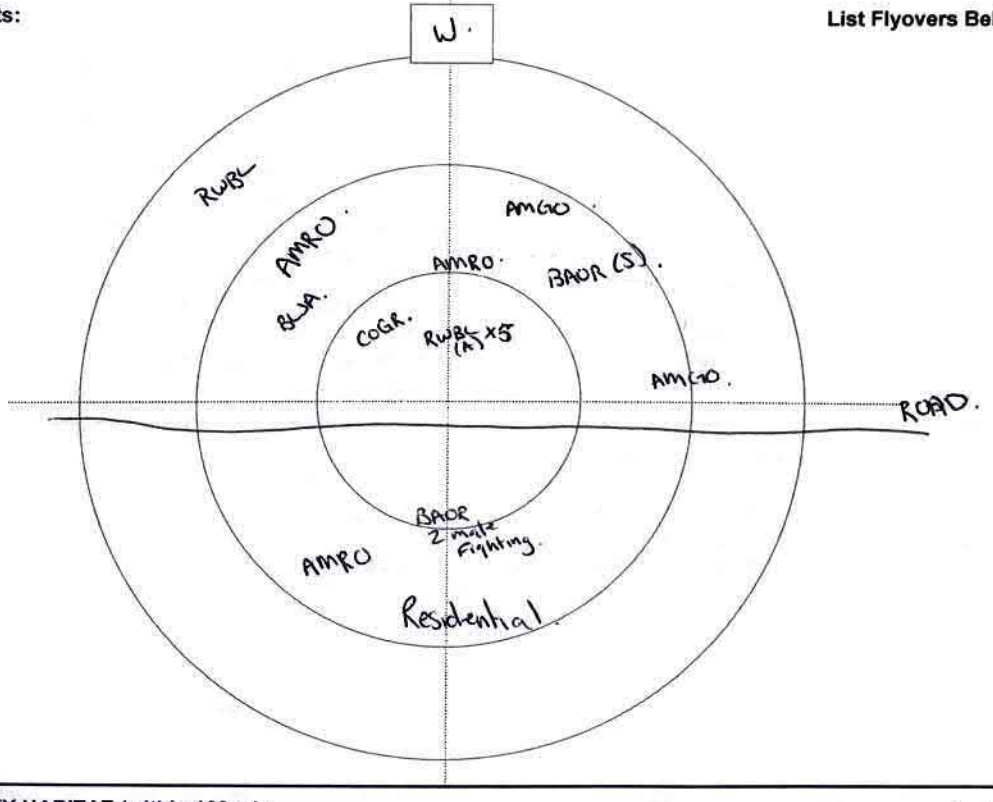
AECOM

Breeding Bird Survey Point Count

Site Details			
Project: 60637047.	**Point ID:** BBS-03.		**Round #:** 1
Survey Conditions			
Surveyors: H. Hughes, M. Reid		**Date:** May 31, 2021	
Temperature: 8°C	**Wind:** 0-1	**Cloud:** 0%	**Precipitation:** —
Start Time: 6:09	**End Time:** 6:14.	**Easting:** 43.200929 **Northing:** -79.931730	**Slope:** Vertical ☐ Steep ☐ Gentle ☒ Flat ☐ **Direction slope faces (Aspect)** (ex. NE):

Comments:

List Flyovers Below:



CLASSIFY HABITAT (within 100 m): Eastern Cottonwood.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed

X – Species observed in its breeding season (no evidence of breeding).

Possible

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Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

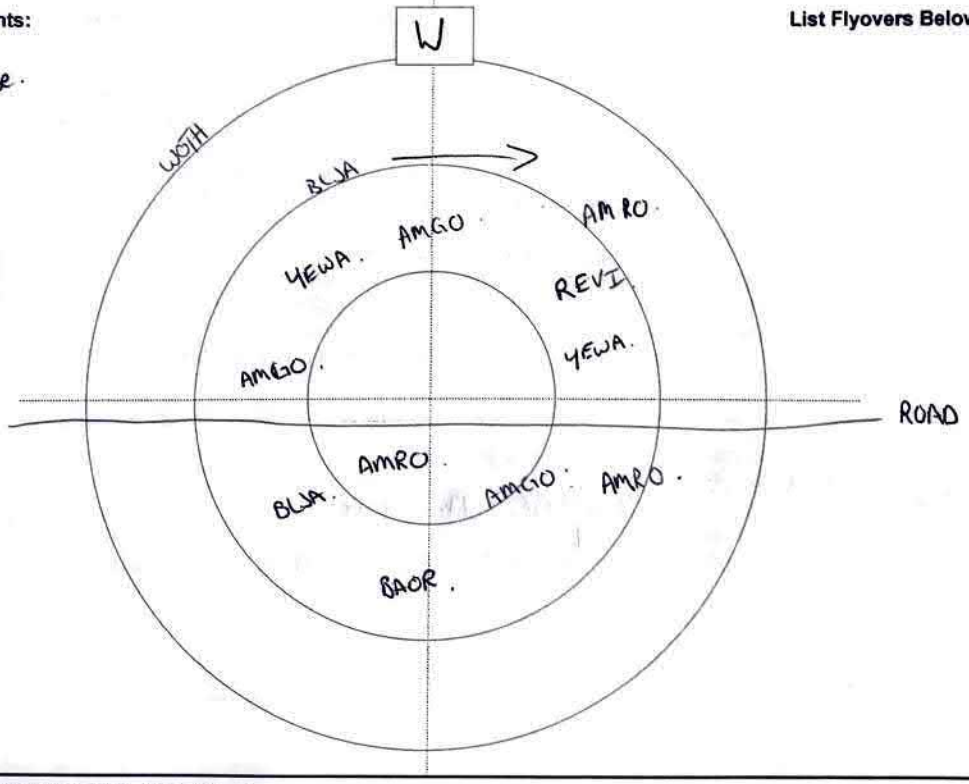
Breeding Bird Survey Point Count

Site Details			
Project: 60637047	**Point ID:** BBS-04.		**Round #:** 1
Survey Conditions			
Surveyors: H. Hughes M Reid		**Date:** May 31, 2021	
Temperature: 10°C	**Wind:** 0-1	**Cloud:** 10%	**Precipitation:** /
Start Time: 6:22.	**End Time:** 6:27.	43.84898 **Easting:** -79.934406 **Northing:**	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE):

Comments:

Traffic noise.

List Flyovers Below:



incidental GRCA.

CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

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N – Nest-building or excavation of nest hole.

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DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: Wood Thrush (Special Concern)
Location of Observation (UTM): 43.194898, -79.934406
Observed in suitable Habitat (Y/N) Y
General Habitat Description (i.e. meadow, deciduous forest, etc.): Deciduous Forest

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details		
Project: 60637047	**Point ID:** BBS-06	**Round #:** 1

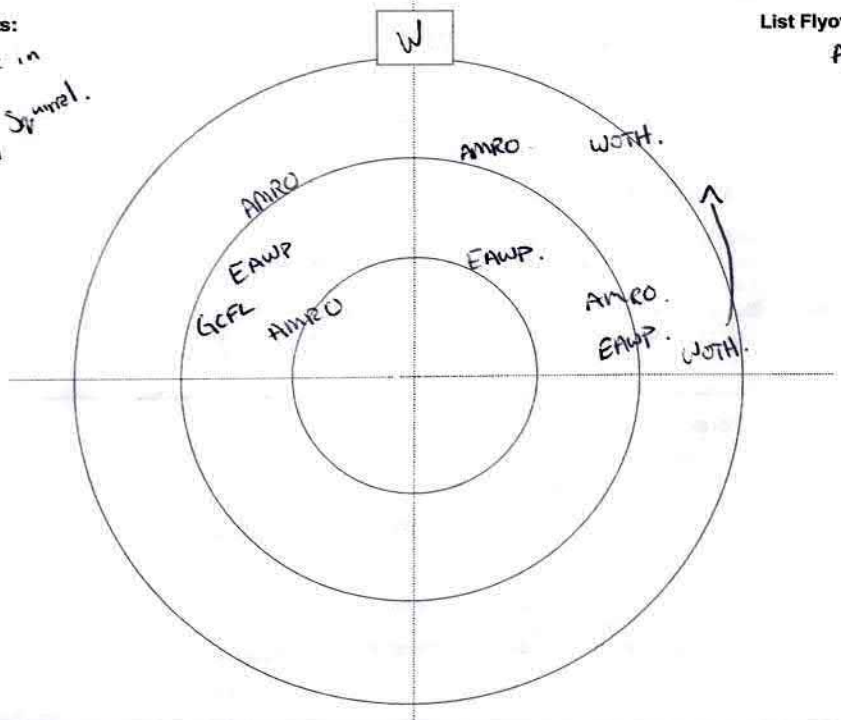
Survey Conditions			
Surveyors: H. Hughes, M. Reid		**Date:** May 31, 2021	
Temperature: 10°C	**Wind:** 0-1	**Cloud:** 15%	**Precipitation:** /
Start Time: 6:35.	**End Time:** 6:40.	43.193457 **Easting:** -79.935899 **Northing:**	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE):

Comments:

Light traffic in background. Eastern Gray Squirrel.

List Flyovers Below:

AMCR.



CLASSIFY HABITAT (within 100 m):

Forest open understory.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: Eastern Wood Pewee (SC)
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) Y
General Habitat Description (i.e. meadow, deciduous forest, etc.): FOD

Species: Wood Thrush (SC)
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) Y
General Habitat Description (i.e. meadow, deciduous forest, etc.): FOD

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) _____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

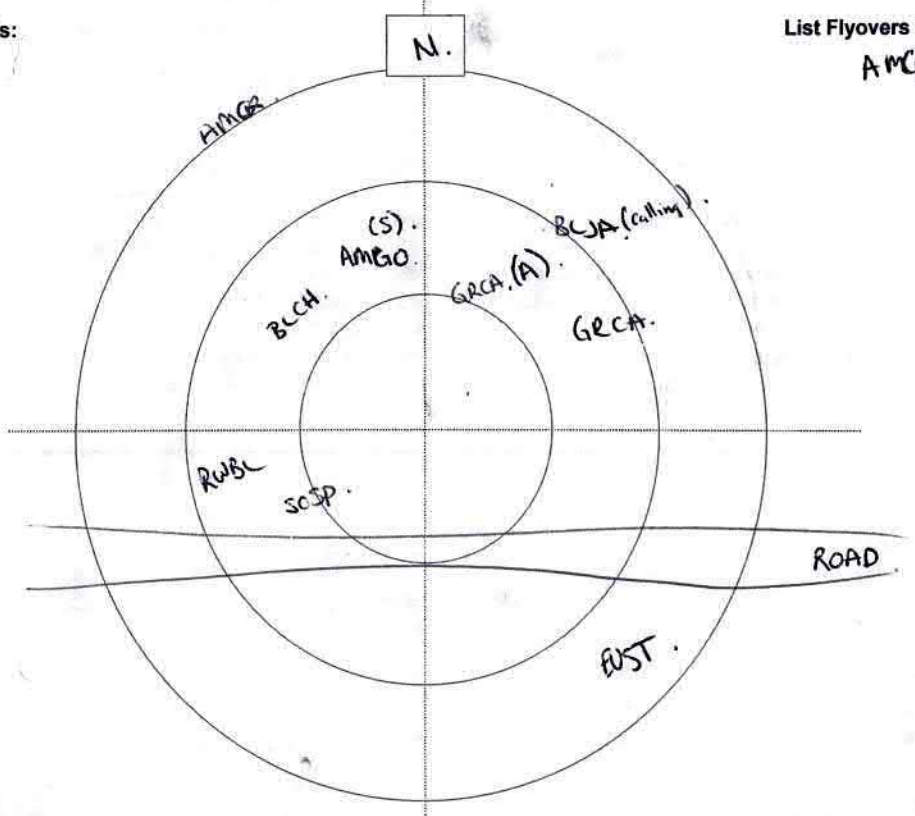
AECOM

Breeding Bird Survey Point Count

Site Details			
Project: 60637047	**Point ID:** BBS-07		**Round #:** 1
Survey Conditions			
Surveyors: H. Hughes M Reid		**Date:** May 31, 2021	
Temperature: 10°C	**Wind:** 0-1	**Cloud:** 15%	**Precipitation:** —
Start Time: 649.	**End Time:** 6:54.	**Easting:** 43.19711 **Northing:** 79.936559	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE): _____

Comments:

List Flyovers Below:
AMCR.



CLASSIFY HABITAT (within 100 m): THICKET Wet shrub.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

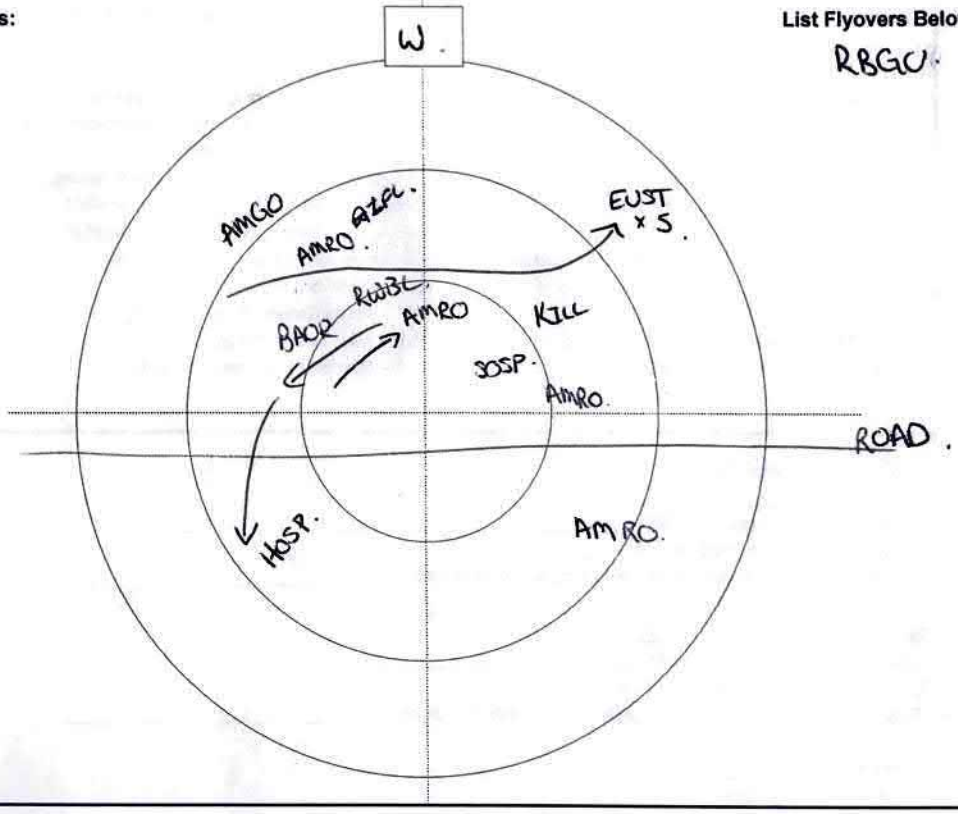
Site Details			
Project: 60637047	**Point ID:** BBS-08.		**Round #:** 1
Survey Conditions			
Surveyors: H. Hughes M Reid		**Date:** May 31, 2021	
Temperature: 11°C	**Wind:** 0-1	**Cloud:** 10%	**Precipitation:** /
Start Time: 7:04.	**End Time:** 7:09.	**Easting:** 43.187326 **Northing:** -79.937776	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE): _____

Comments:

NORO.

List Flyovers Below:

RBGO.



CLASSIFY HABITAT (within 100 m):

AG Field
Hedgerow
Residential Areas.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed

X – Species observed in its breeding season (no evidence of breeding).

Possible

H – Species observed in its breeding season in suitable nesting habitat.

S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable

P – Pair observed in their breeding season in suitable nesting habitat

T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.

D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.

V – Visiting probable nesting site

A – Agitated behaviour or anxiety calls of an adult

B – Brood patch on adult female or cloacal protuberance on adult male

N – Nest-building or excavation of nest hole.

Confirmed Breeding

DD – Distraction display or injury feigning

NU – Used nest or egg shell found (occupied or laid within the period of the study)

FY – Recently fledged young or downy young, including young incapable of sustained flight

AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.

FS – Adult carrying fecal sac

CF – Adults Carrying Food for Young

NE – Nest containing eggs.

NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details		
Project: 60637047	**Point ID:** BBS - 01	**Round #:** 2

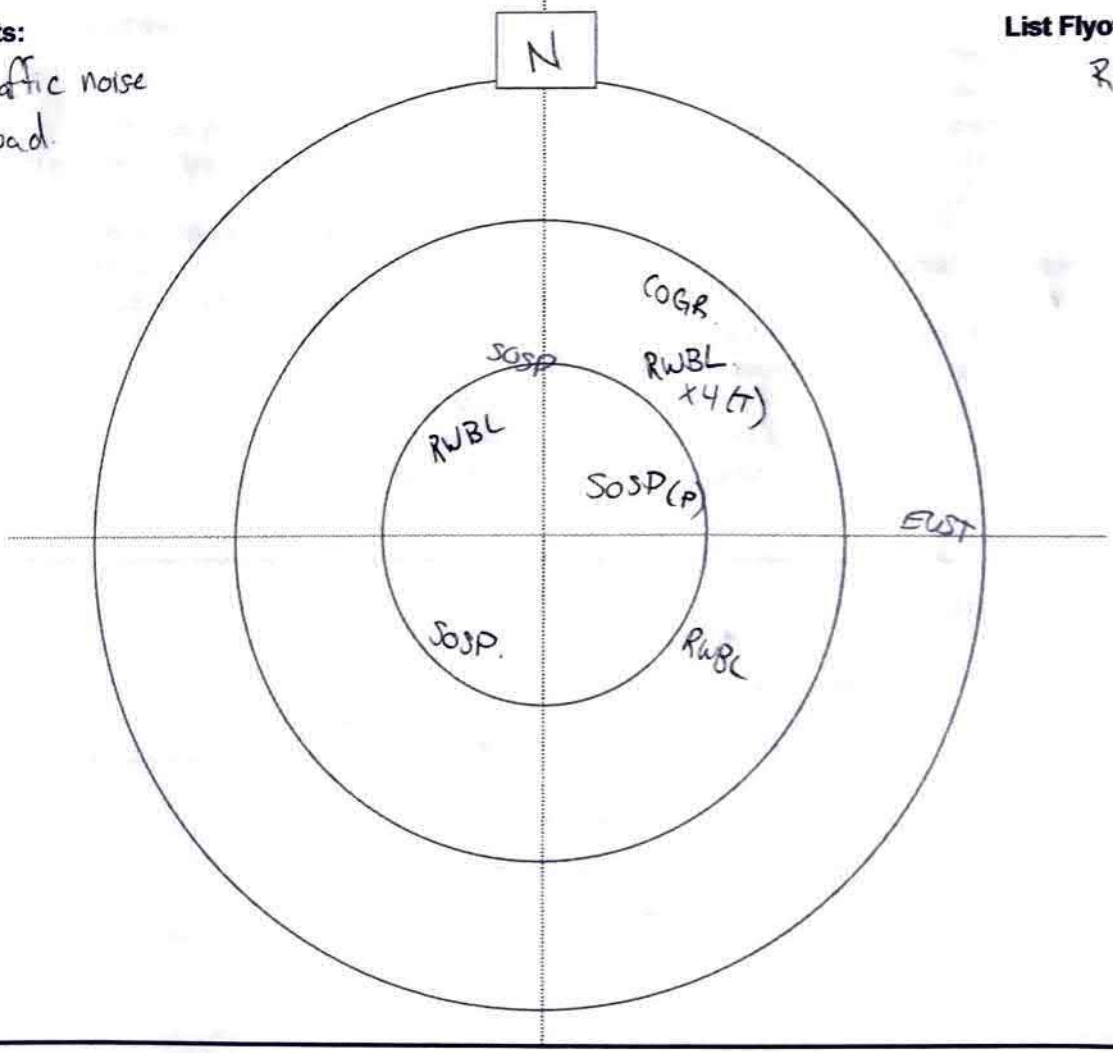
Survey Conditions			
Surveyors: H. Hughes / N. DeCarlo		**Date:** June 22nd	
Temperature: 11°C	**Wind:** 0	**Cloud:** 15%	**Precipitation:** 0
Start Time: 7:20.	**End Time:** 7:25	**Easting:** 43.209848 **Northing:** 79.929005	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☑ **Direction slope faces (Aspect)** (ex. NE): _____

Comments:

light traffic noise from road.

List Flyovers Below:

RBGU



CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

Project: 60637047	Point ID: BBS-02	Round #: 2.

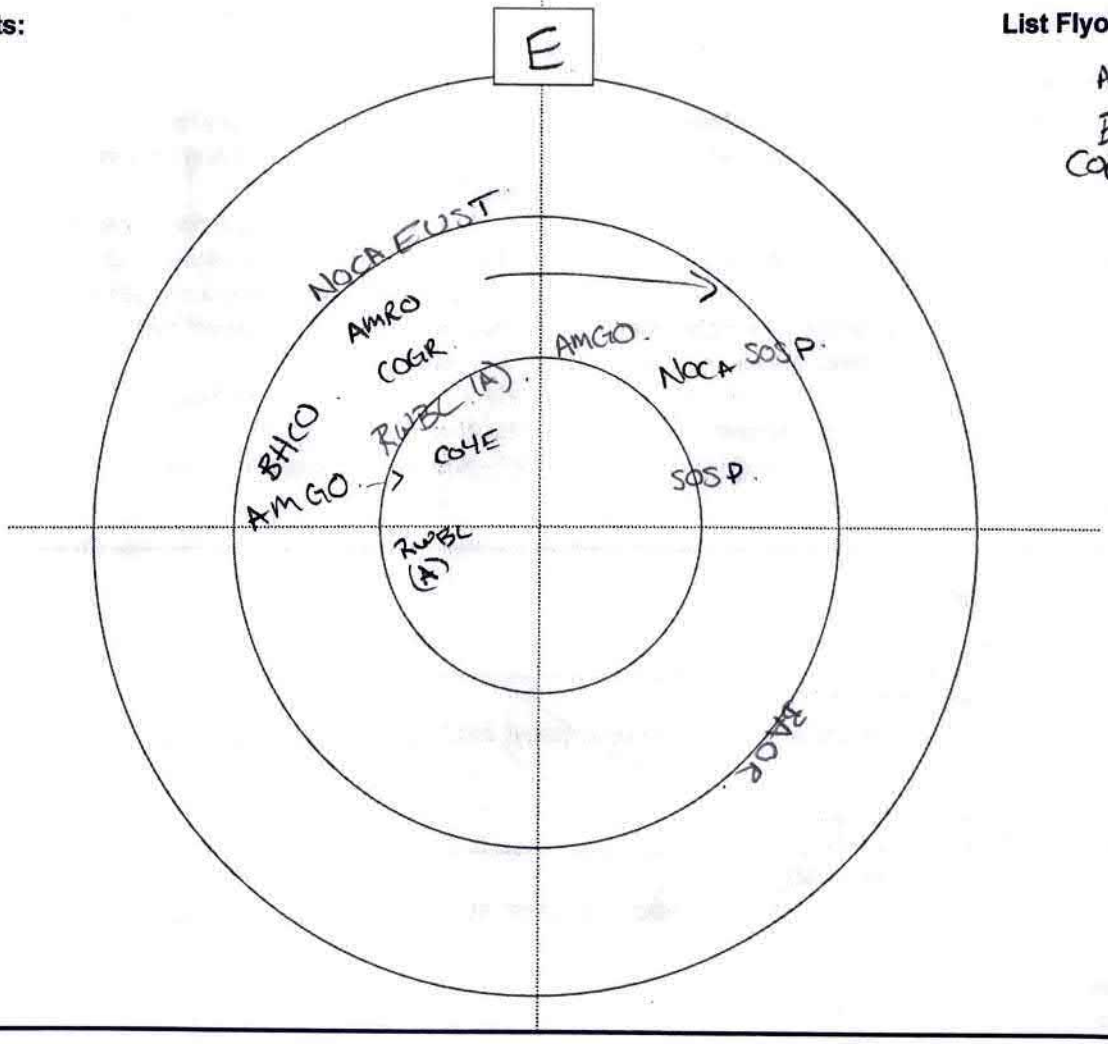
Survey Conditions

Surveyors: H. Hughes N De Carlo		Date: June 22, 2021	
Temperature: 11°C	Wind: 1-2	Cloud: 60%	Precipitation: 0
Start Time: 8:52.	End Time: 8:57.	Easting: 43.204295 Northing: -79.930019	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE): _____

Comments:

List Flyovers Below:

AMRO x 4.
EUST.
COGR x 4.



CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

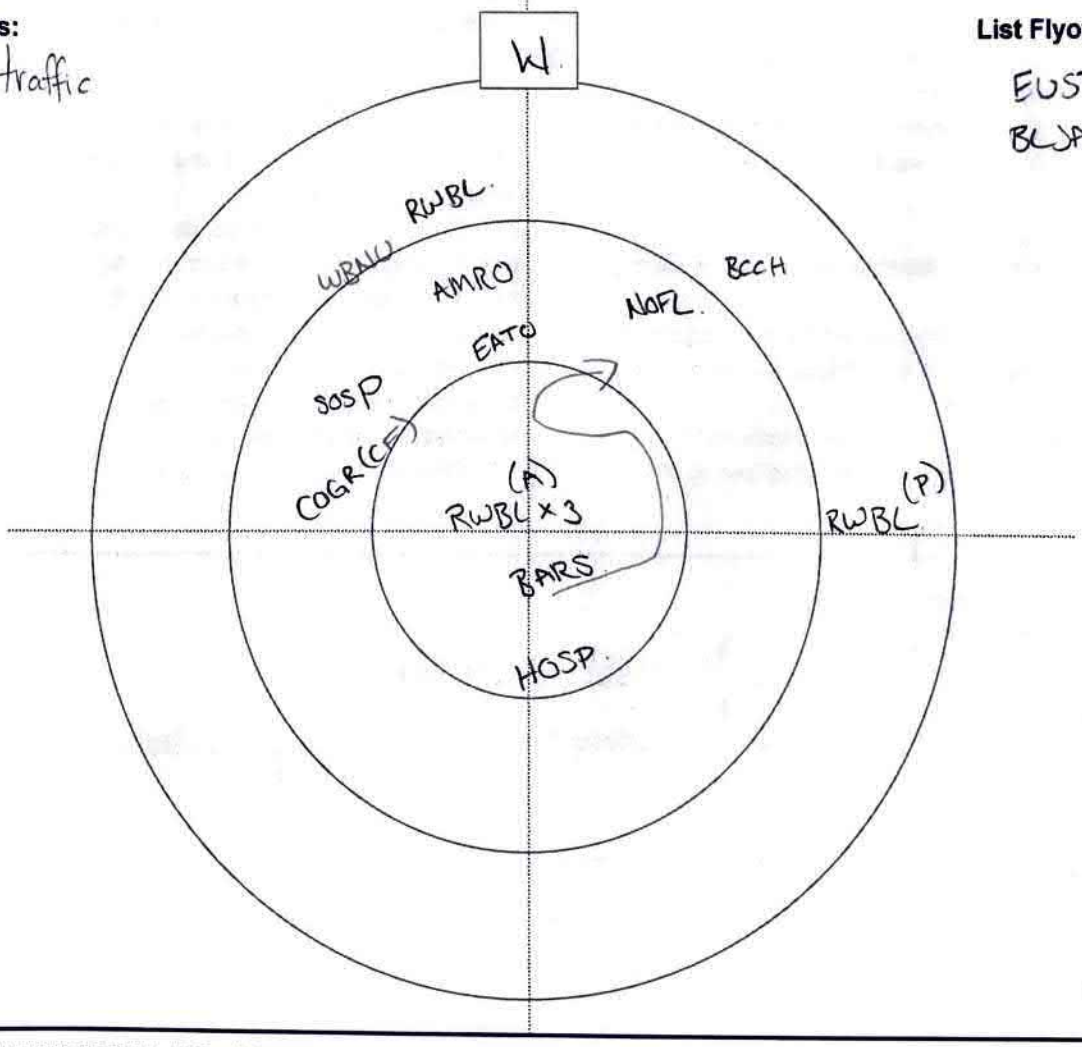
Project: 60637047	Point ID: BBS - 03	Round #: 2

Survey Conditions

Surveyors: H. Hughes N. DeCarlo		Date: June 22 2021	
Temperature: 10°C	**Wind:** 0-1	**Cloud:** 30%	**Precipitation:** 0
Start Time: 7:34.	**End Time:** 7:39.	**Easting:** 43.200929 **Northing:** -79.931730	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE):

Comments:
light traffic noise.

List Flyovers Below:
EUST.
BLJA



CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: Barn Swallow
Location of Observation (UTM): 43.200942, -79.931764
Observed in suitable Habitat (Y/N) Y
General Habitat Description (i.e. meadow, deciduous forest, etc.): foraging meadow.

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

Project: 60637047	Point ID: BBS-04	Round #: 2

Survey Conditions

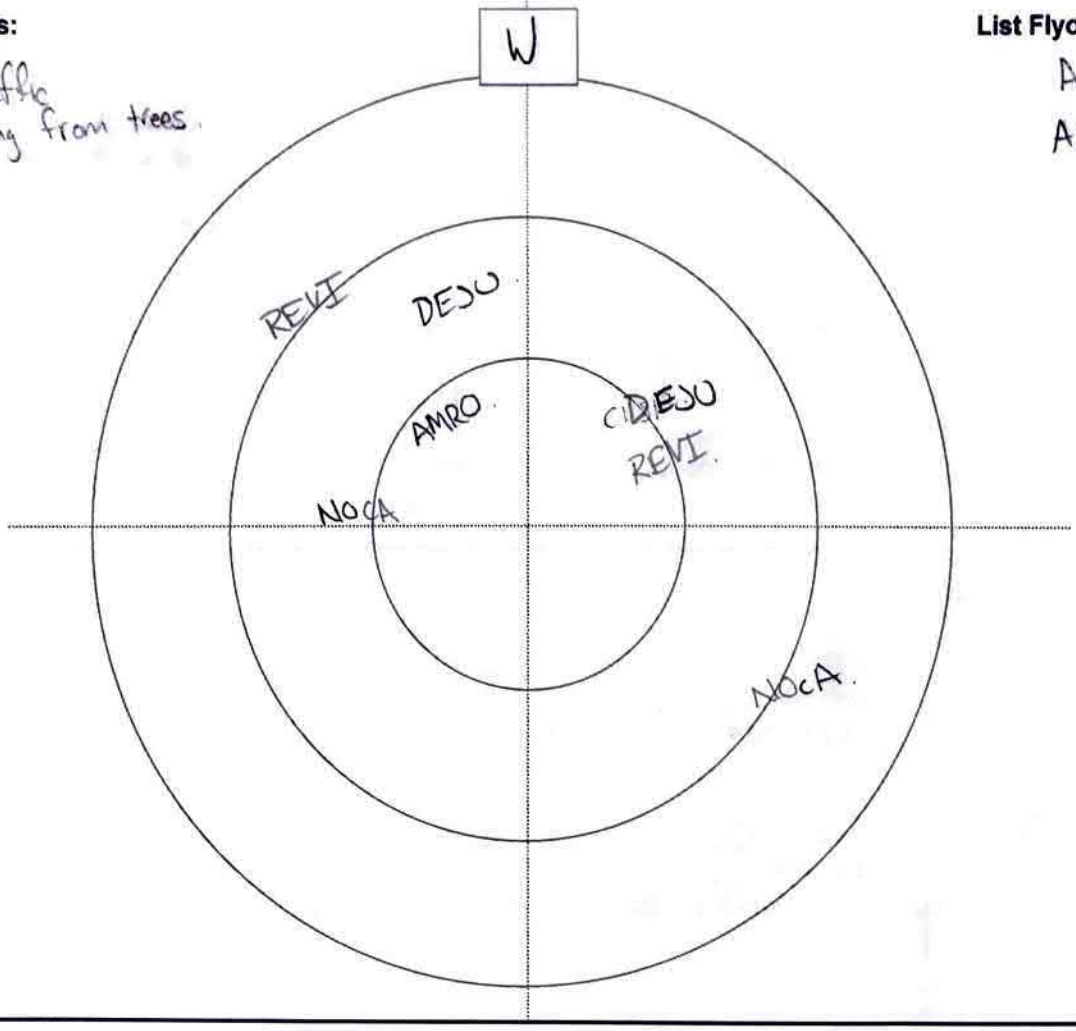
Surveyors: H. Hughes N. DeCarlo		Date: June 22, 2021	
Temperature: 11°C	Wind: 0-1	Cloud: 50%	Precipitation: 0
Start Time: 8:38	End Time: 8:44	43.194898 Easting: -79.934406 Northing:	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE):

Comments:

light traffic
Fras falling from trees.

List Flyovers Below:

AMCR
AMGO



CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

Project: 60637047.	Point ID: BBS-06	Round #: 2

Survey Conditions

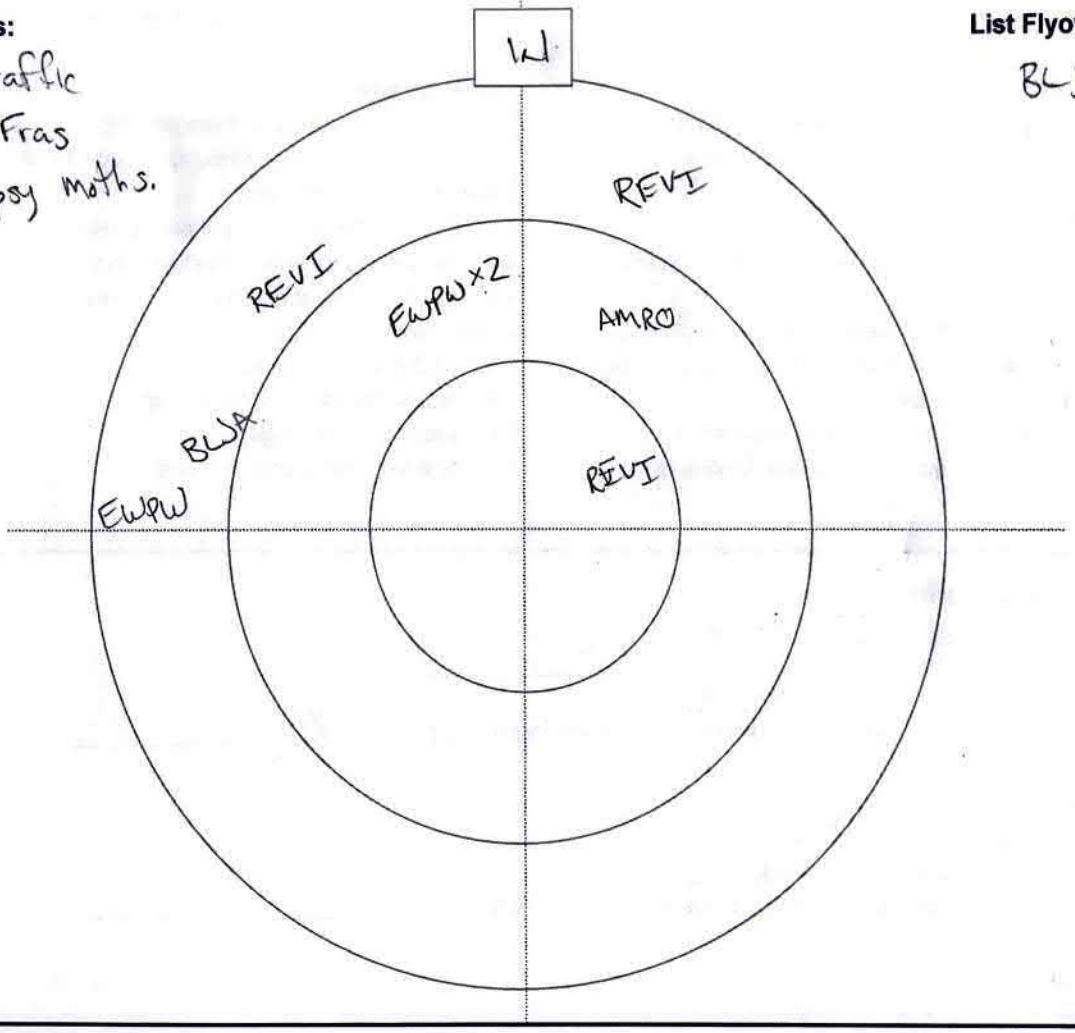
Surveyors: H. Hughes N DeCarlo		Date: June 22 2021	
Temperature: 10%	**Wind:** 0-1	**Cloud:** 30%	**Precipitation:** 0
Start Time: 7:49.	**End Time:** 7:54.	43.193457 N **Easting:** 79.935899 W **Northing:**	**Slope:** Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ **Direction slope faces (Aspect)** (ex. NE): _____

Comments:

Light traffic
+ falling Fras
from Gypsy Moths.

List Flyovers Below:

BLJA.



CLASSIFY HABITAT (within 100 m):

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
B – Brood patch on adult female or cloacal protuberance on adult male
N – Nest-building or excavation of nest hole.

Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: Eastern Wood Pewee
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) Y
General Habitat Description (i.e. meadow, deciduous forest, etc.): FOD

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) _____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N) _____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

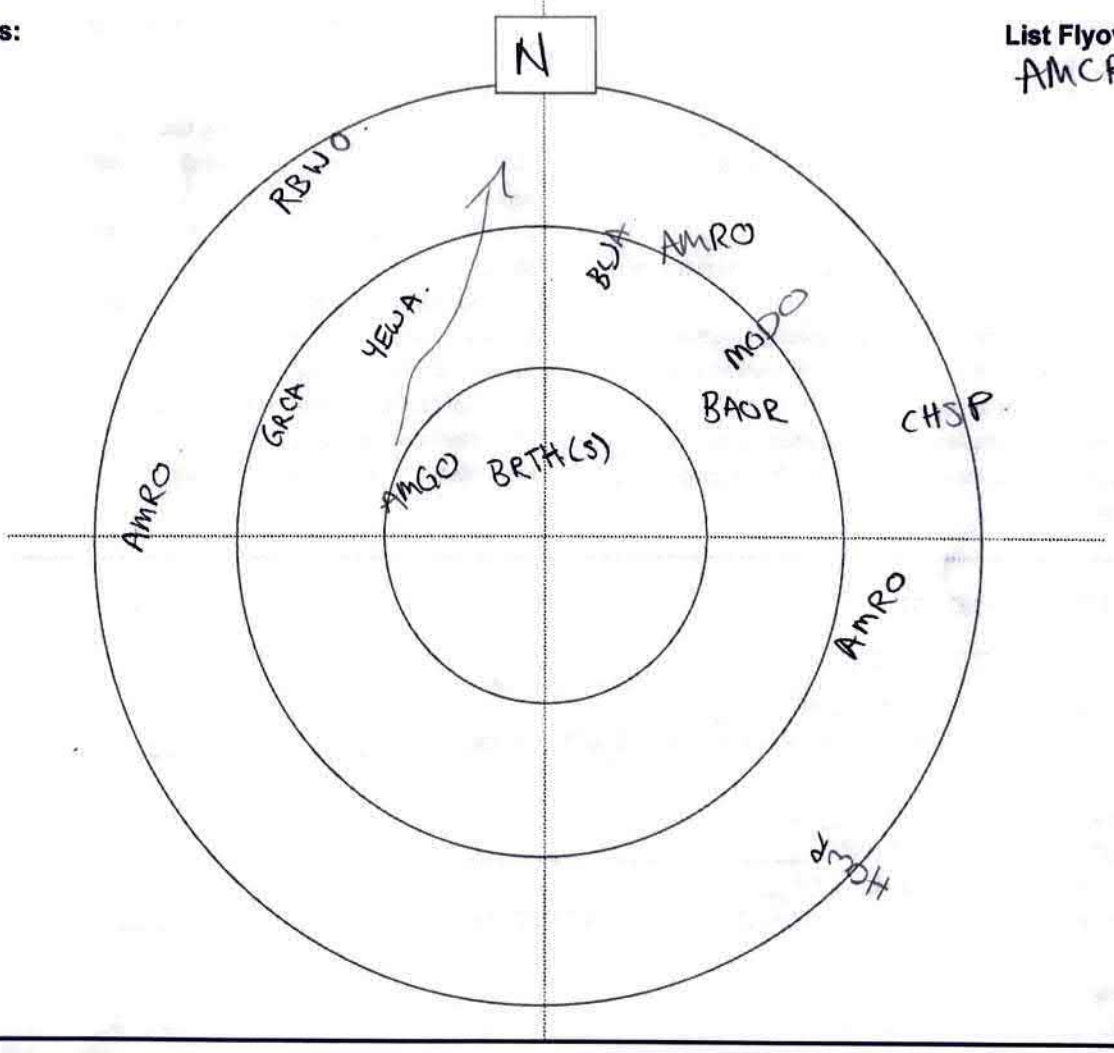
Project: 60637047	Point ID: BBS-07	Round #: 2

Survey Conditions

Surveyors: H. Hughes N. DeCarlo.		Date: June 22, 2021	
Temperature: 11°C	Wind: 0	Cloud: 10%	Precipitation: /
Start Time: 8:04.	End Time: 8:09.	Easting: 79.936559 Northing: 43.19711	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE): _____

Comments:

List Flyovers Below:
AMCR x4.



CLASSIFY HABITAT (within 100 m):

Thicket - wet thicket

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed

X – Species observed in its breeding season (no evidence of breeding).

Possible

H – Species observed in its breeding season in suitable nesting habitat.

S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable

P – Pair observed in their breeding season in suitable nesting habitat

T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.

D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.

V – Visiting probable nesting site

A – Agitated behaviour or anxiety calls of an adult

B – Brood patch on adult female or cloacal protuberance on adult male

N – Nest-building or excavation of nest hole.

Confirmed Breeding

DD – Distraction display or injury feigning

NU – Used nest or egg shell found (occupied or laid within the period of the study)

FY – Recently fledged young or downy young, including young incapable of sustained flight

AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.

FS – Adult carrying fecal sac

CF – Adults Carrying Food for Young

NE – Nest containing eggs.

NY – Nest with young seen or heard.

SAR Observations:

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____

Location of Observation (UTM): _____

Observed in suitable Habitat (Y/N)_____

General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

AECOM

Breeding Bird Survey Point Count

Site Details

Project: 60637047	Point ID: BBS-08	Round #: 2

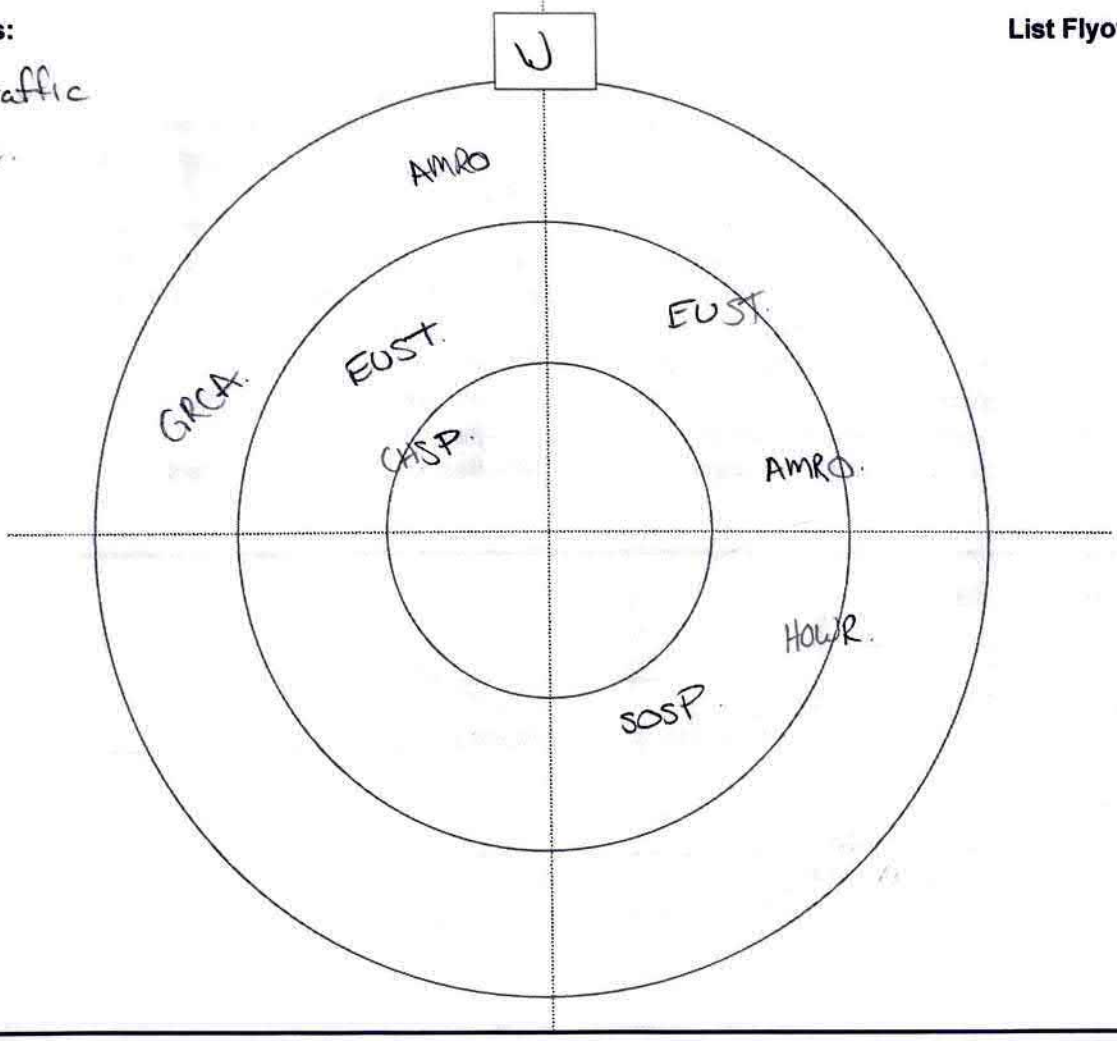
Survey Conditions

Surveyors: H. Hughes N. DeCarlo		Date: June 22, 2021	
Temperature: 11°C	Wind: 1-2	Cloud: 40%	Precipitation: 0
Start Time: 8:21	End Time: 8:25	Easting: 43.187326 Northing: -79.937776	Slope: Vertical ☐ Steep ☐ Gentle ☐ Flat ☒ Direction slope faces (Aspect) (ex. NE): _____

Comments:

light traffic noise.

List Flyovers Below:



CLASSIFY HABITAT (within 100 m):

Row crop + hedgerow.

Beaufort Wind Speed Codes:

Code	Wind Speed Km/h	Descriptive Term	Effects Observed on Land
0	Less than 1	Calm	Smoke rises vertically.
1	1 - 5	Light air	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	Moderate breeze	Raises dust and loose paper. Small branches are moved.
5	29 - 38	Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	Strong breeze	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.

Breeding Evidence Codes:

Observed
X – Species observed in its breeding season (no evidence of breeding).

Possible
H – Species observed in its breeding season in suitable nesting habitat.
S – Singing male present, or breeding calls hears, in its breeding season in suitable nesting habitat.

Probable
P – Pair observed in their breeding season in suitable nesting habitat
T – Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D – Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V – Visiting probable nesting site
A – Agitated behaviour or anxiety calls of an adult
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Confirmed Breeding
DD – Distraction display or injury feigning
NU – Used nest or egg shell found (occupied or laid within the period of the study)
FY – Recently fledged young or downy young, including young incapable of sustained flight
AE – Adults leaving or entering a nest site in circumstances indicating occupied nest.
FS – Adult carrying fecal sac
CF – Adults Carrying Food for Young
NE – Nest containing eggs.
NY – Nest with young seen or heard.

SAR Observations:

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

Species: _____
Location of Observation (UTM): _____
Observed in suitable Habitat (Y/N)_____
General Habitat Description (i.e. meadow, deciduous forest, etc.): _____

C.6 Reptile Encounter Surveys

Snake Search Form

AECOM

Project Name Lancaster Rd Date Aug 31/20 Visit # (1-5) 1 Temp (C) 15C - 21C Cloud Cover (%) 15%

Wind 2 Precipitation none

Field Staff Kasey McKenzie

Property / Location Searched	Habitat / Vegetation	Time Start	Time End	Species Observed	UTM	Notes
Parcel 17081039 (High school property by Garner Rd)	MAM/MAS/CUM	9 am	9:30am	none	—	—
Parcel 17082033 (N of Book Rd E)	FOD4-1	2:15pm	3:30pm	none	—	—
Parcel 17082033 SWT2/MAM2 (Not Book Rd E)	SWT2/MAM2	3:30pm	4:00pm	none	—	—

Additional Notes

Snake Search Form

AECOM

Project Name Wonderland Date October 6/2020 Visit # (1-5) 2 Temp (C) 3 → 18°C Cloud Cover (%) 50%
Wind 5 Precipitation none

Field Staff Kasey McKenzie + first nations monitor

Property / Location Searched	Habitat / Vegetation	Time Start	Time End	Species Observed	UTM	Notes
Parcel 170820033 FOD4-1 (N of Bookrd E)	FOD4-1 (Beech forest)	1:00pm	1:30pm	none	—	—
Parcel 170820033 SNT2/MAM2 (N of Bookrd E)	SNT2/MAM2 thicket/marsh	1:30pm	2:00pm	none	—	—
Parcel 170810039 (High School green space by Gamer Rd)	MAM/MAS/CUM narrow strip along watercourse	8:50am	9:30am	none	—	—

Additional Notes
partly cloudy + windy

Snake Search Form

AECOM

Project Name Glencastle Rd Date April 7/21 Visit # (1-5) 3 Temp (C) 8°c → 16°c Cloud Cover (%) 0%

Wind 3 Precipitation none

Field Staff Kasey McKenzie

Property / Location Searched	Habitat / Vegetation	Time Start	Time End	Species Observed	UTM	Notes
Parcel 17081039 (high school property by Garnet Rd)	MAM/MAS/CUM	9:00am	9:30am	none	—	—
Parcel 17082033 FOD4-1 (NOT Forced E)	FOD4-1	11:15am	12:15pm	none	—	—
Parcel 17082033 SWT2/MAM2 (NOT Forced E)	SWT2/MAM2	12:15pm	1:00pm	none	—	—

Additional Notes

perfect weather for snake basking (just slightly windy)

Snake Search Form

AECOM

Project Name:	Glancaster Rd	Field Staff:	Nataliya Simonova	Date:	20/05/2021
Temp (C):	17°C → 27°C	Cloud Cover (%):	100%	Wind Scale:	1
Precipitation:	None	% Canopy Cover:	5%	Visit # (1-5+):	4
Time Start:	8:25am	Time End:	11:25 am		

Property/Location Searched	Habitat/Vegetation	Time Start	Time End	Species Observed	UTM	Notes
Parcel 17081039 (High School Property off Garner Rd)	MAM/MAS/CUM	8:25am	9:30am	none	—	
Parcel 17082033 (N of Book Rd E)	FOD4-1	10:30am	11:00am	Garter Snake	43.826005/-79.935169	
Parcel 17080033 (N of Book Rd E)	SWT2/MAM2	11:00am	11:25am	none	—	

Notes:

Beaufort Wind Scale	0: 0-2 km/hr - calm	4: 20-30 km/hr -moderate breeze -small branch moves
	1: 3-5 km/hr - light air movement	5 : 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	6: 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Snake Search Form

AECOM

Project Name:	Glancaster	Distance to open canpoy (m)	
Slope (degree)		% Canopy Cover	
Surrounding Landuse Description:	Varried, agricultural, residential, meadow, thicket & Forest		
Temp (C):	11	Cloud Cover (%):	40%
Wind (from):	1-2	Precipitation:	None

Material Description:

Date (dd/mm/yyyy)	June 22, 2021 -visit 1/5			-visit 2			-visit 3		
Staff (full name)	H. Hughes, N. De Carlo.								
Snake Species	Length	Search Type	Distance	Length	Search Type	Distance	Length	Search Type	Distance
None Observed									
No Species Seen									

* Material Description includes material/composition/dimensions

* Search Type can include binoculars/observation/overturned rock and/or wood

* Distance of snake if search type with binoculars or observation

Beaufort Wind Scale	**0:** 0-2 km/hr - calm
	1: 3-5 km/hr - light air movement
	2: 6-11km/hr - slight breeze - can feel on face
	3: 12-19 km/hr- gentle breeze - leaves move on twigs
	4: 20-30 km/hr -moderate breeze -small branch moves
	5: 31-38 km/hr - fresh breeze - moderate branch moves
	6: 39-49 km/hr - strong breeze - large branch moves

Appendix D

Photographic Log

D.1 Aquatic Photo Log

AECOM

Photographic Log

Client Name:	Report Name	Project No.
City of Hamilton	Natural Environment Report	60637047

Photograph 1. ↑
WC-01. Upstream side of the crossing facing NW

Photograph 2. ↑
WC-01. Downstream of crossing facing SE

Photograph 3. ↑
WC-01. Upstream view of the watercourse. Riparian buffer between agricultural fields

Photograph 4. ↑
WC-01. Water present at culvert inlet pool

Photograph 5.
WC-02. Culvert inlet on west side of Glancaster road

Photograph 6.
WC-02. Culvert inlet west side of Glancaster Road. Erosion present on right bank

Photograph 7.
WC-02. Culvert outlet on east side of Glancaster Road

Photograph 8.
WC-03. Looking upstream of road crossing on west side of Glancaster Road.

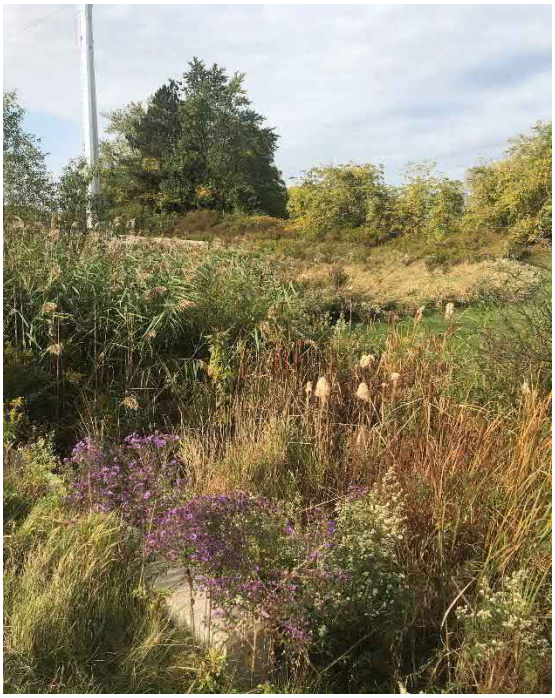
Photograph 9. ↑
WC-03. Slightly Perched Outlet.

Photograph 10. ↑
WC-03. Culvert Outlet

Photograph 11. ↑
WC-04. Looking upstream from downstream end. On east side of Glancaster Road.

Photograph 12. ↑
WC-04. Looking upstream from downstream end on west side of Glancaster Road.

Photograph 13. ↑
WC-05. Culvert Inlet



Photograph 14. ↑
WC-05. Riparian habitat on west side of Glancaster Road.

Photograph 15. ↑
WC-05. Water trickling out of culvert outlet.

Photograph 16. ↑
WC-05. Downstream of vegetated swale.

Photograph 17. ↑
WC-06. Looking upstream of road crossing.

Photograph 18. ↑
WC-06. Culvert inlet

Photograph 19. ↑
WC-06. Culvert outlet.

Photograph 20. ↑
WC-06. Looking downstream from culvert outlet.

Photograph 21.
WC-07. Feature is not visible from fence of neighbouring property due to dense vegetation. There was no permission to enter.

Photograph 22.
WC-08. Looking upstream at swale on west side of Glancaster Road.

Photograph 23.
WC-08. Looking upstream at roadside ditch.

Photograph 24.
WC-09. Looking upstream from culvert inlet on west side of Glancaster Road.

Photograph 25.
WC-09. Water present at culvert inlet

Photograph 26.
WC-09. Water present at culvert outlet.

Photograph 27.
WC-06. Downstream of culvert outlet facing downstream (east)

Photograph 28.
WC-09. Brook Stickleback caught and released at WC-09.

D.2 Terrestrial Photo Log

Photographic Log- Terrestrial

Client Name:	Report Name	Project No.
City of Hamilton	Natural Environment Report	60637047

Photograph 1. ↑
MAS2-1 Cattail Mineral Shallow Marsh

Photograph 2. ↑
MAS2-1 Cattail Mineral Shallow Marsh

Photograph 3. ↑
CUM1-1/CUT1 – Dry-Moist Old Field Meadow/ Mineral Cultural Thicket.

Photograph 4. ↑
CUM1-1/CUT1 – Dry-Moist Old Field Meadow/ Mineral Cultural Thicket.

Photograph 5. ↑
CUM1-1 - Dry-Moist Old Field Meadow

Photograph 6. ↑
FOD4-1 - Dry – Fresh Beech Deciduous Forest

Photograph 7. ↑
SWT2/MAM2-2 – Mineral Thicket Swamp with Reed Canary Grass Mineral Meadow Marsh

Photograph 8. ↑
SWT2/MAM2-2 – Mineral Thicket Swamp with Reed Canary Grass Mineral Meadow Marsh

Photograph 9. ↑
FOD2-2 - Dry – Fresh Oak – Hickory Deciduous Forest

Photograph 10. ↑
FOD2-2 - Dry – Fresh Oak – Hickory Deciduous Forest

Photograph 11. ↑
FOD2-2 - Dry – Fresh Oak – Hickory Deciduous Forest – understory vegetation.

Photograph 12. ↑
FOD2-2 - Dry – Fresh Oak – Hickory Deciduous Forest – pooling in understory.

Appendix E

Plant List

Appendix E. Plant List

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL RANK	ESA STATUS	COSEWIC STATUS (2020-04-21)	SARA STATUS (2020-04-21)	GLOBAL RANK	REGIONAL STATUS 7E - CAROLINIAN ZONE - 2017	LOCAL STATUS HAMILTON	INVASIVE SPECIES ONTARIO	CUM1-1	CUM1-1/ CUT1	CUM1-1/ MAM2	FOD2-2	FOD4-1	MAM2-2	MAS2-1	ROW	SWT2/ MAM2-2
Reference											Oldham 2017	Oldham 2017										
PTERIDOPHYTES		**FERNS & ALLIES**																				
Dryopteridaceae		**Wood Fern Family**																				
Dryopteris	*sp.*	Wood Fern species																x				
Dryopteris	*cristata*	Crested Wood Fern	7	-5		S5				G5	U	C					x	x				
Equisetaceae		**Horsetail Family**																				
Equisetum	*arvense*	Field Horsetail	0	0		S5				G5	C	C		x		x			x			
Equisetum	*variegatum*	Variegated Horsetail	5	-3		S5				G5	U	C								x		x
Onocleaceae		**Ostrich Fern Family**																				
Onoclea	*sensibilis*	Sensitive Fern	4	-3		S5				G5	C	C					x	x				x
GYMNOSPERMS		**CONIFERS**																				
Cupressaceae		**Cedar Family**																				
Thuja	*occidentalis*	Eastern White Cedar	4	-3		S5				G5	C	C						x				
Pinaceae		**Pine Family**																				
Picea	*abies*	Norway Spruce		5	-1	SE3				G5	IX	IR								x		
Picea	*glauca*	White Spruce	6	3		S5				G5	U	C		x								
Pinus	*strobus*	Eastern White Pine	4	3		S5				G5	C	C		x			x	x				x
DICOTYLEDONS		**DICOTS**																				
Adoxaceae		**Moschatel Family**																				
Sambucus	*sp.*	Elderberry species													x							
Viburnum	*opulus*	European Cranberrybush	5	-3	-1	S5				G5		I				x						
Viburnum	*opulus var. americanum*	American Cranberrybush	5	-3		S5				G5TNR	C	C										x
Anacardiaceae		**Sumac or Cashew Family**																				
Toxicodendron	*radicans var. radicans*	Eastern Poison-ivy	2	0		S5				G5T5	C	C						x				
Toxicodendron	*radicans var. rydbergii*	Western Poison-ivy	2	0		S5				G--T5	C	C					x	x				x
Rhus	*typhina*	Staghorn Sumac	1	3		S5				G5	C	C		x	x	x				x	x	x
Apiaceae		**Carrot or Parsley Family**																				
Angelica	*atropurpurea*	Purplestem Angelica	6	-5		S5				G5	C	U								x		
Cicuta	*virosa*	Mackenzie's Water-hemlock		-5		S4?				G5						x						
Daucus	*carota*	Wild Carrot		5	-2	SNA				GNR	IC	IC		x	x	x			x		x	x
Sium	*suave*	Water Parsnip	4	-5		S5				G5	C	C	3							x		
Apocynaceae		**Dogbane Family**																				
Asclepias	*syriaca*	Common Milkweed	0	5		S5				G5	C	C		x		x			x		x	
Asteraceae		**Composite or Aster Family**																				
Achillea	*millefolium*	Common Yarrow		3	-1	SE5?				G5	IX	IX		x		x				x	x	
Arctium	*minus*	Common Burdock		3	-2	SE5				GNR	IC	IC				x					x	
Symphyotrichum	*sp.*	Aster species												x	x	x		x	x			
Eurybia	*macrophylla*	Large-leaved Aster	5	5		S5				G5	C	C					x	x				
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5				G5	C	C		x	x	x	x		x		x	x
Symphyotrichum	*puniceum*	Purple-stemmed Aster				S5				G5	C	C						x				
Bidens	*sp.*	Beggar-ticks species														x						
Bidens	*frondosa*	Devil's Beggar-ticks	3	-3		S5				G5	C	C				x						
Centaurea	*jacea*	Brown Knapweed		5	-1	SE5				GNR		IX		x								
Cichorium	*intybus*	Chicory		5	-1	SE5				GNR	IC	IC		x	x							
Cirsium	*sp.*	Thistle species												x		x						
Cirsium	*arvense*	Canada Thistle		3	-1	SE5				G5	IC	IC	1	x		x			x			
Eupatorium	*perfoliatum*	Boneset	2	-3		S5				G5	C	C						x				
Euthamia	*graminifolia*	Grass-leaved Goldenrod	2	0		S5				G5	C	C				x				x		
Solidago	*sp.*	Goldenrod species												x	x	x	x	x	x		x	
Solidago	*altissima*	Tall Goldenrod	1	3		S5				G5	C	C		x		x				x		
Sonchus	*arvensis*	Field Sow-thistle				SE5				GNR	IC	IX		x	x							
Taraxacum	*officinale*	Common Dandelion		3	-2	SE5				G5	IC	IC		x	x	x			x	x	x	
Tussilago	*farfara*	Coltsfoot		3	-2	SE5				GNR	IC	IX		x	x	x				x		
Balsaminaceae		**Touch-me-not Family**																				
Impatiens	*capensis*	Jewelweed	4	-3		S5				G5	C	C		x		x	x	x	x	x		x
Berberidaceae		**Barberry Family**																				
Podophyllum	*peltatum*	May-apple	5	3		S5				G5	C	C					x	x				

Appendix E. Plant List

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL RANK	ESA STATUS	COSEWIC STATUS (2020-04-21)	SARA STATUS (2020-04-21)	GLOBAL RANK	REGIONAL STATUS 7E - CAROLINIAN ZONE - 2017	LOCAL STATUS HAMILTON	INVASIVE SPECIES ONTARIO	CUM1-1	CUM1-1/ CUT1	CUM1-1/ MAM2	FOD2-2	FOD4-1	MAM2-2	MAS2-1	ROW	SWT2/ MAM2-2
Betulaceae		**Birch Family**																				
Ostrya	*virginiana*	Ironwood	4	4		S5				G5	C	C					x	x				
Boraginaceae		**Borage Family**																				
Myosotis	*scorpioides*	True Forget-me-not		-5	-1	SE5				G5	IX	IX	4				x					
Brassicaceae		**Mustard Family**																				
Alliaria	*petiolata*	Garlic Mustard		0	-3	SE5				GNR	IC	IC	1	x		x	x	x	x	x		x
Barbarea	*vulgaris*	Garden Yellowrocket		0	-1	SE5				GNR	IC	IX	3	x	x	x	x	x	x	x		x
Caprifoliaceae		**Honeysuckle Family**																				
Lonicera	*tatarica*	Tartarian Honeysuckle		3	-3	SE5				GNR	IC	IX	1		x	x	x	x	x	x	x	x
Celastraceae		**Staff-tree Family**																				
Euonymus	*obovatus*	Running Strawberry-bush	6	5		S4				G5	C	C					x	x				x
Cornaceae		**Dogwood Family**																				
Cornus	*racemosa*	Gray Dogwood	2	-2		S5				G5	C	C		x	x	x	x	x	x	x	x	x
Cornus	*rugosa*	Round-leaved Dogwood	6	5		S5				G5	C	C										x
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5				G5	C	C		x	x	x		x	x		x	x
Dipsacaceae		**Teasel Family**																				
Dipsacus	*fullonum*	Fuller's Teasel		5	-1	SE5				GNR	IC	IX	3	x	x	x			x	x	x	
Fabaceae		**Pea Family**																				
Lotus	*corniculatus*	Bird's-foot Trefoil		1	-2	SE5				GNR	IC	IC	2	x								
Vicia	*cracca*	Cow Vetch		5	-1	SE5				GNR	IX	IC	2			x					x	
Fagaceae		**Beech Family**																				
Fagus	*grandifolia*	American Beech	6	3		S4				G5	C	C					x	x				
Quercus	*rubra*	Red Oak	6	3		S5				G5	C	C		x	x		x	x			x	
Geraniaceae		**Geranium Family**																				
Geranium	*maculatum*	Spotted Geranium	6	3		S5				G5	C	C					x	x				
Geranium	*robertianum*	Herb-robert		5	-2	S5				G5	C	C		x			x	x				
Grossulariaceae		**Currant Family**																				
Ribes	*sp.*	Currant species														x	x	x				
Ribes	*americanum*	American Black Currant	4	-3		S5				G5	C	C								x		x
Ribes	*rubrum*	Red Currant		5	-2	SE5				G4G5	IX	IX					x					
Hydrophyllaceae		**Water-leaf Family**																				
Hydrophyllum	*virginianum*	Virginia Water-leaf	6	-2		S5				G5	C	C					x	x				
Juglandaceae		**Walnut Family**																				
Carya	*cordiformis*	Bitternut Hickory	6	0		S5				G5	C	C						x				
Carya	*ovata*	Shagbark Hickory	6	3		S5				G5	C	C			x		x	x				
Juglans	*cinerea*	Butternut	6	2		S2?	END	END	END	G3	U	C					x	x				
Juglans	*nigra*	Black Walnut	5	3		S4?				G5	C	C				x	x	x	x	x		
Lamiaceae		**Mint Family**																				
Ajuga	*reptans*	Common Bugle		5	-1	SE2				GNR	IR		4				x					
Glechoma	*hederacea*	Ground Ivy		5	-2	SE5				GNR	IC	IC	4				x					x
Mentha	*aquatica*	Water Mint				SE1				GNR	IR					x				x		
Monarda	*fistulosa*	Wild Bergamot				S5				G5	C	C										x
Lythraceae		**Loosestrife Family**																				
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5				G5	IC	IC	1	x	x	x			x	x		x
Malvaceae		**Mallow Family**																				
Tilia	*americana*	American Basswood	4	3		S5				G5	C	C			x		x	x				
Oleaceae		**Olive Family**																				
Fraxinus	*americana*	White Ash	4	3		S4				G5	C	C			x		x	x				x
Ligustrum	*vulgare*	European Privet		1	-2	SE5				GNR	IX	IX	4				x	x				x
Onagraceae		**Evening-primrose Family**																				
Circaea	*canadensis*	Canada Enchanter's Nightshade	3	3		S5				G5	C	C						x				
Orobanchaceae		**Broom-rape Family**																				
Epifagus	*virginiana*	Beechdrops	6	5		S5				G5	C	C						x				
Oxalidaceae		**Wood Sorrel Family**																				
Oxalis	*stricta*	Common Yellow Oxalis	0	3		S5				G5	C	C					x	x				x
Papaveraceae		**Poppy Family**																				
Sanguinaria	*canadensis*	Bloodroot	5	4		S5				G5	C	C					x					
Plantaginaceae		**Plantain Family**																				

Appendix E. Plant List

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL RANK	ESA STATUS	COSEWIC STATUS (2020-04-21)	SARA STATUS (2020-04-21)	GLOBAL RANK	REGIONAL STATUS 7E - CAROLINIAN ZONE - 2017	LOCAL STATUS HAMILTON	INVASIVE SPECIES ONTARIO	CUM1-1	CUM1-1/ CUT1	CUM1-1/ MAM2	FOD2-2	FOD4-1	MAM2-2	MAS2-1	ROW	SWT2/ MAM2-2
Linaria	*vulgaris*	Butter-and-eggs		5	-1	SE5				GNR	IC	IC	4	x								
Veronica	*anagallis-aquatica*	Water Speedwell		-5	-1	SE				G5	IX	IX								x		
Polygonaceae		**Smartweed Family**																				
Persicaria	*virginiana*	Virginia Knotweed	6	0		S4				G5	C	C						x				
Rumex	*crispus*	Curly-leaf Dock		-1	-2	SE5				GNR	IC	IX			x	x						
Primulaceae		**Primrose Family**																				
Lysimachia	*nummularia*	Creeping Jenny		-4	-3	SE5				GNR	IC	IX	2				x					x
Ranunculaceae		**Buttercup Family**																				
Actaea	*pachypoda*	White Baneberry	6	5		S5				G5	C	C					x	x				
Ranunculus	*abortivus*	Littleleaf Buttercup	2	-2		S5				G5	C	C					x					
Rhamnaceae		**Buckthorn Family**																				
Rhamnus	*cathartica*	Common Buckthorn		3	-3	SE5				GNR	IC	IC	1		x	x	x	x			x	x
Rosaceae		**Rose Family**																				
Agrimonia	*sp.*	Agrimony species																x				
Agrimonia	*gryposepala*	Tall Hairy Agrimony	2	2		S5				G5	C	C										x
Crataegus	*sp.*	Hawthorn species	4	5											x		x					
Crataegus	*monogyna*	English Hawthorn		5	-1	SE4				G5	IU	IX	3		x							
Crataegus	*punctata*	Dotted Hawthorn	4	5		S5				G5	C	C					x	x				x
Fragaria	*vesca*	Woodland Strawberry				S5				G5	U	C					x	x				
Fragaria	*virginiana*	Wild Strawberry	2	1		S5				G5	C	C		x	x	x		x	x			
Geum	*sp.*	Avens species														x		x			x	
Geum	*aleppicum*	Yellow Avens	2	-1		S5				G5	C	C					x	x				
Physocarpus	*opulifolius*	Ninebark	5	-2		S5				G5	U	C			x		x	x		x		x
Potentilla	*recta*	Rough-fruited Cinquefoil		5	-2	SE5				GNR	IC	IX					x					
Potentilla	*simplex*	Old-field Cinquefoil	3	4		S5				G5	C	C						x				
Prunus	*sp.*	Cherry species														x	x					
Prunus	*serotina*	Black Cherry	3	3		S5				G5	C	C		x			x	x				
Prunus	*virginiana*	Choke Cherry	2	1		S5				G5	C	C		x	x		x	x				
Rosa	*sp.*	Rose species													x	x		x				x
Rosa	*multiflora*	Multiflora Rose		3	-3	SE5				GNR	IC	IC	1					x				
Rubus	*allegheniensis*	Common Blackberry	2	2		S5				G5	C	C						x				x
Rubus	*idaeus*	American Red Raspberry	0	-2		S5				G5		I						x				
Rubus	*occidentalis*	Black Raspberry	2	5		S5				G5	C	C				x		x				
Rubiaceae		**Madder Family**																				
Galium	*mollugo*	Smooth Bedstraw		5	-2	SE5				GNR	IU	IX	2					x				
Galium	*odoratum*	Sweet-scented Bedstraw				SE1				GNR	IR	IR					x					
Salicaceae		**Willow Family**																				
Populus	*balsamifera*	Balsam Poplar	4	-3		S5				G5	U	C			x							
Populus	*tremuloides*	Trembling Aspen	2	0		S5				G5	C	C		x			x	x				x
Salix	*sp.*	Willow species														x			x	x		x
Salix	*discolor*	Pussy Willow	3	-3		S5				G5	C	C								x		
Salix	*exigua*	Narrow-leaf Willow	3	-5		S5				GNR	C	C										x
Salix X	*rubens*	Hybrid Crack Willow		-4	-3	hyb				HYB	hyb	hyb				x				x		
Sapindaceae		**Soapberry Family**																				
Acer	*negundo*	Manitoba Maple	0	0		S5				G5	C	C	1	x								
Acer	*saccharum*	Sugar Maple	4	3		S5				G5	C	C					x	x				
Solanaceae		**Nightshade Family**																				
Solanum	*dulcamara*	Bittersweet Nightshade		0	-2	SE5				GNR	IC	IC	3			x				x		
Ulmaceae		**Elm Family**																				
Ulmus	*americana*	American Elm	3	-2		S5				G4	C	C					x	x				x
Urticaceae		**Nettle Family**																				
Urtica	*dioica ssp. dioica*	Stinging Nettle		-1	-1	SE2				G5T5?	IR	IX	3					x				
Verbenaceae		**Vervain Family**																				
Verbena	*hastata*	Blue Vervain	4	-4		S5				G5	C	C				x						
Vitaceae		**Grape Family**																				
Parthenocissus	*quinquefolia*	Virginia Creeper	6	1		S4?				G5	U	C				x	x	x				x
Vitis	*riparia*	Riverbank Grape	0	-2		S5				G5	C	C		x	x	x	x	x	x	x	x	x
MONOCOTYLEDONS		**MONOCOTS**																				

Appendix E. Plant List

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL RANK	ESA STATUS	COSEWIC STATUS (2020-04-21)	SARA STATUS (2020-04-21)	GLOBAL RANK	REGIONAL STATUS 7E - CAROLINIAN ZONE - 2017	LOCAL STATUS HAMILTON	INVASIVE SPECIES ONTARIO	CUM1-1	CUM1-1/ CUT1	CUM1-1/ MAM2	FOD2-2	FOD4-1	MAM2-2	MAS2-1	ROW	SWT2/ MAM2-2
Asparagaceae		**Asparagus Family**																				
Asparagus	*officinalis*	Garden Asparagus		3	-1	SE5				G5?	IC	IX										x
Convallaria	*majalis*	European Lily-of-the-valley		5	-2	SE5				G5	IX	IX	3			x			x			
Maianthemum	*canadense*	Canada Mayflower	5	0		S5				G5	C	C					x	x				
Maianthemum	*racemosum*	Large False Solomon's Seal	4	3		S5				G5	C	C					x	x				
Araceae		**Arum Family**																				
Arisaema	*triphyllum*	Jack-in-the-pulpit	5	-2		S5				G5	C	C					x	x				
Symplocarpus	*foetidus*	Skunk Cabbage	7	-5		S5				G5	C	C								x		
Cyperaceae		**Sedge Family**																				
Carex	*sp.*	Sedge species														x		x				x
Carex	*albursina*	White Bear Sedge	7	5		S5				G5	C	C					x	x				
Carex	*arctata*	Drooping Wood Sedge	5	5		S5				G5	C	C					x	x				
Carex	*interior*	Inland Sedge	6	-5		S5				G5	C	U					x	x				
Carex	*pensylvanica*	Pennsylvania Sedge	5	5		S5				G5	C	C					x	x				
Carex	*stipata*	Awl-fruited Sedge	3	-5		S5				G5	C	C										x
Carex	*stricta*	Tussock Sedge	4	-5		S5				G5	C	C										x
Carex	*vulpinoidea*	Fox Sedge	3	-5		S5				G5	C	C										x
Schoenoplectus	*sp.*	Bulrush species														x						x
Scirpus	*cyperinus*	Wool-grass	4	-5		S5				G5	C	C										x
Dioscoreaceae		**Yam Family**																				
Dioscorea	*villosa*	Wild Yam	7	1		S4				G4G5	C	C					x					
Iridaceae		**Iris Family**																				
Iris	*versicolor*	Harlequin Blue-flag	5	-5		S5				G5	C	C				x	x		x			
Juncaceae		**Rush Family**																				
Juncus	*sp.*	Rush species														x						x
Luzula	*acuminata*	Hairy Woodrush	6	1		S5				G5	C	C					x					
Liliaceae		**Lily Family**																				
Erythronium	*americanum*	Yellow Trout-lily	5	5		S5				G5	C	C					x	x				
Lilium	*sp.*	Lily species														x						
Melanthiaceae		**Bunchflower Family**																				
Trillium	*grandiflorum*	White Trillium	5	5		S5				G5	C	C					x	x				
Poaceae		**Grass Family**																				
Bromus	*inermis*	Smooth Brome		5	-3	SE5				G5	IC	IC	4	x	x	x			x	x	x	
Dactylis	*glomerata*	Orchard Grass		3	-1	SE5				GNR	IC	IC	3	x	x	x			x		x	
Glyceria	*striata*	Fowl Manna Grass	3	-5		S5				G5	C	C				x						x
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5				G5	C	C		x	x	x			x	x	x	x
Phragmites	*australis*	Common Reed	0	-4		S4?				G5		C	1	x	x	x			x	x	x	
Poa	*sp.*	Blue Grass species												x	x	x						
Poa	*pratensis ssp. pratensis*	Kentucky Blue Grass	0	1		SE5				G5T5	IC	IC	2	x	x	x			x	x	x	
Smilacaceae		**Catbrier Family**																				
Smilax	*sp.*	Greenbrier species															x					
Typhaceae		**Cattail Family**																				
Typha	*angustifolia*	Narrow-leaved Cattail	3	-5		SE5				G5	IC	IX		x		x			x	x	x	x
Typha	*latifolia*	Broad-leaved Cattail	3	-5		S5				G5	C	C				x			x	x		x

Appendix E. Plant List

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

FLORISTIC SUMMARY & ASSESSMENT		CUM1-1	CUM1-1/ CUT1	CUM1-1/ MAM2	FOD2-2	FOD4-1	MAM2-2	MAS2-1	ROW	SWT2/ MAM2-2
Species Diversity										
Total Species:		**42**	**36**	**59**	**65**	**72**	**29**	**34**	**23**	**48**
Native Species:		**21**	**17**	**25**	**48**	**55**	**15**	**19**	**11**	**33**
		50.0%	**47.2%**	**42.4%**	**73.8%**	**76.4%**	**51.7%**	**55.9%**	**47.8%**	**68.8%**
Exotic Species		**17**	**14**	**21**	**13**	**9**	**11**	**14**	**10**	**10**
		40.5%	**38.9%**	**35.6%**	**20.0%**	**12.5%**	**37.9%**	**41.2%**	**43.5%**	**20.8%**
Total Taxa in Region (List Region, Source)		1000	1000	1000	1000	1000	1000	1000	1000	1000
% Regional Taxa Recorded		4.2%	3.6%	5.9%	6.5%	7.2%	2.9%	3.4%	2.3%	4.8%
Regionally Significant Species		0	0	0	0	0	0	0	0	0
S1-S3 Species		0	0	0	0	0	0	0	0	0
S4 Species		0	1	0	4	4	0	0	0	2
S5 Species		19	13	19	41	49	11	15	8	29
Co-efficient of Conservatism and Floral Quality Index										
Co-efficient of Conservatism (CC) (average)		**1.90**	**2.59**	**2.29**	**4.40**	**4.08**	**1.87**	**2.89**	**1.45**	**3.16**
CC 0 to 3	lowest sensitivity	17	10	18	11	18	12	11	10	18
		40.5%	27.8%	30.5%	16.9%	25.0%	41.4%	32.4%	43.5%	37.5%
CC 4 to 6	moderate sensitivity	4	7	6	33	33	3	7	1	14
		9.5%	19.4%	10.2%	50.8%	45.8%	10.3%	20.6%	4.3%	29.2%
CC 7 to 8	high sensitivity	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CC 9 to 10	highest sensitivity	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Floral Quality Index (FQI)		6.32	6.63	7.57	14.54	14.97	5.29	7.42	4.00	10.21
Presence of Weedy & Invasive Species										
mean weediness		**-1.69**	**-1.92**	**-1.95**	**-2.08**	**-2.22**	**-2.00**	**-2.00**	**-1.90**	**-2.30**
weediness = -1	low potential invasiveness	8	5	7	3	2	4	5	4	2
		19.0%	13.9%	11.9%	4.6%	2.8%	13.8%	14.7%	17.4%	4.2%
weediness = -2	moderate potential invasiveness	5	4	7	5	3	3	3	3	3
		11.9%	11.1%	11.9%	7.7%	4.2%	10.3%	8.8%	13.0%	6.3%
weediness = -3	high potential invasiveness	3	4	6	4	4	4	5	3	5
		7.1%	11.1%	10.2%	6.2%	5.6%	13.8%	14.7%	13.0%	10.4%
Presence of Wetland Species										
average wetness value		**1.24**	**1.13**	**0.11**	**1.47**	**1.47**	**0.04**	**-0.88**	**1.29**	**-0.71**
upland		8	6	7	15	13	5	3	5	5
		19.0%	16.7%	11.9%	23.1%	18.1%	17.2%	8.8%	21.7%	10.4%
facultative upland		11	10	11	18	21	5	7	8	9
		26.2%	27.8%	18.6%	27.7%	29.2%	17.2%	20.6%	34.8%	18.8%
facultative		9	5	9	11	14	5	5	1	6
		21.4%	13.9%	15.3%	16.9%	19.4%	17.2%	14.7%	4.3%	12.5%
facultative wetland		7	8	11	11	12	7	10	6	13
		16.7%	22.2%	18.6%	16.9%	16.7%	24.1%	29.4%	26.1%	27.1%
obligate wetland		2	1	6	4	2	4	7	1	9
		4.8%	2.8%	10.2%	6.2%	2.8%	13.8%	20.6%	4.3%	18.8%

EXPLANATION OF TERMINOLOGY *(See the following pages for addition detailed information on terms.)*
Botanical and Common Name: From Newmaster et. al, 1998. Species requiring confirmation noted (cf).
Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based 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 of 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.

DETAILED EXPLANATION OF TERMS

Floral Quality Index and Coefficient of Conservatism Values
Vegetation species and community sensitivity was assessed through the application of coefficient of conservatism values (CC), assigned to each native species in southern Ontario (Oldham, et. al, 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to specific habitat integrity. The occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs.

General habitat values associated with the CC values are:
0-3: species found in a wide variety of communities, including disturbed sites
4-6: species associated with a specific community, but tolerate moderate disturbance
7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances
9-10: species with a high degree of fidelity to a narrow range of synecological parameters

The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. The following provides an example of interpretation of CC values:
mean CC value / % spp CC >8 / Condition of the Landscape
5 / 27 / intact
3.5 / 19 / slightly degraded
1.3 / 2 / severely degraded

The FQI accounts for the species diversity of the area by equating the number of native species with the mean CC value. The FQI is generally used for comparing natural areas. The CC value and FQI of the study area were calculated for the entire study area.

Weediness Index
The sensitivity of natural areas can be assessed through application of the Weediness Index. The Weediness Index quantifies the potential invasiveness of non-native plants, and, in combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1- to -3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:
-1: little or no impact on natural areas (most non-native plants are in this category)
-2: occasional impacts on natural areas, generally infrequent or localized
-3: major potential impacts on natural areas

Wetness Index
All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish & Wildlife Service. Plants are designated into the following categories:
OBL (Obligate Wetland): occurs almost always in wetlands under natural conditions (estimated >99% probability)
FACW (Facultative Wetland): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)
FAC (Facultative): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)
FACU (Facultative Upland): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)
UPL (Upland): occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a "+" or "-" to express exaggerated tendencies for those species. The "+" denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

OBL : -5
FACW+: -4
FACW: -3
FACW-: -2
FAC+: -1

Provincial Status

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:
S1: Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province
S2: Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province
S3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation
S4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5:Secure—Common, widespread, and abundant in the nation or state/province
SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences
SNR Unranked—Nation or state/province conservation status not yet assessed
SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered
SNA Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
SU: Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends
Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.
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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

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Appendix F

Breeding Bird Survey Results

Appendix F: Breeding Bird Survey Results 2021

Common Name	Scientific Name	S-Rank[1]	Hamilton Abundance Codes[2]	MBCA Protected (Yes/No)[3]	SARA Status[4]	ESA Status[5]	BBS-01		BBS-02		BBS-03		BBS-04		BBS-06		BBS-07		BBS-08	
							Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2
Bitterns, Herons & Allies (ARDEIDAE)																				
Great Blue Heron	*Ardea herodias*	S4	N, U	Yes	-	-			FO											
Ducks, Geese, & Swans (ANATIDAE)																				
Canada Goose	*Branta canadensis*	S5	N, C	Yes	-	-			FO											
Plovers and Lapwings (CHARADRIIDAE)																				
Killdeer	*Charadrius vociferus*	S5B,S5N	N, C	Yes	-	-													A	
Gulls & Terns (LARIDAE)																				
Ring-billed Gull	*Larus delawarensis*	S5B,S4N	N, C	Yes	-	-	FO	FO											FO	
Pigeons & Doves (COLUMBIDAE)																				
Mourning Dove	*Zenaida macroura*	S5	N, C	Yes	-	-												S		
Woodpeckers & Allies (PICIDAE)																				
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	N, C	Yes	-	-												S		
Northern Flicker	*Colaptes auratus*	S4B	N, C	Yes	-	-						S								
Flycatchers (TYRANNIDAE)																				
Eastern Wood-Pewee	*Contopus virens*	S4B	N, C	Yes	-	SC									S	T				
Alder Flycatcher	*Empidonax alnorum*	S5B	N, U	Yes	-	-	S		S										S	
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	N, C	Yes	-	-									S					
Swallows (HIRUNDINIDAE)																				
Barn Swallow	*Hirundo rustica*	S4B	N, C	Yes	-	THR						X								
Jays & Crows (CORVIDAE)																				
Blue Jay	*Cyanocitta cristata*	S5	N, C	No	-	-					X		X		FO	FO	X	X		
American Crow	*Corvus brachyrhynchos*	S5B	N, C	No	-	-								X			FO	FO		
Chickadees & Titmice (PARIDAE)																				
Black-capped Chickadee	*Poecile atricapillus*	S5	N, C	Yes	-	-						S						S		
White-breasted Nuthatch	*Sitta carolinensis*	S5	N, C	Yes	-	-						S								
Wrens (TROGLODYTIDAE)																				
House Wren	*Troglodytes aedon*	S5B	N, C	Yes	-	-	S											S		S
Thrushes (TURDIDAE)																				
Wood Thrush	*Hylocicla mustelina*	S4B	N, U	Yes	-	SC							S		S					
American Robin	*Turdus migratorius*	S5B	N, C	Yes	-	-			S	S	S		S	T	S	S		S	S	T
Mockingbirds, Thrashers & Allies (MIMIDAE)																				
Gray Catbird	*Dumetella carolinensis*	S4B	N, C	Yes	-	-							S				A	T		S
Brown Thrasher	*Toxostoma rufum*	S4B	N, U	Yes	-	-												S		
Starlings (STURNIDAE)																				
European Starling	*Sturnus vulgaris*	SNA	E	No	-	-	S			S							S			S
Vireos (VIREONIDAE)																				
Red-eyed Vireo	*Vireo olivaceus*	S5B	N, C	Yes	-	-								S		S				
Wood-Warblers (PARULIDAE)																				
Yellow Warbler	*Dendroica petechia*	S5B	N, C	Yes	-	-							S					S		
Cardinals, Grosbeaks & Allies (CARDINALIDAE)																				
Northern Cardinal	*Cardinalis cardinalis*	S5	N, C	Yes	-	-				S				S						
New World Sparrows & Allies (EMBERIZIDAE)																				
Eastern Towhee	*Pipilio erythrophthalmus*	S4B	N, U	Yes	-	-						S								
Chipping Sparrow	*Spizella passerina*	S5B	N, C	Yes	-	-														
Field Sparrow	*Spizella pusilla*	S4B	N, C	Yes	-	-			S											
Song Sparrow	*Melospiza melodia*	S5B	N, C	Yes	-	-		P	S	S		S					S		S	T
Dark-eyed Junco	*Junco hyemalis*	S5B	-	Yes	-	-								S						
Blackbirds & Allies (ICTERIDAE)																				
Red-winged Blackbird	*Agelaius phoeniceus*	S4	N, C	No	-	-	A	T	S	A	A	T					S		S	

Appendix F: Breeding Bird Survey Results 2021

Common Name	Scientific Name	S-Rank[1]	Hamilton Abundance Codes[2]	MBCA Protected (Yes/No)[3]	SARA Status[4]	ESA Status[5]	BBS-01		BBS-02		BBS-03		BBS-04		BBS-06		BBS-07		BBS-08	
							Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2	Visit 1	Visit 2
Common Grackle	*Quiscalus quiscula*	S5B	N, C	No	-	-		S		S	S	CF								
Brown-headed Cowbird	*Molothrus ater*	S4B	N, C	No	-	-				X										
Baltimore Oriole	*Icterus galbula*	S4B	N, C	Yes	-	-			S	T	D		S					S	S	
Finches & Allies (FRINGILLIDAE)																				
American Goldfinch	*Cardeulis tristis*	S5B	N, C	Yes	-	-	S		S	S	S		S					S	S	
Old World Sparrows (PASSERIDAE)																				
House Sparrow	*Passer domesticus*	SNA	E	No	-	-						X							X	

OBBA Highest Breeding Evidence (2001)

OBSERVED

X	Species observed in its breeding season (no evidence of breeding).

POSSIBLE BREEDING

H	Species observed in its breeding season in suitable nesting habitat.
S	Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat.

PROBABLE BREEDING

P	Pair obsered in their breeding season in suitable nesting habitat.
T	Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D	Courtship or display between a male and a female or 2 males, including courtship, feeding or copulation.
V	Visiting probably nest site.
A	Agitated behaviour or anxeity calls of an adult.
B	Brood patch on adult female or cloacal protuberance on adult male.
N	Nest-building or exacation of nest hole.

CONFIRMED BREEDING

DD	Distraction display or injury feigning.
NU	Used nest or egg shell found (occupied or laid within the period of the study).
FY	Recently fledged young or downy young, including young incapable os sustained flight.
AE	Adults leaving or entering nest site in circumstances indicating occupied nest.
FS	Adult carrying faecal sac.
CF	Adult carring food for young.
NE	Nest containing eggs.
NY	Nest with young seen or heard.

[1] ***S rank:*** *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities.* The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

S3 – Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 – Secure—Common, widespread, and abundant in the nation or state/province.
SNR – Unranked—Province conservation status not yet assessed.
SU – Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
S#? – Rank uncertain

Breeding Status Qualifiers
B – Breeding—Conservation status refers to the breeding population of the species in the province.
N – Nonbreeding—Conservation status refers to the non-breeding population of the species in the province.

[2]Hamilton Abundance Codes (2013) available from: https://conservationhamilton.ca/images/PDFs/Planning/Birds_print.pdf

Residency Codes
Exotic (E) – not indigenous to Ontario
Native (N) – Indigenous to Ontario

Abundance Codes
Rare (R) - Highly significant to Hamilton area
Uncommon (U) - Moderately significant in Hamilton area
Common (C) - Present in many locations across Hamilton

[3]MBCA Protected (Yes/No) *– Migratory birds that are protected under the Migratory Birds Convention Act, 1994 (MBCA).*

[4]ESA Status*: The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*
END *(Endangered) – A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming Endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern) – A species that may become Threatened or Endangered due to a combination of biological characteristics and identified threats.*

[4]SARA Sched. 1 Status:

The SARA protects and ensures the recovery of SAR listed on Schedule 1 as Extirpated, Endangered and Threatened, and their critical habitats at a federal level. Schedule 1 of the SARA classifies SAR as follows:
Extirpated (EXP) – a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild (SARA Registry, 2012).
Endangered (END) – a wildlife species that is facing imminent extirpation or extinction (SARA Registry, 2012).
Threatened (THR) – a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction (SARA Registry, 2012).
Special Concern (SC) – a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats (SARA Registry, 2012).

Appendix G

SAR Habitat Assessment

Appendix G. Species at Risk Screening

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1][2]	Known Species Range[2]	Source Identifying Species Record	Probability of Occurrence within the Study Area	Species Observed During Field Investigations
Amphibians	Jefferson Salamander *Ambystoma jeffersonianum*	END	END Schedule 1	END	Adult Jefferson Salamanders, throughout their range, are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, woodland pools that dry in late summer. Terrestrial habitat is in mature woodlands that have small mammal burrows or rock fissures that enable adults to over-winter underground below the frost line. FOD where permanent or temporary ponds or pools are present.	In Canada, the species is found only in isolated populations that are mostly associated with the Niagara Escarpment and Carolinian forest regions in Ontario.	ORAA 2019	Low - Pools in woodlands did not hold water long enough to support salamander breeing	No
Birds	Bank Swallow *Riparia riparia*	THR	THR	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs.	In Canada, the species is found only in isolated populations that are mostly associated with the Niagara Escarpment and Carolinian forest regions in Ontario.	OBBA	Low - no suitable habitat is present.	No
Birds	Barn Owl *Tyto alba*	END	END Schedule 1	END	The Barn Owl cannot tolerate severe winter temperatures, and southern Ontario is the northern limit of its range. Breeding sites in Ontario seem to be restricted to areas with the moderating effects of the Great Lakes (within 50 kilometres of the lakes). In southern Ontario, this adaptable owl nests and roosts in barns and abandoned buildings. It may also use natural cavities in trees or holes in cliff faces, as it did before the arrival of Europeans in North America. It lives year round at its nest site and hunts for rodents over orchards, and grasslands such as farmlands, fallow fields, and meadows. TPO, TPS, CUM, CUS and CUW where suitable nesting habitat is present.	In the Western Hemisphere, the Barn Owl is found from extreme southern Canada to southern South America and the West Indies. In Canada, the Barn Owl is at the northern limit of its range, and breeds only locally in southern British Columbia, southern Ontario, and possibly in southern Quebec. Barn Owl numbers in Ontario and Quebec were probably never very large, although the species possibly inhabited oak-savannah vegetation adjacent to tall grass prairie prior to European settlement. Colonization of southern Canada is attributed to clearance of forests for agriculture, which created open habitats supporting high rodent populations. In Ontario, Barn Owls may potentially breed on the Niagara Peninsula, in adjacent Halimand-Norfolk, in the Thousands Island area of Kingston, at Long Point, and in several other localities in the southwestern part of the province. Today, there are fewer than five pairs of Barn Owls in Ontario.	OBBA	Low - no suitable nesting structures were present in the Study Area	No
Birds	Barn Swallow *Hirundo rustica*	THR	THR	THR	Before European colonization, Barn Swallows nested mostly in caves, holes, crevices, and ledges in cliff faces. Following European settlement, they shifted largely to nesting in and on artificial structures, including barns and other outbuildings, garages, houses, bridges, and road culverts. Barn Swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of way, cottage areas and farmyards, islands, wetlands, and subarctic tundra.	The Barn Swallow may be found throughout southern Ontario and can range as far north as Hudson Bay, wherever suitable locations for nests exist. The Barn Swallow has become closely associated with human rural settlements. It breeds across much of North America south of the treeline, south to central Mexico. In Canada, it is known to breed in all provinces and territories.	MNRF	High - Suitable foraging habitat present within the study area and structures with the potential to hold nests	Yes

Appendix G. Species at Risk Screening

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1][2]	Known Species Range[2]	Source Identifying Species Record	Probability of Occurrence within the Study Area	Species Observed During Field Investigations
					TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1; containing or adjacent structures that are suitable for nesting.				
Birds	Bobolink *Dolichonyx oryzivorus*	THR	THR Schedule 1	THR	Most of this prairie was converted to agricultural land over a century ago, and at the same time the forests of eastern North America were cleared to hayfields and meadows that provided habitat for the birds. Since the conversion of the prairie to cropland and the clearing of the eastern forests, the Bobolink has nested in forage crops (e.g., hayfields and pastures dominated by a variety of species, such as clover, Timothy, Kentucky Bluegrass, and broadleaved plants). The Bobolink also occurs in various grassland habitats including wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses, remnants of uncultivated virgin prairie (tall-grass prairie), no-till cropland, small-grain fields, restored surface mining sites, and irrigated fields in arid regions. It is generally not abundant in short-grass prairie, Alfalfa fields, or in row crop monocultures (e.g., corn, soybean, wheat), although its use of Alfalfa may vary with region. TPO, TPS, CUM1 and MAM2.	The Bobolink breeds across North America. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists. The breeding range of the Bobolink in North America includes the southern part of all Canadian provinces from British Columbia to Newfoundland and Labrador and south to the northwestern, north-central and northeastern U.S.	OBBA	Low - Cultural meadows most likely to support this species in the Study Area are dominated by forb species rather than grasses	No
Birds	Chimney swift *Chaetura pelagica*	THR	THR	THR	Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate. Foraging habitat for this species can be associated with the following ELC codes: TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1 containing or adjacent structures with suitable nesitng habitat (i.e. chimnies).	he Chimney Swift breeds in eastern North America, possibly as far north as southern Newfoundland. In Ontario, it is most widely distributed in the Carolinian zone in the south and southwest of the province, but has been detected throughout most of the province south of the 49th parallel. It winters in northwestern South America.	OBBA	Medium - Suitable chimneys on buildings may be present within the Study Area but none were found within the right-of-way.	No
Birds	Eastern Meadowlark *Sturnella magna*	THR	THR Schedule 1	THR	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs, or fence posts are used as elevated song perches. Eastern Meadowlarks prefer grassland habitats, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows, and airfields.	In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming, and Lake of the Woods areas. Including all subspecies, the Eastern Meadowlark's global breeding range extends from central and eastern North America, south through parts of South America. However, there is only one subspecies in Canada and the neighbouring northeastern U.S. In Canada, the bulk of the population breeds in southern Ontario.	OBBA	Low - Cultural meadows most likely to support this species in the Study Area are dominated by forb species rather than grasses	No

Appendix G. Species at Risk Screening

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1][2]	Known Species Range[2]	Source Identifying Species Record	Probability of Occurrence within the Study Area	Species Observed During Field Investigations
					TPO, TPS, CUM1, CUS, and MAM2 with elevated song perches.				
	Louisiana Waterthrush *Parkesia motacilla*	THR	THR	THR	The Louisiana Waterthrush is usually found in steep, forested ravines with fast-flowing streams. The Louisiana Waterthrush occupies specialized habitat, showing a strong preference for nesting along relatively pristine headwater streams and wetlands situated in large tracts of mature forest. Although it prefers running water (especially clear, coldwater streams), it also inhabits heavily wooded swamps with vernal or semi-permanent pools, where its territories can overlap with its sister species the Northern Waterthrush. It is often classified as both an area-sensitive forest species, and a riparian-obligate species. Louisiana Waterthrush nests are constructed within niches in steep stream banks, in the roots of uprooted trees, or in mossy logs and stumps, usually within a few metres of water. FOD, FOM, and SWD with fast flowing coldwater streams or large pools of open water.	The Louisiana Waterthrush summer range extends from the lower Great Lakes south to Georgia and west to Kansas. In Canada, the Louisiana Waterthrush breeds only in southern Ontario, along the Niagara Escarpment, in woodlands along Lake Erie, and scattered locations elsewhere. In Canada, the Louisiana Waterthrush breeds in southern Ontario, where it is considered a rare, but regular local summer resident. The bulk of the Canadian population is concentrated in two areas of Ontario: the Norfolk Sand Plain region bordering the north shore of Lake Erie, and the central Niagara Escarpment between Hamilton and Owen Sound.	OBBA	Low - no fast flowing coldwater streams. FOD is Dry - Fresh classification	No
Birds	Northern Bobwhite *Colinus virginianus*	END	END Schedule 1	END	The Northern Bobwhite requires an early successional habitat that can be provided in a variety of vegetation types. Minimally it requires an interspersion of grassland, cropland, and brushy cover. In Ontario it is now usually associated with cultivated lands rather than native prairie fringes. In Ontario there were originally thousands of hectares of long-grass prairie in the extreme southwest. After settlement by Europeans, the creation of numerous small farms with diverse crops, inefficient harvest methods, and large weedy hedgerows greatly enhanced the potential for bobwhites, and resulted in the tremendous population increase. But, through the previous century, the trend has been away from pasture and summer fallow, and natural prairie has been all but eliminated. Habitat fragmentation is also ongoing, and may be a more significant problem than overall habitat loss. TPO, TPS, CUM, CUT, CUS, and CUW.	The Northern Bobwhite is near its northern range limit in southern Ontario. This bird benefited greatly when the original forests were cleared and it expanded its range significantly in Ontario. At its peak over a century ago, its range in Ontario extended north to Georgian Bay and east to Kingston. This range has steadily retracted and now includes only the southwest corner of the province, mostly on Walpole Island, and possibly a few scattered locations nearby. Isolated sightings away from this area are usually a result of introductions or birds escaping from captivity. It has been introduced to many other areas with limited long-term success.	NHIC	Low - Cultural meadows most likely to support this species in the Study Area are dominated by forb species rather than grasses	No

Appendix G. Species at Risk Screening

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1][2]	Known Species Range[2]	Source Identifying Species Record	Probability of Occurrence within the Study Area	Species Observed During Field Investigations
Birds	Yellow-breasted Chat *Icteria virens*	END	END	END	The Yellow-breasted Chat lives in thickets and scrub, especially locations where clearings have become overgrown. This bird eats insects gathered from the foliage of low, dense shrubs, or from the ground. The Yellow-breasted Chat is a shrub specialist, occurring in early successional shrub habitats in eastern North America. In Ontario, habitat has declined since the early 1960s, because of land conversion and successional change. CUT and SWT	In Canada, it lives in southern British Columbia, the Prairies, and southwestern Ontario, where it is concentrated in Point Pelee National Park and Pelee Island in Lake Erie. Yellow-breasted Chats breed in North America, south of the boreal forest. The virens subspecies breeds from the east-central Great Plains and eastern Texas eastward, and north to southwestern Ontario.	OBBA	Low - Shrub habitats are tending towards woodland. Not detected during breeding bird surveys in these habitats.	No
Mammals	Easttern Small-footed Myotis *(Bat)* Myotis leibii	END	No Status	No Status	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year.	The Eastern Small-footed Bat has been found from south of Georgian Bay to Lake Erie and east to the Pembroke area. There are also records from the Bruce Peninsula, the Espanola area, and Lake Superior Provincial Park. Most documented sightings are of bats in their winter hibernation sites.	BCI	Medium - Mature deciduous forests are present within the Study Area but no surveys were completed to check for use.	No Targeted surveys recommended during detailed design.
Mammals	Little Brown Myotis *(Bat)* *Myotis lucifugus*	END	No Status	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. This species can typically be associated with any community where suitable roosting (i.e. cavity trees, houses, abandoned buildings, barns, etc.) habitat is available.	The little brown bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. Outside Ontario, this bat is found across Canada (except in Nunavut) and most of the United States.	BCI	Medium - Mature deciduous forests are present within the Study Area but no surveys were completed to check for use.	No Targeted surveys recommended during detailed design.
Mammals	Tri-colored Bat	END	END Schedule 1	END	In Ontario, the Tri-colored Bat lives in forested habitats, forming day roosts and maternity colonies in older forest within foliage or in high tree cavities, occasionally also in bars or other structures. This species forages over water and along streams in forests. At the close of the summer season, this species congregate at a location to swarm, usually near caves, mines or underground locations where they will winter; it has a strong fidelity to its winter hibernation sites. This bat overwinters in caves, typically individually instead of as a group.	This bat is found in Southern Ontario and ranging as far north as Espanola, near Sudbury, having a scattered distribution. Its broad range sweeps from eastern North America down to Central America.	BCI	Medium - Mature deciduous forests are present within the Study Area but no surveys were completed to check for use	No Targeted surveys recommended during detailed design.

Appendix G. Species at Risk Screening

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1][2]	Known Species Range[2]	Source Identifying Species Record	Probability of Occurrence within the Study Area	Species Observed During Field Investigations
	Perimyotis subflavus				This species can typically be associated with the following ELC communities: FOC, FOM, FOD, SWC, SWM and SWD where suitable roosting (i.e. cavity trees and trees with loose bark) habitat is available.				
Mammals	Northern (Long-eared) Myotis *(Bat)* Myotis septentrionalis	END	No Status	END	Northern long-eared bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April, most often in caves or abandoned mines. This species can typically be associated with the following ELC communities: FOC, FOM, FOD, SWC, SWM and SWD where suitable roosting (i.e. cavity trees and trees with loose bark) habitat is available.	The northern long-eared bat is found throughout forested areas in southern Ontario, to the north shore of Lake Superior and occasionally as far north as Moosonee, and west to Lake Nipigon.	BCI	Medium - Mature deciduous forests are present within the Study Area but no surveys were completed to check for use	No Targeted surveys recommended during detailed design.
Plants	Butternut Juglans cinerea	END	END Schedule 1	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges. This species can typically be associated with the following ELC communities: FOD and mature hedgerows; Soil: dry rocky or moist (4, 5, 6) to fresh (2, 3).	Butternut can be found throughout central and eastern North America. In Canada, Butternut occurs in Ontario, Quebec and New Brunswick. In Ontario, this species is found throughout the southwest, north to the Bruce Peninsula, and south of the Canadian Shield.	NHIC	High - Deciduous forests are present and this species was recorded during surveys.	Yes
Plants	Spotted Wintergreen *Chimaphila maculata*	THR	END Schedule 1	THR	In Ontario, Spotted Wintergreen occurs in dry oak-pine woodland habitats with sandy soils Typically, dominant tree species include White Pine, Red Oak, Black Oak, and American Beech. The species does best in semi-open habitats. Spotted Wintergreen is a woodland understorey species typically associated with dry–fresh oak and oak–pine mixed forests and woodlands. The plant tends to occur on well-drained sandy soils free of coarse fragments, with low organic content and poor nutrient status. **FOC1, FOM1, FOM2-1, FOD1,** and **FOD2** that are semi-open and have sandy soils.	In Canada, it is only found in a few locations in southern Ontario in Norfolk County and the Niagara Region. It is believed to have been been extirpated from Simcoe Kent, Middlesex, and York Counties, Hamilton-Wentworth Region, and the District of Muskoka. Spotted Wintergreen occurs in eastern North America, Mexico, and Central America. Its range in eastern North America extends from southern Michigan and Ontario, east to southern New Hampshire and Maine, and south to Mississippi and northern Florida. Historically, Spotted Wintergreen was more widely distributed in southern Ontario and into southwestern Quebec. It is now restricted to a few subpopulations in southern Ontario and is considered extirpated in Quebec. In Canada, there are currently five extant subpopulations.	NHIC	Low - believed to be extirpated from Hamilton. Was not detected in the three season botanical inventory.	No

Appendix H

Significant Wildlife Habitat and Species of Conservation Concern Screening

F.1 Significant Wildlife Habitat Assessment

F.2 Species of Conservation Concern Assessment

H.1 Significant Wildlife Habitat Assessment

SWH Ecoregion 7E Criterion Schedule

Table 1.1 Seasonal Concentration Areas of Animals.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl Stopover and Staging Areas (Terrestrial) **Rationale;** Habitat important to migrating waterfowl.	American Black Duck Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. - Fields with waste grain in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	Fields with sheet water during Spring (mid- March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Any mixed species aggregations of 100Ⓔ • or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependant on local site conditions and adjacent land use is the significant wildlife habitat [cxlviii]. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMIST[cxlix] Index #7 provides development effects and mitigation measures.	**No;** No evidence of annual spring flooding from melt water or run-off observed within cultural meadow or thicket communities. No anecdotal evidence of concentrations of waterfowl within the Study Area from Ebird.	**No;** Candidate habitat is not present within the Study Area.
Waterfowl Stopover and Staging Areas (Aquatic) **Rationale;** Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only	Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	Information Sources • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org	Studies carried out and verified presence of: • Aggregations of 100 Ⓔ or more of listed species for 7 daysⒺ, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH [cxlix] • The combined area of the ELC ecosites and a 100m radius area is the SWH [cxlviii] • Wetland area and shorelines associated with sites identified	**No;** Limited shallow marsh (MAS), shallow aquatic (SA) or deciduous swamp (SWD) communities were identified within the Study Area. No anecdotal evidence of concentrations of waterfowl within the Study Area from	**No;** Candidate habitat is not present within the Study Area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
one of a few in the eco-district.	Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck		• Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	within the SWHTG [cxlviii] Appendix K [cxlix] are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWH MIST[cxlix] Index #7 provides development effects and mitigation measures.	Ebird.	
Shorebird Migratory Stopover Area **<u>Rationale;</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH, <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • NHIC Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000[Í] shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100[Í] Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area [cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #8 provides development effects and mitigation measures.	**No;** Meadow marsh (MAM) communities and shoreline habitats present within the Study Area are not large enough to support aggregations of migratory shorebirds.	**No;** Candidate habitat is not present within the Study Area.
Raptor Wintering Area **<u>Rationale;</u>** Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **<u>Special Concern:</u>** Short-eared Owl Bald Eagle	**<u>Hawks/Owls</u>** Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland:	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering(hawk/owl) sites need to be > 20 ha [cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi]. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands [cxlix] Field area of the habitat is to be wind swept with limited snow depth or	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or; At least 10 individuals and two of listed hawk/owl species Ⓔ. • To be significant a site must be used regularly (3 in 5 years) [cxlix] for a minimum of 20 days by the above number of birds Ⓔ. • The habitat area for an Eagle	**No;** **<u>Hawks/Owls:</u>** Deciduous forest (FOD) adjacent to upland communities are present within and adjacent to the Study Area but encompass less than 20 ha. **<u>Bald Eagle:</u>** Deciduous forest	**No;** Candidate habitat was not identified within the Study Area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
		CUM; CUT; CUS; CUW. **Bald Eagle:** Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or lakes with open water (hunting areas).	accumulation. Eagle sites have open water and large trees and snags available for roosting. Information Sources: • OMNR Ecologist or Biologist • Naturalist club • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada, most notably for Short-eared Owls. • Results of Christmas Bird Counts. • Reports and other information available from Conservation Authorities.	winter site is the shoreline forest ecosites directly adjacent to the prime hunting area Ⓔ. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	(FOD) in Study Area is not adjacent to large rivers or lakes.	
Bat Hibernacula **Rationale;** Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat Tri-colored Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. Active mine sites should not be considered as SWH. The locations of bat hibernacula are relatively poorly known. Information Sources • OMNR for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH Ⓔ. • The area includes 200m radius around the entrance of the hibernaculum [cxlviii, ccvii, Ⓔ] for most development types and 1000m for wind farms. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Guideline for Wind Power Projects Potential Impacts to Bats and Bat Habitats"[ccv]. • SWH MIST[cxlix] Index #1 provides development effects and mitigation measures.	**No;** No suitable caves, mines, underground foundations or Karsts were identified during field investigations.	**No;** Candidate habitat was not identified within the Study Area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Bat Maternity Colonies **<u>Rationale;</u>** Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	Maternity colonies can be found in tree cavities, vegetation and often in buildings [xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario [xxii]. • Maternity colonies located in Mature deciduous or mixed forest stands [ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees [ccvii] • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 [ccxiv] or class 1 or 2 [ccxii]. • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred [ccx] <u>Information Sources</u> • OMNR for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by; – >10 Big Brown Bats[Í] – >5 Adult Female Silver-haired Bats[Í] • The area of the habitat includes the entire woodland, or the forest stand ELC Ecosite containing the maternity colonies[Í]. • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" [ccv]. • SWH MIST[cxlix] Index #12 provides development effects and mitigation measures.	**Yes;** Deciduous forest (FOD) with at least 10 snags/ ha may be present within the Study Area.	**Candidate;** Presence of indicator species unknown as acoustic monitoring was not performed.
Turtle Wintering Areas **<u>Rationale;</u>** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Midland Painted Turtle **<u>Special Concern:</u>** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted turtles; ELC Community Classes; SW, MA, OA and SA. ELC Community Series; FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen. [cix, cx, cxi, cxviii] • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <u>Information Sources</u> • EIS studies carried out by Conservation Authorities. • Field Naturalist Clubs • OMNRF Ecologist or Biologist • Natural Heritage Information Center (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant[Í]. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant[Í]. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May) [cvii]. Congregation of turtles is more common where wintering areas are limited and therefore significant [cix, cx, cxi, cxii]. • SWH MIST[cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	**No;** Wetlands and water features within the Study Area are not deep enough to be suitable for turtle overwintering.	**No;** Candidate habitat was not identified within the Study Area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Reptile Hibernaculum **Rationale;** Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	**Snakes:** Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **Special Concern:** Milksnake Eastern Ribbonsnake	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator.	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, lii, cxii] . Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g.old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists. • Natural Heritage Information Center (NHIC)	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct)[Í] . • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity.]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30 m buffer is the SWH[Ⓔ] • SWH MIST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula.	**No;** Debris piles observed during field investigations unlikely provide access below the frost line. No abandoned buildings.	**No;** Numbers of Eastern Gartersnake observed during field investigations do not meet criteria for significance.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) **Rationale;** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies).	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles, cliff faces, bridge abutments, silos, barns (Cliff Swallows). Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. Information Sources • Reports and other information	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season (May-June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi] • SWH MIST [cxlix] Index #4 provides development effects and mitigation	**No;** Suitable eroding banks along watercourse or cliff faces were not observed during field investigations.	**No;** No suitable nesting habitat was identified during field investigations.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
population are declining in Ontario.			available from Conservation Authorities • Ontario Breeding Bird Atlas [ccv]. • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs.	measures		
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale;</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. <u>Information Sources</u> • Ontario Breeding Bird Atlas [ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Center (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities • MNRF District Offices. • Local naturalist clubs.	Studies confirming: • Presence of 2Ⓔ or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extend of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH [cc, ccvii] • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST[cxlix] Index #5 provides development effects and mitigation measures.	**No;** No swamps or fens were identified within the Study Area.	**No;** Candidate habitat was not identified within the Study Area.
Colonially - Nesting Bird Breeding Habitat (Ground) **<u>Rationale;</u>** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6; MAS1 – 3; CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas [ccv], rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities • Natural Heritage Information Center	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian TernⒺ. • Presence of 5 or more pairs for Brewer's BlackbirdⒺ • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significantⒺ. • • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH [cc, ccvii]	**No;** No rocky islands or peninsulas within a lake or large river were observed. No records of Brewer's Blackbird in the vicinity of the Study Area.	**No;** Ring-billed Gull observed during field investigations, including breeding bird surveys, did not exhibit evidence of breeding.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
			(NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist Clubs.	• Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #6 provides development effects and mitigation measures.		
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral <u>Special Concern</u> Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field</u>: CUM CUT CUS <u>Forest</u>: FOC FOD FOM CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie and Ontario [cxlix]. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south [xxxii, xxxiii, xxxiv, xxxv, xxxvi]. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat [cxlviii, cxlix]. • Stopover areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes [xxxvii, xxxviii, xxxix, xl, xli]. <u>Information Sources</u> • MNRF district Offices • Natural Heritage Information Center (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii]. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 **or** >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant.Ⓔ SWH MIST [cxlix] Index #16 provides development effects and mitigation measures.	**No;** The Study Area is more than 5 km away from Lake Ontario.	**No;** Candidate habitat is not present within the Study Area.
Landbird Migratory Stopover Areas **<u>Rationale:</u>** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7:	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Woodlots need to be >5 haⒺ in size and within 5 km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario and Erie. If woodlands are rare in an area of shoreline, woodland fragments 2-5ha can be considered for this habitat. Ⓔ • • If multiple woodlands are located along the shoreline those	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey datesⒺ. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (March to May) and fall (Aug	**No;** The Study Area is more than 5 km away from Lake Ontario.	**No;** Candidate habitat is not present within the Study Area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
	Specially Protected Birds (Raptors)		Woodlands <2km from Lake Erie and Lake Ontario are more significant [cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes [cxlix]. • The largest sites are more significant [cxlix] • Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH [cxlviii]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	to Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST [cxlix] Index #9 provides development effects and mitigation measures.		
Deer Winter Congregation Areas **Rationale:** Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions [cxlviii].	White-tailed Deer	All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots>50ha Ⓔ. • Deer movement during winter in the southern areas Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands [cxlviii]. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha [ccxxiv]. • Woodlots with high densities of deer due to artificial feeding are not significantⒺ. Information Sources • MNRF District Offices. • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF [cxlviii]. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRFⒺ • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv] , ground or road surveys, or a pellet count deer density survey[ccxxv]. • SWH MIST [cxlix] Index #2 provides development effects and mitigation measures.	**Yes;** Deer Winter Congregation Areas were identified by the NDMNRF.	**Confirmed;** Deer Winter Congregation Areas were identified by the NDMNRF.

Table 1.2.1 Rare Vegetation Communities.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**		
Cliffs and Talus Slopes **Rationale;** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF Districts • Natural Heritage Information Center (NHIC) has location information available their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes [lxxviii] • SWH MIST[cxlix] Index #21 provides development effects and mitigation measures.	**No;** No cliff or talus ecosites were identified during ELC surveys.	**No;** Candidate habitat is not present within the Study Area.
Sand Barren **Rationale;** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	A sand barren area >0.5ha in size Ⓔ. Information Sources • OMNRF Destricts. • Natural Heritage Information Center (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens [lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics) Ⓔ. • SWHMIST[cxlix] Index #20 provides development effects and mitigation measures.	**No;** No sand barren ecosites were identified during ELC surveys.	**No;** Candidate habitat is not present within the study area.
Alvar **Rationale;** Alvars are extremely rare habitats in Ecoregion 7E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** 1)*Carex crawei* 2)*Panicum*	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number	An Alvar site > 0.5 ha in size [lxxv]. Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie.[cxcix] Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists [lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Center (NHIC) has location information available on their website	Field studies identify four of the five Ⓔ **Alvar Indicator Species** [lxxv] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses [lxxv]. • SWH MIST[cxlix] Index #17 provides development effects and mitigation measures.	**No;** This vegetation community was not identified within the Study Area.	**No;** Candidate habitat is not present within the study area.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
	philadelphicum 3)*Elocharis compressa* 4)*Scutellaria parvula* 5)*Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 7E Ⓔ.	of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover [lxxviii].	• OMNRF Staff. • Field Naturalist Clubs. • Conservation Authorities.			
Old Growth Forest **<u>Rationale;</u>** Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old-growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in mosaic of gaps that encourage development of multi-layered canopy and an abundance of snags and downed woody debris.	• Woodland area is >0.5 ha Ⓔ. <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Districts. • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then area containing these trees is Significant Wildlife Habitat [cxlviii]. • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut steps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest area containing the old growth characteristics[lxxviii]. • SWH MIST[cxlix] Index #23 provides development effects and mitigation measures.	**No;** Trees within deciduous forest (FOD) community are too small to be considered old-growth.	**No;** Candidate habitat is not present within the study area.
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).	No minimum size to site Ⓔ Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location data available on their website. • OMNRF Districts. • Field Naturalists Clubs. • Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in [lxxv] Appendix N should be present Ⓔ. Note: Savannah plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH· • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWH MIST[cxlix] Index #18 provides development effects and mitigation measures.	**No;** This vegetation community was not identified within the Study Area.	**No;** Candidate habitat is not present within the study area.
Tallgrass Prairie	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated	No minimum size to site Ⓔ. Site must be restored or a natural site. Remnant	Field studies confirm one or more of the Prairie indicator species listed in [lxxv] Appendix N should	**No;** This vegetation community	**No;** Candidate habitat is not

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.		by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). [cc]	sites such as railway right of ways are not considered to be SWH. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location data available on their website. • Field Naturalists Clubs. • Conservation Authorities	be present Ⓔ. Note: Prairie plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWH MIST[cxlix] Index #19 provides development effects and mitigation measures.	was not identified within the Study Area.	present within the study area.
Other Rare Vegetation Communities **Rationale:** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG[cxlviii] . Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M [cxlviii] The OMNRF/NHIC will have up to date listing for rare vegetation communities. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location data available on their website. • Field Naturalists Clubs. • Conservation Authorities •	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG[cxlviii] . • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST [cxlix] Index #37 provides development effects and mitigation measures.	**Yes;** Rare vegetation communities may be present within the Study Area	**No;** No provincially rare (S2S3) vegetation communities present within the Study Area.

Table 1.2.2 Specialized Habitats of Wildlife considered SWH.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl Nesting Area **<u>Rationale;</u>** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m [cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5 ha) with small wetlands (<0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur [cxlix]. • Upland areas should be at least 120m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards Ⓔ , or; • Presence of 10 or more nesting pairs for listed species including Mallards Ⓔ • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m [cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWH MIST[cxlix] Index #25 provides development effects and mitigation measures.	**No;** Wetland areas are limited with no documented waterfowl nesting.	**No;** Numbers of indicator species observed during breeding bird surveys do not meet criteria for significance. No indication of abundant waterfowl nesting observed during field investigations and features not anticipated to support significant concentrations.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **<u>Rationale;</u>** Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations, Note: data from NRVIS is provided as a point and does not	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area[cxlviii] . • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH [ccvii], maintaining undisturbed shorelines with large trees within this area is important[cxlviii]. • For a Bald Eagle the active nest	**No;** Riparian areas adjacent to deciduous forest (FOD) are too small to support Osprey or Bald Eagle foraging. No potential Osprey or Bald Eagle nests were identified during field investigations.	**No;** Candidate habitat is not present within the study area.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
scarcity of habitat.			represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities • Field naturalist Clubs	and a 400-800 m radius around the nest is the SWH. [cvi, ccvii] Area of the habitat from 400-800m is dependant on site lines from the nest to the development and inclusion of perching and foraging habitat [cvi] • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or suspected of not being used for >5 years before being considered not significant. [ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi] • SWH MIST[cxlix] Index #26 provides development effects and mitigation measures		
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands combined >30ha or with >4 ha of interior habitat [lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv,xcvi, cxxxiii]. Interior habitat determined with a 200m buffer [cxlviii] • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. <u>Information Sources</u> • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of 1 or more active nests from species list is considered significant [cxlviii]. • Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) [ccvii]. • Barred Owl – A 200m radius around the nest is the SWH [ccvii]. • Broad-winged Hawk and Coopers Hawk – A 100m radius around the nest is the SWH[ccvii]. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWH MIST[cxlix] Index #27 provides	**No;** Deciduous forest (FOD) in the Study Area does not meet size criteria for significance. No stick nests were observed during field investigations.	**No;** Candidate habitat is not present within the study area.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
				development effects and mitigation measures.		
Turtle Nesting Areas **<u>Rationale;</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle <u>Special Concern Species</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) [cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. •For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. •Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Atlas records (or other similar atlases) for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist Clubs	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles Ⓔ • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH Ⓔ. • The area or collection of sites within an area of exposed mineral soils where the turtles' nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH. [cxlviii] • Travel routes from wetland to nesting area are to be considered within the SWH as a part of the 30-100m area of habitat. [cxlix] • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST [cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	**No;** No naturally occurring areas of exposed mineral soil adjacent (<100 m) to qualifying ecosites were observed within the Study Area.	**No;** Candidate habitat is not present within the study area.
Seeps and Springs **<u>Rationale;</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system [cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species [cxix, cxx, cxxi, cxxii, cxiii, cxiv]. <u>Information Sources</u> • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOE. • Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more Ⓔ seeps/springs should be considered SWH. • The area of an ELC forest ecosite or ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat [cxlviii]. • SWH MIST [cxlix] Index #30 provides development effects and mitigation measures	**Yes;** Deciduous forest (FOD) within the headwaters of a stream or river system are present in the Study Area.	**No;** No seeps/springs were identified during field investigations.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Amphibian Breeding Habitat (Woodland). **<u>Rationale:</u>** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m^2 within or adjacent (within 120m) to a woodland (no minimum size).[clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx]. Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat [cxlviii] <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist Clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of 1 or more of the listed salamander species or 2 or more of the listed frog species with at least 20 individuals (adults, juveniles, eggs/larval masses) [lxxi] or 2 or more of the listed frog species wioth Call Level Codes of 3 Ⓔ. • A combination of observation study and call count survey will be required during the sping (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST [cxlix] Index #14 provides development effects and mitigation measures.	**Yes;** Woodland pool within 120 m of deciduous forest (FOD) are present within the Study Area	**No;** Numbers of indicator species observed during anuran call surveys conducted in 2021 did not meet criteria of significance.
Amphibian Breeding Habitat (Wetlands) **<u>Rationale:</u>** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands>500m2 (about 25m diameter)) [ccvii] ,supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats [clxxxii] . • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) •Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. •OMNRF Districts and wetland evaluations. •Reports and other information available from Conservation Authorities.	Studies confirm: •Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) [lxxi] or 2 or more of the listed frog/toad species with Call Level Codes of 3Ⓔ. or; Wetland with confirmed breeding Bullfrogs are significantⒺ. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys [cviii] will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands.	**No;** Wetlands >120 m do not occur within the Study Area.	**No;** Candidate habitat is not present within the study area. Anuran call surveys conducted in 2021 at wetlands did not meet criteria of significance.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
				• If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST [cxlix] Index #15 provides development effects and mitigation measures.		

Table 1.3. Habitats of Species of Conservation Concern considered SWH.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
Woodland Area-Sensitive Bird Breeding Habitat **Rationale:** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix, • Interior forest habitat is at least 200 m from forest edge habitat. clxiv Information Sources • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Ⓟ • Note: any site with breeding Cerulean Warblers or Canada Warbler is to be considered SWH.Ⓔ • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"ccxi • SWH MIST cxlix Index #34 provides development effects and mitigation measures.	**No;** Deciduous forest (FOD) in the Study Area does not meet size criteria for significance.	**No;** Candidate habitat is not present within the study area.
Marsh Breeding Bird Habitat **Rationale:** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present cxxiv. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Centre (NHIC) Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren **or** breeding by any combination of 4 or more of the listed species Ⓔ. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH Ⓔ. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #35 provides development effects and mitigation measures	**Yes;** Meadow marsh (MAM) communities are present in the Study Area.	**No;** Indicator species were not observed during field investigations, which included breeding bird surveys. Features not anticipated to support significant concentrations.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
Open Country Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix]. • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) Ⓔ. • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources Agricultural land classification maps, Ministry of Agriculture. Local bird clubs. Ontario Breeding Bird Atlas EIS Reports and other information available from Conservation Authorities.	Field Studies confirm: ·Presence of nesting or breeding of 2 or more of the listed species. Ⓔ · A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] • SWH MIST [cxlix] Index #32 provides development effects and mitigation measures	**No;** Cultural meadow (CUM) communities present in the Study Area are less than 30 ha in size.	**No;** Candidate habitat is not present within the study area.
Shrub/Early Successional Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records [cxcix].	<u>Indicator Spp</u>: Brown Thrasher Clay-coloured Sparrow <u>Common Spp.</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats >10ha[clxiv] in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years) Ⓔ. • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species clxxiii. • Shrub and thicket habitat sites considered significant should have a	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. Ⓔ • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. Ⓔ • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories	**No;** Cultural thicket (CUT) communities encompassing greater than 10 ha are not present within the Study Area.	**No;** Numbers of indicator species observed during breeding bird surveys do not meet criteria for significance.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
			history of longevity, either abandoned fields or pasturelands. Information Sources Agricultural land classification maps, Ministry of Agriculture. Local bird clubs. Ontario Breeding Bird Atlas Reports and other information available from Conservation Authorities.	• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"ccxi • SWH MIST • cxlix Index #33 provides development effects and mitigation measures.		
Terrestrial Crayfish; **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. [ccii]	Chimney or Digger Crayfish; (*<u>Fallicambarus fodiens</u>*) Devil Crawfish or Meadow Crayfish; (*<u>Cambarus Diogenes</u>*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows; the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. <u>Information Sources</u> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites cci • Area of ELC ecosite or an Habitat ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult cci • SWH MIST cxlix Index #36 provides development effects and mitigation measures.	**Yes;** Meadow marsh (MAM) communities are present in the Study Area.	**No;** Neither indicator species nor their chimneys (burrows) were observed in suitable habitat within the Study Area during field investigations.
Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre (NHIC).	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites lxxviii • Information Sources • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information" : http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas• • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWH MIST Index #37 provides development effects and mitigation measures.	**Yes;** Habitat for several Special Concern species as well as S-Rank 1-3 species are known to occur within the Study Area. See **Appendix C2 -SOCC Habitat Screening** for a complete list of SOCC and additional details pertaining to habitat assessment.	**Confirmed;** Eastern Wood Pewee and Wood Thrush habitat was confirmed within the deciduous forest (FOD4-1) during field investigations.

Table 1.4 Animal Movement Corridors

Habitat	SPECIES	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area	Confirmed Habitat Present within the Study Area
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria		
Amphibian Movement Corridors **<u>Rationale;</u>** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat [clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi]. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat –Wetland) of this Schedule Ⓔ. Information Sources •MNRF District Office. •Natural Heritage Information Centre (NHIC). •Reports and other information available from Conservation Authorities. •Field Naturalist Clubs.	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. * Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant cxlix • Corridors should have at least 15m of vegetation on both sides of waterway cxlix or be up to 200m wide cxlix of woodland habitat and with gaps <20m cxlix . • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat cxlix. • SWH MIST cxlix Index #40 provides development effects and mitigation measures	**No;** SWH Amphibian Breeding Habitat (Wetlands) was confirmed not present in the Study Area.	**No;** Candidate habitat is not present within the study area.

H.2 Species of Conservation Concern Assessment

Appendix H2. Species of Special Concern Habitat Assessment

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified In Study Area	Species Observed During Field Investigations
Birds	Eastern Wood-pewee *Contopus virens*	SC	SC Schedule 1	SC	The Eastern Wood-pewee lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation. During migration, a variety of habitats are used, including forest edges and early successional clearings.	The Eastern Wood-pewee is found across most of southern and central Ontario, and in northern Ontario as far north as Red Lake, Lake Nipigon, and Timmins. The breeding range of the Eastern Wood-pewee covers much of south-central and eastern North America.	OBBA	**Yes** Potentially suitable wooded habitat is present within Study Area.	**Yes** The species was recorded during breeding bird surveys.
Birds	Golden-winged Warbler *Vermivora chrysoptera*	SC	THR Schedule 1	THR	Golden-winged Warblers prefer to nest in areas with young shrubs surrounded by mature forest – locations that have recently been disturbed, such as field edges, hydro or utility right-of-ways, or logged areas. In their breeding areas, Golden-winged Warblers seem to be fond of regeneration zones where young shrubs grow, surrounded by mature forest, and characterized by plant succession of 10 to 30 years. The warblers frequent clusters of herbaceous plants and low bushes (where they place their nests, which are built on the ground). They favour environments where the trees are spread out, as well as the forest edge, and use this setting for perching, singing, and looking for food. Golden-winged Warblers are found in dry uplands, swamp forests, and marshes. This warbler shows a preference for beaver ponds and burned-out or intermittently cultivated areas.	The Golden-winged Warbler is found in southern Saskatchewan, Manitoba, Ontario, and Quebec, as well as the north-eastern United States. In Ontario, these birds breed in central-eastern Ontario, as far south as Lake Ontario and the St. Lawrence River, and as far north as the northern edge of Georgian Bay. Golden-winged Warblers have also been found in the Lake of the Woods area near the Manitoba border, and around Long Point on Lake Erie. Golden-winged Warblers nest primarily in the northeastern United States, southeastern Saskatchewan, southwestern Manitoba, southwestern Ontario and far southwestern Quebec. In Ontario, they breed from the far southwest of the province north as far as the centre of the Nipissing region, the southern part of the Sudbury and Algoma districts, and the southwest part of the Rainy River district, near Lake of the Woods.	OBBA	**Yes** Potentially suitable habitat is present within Study Area.	**No** The species was not recorded during breeding bird surveys or incidentially.
Birds	Grasshopper Sparrow *Ammodramus savannarum* Grasshopper Sparrow (pratensis subspecies; Eastern Grasshopper Sparrow) *Ammodramus savannarum pratensis*	SC	SC Schedule 1	SC	It lives in open grassland areas with well-drained, sandy soil. It will also nest in hayfields and pasture, as well as alvars, prairies, and occasionally grain crops such as barley. It prefers areas that are sparsely vegetated. Its nests are well-hidden in the field and woven from grasses in a small cup-like shape. The Grasshopper Sparrow is a short-distance migrant and leaves Ontario in the fall to migrate to the southestern United States and Central America for the winter. In Canada, the Eastern Grasshopper Sparrow typically breeds in large human-created grasslands (5 ha or greater), such as pastures and hayfields, and natural prairies, such as alvars, characterized by well-drained, often poor soil dominated by relatively low, sparse perennial herbaceous vegetation.	The Grasshopper Sparrow can be found throughout southern Ontario, but only occasionally on the Canadian Shield. It is most common where grasslands, hay, or pasture dominate the landscape. In Canada, the breeding range of the Eastern Grasshopper Sparrow includes extreme southern Québec and southern Ontario, with the vast majority of birds occurring in Ontario.	OBBA	**No** Meadow communities were typically dominated by dense growth of herbaceous plants.	**No** The species was not recorded during breeding bird surveys or incidentially.
Birds	Wood Thrush *Hylocichla mustelina*	SC	THR Schedule 1	THR	The Wood Thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees, or shrubs, usually in Sugar Maple or American Beech. In Canada, the Wood Thrush nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. This species prefers large forest mosaics, but may also nest in small forest fragments.	The Wood Thrush is found all across southern Ontario. It is also found, but less common, along the north shore of Lake Huron, as far west as the southeastern tip of Lake Superior. There is a very small population near Lake of the Woods in northwestern Ontario, and there have been scattered sightings in the mixed forest of northern Ontario. The Wood Thrush breeds in southeastern Canada from southern Ontario east to Nova Scotia.	OBBA	**Yes** Potentially suitable wooded habitat is present within Study Area.	**Yes** The species was recorded during breeding bird surveys.

Appendix H2. Species of Special Concern Habitat Assessment

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified In Study Area	Species Observed During Field Investigations
Fish	Grass Pickerel *Esox americanus vermiculatus*	SC	SC Schedule 1	SC	The habitat of the Grass Pickerel is characterized by warm, slow-moving streams, ponds and shallow bays of larger lakes, with clear to tea-coloured water, and abundant aquatic vegetation. Bottom substrate is usually mud, but it has also been found over rock and gravel. Associated with overland flooding, spawning occurs in the spring in water temperatures of 4° to 12° Celcius; however, there is evidence of late summer to winter spawning as well. Eggs are dispersed and adhere to aquatic vegetation. No nest is built and neither eggs nor young are provided parental care.	The Grass Pickerel range extends from Minnesota and Nebraska east to southwestern Quebec and south from Ontario and Quebec to Louisiana, Mississippi and Texas. In Canada, it is limited to extreme southwestern Quebec and southern Ontario. In Ontario, Grass Pickerel is found in coastal wetlands in the Great Lakes and tributaries of Lake St. Clair, Lake Erie, Lake Huron, the Niagara River, Lake Ontario, and the St. Lawrence River, and inland in the Severn River system. The Grass Pickerel is largely restricted to the west of the Appalachian Mountains, in the Great Lakes and the Mississippi River basins. In Canada, its range is disjunct and is represented by several populations in southwestern Quebec and southern Ontario. It is known in the lower Ottawa and St. Lawrence rivers, as well as in shallow bays and tributaries of eastern and southwestern Lake Ontario, and along the north shore of Lake Erie. Populations occur in Lake St. Clair and some of its tributaries. It is also found in several tributaries in the Lake Huron watershed. It has been found in the St. Lawrence River, as well as in shallow bays and tributaries of eastern and southwestern Lake Ontario, inland watercourses of the Niagara region, and along the north shore of Lake Erie. Populations occur in Lake St. Clair and some of its tributaries. It is also found in several tributaries and waterbodies in the lower Lake Huron watershed.	DFO	**No** Suitable stream habitat is not present within Study Area.	**No** The species was not recorded during surveys or incidentially.

Appendix H2. Species of Special Concern Habitat Assessment

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified In Study Area	Species Observed During Field Investigations
Insects	Monarch Danaus plexippus	SC	SC Schedule 1	END	Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Milkweeds (numerous species) are the sole food plant for Monarch caterpillars. These plants grow predominantly in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests. Milkweeds are often planted outside their native range, and sometimes wayward Monarchs are observed at these patches. Monarchs require staging areas which are used to rest, feed, and avoid inclement weather during migration. In Canada, they are found along the north shores of the Great Lakes where Monarchs roost in trees before crossing large areas of open water.	The Monarch's range extends from Central America to southern Canada. In Canada, Monarchs are most abundant in southern Ontario and Quebec where milkweed plants and breeding habitat are widespread. During late summer and fall, Monarchs from Ontario migrate to central Mexico where they spend the winter months. During migration, groups of Monarchs numbering in the thousands can be seen along the north shores of Lake Ontario and Lake Erie. The overall native range of the Monarch occurs from Central America northward through the continental United States to southern Canada, and from the Atlantic Coast westward to the Pacific Coast. The Canadian range of occurrence includes portions of all ten provinces and the Northwest Territories. Monarchs are loosely divided into eastern and western subgroups based on their migratory routes and overwintering sites. Eastern Monarchs breed from Alberta east to Nova Scotia and migrate south to overwinter in the mountains of Central Mexico. The breeding range in Canada is south of the 50° latitude in Ontario, Quebec, and the Maritimes. Each fall hundreds of thousands of Monarchs migrate through Long Point in southern Ontario but it's unknown what proportion of the Canadian population these individuals represent.	Ontario Butterfly Atlas	**Yes** Suitable meadow habitat is present within the Study Area.	**Yes** The species was observed foraging within the Study Area
Plants	Perfoliate Bellwort *Uvularia perfoliata*	N/A	N/A	N/A	It grows in habitats such as floodplain forests, but also mesic upland forests, and dry rocky woodlands.The presence of this species is dependent on appropriate habitat, and it may be eliminated from an area by development, changes in land use, or competition with invasive species.	Uvularia perfoliata is widely distributed in the eastern and southern United States from Texas to New Hampshire, plus the Canadian province of Ontario. It is listed as an endangered species by the states of Indiana and New Hampshire.	NHIC	**No** No potentially suitable woodland habitat present within the Study Area.	**No** The species was not recorded during vegetation surveys.
Reptiles	Northern Map Turtle *Graptemys geographica*	SC	SC Schedule 1	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled. The Northern Map Turtle inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	The Northern Map Turtle's range extends from the Great Lakes region west to Oklahoma and Kansas, south to Louisiana, and east to the Adirondack and Appalachian mountain barrier. In Canada, it is found in southwestern Quebec and southern Ontario. In southern Ontario, it lives primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie, and Lake Ontario, and along larger rivers including the Thames, Grand, and Ottawa. It reaches its northern limit in southern Ontario and southwestern Quebec, where it is associated with the Great Lakes Basin and the St. Lawrence River.	ORAA 2018	**No** Suitable wetland habitat has not identified within the Study Area.	**No** However targeted surveys were not undertaken.

Appendix F2. Species of Special Concern Habitat Assessment

Glancaster Road Municipal Class Environmental Assessment Phases 3 and 4

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified In Study Area	Species Observed During Field Investigations
Reptiles	Snapping Turtle *Chelydra serpentina*	SC	SC Schedule 1	Not At Risk	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams, and aggregate pits. Although Snapping Turtles have been observed in shallow water in almost every kind of freshwater habitat, the preferred habitat of the species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats. Individual turtles will persist in urbanized water bodies, such as golf course ponds and irrigation canals, but it is unlikely that a population could become established in such habitats. The Snapping Turtle can occur in highly polluted waterways, but environmental contamination is known to reduce the already low reproductive output of this species. Basking on offshore logs and protruding rocks can be common in Snapping Turtles, depending on environmental temperature. Females generally nest on sand or gravel banks along waterways. Upon emergence from the nest in early fall, hatchling Snapping Turtles usually move to water, after which they bury themselves under leaf litter or debris. Snapping Turtles overwinter underwater, buried beneath logs, sticks or overhanging banks in small streams that flow continuously throughout the winter. They can also hibernate buried in deep mud in marshy areas or beneath floating mats of vegetation. Snapping Turtle habitat is diminishing in both quantity and quality in Canada, with losses primarily due to conversion of wetlands to agriculture and urban development.	The Snapping Turtle's range extends from Ecuador to Canada. The Snapping Turtle's range is contracting. In Canada, the species is widespread from Nova Scotia to southeastern Saskatchewan, though it is absent from northwestern Ontario, where summers are likely too cool for Snapping Turtle embryos to complete development successfully. The Snapping Turtle is therefore present in mainland Nova Scotia, southern New Brunswick, southern and central Quebec, southern and central Ontario, southern Manitoba, and southeastern Saskatchewan, primarily in the Qu'Appelle watershed.	ORAA 2019	**Yes** This species can persist in urbanized environments. Watercourses which may provide habitat for the species are identified within the Study Area.	**No** However targeted surveys were not undertaken.

Glossary

END	ESA - Endangered - a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's Endangered Species Act.
	SARA - Endangered - a wildlife species that is facing imminent extirpation or extinction.
THR	ESA - Threatened - a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
	SARA - Threatened - a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC	ESA - Special Concern (formerly Vulnerable) - a species with characteristics that make it sensitive to human activities or natural events.
	SARA - Special Concern - a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
OMNR	Ontario Ministry of Natural Resources
ESA	Endangered Species Act
SARA	Species at Risk Act (Federal)
Schedule 1	The official list of species that are classified as extirpated, endangered, threatened, and of special concern.
COSEWIC	Committee on the Stauts of Endangerd Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

References

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