

Appendix A

Environmental Impact Study



Greenhouse Road Reconstruction and Extension Project – Breslau

Environmental Impact Study

Township of Woolwich

60683946

November 2023

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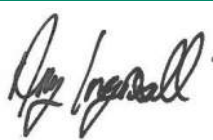
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Environmental Impact Study

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1. Introduction

AECOM Canada Limited (AECOM) has been retained by the Township of Woolwich (the Township) to undertake the required investigations for the preparation of an Environmental Impact Study in support of the proposed Greenhouse Road Reconstruction and Extension Schedule B Municipal Class Environmental Assessment and preliminary and detailed design Project (hereafter “the Project”) in Breslau, Ontario. The Project proposes the reconstruction of the existing length of Greenhouse Road south of Highway 7 (Victoria Street North), and the extension of the road along the right of way to a turn around area at the southerly end of the extension where it meets the Metrolinx rail corridor. The intent of the Project is to fully urbanize Greenhouse Road in this area to service existing and future development within the Breslau Settlement Area. The Project is evaluating the following alternatives for the cross-section of the proposed Greenhouse Road extension in addition to the road reconstruction:

- **Alternative 1:** Two lane urbanized cross-section with sidewalks on both sides of the road, including culvert upgrades south of Kramp Road.
- **Alternative 2:** Two lane urbanized cross-section with multi-use pathway on one side of the road, including culvert upgrades south of Kramp Road.
- **Alternative 3:** Two lane urbanized cross-section with sidewalks on both sides of the road and bike lanes within the roadway width, including culvert upgrades south of Kramp Road.

This Environmental Impact Study report documents the existing environmental conditions based on background review and ecological field investigations, evaluates and identifies significant natural heritage features, describes the proposed Project works, assesses potential environmental impacts, and outlines mitigation measures, monitoring requirements and restoration/enhancement opportunities to ensure the proposed development will not negatively impact natural features or their functions. This report is intended to fulfill the requirements for an Environmental Impact Study in accordance with the Woolwich Township Official Plan (2022), Regional Official Plan (Region of Waterloo, 2015), Greenlands Network Implementation Guide (Region of Waterloo, 2016), the Provincial Policy Statement (2020), and the Natural Heritage Reference Manual’s guidelines (Ministry of Natural Resources and Forestry, 2010).

Effective January 1, 2023, amendments to the Planning Act (1990) and Conservation Authorities Act (1990) have limited the rights of conservation authorities to comment on land use planning decisions unless the matters are related to natural hazard policies. AECOM has developed a Terms of Reference for the Environmental Impact Study report in consultation with the Grand River Conservation Authority prior to January 1, 2023, as such, this report generally follows the scope of work approved by the Grand River Conservation Authority in 2022. The approved scope of work is outlined in **Section 1.2**.

1.1 Study Area

The Study Area encompasses a 1.2 kilometres length of Greenhouse Road where the proposed reconstruction and extension is located. The existing roadway for proposed reconstruction extends for approximately 870 metres from Highway 7 (Victoria Street North) to the termination point at an existing cul de sac, approximately 75 metres south of Kramp Road within the Township’s Ward 3 boundary (Councillors Bonnie Bryant and Kayla Grant). The right of way for this road extends an additional 320 metres south beyond the cul de sac to the existing rail corridor. The limits of all Alternatives possess the same boundaries which include the Construction Disturbance Area as shown on **Figure A1 – Appendix A**. The Construction Disturbance Area is the outermost limit that will be impacted by construction activities.

The Study Area includes 120 metres of adjacent lands around the Construction Disturbance Area along the 1.2 kilometres length of Greenhouse Road (refer to **Appendix A – Figure A1**). The 120 metres of adjacent lands was applied around the Construction Disturbance Area to allow for the identification of natural heritage features on adjacent lands as defined by the Natural Heritage Reference Manual (Ministry of Natural Resources and Forestry, 2010) through desktop background review. The larger Environmental Assessment Study Area is also shown on **Figure A1**. The existing section of Greenhouse Road within the Study Area provides driveway access to the Belgian Nursery (#2615 Victoria Street North), Grobe Nursery (#1787 Greenhouse Road), and National Engineered Fasteners (#1747 Greenhouse Road). It also provides maintenance access to the stormwater management pond at the northeast corner of the Hopewell Crossing subdivision and to a Union Gas inspection station and includes intersections with Loxleigh Lane and Kramp Road/Hopewell Crossing Drive.

The Study Area is comprised of residential, commercial, industrial, and institutional land uses, along with the Breslau Provincially Significant Wetland Complex which are apart of Core Environmental Features as identified by the Regional Official Plan (Region of Waterloo, 2015) and the Woolwich Township Official Plan (2022), which is discussed further in **Sections 2.3.1** and **2.3.2** respectively. Additionally, the Study Area contains the Natural Heritage System for the Growth Plan for the Greater Golden Horseshoe (2019) as well as the Grand River Conservation Authority's Regulation Limit, which are discussed further in **Sections 2.2.2** and **2.2.6** respectively. These areas are subject to provincial and municipal natural heritage policies and are mapped on **Figure A2**.

1.2 Scope of Work

This report follows the scope of work as outlined in the *Environmental Impact Study Terms of Reference for Greenhouse Road Reconstruction Project – Breslau* (hereafter referred to as the Terms of Reference and provided in **Appendix B**) that was approved by Grand River Conservation Authority on December 2, 2022 (consultation began prior to amendments to the Planning Act and Conservation Act that came into effect on January 1, 2023). The natural heritage (terrestrial and aquatic) existing conditions within the Study Area were documented and assessed based on a combination of background information review and field investigations, and include the following:

- Identification of natural heritage features and policy areas, including but not limited to Provincially Significant Wetland, Areas of Natural and Scientific Interest, Significant Woodlands, and Environmentally Sensitive Areas.
- Inventory of biological features including:
 - Vegetation communities based on Ecological Land Classification protocol for Southern Ontario (Lee et al., 1998);
 - wetland delineation using the Ontario Wetland Evaluation System Southern Manual (Ministry of Natural Resources and Forestry, 2022);
 - incidental wildlife observations (e.g., breeding birds and amphibians) and bird nest checks of potential nesting structures completed in conjunction with other surveys;
 - connectivity Assessment in accordance with the Region of Waterloo Greenlands Network Implementation Guideline (2016) to identify potential Linkages;
 - aquatic resources and fish habitat (e.g., watercourses and drainage features);
 - Species at Risk and their habitats; and,
 - Significant Wildlife Habitat (Ecoregion 6 E).
- A preliminary Species at Risk screening and Significant Wildlife Habitat screening.
- An impact assessment to describe any direct or indirect effects associated with the proposed works.

Additionally, a high-level fluvial geomorphic assessment was undertaken for the three watercourses within the Study Area, which includes:

- A desktop assessment summarizing the background information related to the watercourses;
- A field reconnaissance survey completed in November 2022; and,
- A crossing assessment of the existing watercourse crossing closer to the Highway 7 intersection to ensure that the proposed crossing structure has considered the fluvial characteristics of the existing watercourse.

Finally, a stormwater management impact assessment and preliminary stormwater management design was completed to include details of Greenhouse Road drainage for existing and proposed conditions in a separate Stormwater Management Memorandum (AECOM, 2023a) which include the following:

- Development of Stormwater Management design criteria;
- Update and revision to the existing hydrologic and hydraulic model; and,
- Preparation of Conceptual Stormwater Management design options.

The fluvial geomorphology, and stormwater management impact assessments outlined in the Terms of Reference will be provided in a separate Fluvial Geomorphology Memorandum and Stormwater Management Memorandum. Key findings from the Fluvial Geomorphology Report and stormwater management impact assessments have been summarized in this Environmental Impact Study.

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 within the Study Area.

2.1 Federal

2.1.1 Fisheries Act, 1985 (amended 2019)

The Fisheries Act was amended on June 21, 2019, and 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'; 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. If project proponents are unable to reduce the risk of a harmful alteration, disruption, or destruction to fish habitat or death of fish through the implementation of Fisheries and Oceans Canada Measures to Protect Fish and Fish Habitat, including the use of applicable Standards and Codes of Practice, or if a project does not fall under the exclusion criteria presented on the Fisheries and Oceans Canada Projects Near Water website, those projects may be subject to a Request for Review by Fisheries and Oceans Canada. Upon submission of a Request for Review, Fisheries and Oceans Canada will determine whether the proposed works are likely to cause a harmful alteration, disruption, or destruction to fish habitat or the death of fish.

If death of fish, or harmful alteration, disruption, or destruction to fish habitat is likely to result from a project, the proponent will be required to obtain a Fisheries Act Authorization from Fisheries and Oceans Canada. 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 Species at Risk Act protects and provides recovery strategies for Species at Risk listed as Extirpated, Endangered or Threatened species under Schedule 1 of the Act. With respect to terrestrial Species at Risk, 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 Endangered and Threatened under the Species at Risk Act 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 the Species at Risk Act receive habitat protection on non federal lands under the Endangered Species Act (2007) (refer to **Section 2.2.3**). Species that do not receive protection under the Endangered Species Act and do not have Critical Habitat identified may be afforded protection under other legislation such as the Migratory Birds Convention Act (1994) (refer to **Section 2.1.3**). In the case of aquatic Species at Risk, the Species at Risk Act 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 the Species at Risk Act receive management initiatives to prevent them from becoming Endangered and Threatened, but do not receive individual or habitat protection under the Species at Risk Act.

Permits are generally required by those persons and organizations conducting activities that may affect species listed on Schedule 1 of the Species at Risk Act, 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 (for example, nest or den). Under Section 73 of the Species at Risk Act, a permit may be issued to engage in an activity affecting a listed wildlife species or any part of its Critical Habitat or residences.

2.1.3 Migratory Birds Convention Act, 1994

The Migratory Birds Convention Act is intended to protect migratory birds, their eggs, and their active nests. The Act includes protections for more than 700 species of birds. The Migratory Birds Convention Act generally prohibits the possession, destruction, and harm of migratory birds and or their nests while there is a live bird or a viable egg in it with the exception of 18 species that reuse their nests from year to year. The nests of these 18 species receive year round nest protection whether there are eggs or live birds in there or not. The Migratory Birds Convention Act applies to any listed migratory bird species within the Study Area.

2.2 Provincial

2.2.1 Provincial Policy Statement, 2020

The Provincial Policy Statement came into effect on May 1, 2020, and 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 (1990). Sections 2.1.1 to 2.1.2 outline policies that provide long term protection of natural heritage features including the maintenance, restoration and enhancement of ecological function, biodiversity, and connectivity of natural heritage systems. Linkages between and among natural heritage features, surface water features and groundwater features should also be recognized. Legislative protection is included for the following natural heritage features:

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

Section 2.1.4 prohibits development or site alteration within Provincially Significant Wetland's in Ecoregions 5 E, 6 E and 7 E as well as significant coastal wetlands. Meanwhile, Section 2.1.5 prohibits development and site alteration in Provincially Significant Wetlands in the Canadian Shield north of Ecoregion 5 E, Significant Wildlife Habitat, Significant Woodlands and valleylands in Ecoregions 6 E and 7 E, coastal wetlands not subject to the policies of Section 2.1.4, and Areas of Natural and Scientific Interest 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 Species at Risk provided that appropriate

authorizations and permits are obtained, and conditions therein are carried out in accordance with provincial and federal legislation such as the Endangered Species Act (refer to **Section 2.2.3**), Species at Risk Act (2002) (refer to **Section 2.1.2**) and the Fisheries Act (1985) (refer to **Section 2.1.1**). The following reference materials provide guidance for implementing the natural heritage policies of the Provincial Policy Statement:

- Natural Heritage Reference Manual (Ministry of Natural Resources and Forestry, 2010);
- Significant Wildlife Habitat Technical Guide (Ministry of Natural Resources and Forestry, 2000); and,
- Significant Wildlife Habitat Criteria Schedules For Ecoregion 6 E (Ministry of Natural Resources and Forestry, 2015).

The Significant Wildlife Habitat Criteria Schedules for Ecoregion 6 E (Ministry of Natural Resources and Forestry, 2015) contains information and criteria for identifying Significant Wildlife Habitat, 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 Natural Resources and Forestry generally categorizes Significant Wildlife Habitat into the following five categories:

- Seasonal Concentration Areas;
- Rare Vegetation Communities with a Provincial S Rank¹ of S 1 to S 3;
- Specialized Habitats for Wildlife;
- Habitats of Species of Conservation Concern; and
- Animal Movement Corridors.

Candidate Significant Wildlife Habitat refers to potential habitats that meet the habitat criteria as defined in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6 E (Ministry of Natural Resources and Forestry, 2015) but have not been confirmed as significant through additional detailed studies or as mapped by the Ministry of Natural Resources and Forestry. According to the Natural Heritage Reference Manual (Ministry of Natural Resources and Forestry, 2010), Significant Wildlife Habitat includes the habitat of Species of Conservation Concern, which is defined as the following:

- Species with Provincial S rank assigned by the Natural Heritage Information Centre as S 1 (critically imperiled), S 2 (imperiled) or S 3 (vulnerable);
- Species listed as Special Concern under the Endangered Species Act (2007); and
- Species identified as nationally Endangered or Threatened by the Committee on the Status of Endangered Wildlife in Canada, which are not protected under the Endangered Species Act (2007).

Although Species of Conservation Concern do not receive legal protection under the Endangered Species Act (2007), their habitat is protected under the Provincial Policy Statement and they may also be afforded protection under the Migratory Birds Convention Act (1994), the Ontario Fish and Wildlife Conservation Act (1997), or other planning documents such as municipal official plans and policies.

2.2.2 A Place to Grow Growth Plan for the Greater Golden Horseshoe Office Consolidation, 2020

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Growth Plan; Office Consolidation 2020) is a long term plan for Ontario designed to promote economic growth, increase housing supply, create jobs, and build communities that make life easier, healthier, and more affordable for people of all ages. As one of the most dynamic and fast-growing regions in North America, the Greater Golden Horseshoe is a designation for many

1. *The Natural Heritage Information Centre and the Nature Serve 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).*

people and businesses from other parts of Canada and around the world. To accommodate such growth, an integral part of the Plan's vision is focused on investing in transit infrastructure to support the regional transit network.

According to Section 3.2.5 (d), any impacts on Key Natural Heritage Features in the Natural Heritage System for the Growth Plan, Key Hydrological Features and Key Hydrologic Areas should be avoided or, if not possible, minimized and mitigated to the extent possible as demonstrated through an environmental assessment completed by the Province when planning for the development, optimization, or expansion of existing or planned infrastructure corridors.

2.2.3 Endangered Species Act, 2007

The Endangered Species Act provides protection for provincial Species at Risk 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; classification is based on best-available science and Indigenous traditional knowledge. Species classified as Threatened or Endangered on the Species at Risk in Ontario list are afforded individual and habitat protection under the Endangered Species Act. 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 Species at Risk. Where impacts cannot be avoided or mitigated, a permit process may be pursued. The Ministry of the Environment, Conservation and Parks may grant a permit or other authorization for activities that would otherwise contravene the Endangered Species Act. 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 Species at Risk.

Although listed as Species at Risk under the Endangered Species Act, 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 Migratory Birds Convention Act and Fish and Wildlife Conservation Act (1997), and as Significant Wildlife Habitat under the Provincial Policy Statement (2020), and other planning documents (for example, municipal official plans).

Aquatic Species at Risk are considered those listed as Endangered or Threatened under the Endangered Species Act or the Species at Risk Act (2002). Aquatic Special Concern species are not subject to prohibitions under the Endangered Species Act or Species at Risk Act (2002), but the species and their habitat are considered through the recommendations in applicable Management Plans drafted under the Endangered Species Act or Species at Risk Act (2002) and the general provisions of the Fisheries Act (1985).

2.2.4 Fish and Wildlife Conservation Act, 1997

This act provides protection and regulation (including ownership and possession, sale, facilities, administrative, import/export, transportation, and habitat), for wildlife in Ontario. The Fish and Wildlife Conservation Act includes protection for raptors and other bird species not protected under the Migratory Birds Convention Act. Nests of these bird species can only be removed if a permit is obtained from the Ministry of Natural Resources and Forestry.

2.2.5 Bill 23, More Homes Built Faster Act, 2022

Bill 23 has introduced regulatory changes to the Conservation Authorities Act (1990) and the Planning Act (1990) that came into force on January 1, 2023. Changes to the Conservation Authorities Act (1990) include limits on what conservation authorities are permitted to comment on with respect to development applications and land use planning policies under prescribed Acts as outlined in the new Ontario Regulation 596/22. The new regulation

restricts a conservation authority from reviewing and commenting role as a “municipal” or “other” program or service under sections 21.1.1 and 21.1.2 of the Conservation Authorities Act (1990) unless the matters are related to natural hazards policies in the Provincial Policy Statement (2020) issued under the Planning Act (1990).

2.2.6 Conservation Authorities Act, 1990

Development in proximity to protected watercourses would require review by the Grand River Conservation Authority and the submission of an “Application for Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses”. The Grand River Conservation Authority’s Regulation Limits occurs throughout the Study Area. Regulated limits of watercourses are present within the Study Area and shown on **Figure A2**.

2.3 Municipal

2.3.1 Regional Official Plan, 2015

The Regional Official Plan (Region of Waterloo, 2015) identifies the Greenlands Network which is made up of natural environmental features and the linkages between them. The Greenlands Network, and the ecological functions it provides, contributes to maintaining the environmental health of the Waterloo Region and the Grand River watershed. The Greenlands Network is comprised of the following environmental features:

- **Landscape Level Systems:**

- Environmentally Significant Landscapes;
- Significant Valleys;
- Regional Recharge Areas; and,
- Provincial Greenbelt Natural Heritage System.

- **Core Environmental Features:**

- Habitat of Endangered and Threatened Species
- Provincially Significant Wetlands;
- Environmentally Sensitive Policy Areas;
- Significant Woodlands; and,
- Environmentally Significant Valley Features.

- **Supporting Environmental Features:**

- Environmentally Significant Discharge Areas;
- Environmentally Significant Recharge Areas;
- Linkages;
- Other environmental features designated in Area Municipal Official Plans; and/or
- regulated by the Grand River Conservation Authority.

These features are shown on Map 4 - Greenlands Network of the Regional Official Plan (Region of Waterloo, 2015). Development or site alteration is not permitted within elements of the Greenlands Network unless an Environmental Impact Study is completed, demonstrating that there will be no adverse environmental impacts on the features and their ecological functions (Region of Waterloo, 2015). According to Section 7.G.4 of the Regional Official Plan, the Environmental Impact Study should be prepared in accordance with the Regional Greenlands Network Implementation Guide (Region of Waterloo, 2016). The Implementation Guideline provides detailed guidance on selected Regional Official Plan environmental policies. These policies ensure the elements of the Greenlands Network are to be maintained, enhanced, or wherever feasible, restored.

The Study Area contains elements of the Woolwich Township and Region of Waterloo's Natural Heritage System. This Natural Heritage System consists of Core Environmental Features, which represent significant natural features (i.e., watercourses, wetlands, significant woodlands) and supporting Environmental Features such as Linkages. Linkages are remnant natural areas in the landscape (i.e., urban development, riparian areas and hedgerows) that connect Core Environmental Features and other natural habitat features; by providing avenues that facilitate movement of indigenous organisms among what would otherwise be isolated habitat patches (Region of Waterloo, 2016). This enhances or maintains the viability of populations of indigenous species in the habitat patches by conserving the potential for genetic variability and allowing populations of indigenous species to meet their habitat needs, disperse, and re-colonise environmental features where those species had been extirpated (Region of Waterloo, 2016). Linkages can also be important natural features on their own, or degraded habitat which can be improved through restoration.

2.3.2 Woolwich Township Official Plan, 2022

The Woolwich Township's Official Plan (August 2022 Consolidated Version) outlines the protection of natural heritage features and functions through Chapter 13 of the plan and builds on the Regional Greenlands Network. The Greenlands Network is shown on Map 13.1 of the Township's Official Plan. This network encompasses a system of woodlands, wetlands, watercourses, recharge areas and other natural heritage areas that are connected, or will be connected, through a series of linkages. The policies of this plan therefore seek to maintain, enhance or wherever feasible, restore the elements of the Township's Greenlands Network, including the Grand River and its tributaries for current and future generations.

According to Section 13.7.4 (d) of the Woolwich Township Official Plan (2022), development or site alteration within Core Environmental Features may be permitted for Infrastructure Projects, provided an Environmental Impact Study is submitted. Section 13.7.5 of the Woolwich Township Official Plan (2022) states that development or site alteration will only be permitted on lands contiguous to a Core Environmental Feature or Supporting Environmental Feature where an Environmental Impact Statement, or similar study, is submitted in accordance with the policies in Section 13.13 and has determined to the satisfaction of the Township, the Region, and / or the Province, as appropriate, that approval of the proposed development or site alteration would not result in adverse environmental impacts on the features and ecological functions of the Core Environmental Feature (Woolwich Township, 2022).

The Core Environmental Feature designation identifies environmental features that are provincially or regionally significant (Woolwich Township, 2022), and applies to lands that meet the criteria in the Regional Official Plan (Region of Waterloo, 2015) as:

- Habitat of Endangered Species and Threatened Species;
- Provincially Significant Wetlands;
- Environmentally Sensitive Policy Areas;
- Significant Woodlands;
- Environmentally Significant Valley Features; or
- Significant Areas of Natural and Scientific Interest.

Supporting Environmental Features are environmental features that do not meet the above requirements but are locally significant and meet the following criteria (Woolwich Township, 2022):

- Is designated by the Ministry of Natural Resources and Forestry as a locally significant wetland, including all non provincially Significant Wetlands designated by the Ministry of Natural Resources and Forestry and the Grand River Conservation Authority;
- Is identified as a locally significant woodland;

- Is identified as a locally significant Environmental Linkage by a study or studies completed in accordance with Section 13.13 of this Plan;
- Is identified as a locally significant valley;
- Is identified as a locally significant wildlife habitat area;
- Is identified as a permanent or intermittent watercourse;
- Provides a connection or acts as a buffer or supporting area to environmental features, thus maintaining ecological connection between communities; or
- Performs vital hydrogeological functions, such as serving as headwaters of a stream, groundwater recharge and discharge areas, or fulfils at least three of the following criteria:
 - Is a good quality, representative example of a particular type of ecosystem native to the Township;
 - Contains uncommon or rare ecological communities such as old-growth forests, savannas, prairies, bogs, fens, meadows and so on;
 - Is a natural area of over 1.0 hectare (2.5 acres);
 - Supports a moderate to high diversity of native species and ecological communities due to varied topography, microclimates, soils, and / or drainage;
 - Contains nationally, provincially, or regionally significant species;
 - Contains “special” physical features (including landforms, springs, fossils);
 - Is important or has the potential for ecological research, education and / or passive recreation due to location or features; or
 - Has a high aesthetic or scenic value in the Township.

The Study Area overlaps with Core and Supporting Environmental Features and is shown on **Figure A2**.

According to Section 13.9.5 of the Woolwich Township Official Plan (2022), where an Environmental Impact Study, submitted in accordance with Section 13.13, demonstrates that development may have an adverse environmental impact upon the environmental features and functions of a Supporting Environmental Feature, the Township will undertake one of the following:

- Negotiate an agreement with the owner of the land requiring conditions of approval, or dedication of land to protect lands supporting the environmentally significant features and functions of the Supporting Environmental Feature;
- Request the Province, the Region, or the Grand River Conservation Authority to use powers within their jurisdiction to enable the acquisition of the Supporting Environmental Feature;
- Encourage public and / or private agencies to acquire all or the affected portion of the Supporting Environmental Feature;
- Require a Conservation Easement;
- Consider rehabilitation, restoration, compensation and net-gain as a potential tool to mitigate any potential adverse impacts on the Supporting Environmental Feature; or,
- Refuse the application.

Appendix 2 of the Woolwich Township’s Official Plan (2022) contains supporting natural heritage information specific to the Breslau Settlement Area, which overlaps with the west portion of the Study Area. Appendices of the Township’s Official Plan are a non-statutory component of the Plan and are included to help understand the policy framework and associated schedules (Woolwich Township, 2022).

3. Methods

3.1 Background Review

A desktop review of natural heritage information, including Species at Risk and Species of Conservation Concern occurrences and natural features, was conducted from the following available sources:

- **Ministry of Natural Resources and Forestry’s Natural Heritage Information Centre: Make-a-map feature (2022a) and Ministry of Natural Resources and Forestry’s Land Information Ontario GeoHub database (2022b) for:**
 - Natural heritage features (such as Areas of Natural and Scientific Interest, wooded areas, Provincially Significant Wetlands, Locally Significant Wetlands, unevaluated wetlands, provincial parks);
 - Aquatic Resource Areas;
 - Dam Inventory,
 - Watershed mapping;
 - Wildlife habitats;
 - Aerial Photography; and
 - Natural Heritage Information Centre provincially tracked species.
- **Wildlife Atlases:**
 - Ontario Breeding Bird Atlas (Bird Studies Canada et al., 2006);
 - Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019);
 - Ontario Butterfly Atlas (Toronto Entomologists’ Association, 2022);
 - Bat Conservation International Species Profile and Range Maps (2022);
 - Fisheries and Oceans Canada Aquatic Species at Risk map (Fisheries and Oceans Canada, 2022);
 - E Bird (2022); and
 - I Naturalist (2022).
- **Planning Documents and Guidelines:**
 - Natural Heritage Reference Manual (Ministry of Natural Resources and Forestry, 2010);
 - Species at Risk Public Registry (Environment and Climate Change Canada, 2021);
 - Species at Risk in Ontario List (Ministry of the Environment, Conservation, and Parks, 2018);
 - Grand River Information Network - Open data downloads and online applications (Grand River Conservation Authority, 2020);
 - Significant Wildlife Habitat Technical Guide (Ministry of Natural Resources and Forestry, 2000);
 - Significant Wildlife Habitat Criteria Schedules for Ecoregion 6 E (Ministry of Natural Resources and Forestry, 2015);
 - The Corporation Township of Woolwich Official Plan (Township of Woolwich, 2022);
 - Regional Official Plan (Region of Waterloo, 2015);
 - Region of Waterloo Greenlands Network Implementation Guideline (Region of Waterloo 2016); and,
 - Grand River Conservation Authority Environmental Impact Study Guidelines and Submission Standards for Wetlands (2005).
- **Aerial Photographic Imagery** (Environmental Systems Research Institute Inc., 2021).

It should be noted that several natural heritage studies have been undertaken in support of the following adjacent or overlapping projects. The following reports have also been reviewed:

- Ontario Ministry of Transportation Class EA Greenhouse Road / Highway 7 Intersection (Natural Resource Solutions Inc., 2019);
- Hydrological Investigation Report. Breslau East Connector Road Fountain Street to Greenhouse Road (Sirati and Partners Consultants Limited, 2021);
- Breslau Connector Road Environmental Assessment Report (Natural Resource Solutions Inc., 2021);
- Intersection Improvements at Victoria Street North (Highway 7) & Greenhouse Road, Breslau EA Report (AECOM, 2019);
- Proposed Mixed Use Development Ariss Glen Developments and Thomasfield Homes (Natural Resource Solutions Inc., 2011); and,
- Hopewell Crossing Subdivision (Paradigm Transportation Solutions Limited, 2018).

3.2 Agency Consultation

In addition to the desktop review, data requests were sent to relevant agencies to obtain and confirm natural heritage data that was not publicly available from online sources. Agency correspondence is provided in **Appendix C. Table 3-1** below summarizes agency consultation completed for this Project and the information received from each agency to date.

Table 3-1: Summary of Agencies Correspondence

Agency	Correspondence Date	Information Received / Comments
Grand River Conservation Authority	September 29, 2022	■ AECOM met with the Grand River Conservation Authority to discuss the Terms of Reference requirements and wetland delineation requirements. ■ Grand River Conservation Authority provided information on fish habitat within the watercourses and drainage crossings. ■ Grand River Conservation Authority provided recommendations for the culverts in order to accommodate and maintain upstream water levels.
Grand River Conservation Authority	October 5, 2022	■ Ontario Wetland Evaluation System Record for Breslau Provincially Significant Wetland Complex. ■ Natural heritage information pertaining to fish habitat, sensitive timing windows and Species at Risk records.
Grand River Conservation Authority	October 14, 2022	■ Site visit with Grand River Conservation Authority staff (Anthony Zammit) to verify wetland delineation completed by AECOM.
Grand River Conservation Authority	December 2, 2022	■ Grand River Conservation Authority deemed the Terms of Reference for this Environmental Impact Statement as acceptable. ■ Grand River Conservation Authority offered additional comments to be incorporated into this Environmental Impact Statement.
Ministry of Natural Resources and Forestry	January 25, 2023	■ Ontario Wetland Evaluation System Report for Breslau Provincially Significant Wetland Complex. ■ Natural heritage information pertaining to fish habitat, sensitive timing windows and fish species records.
Ministry of the Environment, Conservation, and Parks	January 23, 2023	■ No data received to date

3.2.1 Field Investigations

Field investigations were conducted in accordance with the Terms of Reference (**Appendix B**) to characterize the existing conditions of the aquatic and terrestrial ecosystems within the Study Area. The following sections detail the field investigation methods undertaken for this Project. A summary of field investigations conducted in support of this Environmental Impact Study report is provided in **Table 3-2**, including dates, timing, weather information and field investigators who completed the work, where applicable. Representative photos of terrestrial and aquatic habitats are provided in **Appendices D1** and **D2**.

3.2.2 Fish Habitat Assessment

An AECOM aquatic ecologist undertook aquatic habitat assessments to characterize aquatic features and functions within the Study Area. Investigations were conducted for all aquatic features identified during the background review. Data collected during field investigations for these features included:

- Flow description (source of flow, permanency/seasonality, low flow conditions);
- Characterization of channel dimensions and stream morphology including:
 - Runs – typically found at the head of a pool with water velocity similar to a riffle but with greater depth and surface that is typically not agitated,
 - Riffles – relatively shallow, fast turbulent flow where the water's surface is typically broken
 - Pools – deep areas with a relatively low flow velocity and a smooth unagitated surface, an
 - Flats – low flowing water with a smooth unagitated surface that are not as deep as a pool.
- Substrate composition (including clay, silt, sand, gravel, cobble, rock, boulder, muck and detritus) and instream vegetation and other cover elements (such as woody debris, undercut banks, boulders);
- Characterization of riparian habitat and surrounding natural features and land uses (including wetland, agriculture, etcetera);
- Indicators of water quality – water clarity, water colour, presence and type of macrophytes and algal growth, evidence of runoff;
- Incidental observations of fish community species composition and life history habitat elements (such as spawning, rearing, nursery habitat); and,
- Basic field parameters such as pollution sources (such as tile drain discharges, other piped discharges and road runoff).

Fish community sampling was not required as the fish community data obtained through the background review and previous assessments for the Study Area was found to be sufficient. Field notes taken during the Aquatic Habitat Assessment are provided in **Appendix E**.

Table 3-2: Field Investigation Overview

Field Investigation	Survey Date (s)	Field Investigator(s)*	Time of Survey (24hrs)	Weather Conditions
Aquatic Habitat Assessment	October 21, 2022	■ Samuel Turner	10:00 to 13:30	Air Temperature: 5°C to 10°C Cloud Cover: 0 percent Beaufort Wind Scale: Precipitation: No Precipitation
Ecological Land Classification and Significant Wildlife Habitat Assessment	October 14, 2022	■ Nataliya Simonova ■ Jessica Ballie	9:30 to 12:45	Air Temperature: 9°C to 10°C Cloud Cover: 5% to 20% Beaufort Wind Scale: 0 to 1 Beaufort Precipitation: No Precipitation
Wetland Delineation	October 13, 2022	■ Nataliya Simonova	9:00 to 14:00	Air Temperature: 9°C to 10°C Cloud Cover: 5% to 20% Beaufort Wind Scale: 0 to 1 Beaufort Precipitation: No Precipitation
	October 14, 2022	■ Nataliya Simonova ■ Jessica Ballie ■ Grand River Conservation Authority	13:00 to 15:00	Air Temperature: 9°C to 10°C Cloud Cover: 5% to 20% Beaufort Wind Scale: 0 to 1 Beaufort Precipitation: No Precipitation
Fluvial Geomorphological Assessment	November 17, 2022	■ Francisco Amaya ■ Kathy RobitailleFeick	8:30 am to 11:00 am	Air Temperature: Temperature not recorded Cloud Cover: Mix of sun and clouds Beaufort Wind Scale: Wind scale not recorded Precipitation: No Precipitation
Bird Nest Checks and Incidental Wildlife Observations	October 13, 2022	■ Nataliya Simonova	See above – survey conducted in conjunction with above surveys	
	October 14, 2022	■ Nataliya Simonova ■ Jessica Ballie	See above – survey conducted in conjunction with above surveys	
	October 21, 2022	■ Samuel Turner	See above – survey conducted in conjunction with above surveys	

3.3 Vegetation Communities and Plants

In order to acquire up-to-date information on the existing natural heritage conditions within the Study Area, field investigations were conducted on October 13 and 14, 2022 by AECOM ecologists. Vegetation community data from background reports (refer to **Section 3.1**) and aerial imagery was used to delineate vegetation communities that were not accessible during field investigations. Field investigations were completed to supplement and update available background information as described in **Section 3.2.1**.

3.3.1 Vegetation Community Classification and Delineation

Vegetation communities within the Study Area were classified using the Southern Ontario Ecological Land Classification 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 inventory and representative photographs were also recorded for each vegetation patch.

3.3.2 Community Sensitivity

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

■ Co-efficient of Conservatism:

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 Co-efficient of Conservatism 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 Co-efficient of Conservatism of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs. General habitat values associated with the Co-efficient of Conservatism values are:

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

■ Floristic Quality Index:

The floristic quality of an area is reflected in the mean value of Co-efficient of Conservatism. For example, an old field or grazed woodlot would tend have a low mean Co-efficient of Conservatism; 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 many species' specific habitat requirements and a generally undisturbed condition. A community with a Floristic Quality Index between 1 to 19 will be considered to be of low vegetative quality; communities with a Floristic Quality Index between 20 to 35 will be considered to have a high vegetative quality and communities with a Floristic Quality Index above 35 will be considered of "Natural Area" Quality.

■ Co-efficient of Wetness:

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: occurs almost always in wetlands under natural conditions (estimated greater than 99% probability);
- Facultative Wetland: usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67 %to 99% probability);
- Facultative: equally likely to occur in wetlands or non-wetlands (estimated 34% to 66% probability);
- Facultative Upland: occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1% to 33% percent probability); and,
- Upland: occurs almost never in wetlands under natural conditions (estimated less than 1% probability).

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

3.3.3 Wetland Delineation

On October 13, 2022, the wetland delineation was led by an Ontario Wetland Evaluation System certified AECOM ecologist and conducted in accordance with the criteria outlined in the Ontario Wetland Evaluation System Southern Manual (Ministry of Natural Resources and Forestry, 2022). The boundaries of the Breslau Provincially Significant Wetland Complex were delineated and staked within the Construction Disturbance Area. AECOM met with Grand River Conservation Authority (Tony Zammit) on October 14, 2022 to review the delineated wetland boundaries.

Field notes taken during the Ecological Land Classification and Wetland Delineation surveys are provided in **Appendix E**.

3.4 Fluvial Geomorphology Assessment

The general methods from the Fluvial Geomorphological Assessment completed on November 17, 2022 are provided below.

Reaches are generally defined as a length or segment of a watercourse with similar physical characteristics and a setting that remains nearly constant along their length. A selected reach displays relative homogeneity in channel form, functions and process, and are influenced by similar controlling (discharge, slope) and modifying factors (vegetation) to which the channel has become or is becoming adjusted. Reach breaks were delineated through desk-based assessment of tributary locations, channel gradient, surficial geology, valley setting, sinuosity, and riparian vegetation using Geographic Information Systems layers, and previous reports. The field assessment was completed to verify the reach breaks and identify local geomorphological form and function of the Hopewell Creek East Tributaries in the vicinity of the proposed road extension. The following components were part also of the field-based assessment:

- Identification of the hydraulic regime of each feature;
- Floodplain access characteristics;
- Rapid Geomorphic Assessment;
- Identification of stability and dominant channel process; and,
- Photographic Record.

During the field reconnaissance, basic geomorphological data were collected. This included: the hydraulic regime of each feature, bed materials, surrounding land use, riparian vegetation, degree of channel-floodplain connectivity, and the location of erosion and channel modification. An overview of site observations and interpretations are provided in **Section 4.10**. The full Fluvial Geomorphological Assessment is documented under a separate cover titled Greenhouse Road Reconstruction Project Fluvial Geomorphological Assessment Memorandum (AECOM, 2023b).

3.5 Stormwater Impact Assessment and Conceptual Stormwater Management Design

The stormwater management impact assessment included a background review of design standards and guidelines as well as available background data and reports in order to identify Stormwater Management Criteria.

AECOM completed Stormwater Management Facility Design for the proposed Hopewell Crossing Development in 2018. A hydrologic/hydraulic computer model (PCSWMM) was developed and used to support the design. For the Greenhouse Road Reconstruction and Extension Project, the existing model was updated to include details of Greenhouse road drainage for existing conditions. Impacts were identified based on the model results of existing and proposed conditions and the memorandum proposes conceptual stormwater management design options to satisfy the stormwater management criteria.

The full stormwater assessment is documented under a separate cover titled Greenhouse Road Reconstruction Project Draft Stormwater Impact Assessment and Conceptual Stormwater Management Design Memorandum (AECOM, 2023a).

3.6 Incidental Wildlife

Incidental wildlife observations, as well as the identification of preferred wildlife habitat conditions were documented during the field investigations conducted by AECOM ecologists. Incidental wildlife observations included wildlife species sightings, tracks, scat, as well as any other wildlife activity. Field notes documenting incidental wildlife observations can be found in **Appendix E**.

3.7 Connectivity Assessment

The purpose of a Connectivity Assessment is to ensure Linkages are identified, maintained, or established in accordance with the Provincial Policy Statement (2020) and the Regional Official Plan (Region of Waterloo, 2005). An ecological function assessment was completed per the Natural Heritage Reference Manual (Ministry of Natural Resources and Forestry, 2010) and Guidelines for Determining Linkages detailed in the Region of Waterloo Greenlands Network Implementation Guideline (2016) using the results of background information review and field investigations.

3.8 Significant Wildlife Habitat Screening

The Significant Wildlife Habitat Criteria Schedules for Ecoregion 6 E (Ministry of Natural Resources and Forestry, 2015) contains information and criteria for identifying Significant Wildlife Habitat, 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 criteria were compared against site conditions to identify any candidate or confirmed Significant Wildlife Habitat. A screening for Species of Conservation Concern was completed as per **Section 3.9** below.

3.9 Species at Risk Habitat Screening

Special consideration was given to identifying any Species of Conservation Concern or Species at Risk within or in the vicinity of the Study Area. Desktop Species of Conservation Concern and Species at Risk habitat screenings were conducted using the sources listed in **Section 3.1** within the Study Area. Species at Risk and Species of Conservation Concern with ranges overlapping with, or recent occurrence records within the Study Area were identified and then screened by comparing their habitat requirements to the habitat conditions present on-site as determined through the background information review (**Section 3.1**) and field investigations (**Section 3.2.1**). The potential for the species to occur within the Study Area was determined through a probability of occurrence whereby the following rankings were applied:

- **Low Probability:** no suitable habitat for the species and no occurrence of the species incidentally observed through field reconnaissance within the Study Area but there is a known species record in the general area;
- **Medium Probability:** potentially suitable Species at Risk habitat identified within the Study Area, but no occurrence of the species incidentally observed through field reconnaissance although there is a known species record in the general area; and,
- **High Probability:** good quality Species at Risk habitat identified within the Study Area and known species record in the Study Area (either through current field assessment or background information).

4. Existing Conditions

4.1 Physical Environment

4.1.1 Physiography, Topographic Features and Geology

The Study Area is located within the Waterloo Hills physiographic region of southern Ontario and extends into the eastern part of the Regional Municipality of Waterloo. The overburden soil in the Study Area is comprised of localized topsoil, fill over fill materials, underlain by sand and silt layers, and sand, silty or clayey soil deposits (Peto MacCallum Limited, 2011).

The Township of Woolwich is located in an extensive area of alluvial terraces and low-lying lands of the Grand River spillway system, adjoining the hilly region (Peto MacCallum Limited, 2011). The land is typically gently rolling and hilly, with a local plateau along Greenhouse Road (at elevation 325 metres) (Natural Resource Solutions Incorporated, 2019). The Study Area is located in the Guelph Drumlin Field physiographic region. The general landform pattern in the Guelph Drumlin Field consists of drumlins or groups of drumlins fringed by gravel terraces and separated by valleys (Sirati & Partners Consultants Limited, 2021). Tributaries of the Grand River flow through these valleys (Sirati & Partners Consultants Limited, 2021).

4.1.1.1 Bedrock Geology

Based on the hydrogeological site assessment conducted by Peto MacCallum Limited (2011), the bedrock on the west side of Greenhouse Road is anticipated to be at elevations ranging from 297.0 (approximately 25 metres below ground surface) in the north of the Study Area to 275.0 (approximately 47 metres below ground surface) in the south of the Study Area. The bedrock on the east side of Greenhouse Road is anticipated to be at an average elevation of 284.0 (approximately 40 metres below ground surface). Bedrock is comprised of grey limestone with green shale interbreeding (Peto MacCallum Limited, 2011).

4.1.1.2 Surficial Geology

The surficial geology of southern Ontario consists largely of varying types and thicknesses of deposits emplaced primarily during the Quaternary period, these surficial deposits overly a bedrock terrain (Ministry of Natural Resources and Forestry, 2012b). The Ministry of Natural Resources and Forestry has mapped southern Ontario's surficial geology, which illustrates surficial deposit types, geological features and general bedrock types (Ministry of Natural Resources and Forestry, 2012b). Map units are numbers that correlate with surficial deposit and material types which are shown in **Table 4-1** below.

Table 4-1: Southern Ontario Surficial Geology Map Units

Material	Map Unit
Fill:	21
Organic Materials:	20
Silt & Clay:	8, 8a, 9b, 10, 12, 13, 15, 18, 19
Sand & Gravel:	6, 7, 9, 11, 12, 14, 16, 18, 19
Till (Diamicton):	5, 5a, 5b, 5c, 5d, 5e
Sedimentary Bedrock:	3, 4
Precambrian bedrock:	1, 2

Note. Adapted from the *Surficial Geology of Southern Ontario* (Ministry of Natural Resources and Forestry, 2012b).

Surficial soil within the Study Area is dominated by Port Stanley Till (Ministry of Natural Resources and Forestry, 2012b; Sirati & Partners Consultants Limited, 2021) consisting of stone-poor, sandy silt to silty sand-textured till

(5b). The southern end of the Study Area consists of ice-contact stratified deposits (6) that is associated with esker glacial deposit. Surficial geology based on map units are mapped on **Figure A3**.

4.1.2 Surface Water and Drainage

Surface drainage in the Study Area is generally from southeast to northwest within the Hopewell Creek subwatershed, which is part of the Grand River watershed (AECOM, 2023a). The large wetland in the east part of the Study Area drains to a culvert under Greenhouse Road to a catchbasin on the west side of the road. A review of aerial photography showed that drainage flowed northwest through the Study Area in a surface swale in the years prior to 1980. Due to road and culvert improvements and maintenance, as well as agricultural activities, it appears that the southwestern portion of the Study Area drains easterly towards a catchbasin at Greenhouse Road and flows from these two portions of the Study Area enter the catchbasin and flow north, under Highway 7. From this point it appears that the drainage is tiled, but eventually outlets to Hopewell Creek, approximately 725 metres north of Highway 7. Surface Drainage within the Study Area is mapped on **Figure A4**.

4.1.3 Hydrology and Hydrogeology

According to the Township's Official Plan (2022), Source Water Protection Areas include Wellhead Protection Areas and vulnerability scores which are used to protect municipal water service wells. Vulnerability scores for Well Head Protection Areas range from 2 to 10, with 2 representing low vulnerability and 10 representing high vulnerability (Grand River Conservation Authority, 2020). This classification allows for varying degrees of management relative to the vulnerability of the underlying groundwater to contamination, the importance of the well to the capacity of the municipal water services, and the length of time groundwater within the area will take to reach the municipal water service well (Township of Woolwich, 2022). As shown on **Figure A4**, the entire Study Area is located within a Wellhead Protection Area with a low vulnerability score of 2 (Grand River Conservation Authority, 2020).

4.1.4 Stormwater Management Assessment

The existing on-site drainage conditions are summarized as follows from the standalone Stormwater Impact Assessment and Conceptual Stormwater Management Design Memorandum (AECOM, 2023a).

There were two watercourse crossings that connected the wetlands located west and east of Greenhouse Road; these are summarized in **Table 4-2**. A review of background information identified a watercourse crossing along Greenhouse Road, located immediately north of Loxleigh Lane (fisheries assessment identified as W C 0 2). As mentioned in **Section 4.2.2.2**, there were no defined channel banks observed or evidence of substrate sorting that would indicate channel forming flows occur in this feature. The W C 0 2 feature has therefore been excluded from the Stormwater Management Assessment.

Table 4-2: Summary of Crossings

I D	Watercourse	Location	Culvert Material	Culvert Size
Crossing #1 (Fisheries assessment I D W C 0 1)	Tributary to Hopewell Creek	125 m south of Highway 7 (Victoria Street North)	Twin Corrugated Steel Pipe	400 mm
Crossing #2 (Fisheries assessment I D W C 0 3)	Airport Creek	80 m North of CNR – Metrolinx Crossing	Corrugated Steel Pipe	450 mm

Upstream drainage to Crossing 2 (fisheries assessment identified as W C 0 3) includes a new residential subdivision with Phase 1 of the Hopewell Crossing development and a small wetland area. A Stormwater Management Pond is included in the new development area; its outflow discharges to the small wetland and then crosses the existing trail (future Greenhouse Road extension) to the east. The total drainage area is about 25 hectares. Downstream of Crossing 2, water in the channel connects to Airport Creek (Branch B drain) and then flows south under the rail corridor.

The land in the Study Area is relatively flat, with a local plateau along Greenhouse Road (at elevation 326 metres) and a large wetland to the east (elevation approximately 321 metres) within a localized low area. The elevation at the location close to Crossing 2 is about 321.6 metres. Fill material (i.e., sandy silt, silty sand, sand and gravel) extended to depths ranging from 1.5 metres to 2.3 metres for all boreholes except for Borehole 5. During and upon completion of drilling, water entering the open boreholes was observed in all boreholes except Borehole 4, resulting in soil cave-in of the boreholes. The soil cave-in depth in the boreholes ranged from 2.4 metres to 4.6 metres. The accumulated groundwater (short-term) was encountered at an approximate depth ranging from 0.9 metres to 5.0 metres below the existing pavement surface.

4.2 Aquatic Environment

4.2.1 Watershed

The background information sources detailed in **Section 3.1** were reviewed prior to field investigations to gain an understanding of the aquatic natural heritage features within the Study Area. The watercourses identified in the Study Area are located in the Hopewell Creek (Sites W C 0 1 and W C 0 2) and East Side Lands (Site W C 0 3) subwatersheds within the larger Grand River watershed. The Hopewell Creek subwatershed originates north of the unincorporated rural community of Ariss from which the main channel of Hopewell Creek flows generally southwest to the confluence with the Grand River immediately south of the Victoria Street North bridge over the Grand River. This watershed is comprised of mixed agricultural and small rural community land use and is highly influenced by these agricultural activities such as nutrient loading from fertilizer, soil, and road runoff (Riverstone Environmental Solutions Incorporated, 2019). Recent studies of nutrient loading in the Hopewell Creek subwatershed have been conducted by researchers at the University of Waterloo (see Irvine *et al.*, 2019). Most of the land in the Study Area is located in the Hopewell Creek subwatershed and drains northwestward to the main channel of Hopewell Creek. A smaller portion of the Study Area drains south of Greenhouse Road and across the CN Rail – Metrolinx rail corridor, which constitutes the uppermost reach of this drain / watercourse (Branch B or Airport Creek) in the East Side Lands subwatershed that is bound generally by the Grand River west of Fountain Street, Shantz Station Road in the east, and the limits of the City of Cambridge in the south. The land use within this subwatershed is predominantly rural, consisting of agricultural lands (44 percent), rural and small urban residential areas (20%), and natural heritage features (23%) (Grand River Conservation Authority, 2016).

The unnamed tributaries to Hopewell Creek – identified as W C 0 1 and W C 0 2 – convey outflow from the Breslau Provincially Significant Wetland and roadside drainage along Greenhouse Road northwestward across Highway 7 (Victoria Street North) to the main channel of Hopewell Creek. The main channel of Hopewell Creek contains a mixed coolwater / warmwater fish community along its length, but also provides habitat for coldwater species such as Brown Trout (*Salmo trutta*) near the confluence with the Grand River in Breslau (Riverstone Environmental Solutions Incorporated, 2019). Consequently, W C 0 1 and W C 0 2 are classified as having a coldwater thermal regime according to available background information sources (Ministry of Natural Resources and Forestry, 2022b) and consultation with Grand River Conservation Authority (2022) due to their support of trout species and Northern Pike (*Esox lucius*) habitat in the main channel of Hopewell Creek. The East Side Lands tributary (W C 0 3) – also known as Branch B municipal drain or Airport Creek – drains southward along Greenhouse Road to a culvert crossing the Metrolinx Rail line and eventually flows through the Region of Waterloo International Airport before joining Randal Drain which outlets to the Grand River southwest of the Fairway Road North bridge (Ontario Ministry of Agriculture, Food, and Rural Affairs, 2022). Branch B is classified as a Fisheries and Oceans Canada Class E municipal drain, which is an open drain with a permanent flow regime and spring spawning period (Mandrak and Bouvier, 2014), and a warmwater thermal regime that supports a relatively diverse assemblage of fish species (Grand River Conservation Authority, 2022; Ministry of Natural Resources and Forestry 2022b).

Fish community data obtained from available background information sources and information from the Grand River Conservation Authority and Ministry of Natural Resources and Forestry are presented in **Table 4-3** to **Table 4-5**. No records of aquatic Species at Risk are present within the Study Area.

Table 4-3: Fish Community Data for Hopewell Creek in the Vicinity of the Study Area

Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status	Species at Risk Act Status	Thermal Regime	Source ²
Brown Bullhead	<i>Ameiurus nebulosus</i>	S 5	N / A	N / A	Warmwater	Riverstone
Brown Trout	<i>Salmo trutta</i>	S N A	N / A	N / A	Coldwater	Riverstone
Creek Chub	<i>Semotilus atromaculatus</i>	S 5	N / A	N / A	Coolwater	Riverstone
Largemouth Bass	<i>Micropterus salmoides</i>	S 5	N / A	N / A	Warmwater	Riverstone
Longnose Dace	<i>Rhinichthys cataractae</i>	S 5	N / A	N / A	Coolwater	Riverstone
Northern Pike	<i>Esox lucius</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
Trout species	-	-	-	-	Coldwater	GRCA, MNRF
White Sucker	<i>Catostomus commersonii</i>	S 5	N / A	N / A	Coolwater	Riverstone

Notes: 1. S 5 – Secure, S N A – No Status Rank (Exotic)

2. GRCA: Grand River Conservation Authority (2022), MNRF: Ministry of Natural Resources and Forestry (2022b), Riverstone Environmental Solutions Incorporated (2019)

Table 4-4: Fish Community Data for Hopewell Creek Tributaries (W C 01 and W C 02)

Common Name	Scientific Name	S-Rank	Endangered Species Act Status	Species at Risk Act Status	Thermal Regime	Source ¹
Northern Pike	<i>Esox lucius</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
Trout species	-	-	-	-	Coldwater	GRCA, MNRF

Note: 1. GRCA: Grand River Conservation Authority (2022), MNRF: Ministry of Natural Resources and Forestry (2022b)

Table 4-5: Fish Community Data for Branch B/Airport Creek (W C 03)

Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status ²	Species at Risk Act Status ²	Thermal Regime	Source ¹
Blacknose Dace	<i>Rhinichthys atratulus</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
Bluntnose Minnow	<i>Pimephales notatus</i>	S 5	N / A	N / A	Warmwater	GRCA, MNRF
Brook Stickleback	<i>Culea inconstans</i>	S 5	N / A	N / A	Warmwater	GRCA, MNRF
Central Mudminnow	<i>Umbra limi</i>	S 5	N / A	N / A	Warmwater	GRCA, MNRF
Creek Chub	<i>Semotilus atromaculatus</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
Fathead Minnow	<i>Pimephales promelas</i>	S 5	N / A	N / A	Warmwater	GRCA, MNRF
Longnose Dace	<i>Rhinichthys cataractae</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
Northern Redbelly Dace	<i>Chrosomus eos</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF
White Sucker	<i>Catostomus commersonii</i>	S 5	N / A	N / A	Coolwater	GRCA, MNRF

Note: 1. GRCA: Grand River Conservation Authority (2022), MNRF: Ministry of Natural Resources and Forestry (2022b)

The Grand River Conservation Authority recommended the generic spring and fall in-water work timing windows for the watercourses within the Study Area; however, more refined timing window restrictions were received via correspondence with the Ministry of Natural Resources and Forestry. Based on the thermal regime classifications and the records of fish species present, the Ministry of Natural Resources and Forestry issued in-water work timing restrictions **between October 1 and June 30 of the any given year for W C 0 1 and W C 0 2 and no in-water work between April 1 and June 30 in any given year for W C 0 3.**

4.2.2 Fish Habitat

AECOM ecologists completed a field assessment of aquatic habitat features on October 21, 2022 for the three features identified during the background review. The Hopewell Creek tributaries (W C 01 and W C 0 2) and Branch B/Airport Creek (W C 0 3) were assessed along the Greenhouse Road right of way and within the larger Study Area, where property access restrictions allowed. Aquatic habitat features are mapped on **Figure A5**.

4.2.2.1 Hopewell Creek Tributary W C 0 1

Hopewell Creek Tributary W C 01 generally traverses southeast to northwest through the Study Area, crossing the north end of Greenhouse Road and then Victoria Street North towards the main channel of Hopewell Creek. According to background information sources and correspondence with the Grand River Conservation Authority (2022), the thermal regime is coldwater (Ministry of Natural Resources and Forestry, 2022b). The upstream extent of the watercourse originates east of Greenhouse Road from the Breslau Provincially Significant Wetland and is conveyed via the roadside drainage ditch westward across Greenhouse Road through double 400 millimetres corrugated steel pipe culverts. West of Greenhouse Road, the channel exits the roadside ditch through a second set of double corrugated steel pipe culverts and continues westward through a poorly defined swale towards an outcrop of marsh before crossing Highway 7 (Victoria Street North) and joining agricultural field drainage towards Hopewell Creek. The watercourse was channelized and lacking natural morphological structure for most of the length through the Study Area, and was entirely dry at the time of assessment; however, the watercourse is known to flow intermittently at other points in the year, from knowledge gained of this feature from previous AECOM project experience. The mean bankfull width of the channel was 1.5 metres and mean bankfull depth was 0.3 metres upstream (east) of Greenhouse Road, while downstream (west) the mean bankfull width was 2.0 metres and mean bankfull depth was 0.4 metres. The substrate consisted of a mixture of rip-rap armouring and exposed clay soil. Instream vegetation consisted of hybrid cattails (*Typha* species) and common reed (*Phragmites australis*) within the roadside drainage ditch portions and reed canary grass (*Phalaris arundinacea*) and terrestrial herbaceous species in the swale/marsh portion of the channel. Riparian vegetation included reed canary grass, nodding beggarticks (*Bidens cernua*), and willows (*Salix* species). The poorly defined channel structure and ephemeral flow condition indicated that within the Study Area the watercourse may only be capable of providing direct fish habitat seasonally during periods of flow or only supporting fish habitat indirectly by contributing flow downstream towards the main channel of Hopewell Creek.

4.2.2.2 Hopewell Creek Tributary W C 0 2

Hopewell Creek Tributary W C 02 is located within the roadside drainage ditch of Greenhouse Road. The feature traverses parallel to Greenhouse Road to the confluence with W C 01 and no existing culvert crossing of Greenhouse Road was present. It originates from the cultural meadow east of Greenhouse Road and north of Grobe Nursery and Garden Centre and transitions northward into cattail marsh associated with the Breslau Provincially Significant Wetland. The feature was dry at the time of assessment and consisted of a shallow swale with no defined channel banks observed or evidence of substrate sorting that would indicate channel forming flows occur in this feature. Stands of cattails and common reed were present within the feature at the northern reach in proximity to W C 01, but otherwise vegetative cover consisted of terrestrial cultural meadow species such as reed canary grass, smooth brome (*Bromus inermis*), New England aster (*Symphyotrichum novae-angliae*), lance-leaved aster (*Symphyotrichum lanceolatum*), and Canada goldenrod (*Solidago canadensis*). For most of its length, no aquatic habitat capable of supporting fish at any point in the year was present in the feature until it approaches the confluence with W C 01 within the Breslau Provincially Significant Wetland.

4.2.2.3 Branch B/Airport Creek W C 0 3

Branch B/Airport Creek originates from a stormwater management facility northeast of the intersection of Greenhouse Road and Kramp Road and traversed the Study Area southward parallel to Greenhouse Road to a crossing of the CN Rail – Metrolinx Rail corridor before continuing southward out of the Study Area. Within the Study Area, the feature consisted mainly of an old constructed agricultural drain from Kramp Road to the CN Rail – Metrolinx Rail corridor that was dry at the time of assessment. Like W C 01, this watercourse is known to flow intermittently at other points in the year from previous AECOM project experience. The mean bankfull width of this reach was 2.0 metres and mean bankfull depth was 0.3 metres. The substrate consisted of dry clay soil with no evidence of substrate sorting indicating channel forming flows occur in the feature, likely due to the limited catchment area upstream and the dense instream reed canary grass overgrowing the channel. Riparian vegetation consisted of reed canary grass and buckthorn (*Rhamnus* species). At the boundary with the CN Rail – Metrolinx Rail corridor, an earthen berm with a perched corrugated steel pipe culvert was recently constructed perpendicularly across the channel. South of the CN Rail – Metrolinx Rail corridor on the residential property at 1085 Wurster Place, a large inline pond was present along Branch B/Airport Creek that could serve as a potential refuge for fish during seasonal dry periods, such as those observed at the time of assessment; however, the rail corridor and perched culvert pose a potential impediment to upstream fish movement into the Study Area even during periods of seasonal flow. At the point crossing the Greenhouse Road right of way (W C 03), a small, low gradient swale entered the main Branch B/Airport Creek channel from the west across the southern extent of the proposed Greenhouse Road extension. This swale feature was dry at the time of assessment and no defined channel was present, but it functions to convey runoff drainage from the portion of the Breslau Provincially Significant Wetland complex south of Hopewell Crossing Drive and contribute seasonal flow southward to Branch B/Airport Creek across the Greenhouse Road right of way. The feature through this corridor was open with an undefined channel width, but an old staff gauge encountered indicated that water levels with maximum depths of 0.2-0.35 metres have occurred in the past based on water marks on the gauge. Riparian vegetation consisted of willow, trembling aspen (*Populus tremuloides*), red-osier dogwood (*Cornus sericea*), purple loosestrife (*Lythrum salicaria*), and sparse cattails. Based on existing fish community records and the presence of potential fish refuge areas, Branch B/Airport Creek may provide seasonal direct fish habitat, but only if fish are capable of recolonizing and utilizing habitat in the watercourse from the potential refuge areas in the stormwater management facility upstream (north) or inline pond downstream (south) during periods of flow such as the spring melt.

4.3 Vegetation Communities and Plants

As mentioned in **Section 3.3**, field investigations were completed to update vegetation communities within the Study Area. Vegetation communities delineated by AECOM ecologists are shown in **Figure A6** and outlined in **Table 4-6** below. Vegetation communities within the Study Area were fragmented due to the presence of Greenhouse Road as well as an existing service road, which runs south from Kramp Road to the railway tracks. Vegetation communities were also fragmented as a result of residential areas, agricultural fields, manicured lawns and the railway within the Study Area. Larger tracts of vegetation communities were present within the Breslau Provincially Significant Wetland complex located both in the north and south portions of the Study Area. Vegetation communities that were cultural in nature also occurred throughout the Study Area and connected with communities associated with the Breslau Provincially Significant Wetland complex. Vegetation clearing for previous development had occurred south of Hopewell Creek Crossing and Greenhouse Road. This area has remained undisturbed and became overgrown with herbaceous plants, representing a Dry-Moist Old Field Meadow Type community (refer to **Figure A6**).

Due to accessibility limitations, AECOM ecologists were unable to delineate vegetation communities south of the railway tracks within the Study Area. A review of background reports (refer to **Section 3.1**) and aerial imagery identified Mineral Cultural Woodland and Reed-canary Grass Mineral Meadow Marsh communities were present south of the railway tracks. In 2019, Natural Resource Solutions Inc. (2021) identified one regionally rare plant species during their field investigations, greenish sedge (*Carex viridula* ssp. *viridula*) within the Reed-canary Grass Mineral Meadow Marsh located southeast of Kramp Road and Greenhouse Road.

Table 4-6: Vegetation Communities within the Study Area

ELC Code	Dominant Species								
	S-Rank ¹	Vegetation or Ecosite Name	Inclusion(s) Present	Community Age	Canopy	Sub-canopy	Understorey	Ground Layer	Floristic Quality Index
C U M 1 - 1	S5	■ Dry-Moist Old Field Meadow Type	■ The Dry-Moist Old Field Meadow Type located north of Kramp Road contained a Mineral Cultural Thicket (C U T 1 – 1) inclusion, which was dominated by Manitoba maple (<i>Acer negundo</i>), common buckthorn and red-osier dogwood.	■ Young	■ N/A	■ N/A	■ The shrub layer contained Manitoba maple, common buckthorn, trembling aspen, red-osier dogwood and Scots pine (<i>Pinus sylvestris</i>).	■ The dense ground layer included smooth brome, reed canary grass (<i>Phalaris arundinacea</i>), white heath aster (<i>Symphyotrichum ericoides</i>), Canada goldenrod (<i>Solidago canadensis</i>), wild carrot (<i>Daucus carota</i>) and white sweet clover.	■ Co-efficient of Conservatism: 1.29 ■ Co-efficient of Wetness: 1.28 ■ Native species (%): 52 ■ Non-native species (%): 48 ■ Floristic Quality Index: 7.54 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.
C U W 1	S5	■ Mineral Cultural Woodland	■ None	■ Young	■ The canopy layer contained black willow (<i>Salix nigra</i>) followed by relatively equal abundances of Freeman’s maple (<i>Acer freemani</i>), white ash (<i>Fraxinus americana</i>) and eastern cottonwood (<i>Populus deltoides</i>).	■ The sub-canopy consisted of Manitoba maple, common buckthorn, white ash and eastern cottonwood.	■ The understorey was dominated by common buckthorn followed by red-osier dogwood, gray dogwood (<i>Cornus racemosa</i>) and wayfaring viburnum (<i>Viburnum lantana</i>).	■ The ground layer included reed canary grass, smooth brome, wild carrot, and New England Aster (<i>Symphyotrichum novae-angliae</i>).	■ Co-efficient of Conservatism: 1.53 ■ Co-efficient of Wetness: 0.92 ■ Native species (%): 61 ■ Non-native species (%): 39 ■ Floristic Quality Index :7.17 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.
M A M 2 - 2	S5	■ Reed-canary Grass Mineral Meadow Marsh	■ All Reed-canary Grass Mineral Meadow Marsh communities contained Mineral Cultural Woodland (C U W 1) inclusions.	■ Young	■ N/A	■ N/A	■ N/A	■ The ground layer was dominated by reed canary grass, narrow-leaved cattail (<i>Typha angustifolia</i>), purple loosestrife and spotted jewelweed.	■ Co-efficient of Conservatism: 1.98 ■ Co-efficient of Wetness: -0.53 ■ Native species (%): 64 ■ Non-native species (%): 36 ■ Floristic Quality Index: 10.65 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.
M A S 3 - 1	S5	■ Cattail Organic Shallow Marsh	■ Submerged Shallow Aquatic Ecosite was present within the Cattail Organic Shallow Marsh (S A F 1) located in the north end of the Study Area. The inclusion was dominated with water milfoil (<i>Myriophyllum</i> spp.). ■ A Willow Mineral Thicket Swamp Type (S W T 2 – 2) was present within the Cattail Organic Shallow Marsh just east of Greenhouse Road and Loxleigh Lane. The inclusion was dominated by sandbar willow (<i>Salix interior</i>).	■ Young	■ N/A	■ N/A	■ N/A	■ The ground layer was densely vegetated and contained broad-leaved cattail, narrow-leaved cattail, hybrid cattail (<i>Typha x glauca</i>) and reed canary grass in relatively equal abundances	■ Co-efficient of Conservatism: 2.38 ■ Co-efficient of Wetness: -3.12 ■ Native species (%): 80 ■ Non-native species (%): 20 ■ Floristic Quality Index: 10.62 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.
O A O	-	■ Open Aquatic	■ Inclusions of Cattail Mineral Shallow Marsh were present around the peripheries of all Open Aquatic communities and mostly consisted of broad-leaved cattail and reed canary grass.	■ Young	■ N/A	■ N/A	■ N/A	■ The ground layer contained some small amounts of emergent vegetation which included broad-leaved cattail and reed canary grass.	■ Co-efficient of Conservatism: 2.00 ■ Co-efficient of Wetness: 1.33 ■ Native species (%): 62 ■ Non-native species (%): 38 ■ Floristic Quality Index: 7.21 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.
S W D 4 - 1	S5	■ Willow Mineral Deciduous Swamp	■ None	■ Young	■ The canopy mostly contained black willow followed by green ash (<i>Fraxinus pensylvanica</i>), silver maple (<i>Acer saccharum</i>) and easter cottonwood.	■ The subcanopy contained equal amounts of black willow, green ash, white ash and Manitoba maple.	■ The understorey was densely vegetated with black willow, red-osier dogwood, gray dogwood and common buckthorn.	■ The ground layer was dominated by field horsetail (<i>Equisetum arvense</i>), purple loostriffe, reed canary grass and spotted jewelweed.	■ Co-efficient of Conservatism: 2.14 ■ Co-efficient of Wetness: -2.50 ■ Native species (%): 75 ■ Non-native species (%): 25 ■ Floristic Quality Index: 10.03 ■ No Species at Risk, Species of Conservation Concern or locally rare plants were observed.

Notes: 1. S 3 – 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.
S 4 – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S 5 – Secure—Common, widespread, and abundant in the nation or state/province.
S N R – Unranked—Province conservation status not yet assessed.
S U – Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
S N A – 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 #? – Inexact Rank.
S ? – Not Ranked/ under review

A total of 107 plant species were recorded, of which 62 (58%) were native, and 45 (42%) were non-native. Of the non-native species, 21 (20%) were considered invasive, including but not limited to Manitoba maple (*Acer negundo*), Kentucky bluegrass (*Poa pratensis*), purple loosestrife, white sweet clover (*Melilotus albus*), reed canary grass and common buckthorn (*Rhamnus cathartica*). The majority of the plant species recorded had a low to moderate sensitivity to disturbance. All of the identified vegetation communities within the Study Area were generally low vegetation quality as evidenced by the Floristic Quality Index being less than a score of 19. There were no Species at Risk plants, provincially significant plants, regionally significant plants or provincially significant communities recorded within Study Area during field investigations by AECOM in 2022. While field investigations were conducted in October, after the typical growing season in Ontario, there have been sufficient studies (refer to **Section 3.1**) within and adjacent to the Study Area that have completed botanical inventories during appropriate times of the year such that any rare plants would have been documented. A vascular plant list is provided in **Appendix F**.

4.3.1 Wetland Delineation

The wetlands that occur in the north and south ends of the Study Area are part of the Breslau Provincially Significant Wetland Complex. This Provincially Significant Wetland was evaluated by Ministry of Natural Resources and Forestry in 1993 and was comprised of 15 individual wetlands including swamp and marsh communities, totalling an area of 173.43 hectares (Ministry of Natural Resources and Forestry, 1993). Swamp communities were determined to comprise the majority (80%) of total wetlands and dominant vegetation included pussy willow (*Salix discolor*), spotted jewelweed (*Impatiens capensis*) and marsh fern (*Thelypteris palustris*). Marsh communities comprised the remaining (20%) of wetlands and dominant vegetation included broad-leaved cattail (*Typha latifolia*), lesser duckweed (*Lemna minor*), as well as other species of duckweed (*Wolffia* spp.) (Ministry of Natural Resources and Forestry, 1993). Vegetation type within the wetlands consisted of approximately 77% of live trees, shrubs, herbaceous vegetation and mosses. Emergent, submergent and/or floating vegetation comprised approximately 23% of wetland area. Vegetation type was used to calculate the Determination of Pollutant Factor of 0.81 indicating, a high efficiency for removing pollutants from water and improving water quality (Ministry of Natural Resources and Forestry, 1993; Ministry of Natural Resources and Forestry, 2022).

According to the Ontario Wetland Evaluation System report (Ministry of Natural Resources and Forestry, 1993), the Provincially Significant Wetland was comprised of palustrine and riverine site types. Palustrine wetlands, which are associated with temporary/ intermittent watercourses and riverine wetlands, associated with rivers, can provide important flood attenuation functions to help manage flood risk (Ministry of Natural Resources and Forestry, 2022). The Ontario Wetland Evaluation System report (Ministry of Natural Resources and Forestry, 1993) for the Breslau Provincially Significant Wetland Complex evaluation calculated a Flood Attenuation score of 100, indicating high efficiency for attenuating floods.

The Ontario Wetland Evaluation System report (Ministry of Natural Resources and Forestry, 1993) for the Evaluation of the Breslau Provincially Significant Wetland identified habitat for one provincially significant species; Greenside Darter (*Etheostoma blennioides*). In 2006, this species was determined to be no longer at risk provincially (Committee on the Status of Endangered Wildlife in Canada, 2006). Wildlife noted in the Ontario Wetland Evaluation System record was considered common to the area. Additionally, suitable habitat for waterfowl breeding, fish habitat and winter cover areas for wildlife was identified in 1993 (Ministry of Natural Resources and Forestry, 1993). Wildlife habitat identified in 2022 within the Provincially Significant Wetland is discussed further in **Section 4.6**. No provincially or locally significant plant species were identified in 1993 (Ministry of Natural Resources and Forestry, 1993).

Given the Study Area is situated within an anthropogenically influenced landscape (agricultural fields, residential areas), species composition with Provincially Significant Wetland communities likely contains more invasive species present in higher abundances since the 1993 evaluation. In 1993, no invasive purple loosestrife was identified within the Breslau Provincially Significant Wetland Complex (Ministry of Natural Resources and Forestry,

1993); however, field investigations in 2022 identified purple loosestrife as a dominant species within the Reed-canary Grass Mineral Meadow Marsh in addition to other invasive species (i.e., reed canary grass, common buckthorn).

Due to changes in drainage in the local area through road and culvert improvements and maintenance, weather patterns and subsequent agricultural activities, this wetland complex has fluctuated in size over the years. The wetlands that overlap with the Study Area are currently mapped as a total size of 122.95 hectares (Ministry of Natural Resources and Forestry, 2022b). Wetland boundaries delineated by AECOM and verified by the Grand River Conservation Authority in 2022 are shown on **Figures A2 and A6**. Since the original delineation in 1993, the wetland boundaries have changed and now set further back away from Greenhouse Road as confirmed by AECOM and the Grand River Conservation Authority on October 14, 2022. The revised wetlands were mapped as a total size of 122.62 hectares.

4.4 Terrestrial Wildlife

4.4.1 Background Reports and Wildlife Atlases

As mentioned in **Section 2.3.2**, the Township mapped wildlife monitoring results as well as various habitats for wildlife within the Breslau area in 2016. According to the Township's mapping (2022), vegetation communities associated with the Breslau Provincially Significant Wetland complex were found to contain high concentrations of frog calls as well as provide wildlife corridors. A number of targeted wildlife surveys have also been completed within or adjacent to the Study Area in the reports listed in **Section 3.1**. Wildlife surveys conducted within or adjacent to the Study Area observed species considered common and tolerant of urban disturbances. A review of background information determined wetland communities as well as cultural communities, are likely to support habitat for a variety of disturbance-tolerant bird, amphibian, reptile and mammal species.

Background data collected from the secondary sources listed in **Section 3.1** identified records of general and rare wildlife known to occur within the Study Area. A summary of species records by taxon is provided in **Table 4-7**. Species at Risk and Species of Conservation Concern records are discussed further in **Sections 4.6 and 4.7**.

Table 4-7: Summary of Wildlife Species Records within the Study Area

Taxon	Total Number of Species	Total Number of Species at Risk	Total Number of Species of Conservation Concern	Source(s) ¹
Amphibians	11	0	1	■ Ontario Reptile and Amphibian Atlas, I Naturalist, Natural Resource Solutions Inc. (2021), AECOM (2019), Natural Resource Solutions Inc. (2011), Paradigm Transportation Solutions Limited
Birds	179	12	24	■ Ontario Breeding Bird Atlas, E Bird, I Naturalist, Natural Resource Solutions Inc. (2021), AECOM (2019), Natural Resource Solutions Inc. (2011), Paradigm Transportation Solutions Limited
Insects	84	0	5	■ Ontario Butterfly Atlas, I Naturalist, Natural Resource Solutions Inc. (2021), AECOM (2019), Natural Resource Solutions Inc. (2011), Paradigm Transportation Solutions Limited
Mammals	45	4	0	■ Bat Conservation International, Dobbyn, JS., (1994), Natural Resource Solutions Inc. (2021), AECOM (2019), Natural Resource Solutions Inc. (2011), Paradigm Transportation Solutions Limited
Reptiles	7	0	1	■ Ontario Reptile and Amphibian Atlas, I Naturalist, Natural Heritage Information Centre, AECOM (2015), Natural Resource Solutions Inc. (2021), AECOM (2019), Natural Resource Solutions Inc. (2011), Paradigm Transportation Solutions Limited (2018)

4.4.2 Field Investigations

4.4.2.1 Incidental Wildlife Observations

The majority of species observations were considered common and tolerant of urban disturbances, and many bird species observed are also protected under the Migratory Birds Convention Act (1994). Although the sites have been anthropogenically disturbed and fragmented, the vegetation present still provided potential nesting opportunities for migratory birds. Isolated trees, shrubs, vegetation communities and anthropogenic structures (e.g., buildings and bridges) can provide nesting habitat for migratory birds protected under the Migratory Birds Convention Act (1994). Furthermore, large tracts of vegetation communities associated with the Breslau Provincially Significant Wetland complex likely provide habitat for general wildlife that are considered common in the area. Field investigations recorded five bird species protected under the Migratory Birds Convention Act (1994): American Robin (*Turdus migratorius*), Black-capped Chickadee (*Poecile atricapillus*), Canada goose (*Branta canadensis*), Downy Woodpecker (*Picoides pubescens*) and White-throated Sparrow (*Zonotrichia albicollis*). Incidental wildlife observations are provided in **Table 4-8** below. A total of two Species of Conservation Concern were observed within the Study Area, which included visual observations of a Snapping Turtle and burrows belonging to a species of Terrestrial Crayfish. Observations of Species of Conservation Concern are discussed further in **Section 4.6**.

Table 4-8: Incidental Wildlife Observations

Taxon	Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status ²	Committee on the Status of Endangered Wildlife in Canada Status ²	Observation Evidence ³
Bird	American Crow	<i>Corvus brachyrhynchos</i>	S 5 B	None	None	Observation, Vocalization
Bird	American Robin	<i>Turdus migratorius</i>	S 5 B	None	None	Observation, Vocalization
Bird	Black-capped Chickadee	<i>Poecile atricapillus</i>	S 5	None	None	Observation, Vocalization
Bird	Blue jay	<i>Cyanocitta cristata</i>	S 5	None	None	Observation, Vocalization
Bird	Canada Goose	<i>Branta canadensis</i>	S 5	None	None	Observation, Vocalization
Bird	Downy Woodpecker	<i>Picoides pubescens</i>	S 5	None	None	Vocalization
Bird	European Starling	<i>Sturnus vulgaris</i>	S N A	None	None	Observation, Vocalization
Bird	Red-tailed Hawk	<i>Buteo jamaicensis</i>	S 5	None	None	Observation, Vocalization
Bird	White-throated Sparrow	<i>Zonotrichia albicollis</i>	S 5 B	None	None	Vocalization
Crustacean	Terrestrial Crayfish*	<i>Creaserinus fodiens</i>	S 3	None	None	Chimney Burrow Structure
		<i>Lacunicambarus diogenes</i>	S 3	None	None	
Mammal	White-tailed Deer	<i>Odocoileus virginianus</i>	S 5	None	None	Tracks, Scat
Reptile	Eastern Gartersnake	<i>Thamnophis sirtalis</i>	S 5	None	None	Observation
Reptile	Snapping Turtle	<i>Chelydra serpentina</i>	S 4	Special Concern	Special Concern	Observation

Notes: * Could not be identified to species-level as only burrows were observed. There are two species of terrestrial crayfish that create chimney-shaped burrows in Ontario, therefore observed burrows belong to either of the two species listed.

S 1 – Extremely rare in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares.

S 2 – Very rare in Ontario; usually between 5 and 20 occurrences in the province, or few remaining hectares.

S 3 – 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.

S 4 – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S 5 – Secure—Common, widespread, and abundant in the nation or state/province.

S N R – Unranked—Province conservation status not yet assessed.

S U – Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

S N A – 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 #? – Inexact Rank.

S ? – Not Ranked/ under review.

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.

4.5 Significant Natural Heritage Features

Natural features and areas identified for protection in the Provincial Policy Statement (2020) and other legislation are collectively referred to herein as “natural heritage features”; these include, but are not limited to Significant Wetlands, Significant Wildlife Habitat, etcetera and may be identified by the planning authorities (including provincial, municipal, conservation authority). A summary of natural heritage features identified within the Study Area through the background review are provided below. Policy areas and natural heritage features within and in the vicinity of the Study Area are illustrated on **Figure A2**.

4.5.1 Fish Habitat

Potential for Fish habitat was identified within the watercourses listed below.

- **Hopewell Creek Tributary W C 0 1** – only provides direct fish habitat seasonally during periods of flow or only supporting fish habitat indirectly by contributing flow downstream towards the main channel of Hopewell Creek.
- **Hopewell Creek Tributary W C 0 2** - for most of its length, no aquatic habitat capable of supporting fish at any point in the year was present in the feature until it approaches the confluence with W C 0 1 within the Breslau Provincially Significant Wetland.
- **Branch B/Airport Creek W C 0 3** - may provide seasonal direct fish habitat, but only if fish are capable of recolonizing and utilizing habitat in the watercourse from the potential refuge areas in the stormwater management facility upstream (north) or inline pond downstream (south) during periods of flow such as the spring melt.

4.5.2 Significant Wetland

The Breslau Provincially Significant Wetland Complex was identified within the Study Area. Field investigations with the Grand River Conservation Authority confirmed the wetland complex overlaps with the Construction Disturbance Area. The north end of the Study Area overlaps with two wetlands that are a part of the wetland complex, including one wetland community within the Construction Disturbance Area. The south end of the Study Area overlaps with four wetlands that are a part of the complex, including two wetland communities within the Construction Disturbance Area. The Breslau Provincially Significant Wetland Complex is mapped on **Figure A2**.

4.5.3 Significant Valleylands

There were no Significant Valleylands identified within the Study Area.

4.5.4 Significant Areas of Natural and Scientific Interest

No Significant Areas of Natural and Scientific Interest were identified within the Study Area.

4.6 Significant Wildlife Habitat Assessment

Significant Wildlife Habitat was limited within the Study Area due to fragmentation and human influence (i.e., manicured lawns). The Significant Wildlife Habitat assessment identified candidate and confirmed Significant Wildlife Habitat occurred mostly within vegetation communities associated with the Provincially Significant Wetland. A detailed Significant Wildlife Habitat assessment is provided in **Appendix G**. The following is a summary of candidate and confirmed Significant Wildlife Habitat identified within the Study Area:

Candidate:◆ **Seasonal Concentration Areas**

- Bat Maternity Colonies within the Willow Mineral Deciduous Swamp community where trees that possessed suitable characteristics (i.e., peeling bark, crevices, cavities) were noted; however, the majority of these trees were outside of the Construction Disturbance Area. One tree that has the potential to support roost habitat was identified within the Construction Disturbance Area (mapped on **Figure A6**).

◆ **Specialized Habitat for Wildlife**

- Amphibian Breeding Habitat (Woodland) - Suitable vernal pools may be present within the Study Area; however, seasonally appropriate surveys were not completed to determine presence/absence. Surveys by Natural Resource Solutions Inc. in 2019, documented Spring Peeper (*Pseudacris crucifer*) and Gray Treefrog (*Dryophytes versicolor*) with Call Level Codes of 3 approximately 300 metres from the Study Area (Natural Resource Solutions Inc., 2021).
- Turtle Nesting Areas – Suitable exposed areas with sand and gravel substrates were identified on the edges of the Reed-canary Grass Mineral Meadow Marsh. Suitable nesting areas of exposed soils were also noted in the Dry-Moist Old Field Meadow Type. A Snapping Turtle was also observed within the Study Area, in proximity to suitable nesting habitat.
- Amphibian Breeding Habitat (Wetlands) within wetland communities (i.e., Open Aquatic, Cattail Mineral Shallow Marsh Complex, Reed-canary Grass Mineral Meadow Marsh);
- Marsh Breeding Bird habitat within Reed-canary Grass Mineral Meadow Marsh and Open Aquatic communities.
- Habitats of Species of Conservation Concern – potentially suitable habitat was identified for Eastern Wood-pewee (*Contopus virens*), Western Chorus Frog (*Pseudacris maculata*) and Monarch (*Danaus plexippus*). A detailed Species of Conservation Concern habitat screening is provided in **Appendix H**.

◆ **Animal Movement Corridors**

- Amphibian Movement Corridor – Movement corridors may be present along the watercourses within the Study Area.

Confirmed:◆ **Seasonal Concentration Areas**

- Turtle Wintering Areas - A Snapping Turtle was observed incidentally near the pond situated southeast of Greenhouse Road and Victoria Street North. The pond was identified as an Open Aquatic inclusion of the Cattail Organic Shallow Marsh. The pond was observed to be of sufficient depth for overwintering. Furthermore, the Open Aquatic communities that are stormwater management ponds may also provide suitable overwinter habitat; however, stormwater management ponds are not considered Significant Wildlife Habitat (Ministry of Natural Resources and Forestry, 2015).
- Reptile Hibernaculum – An old building foundation was found within the Reed-canary Grass Mineral Meadow Marsh and Mineral Cultural Woodland (mapped on **Figure A6**). Three Eastern Gartersnakes were observed in close vicinity to the old foundation. The presence of five individuals near hibernacula is typically required to confirm Significant Wildlife Habitat (MNR, 2015). However, a conservative approach is being used to assume confirmed Reptile Hibernacula Significant Wildlife Habitat exists.

◆ Specialized Habitat for Wildlife

- Terrestrial Crayfish - Approximately 50 burrows belonging to a species of Terrestrial Crayfish were observed within the Reed-canary Grass Mineral Meadow Marsh community.
- Habitats of Species of Conservation Concern – Terrestrial Crayfish (either Digger Crayfish or Devil Crayfish) and Snapping Turtle. A detailed Species of Conservation Concern habitat screening is provided in **Appendix H**.

Confirmed Significant Wildlife Habitat is mapped on **Figure A6**.

4.7 Species at Risk Habitat Assessment

The Species at Risk Habitat Assessment and screening exercise is presented in **Appendix H**. A total of six Species at Risk were determined to have a medium probability of occurring within the Study Area based on the presence of suitable habitat as well as confirmation of presence through field investigations, agency correspondence and background review. Of these Species at Risk, five are designated as Endangered and one is designated as Threatened under the Endangered Species Act (2007). The remaining Species at Risk outlined **Appendix H** were determined to have a low potential to occur within the Study Area due to lack of suitable habitat. No records of aquatic Species at Risk were identified during the background review.

The following Species at Risk were determined to have a medium potential to occur within the Study Area:

- **Least Bittern (*Ixobrychus exilis*)**
Least Bittern is designated as Threatened under the Endangered Species Act (2007). The large Cattail Organic Shallow Marsh possessed dense stands of emergent vegetation that may provide suitable nesting habitat. A review of aerial imagery identified the presence of interspersed shallow aquatic communities which may provide suitable foraging habitat.
- **Red-headed Woodpecker (*Melanerpes erythrocephalus*)**
Red-headed Woodpecker is designated as Endangered under the Endangered Species Act (2007). The Willow Mineral Deciduous Swamp and Mineral Cultural Woodland contained suitable cavity trees that may provide potential nesting habitat; most of the suitable cavity trees were located outside of the Construction Disturbance Area. One tree that possessed multiple cavities and may support suitable nesting habitat, was observed within the Construction Disturbance Area within the Mineral Cultural Woodland, located south of Kramp Road and Greenhouse Road. The cavity tree was observed east of the service road, on the edge of the Mineral Cultural Woodland community (refer to **Figure A6**).
- **Bat Species at Risk including Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-coloured Bat (*Perimyotis subflavus*)**
Bat Species at Risk are designated as Endangered under the Endangered Species Act (2007). Candidate habitat for bat Species at Risk was identified within the Willow Mineral Deciduous Swamp and Mineral Cultural Woodland. Suitable roost trees were observed in both communities; however, the majority were outside of the Construction Disturbance Area. The one cavity tree in the Construction Disturbance Area that was noted above, possessed suitable cavities and crevices for roost habitat (refer to **Figure A6**).

4.8 Linkages

Vegetation communities within the Study Area comprise Core Environmental Features and other natural habitat features. As mentioned in **Section 4.3**, vegetation communities were fragmented by Greenhouse Road, the service road, the railway, and other anthropogenic landscapes (agricultural fields, manicured lawns, etc.). However, plant (i.e., propagules) and animals can still move across fragmented landscapes that are divided by roads and rail corridors via naturally vegetated corridors acting as Linkages.

The Reed-canary Grass Mineral Meadow Marsh, Mineral Cultural Woodland, Willow Mineral Deciduous Swamp communities and watercourse on the east and west sides of the service road likely act as a local-scale Linkage, allowing for east-west movement for a variety of species to move into specialized habitat needed for important life processes (i.e., breeding, foraging, migrating).

A review of background information (refer to **Section 3.1**) identified large units of the Breslau Provincially Significant Wetland in the greater landscape, located outside of the Study Area. The Study Area is fragmented from these communities by roads, residential properties and agricultural fields. Large tracts of mostly swamp and meadow marsh communities occur south of the rail corridor, outside of the Study Area (Natural Resource Solutions Inc., 2021). The Study Area is separated from these large vegetation communities by an agricultural field located immediately south of the rail corridor. A study by Natural Resource Solutions Inc. (2021) documented wildlife habitat within the vegetation communities south of the rail corridor, outside of the Study Area. Natural Resource Solutions Inc., (2021) completed surveys targeting mammals, amphibians, birds and vegetation. Confirmed Significant Wildlife Habitat was documented by Natural Resource Solutions Inc. (2021), which included:

- Amphibian Breeding Habitat (Woodland);
- Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs);
- Terrestrial Crayfish; and,
- Habitat for Species of Conservation Concern including Eastern-Wood Pewee, Wood Thrush, Amethyst Aster (*Symphotrichum x amethystinum*), and Spreading Sedge (*Carex laxiculmis*).

Significant Wildlife Habitat documented by Natural Resource Solutions Inc. (2021) indicate a large variety of species utilize the large vegetation communities located south of the Study Area. Although an agricultural field presents a barrier between the Study Area and the large vegetation communities south of the Study Area, movement is not restricted, and a north-south Linkage likely exists. This Linkage is expected to be an important corridor for amphibians and reptiles at a local scale. An amphibian movement corridor likely exists as amphibians may disperse between the Study Area and communities south of the Study Area to utilize suitable terrestrial and aquatic habitats to complete life stages (larval, juvenile and adult). Additionally, this Linkage presumably enables movement for reptiles to get to habitat suitable for nesting, overwintering, foraging and resting.

There may also be potential for a Linkage throughout the Study Area via the Dry-Moist Old Field Meadow, Mineral Cultural Woodland, Open Aquatic and watercourses between the Provincially Significant Wetlands in the north and south ends of the Study Area. These communities are fragmented by existing roads, residential and agricultural land uses. While crossing roads is dangerous for wildlife, the roads may not impede wildlife movement for some urban species that will move between areas to locate suitable habitat to forage or for different life stages such as reptile and amphibian breeding, wintering and cover habitat. Given the large variety of wildlife use within and adjacent to the Study Area, there is potential for a variety of species to move into the cultural communities throughout the Study Area. These cultural communities and Open Aquatic community occur along the length of Greenhouse Road and may act as nodes which may serve as destinations or temporary refuge habitat (Region of Waterloo, 2016). The Dry-Moist Old Field Meadow, Mineral Cultural Woodland, Open Aquatic may provide Linkage at a local scale for east to west movement.

4.9 Locally and Municipally Significant Features

Municipally recognized natural heritage features and policy areas that were identified within the Study Area include:

- Breslau Provincially Significant Wetland Complex;
- Waterloo-Guelph Airport Creek;
- Grand River Conservation Authority Regulation Limits;
- Woolwich Township Greenlands Network – Core Environmental Features;
- Region of Waterloo Greenlands Network – Core Environmental Features;

- Candidate habitat for Red-headed Woodpecker and Bat Species at Risk (Eastern Small-footed Myotis, Northern Myotis, Little Brown Myotis and Tricoloured Bat);
- Confirmed Significant Wildlife Habitat for Turtle Wintering Areas, confirmed habitat for Terrestrial Crayfish (either Digger Crayfish or Devil Crayfish) and Snapping Turtle; and,
- Candidate Significant Wildlife Habitat including seasonal concentration areas, specialized wildlife habitat, candidate Species of Conservation Concern habitat and animal movement corridors detailed in **Section 4.6.**

4.10 Fluvial Geomorphology Memorandum

The fluvial geomorphological assessment investigated two watercourses (fisheries assessment identified as W C 0 1 and W C 0 3). A review of background information identified a watercourse crossing along Greenhouse Road, located immediately north of Loxleigh Lane (fisheries assessment identified as W C 0 2). As mentioned in **Section 4.2.2.2**, there were no defined channel banks observed or evidence of substrate sorting that would indicate channel forming flows occur in this feature. The W C 0 2 feature has therefore been excluded from the fluvial geomorphological assessment.

The fluvial geomorphological assessment completed along Greenhouse Road concluded the following based on the field investigations and the review of background material:

- None of the investigated features (reaches of the watercourses) had defined bank full width or depth, suggesting that they are ephemeral-type features or low energy flows;
- No evidence of erosion was visible during the field assessment, indicating that the size and location of the twin culverts are not affected by fluvial processes; and,
- Even though the culvert on the section where the Greenhouse Road extension is proposed could not be located, there was no evidence of erosion in the area, indicating that the size and location of the culvert is not affected by fluvial processes.

The following is a list of recommendations for both crossings:

- From a fluvial geomorphic perspective, it is key that sediment be able to move downstream. For W C 0 1 the perched nature of the culverts, the 90 degree turns, and the twin nature of the crossings are not recommended due to impacts to fluvial processes. These issues may pose a barrier to sediment travelling downstream and increase erosion at the locations where the culverts discharge perpendicular to the roadside ditch banks.
- It is recommended that open bottom culverts be used. Closed bottom culverts introduce grade separation in the longitudinal profile of a fluvial feature, can become perched, and affect sediment transport over time.
- New crossings should be sized accordingly to maintain flow and sediment transport downstream. The anticipated migration of the channel (i.e., meander belt) does not need to be considered for culvert sizing as the investigated features are undefined channels.

Flow in ephemeral-type features is seasonal and typically lacks the stream power to form a defined channel with a meandering planform. Therefore, a meander belt assessment is not applicable for the investigated features. Generally, a meander belt can only be delineated when defined banks are present and/or when the planform of a watercourse can be tracked over time to determine its possible extent within the floodplain.

The full Fluvial Geomorphological Assessment is documented under a separate cover titled Greenhouse Road Reconstruction Project Fluvial Geomorphological Assessment Memorandum (AECOM, 2023b).

5. Proposed Works

5.1 Project Components and Design

The Project proposes the reconstruction of the existing length of Greenhouse Road south of Victoria Street North and the extension of the road along the right of way to a turnaround area at the southerly end of the extension where it meets the existing rail corridor. The Project's design will also address the need for a new stormwater drainage system along Greenhouse Road.

The existing right of way is a rural cross-section with a 20 metre 'built' width that contains a two-lane 6.6 metre asphalt laneway width, gravel shoulders and roadside ditches. The road reconstruction and extension will maintain the 20 metre 'built' width but the right of way will contain a larger two-lane asphalt roadway width of 9 metres, 1.8 metres sidewalks on each side and urbanized grassed boulevards. The reconstruction will require vegetation removal within the roadside ditches to accommodate the laneway widening and side walks. Currently, there exists an unpaved service road, approximately 3 metres wide, south of where Greenhouse Road currently ends that is used to access the rail corridor. This service road will be widened to accommodate the proposed cross-section of the road extension.

5.2 Alternatives Design Considerations

As described in **Section 1**, the following three alternative solutions are being evaluated for the cross-section of the proposed Greenhouse Road extension in addition to the road reconstruction:

- **Alternative 1:** Two-lane urbanized cross-section with sidewalks on both sides of the road, including culvert upgrade south of Kramp Road.
- **Alternative 2:** Two-lane urbanized cross-section with multi-use pathway on one side of the road, including culvert upgrade south of Kramp Road.
- **Alternative 3:** Two-lane urbanized cross-section with sidewalks on both sides of the road and bike lanes within the roadway width, including culvert upgrade south of Kramp Road.

All three alternatives have the same alignment and will be 20 metres wide. For this reason, the impact on the natural environment is the same for all three alternatives because these have the same footprint for the proposed road extension. Alternative 1 is the preferred cross-section design because the sidewalks on both side of the road accommodate higher pedestrian foot traffic projected once the future subdivision expansion of Kramp Road is completed. This cross-section configuration will also allow for future widening of the east boulevard while maintaining the west boulevard and southbound traffic lanes. A detailed potential impact assessment is provided in **Section 6** for the preferred solution, which includes both the road reconstruction and the preferred Alternative 1 cross-section for the extension component of the Project.

6. Assessment of Potential Impacts

6.1 Existing Impacts

It is recognized that many, if not all, natural areas within Southern Ontario have been affected by human disturbance. In order to assess the potential impacts of the Project, it is necessary to consider existing impacts that are present within the Study Area prior to the initiation of the work. Existing impacts should be documented to determine whether, following site alteration, impacts are a result of the work or a result of previous activities or events on the lands. Based on AECOM's site investigations, the following existing impacts were identified within the Study Area:

- **Fragmentation of Natural Vegetation and Habitat**

Natural heritage features within the Study Area, such as the Breslau Provincially Significant Wetland Complex, and surrounding landscape are already fragmented because of clearing for residential and agricultural purposes, as well as for the construction of municipal roads such as Greenhouse Road. Despite this fragmentation, the communities along the Breslau Provincially Significant Wetland Complex provide wildlife habitat and likely a movement corridor through the greater landscape.

- **Introduction of Horticultural and Invasive Plants**

Vegetation communities adjacent to developed areas are subject to the gradual invasion of weedy and horticultural species introduced from residential gardens, vehicle traffic and by natural dispersal. A heavy presence of non-native vegetation species was recorded in several of the delineated vegetation communities within the Breslau Provincially Significant Wetland Complex, which have been introduced into natural communities from the surrounding residential areas. As mentioned in **Section 4.3**, there were many invasive plant species in the Study Area, including but not limited to common buckthorn, Manitoba maple, Kentucky bluegrass, reed canary grass, purple loosestrife and white sweet clover.

- **Transportation and Stormwater Infrastructure**

The Study Area consists of agricultural, residential, horticultural, and commercial/industrial land uses. Road salt, oil and gas, sediment, excess nutrients, and other deleterious substances from the roadways, driveways, and parking lots enter watercourses via stormwater drainage, existing watercourse crossings, and from agricultural/horticultural drainage. Such inputs can have an impact on overall water quality, and physical habitat for aquatic species. Moderate traffic noise levels are evident throughout the Study Area. This noise may cause a reduction in the species abundance or richness of birds and other wildlife inhabiting natural areas in the vicinity of watercourses and wetlands. Some species may have acclimated to the noises generated by human activities

6.2 Potential Impacts of the Proposed Works

The potential environmental impacts associated with the Project relate to construction and operational activities. Many of the potential impacts are commonly encountered with construction and have associated standard mitigation measures available to minimize or avoid potential impacts. These potential impacts can be prevented or negated if appropriate measures are implemented. If they are not managed and prevented through best management practices and avoidance or mitigation, they may lead to long-term impacts and significant damage to both ecological features and their functions. The following sections outline potential environmental impacts based on the construction disturbance area for the preferred solution (Alternative 1), which includes the proposed reconstruction and extension of Greenhouse Road.

6.2.1 Direct Potential Impacts

Potential direct impacts to existing natural heritage features and functions are associated with construction activities (e.g., excavation activities, machinery use) such as vegetation/habitat removal.

6.2.1.1 Construction Phase

◆ Loss of Vegetation

Estimated areas of vegetation removals by affected Ecological Land Classification community are provided in **Table 6-1** below (as illustrated on **Figure A6**). Approximately 1.02 hectares of vegetation communities will be cleared to accommodate the proposed works. This represents 7% of the existing vegetation communities inventories within the Study Area that will be affected by removal activities. Vegetation removal will occur along existing infrastructure for the road reconstruction and within the edges of a service road used to access the railway for the road extension. Vegetation removal within the existing Greenhouse Road is comprised mainly of disturbed roadside ditch vegetation. According to **Table 6-1**, most of the vegetation removal (0.44 hectares) will occur along the road extension component compared to the road reconstruction (0.58 hectares) which will be limited within the existing 20 m built right of way. Vegetation removal along the road reconstruction and extension components will be limited to edge habitat that is already disturbed by anthropogenic influences, as evidenced by the high portion of non-native and invasive plant species.

Table 6-1: Summary of Impacts to Vegetation for the Greenhouse Road Reconstruction and Extension

ELC Vegetation Code	ELC Description	Sum of Total Area (hectares) in Study Area	Total Impacted Area for Road Reconstruction (hectares)	Total Impacted Area for Road Extension (hectares)	Total Impacted Area in Hectares and Percentage
CUM 1 - 1	Dry-Moist Old Field Meadow Type	6.2	0.35	0.29	0.64 (10%)
M A M 2 - 2	Reed-canary Grass Mineral Meadow Marsh	4.05	0.004	0.01	0.01 (less than 0.5%)
C U W 1	Mineral Cultural Woodland	1.98	0.04	0.19	0.23 (11.62%)
O A O	Open Aquatic	0.48	0	0	0
M A S 3 - 1	Cattail Organic Shallow Marsh	1.96	0.05	0	0.05 (3%)
S W D 4 - 1	Willow Mineral Deciduous Swamp	0.94	0	0.09	0.09 (10%)
Total		15.61	0.44	0.58	1.02 (7%)

◆ Fragmentation of Land Connectivity

The reconstruction of Greenhouse Road is not anticipated to increase fragmentation of the landscape as it is limited to within an existing road right of way in a developed area. Minimal fragmentation is anticipated as a result of the extension of Greenhouse Road to the rail corridor because this section will be widened from the current 3 metre wide service road to a 20 metre wide future road right of way. Core Environmental Features within the Study Area are already heavily fragmented as result of adjacent subdivision development.

◆ Loss of Breslau Provincially Significant Wetland Complex

Approximately 0.150 hectares of vegetation removal is anticipated within the Breslau Provincially Significant Wetland complex (122.62 hectares) to accommodate the proposed works. This represents only 0.12% of loss of impacted wetlands that are a part of the Breslau Provincially Significant Wetland Complex. These impacts are considered minimal given that the greater landscape outside of the Construction Disturbance Area comprises continuous, larger tracts of wetland communities. Vegetation removal within the Breslau Provincially Significant Wetland complex will be located along existing roads and infrastructure and limited to edge habitat which is already subject to anthropogenic disturbances. A total of 0.05 hectares of the Cattail Organic Shallow Marsh is anticipated to be removed for the road reconstruction, representing a 0.24% loss of this Breslau

Provincially Significant Wetland Complex that was of low vegetative quality as evidenced by the presence of mostly invasive reed canary grass and common reed in roadside ditches. Removal of 0.1 hectares of Willow Mineral Deciduous Swamp and Reed-canary Grass Mineral Meadow Marsh is anticipated for the road extension, which represents an additional 0.081% loss of the Breslau Provincially Significant Wetland Complex. Vegetative quality along the edges of Breslau Provincially Significant Wetland Complex within the road extension Construction Disturbance Area was also low and was dominated by purple loosestrife, common reed and common buckthorn. Overall, removal of 0.150 hectares of already disturbed edge habitat is not anticipated to have an impact on the wetland complex.

◆ **Loss of Candidate Significant Wildlife Habitat including Habitat for Monarch**

Candidate habitat for Monarch was identified within the Dry-Moist Old Field Meadow Type polygons where common milkweed (*Asclepias syriaca*) was present. Impacts to candidate Monarch habitat is anticipated to be minimal as the 0.64 hectares of the Dry-Moist Old Field Meadow Type that will be removed is comprised of disturbed edge habitat.

◆ **Loss of Candidate Significant Wildlife Habitat including Habitat for Bird Species of Conservation Concern**

Candidate habitat for Eastern Wood-pewee was identified within the Willow Mineral Deciduous Swamp and Mineral Cultural Woodland. Approximately 0.32 hectares of vegetation removal is anticipated within these communities. This represents a 10.9% of loss of candidate habitat in the Study Area. Forested and woodland communities located along existing roads and infrastructure will be limited to edge habitat which is already subject to anthropogenic disturbances.

◆ **Loss of Candidate Marsh Breeding Bird Significant Wildlife Habitat**

Candidate Marsh Breed Bird Significant Wildlife Habitat was identified within the Mineral Cultural Woodland, Open Aquatic and Cattail Mineral Shallow Marsh Complex. Approximately 0.28 hectares of vegetation removal is anticipated within these wetland communities. Vegetation removal within candidate Significant Wildlife Habitat is considered minimal given that the greater landscape outside the Construction Disturbance Area comprises continuous, larger tracts of wetland communities part of the Breslau Provincially Significant Wetland complex.

◆ **Loss of Candidate Significant Wildlife Habitat including Habitat for Western Chorus Frog, Amphibian Breeding Habitat and Amphibian Movement Corridors**

Candidate habitat for Western Chorus Frog and Amphibian Breeding Habitat (Wetlands) were identified within the wetland communities (Reed-canary Grass Mineral Meadow Marsh, Open Aquatic, Cattail Mineral Shallow Marsh and Willow Mineral Deciduous Swamp). Additionally, candidate habitat for Amphibian Breeding Habitat (Woodlands) was identified within the Mineral Cultural Woodland and Willow Mineral Deciduous Swamp. Approximately 0.38 hectares of vegetation removal is anticipated within these communities. Furthermore, vegetation communities along and adjacent to the watercourses and wetland communities have potential to be Amphibian Movement Corridors. Vegetation removal within candidate Significant Wildlife Habitat is considered minimal given that the vegetation removal will be limited to within the existing right of way and/or mostly within previously disturbed areas.

◆ **Disturbance to Confirmed Significant Wildlife Habitat for Turtle Wintering Areas (including habitat for turtle Species of Conservation Concern)**

Confirmed over wintering ponds are located outside of the Construction Disturbance Area and not anticipated to be impacted.

◆ **Disturbance to Candidate Significant Wildlife Habitat for Turtle Nesting Areas (including habitat for turtle Species of Conservation Concern)**

Turtle nesting habitat and habitat for Snapping Turtle was identified outside of the Construction Disturbance Area and not anticipated to be impacted.

◆ **Disturbance to Confirmed Significant Wildlife Habitat for Terrestrial Crayfish Significant Wildlife Habitat including Habitat for Species of Conservation Concern**

Approximately 50 burrows belonging to a species of Terrestrial Crayfish were observed within the Reed-canary Grass Mineral Meadow Marsh community located southeast of Greenhouse Road and Kramp Road (mapped on **Figure A6**). The species of Terrestrial Crayfish that created the burrows are also considered Species of Conservation Concern. Confirmed Significant Wildlife Habitat for Terrestrial Crayfish are outside of the Construction Disturbance Area and are not anticipated to be impacted.

◆ **Disturbance to Assumed Confirmed Significant Wildlife Habitat for Snake Hibernacula**

Impacts to snake hibernacula is not anticipated as the old foundation was identified approximately 45 metres away from the proposed work, outside of the Construction Disturbance Area (refer to **Figure A6**).

◆ **Loss of Candidate Red-headed Woodpecker Habitat**

Approximately 0.32 ha of vegetation removal will occur within candidate habitat for Red-headed Woodpecker. One cavity tree suitable for breeding habitat will also be removed as it is located within the Construction Disturbance Area.

◆ **Loss of Candidate Least Bittern Habitat**

Approximately 0.05 ha of vegetation removal will occur within candidate habitat for Least Bittern. This represents approximately 0.77% of removal within the Cattail Organic Shallow Marsh. Least Bitterns are typically found within remote areas of large marshes with dense emergent vegetation dominated by cattails, that also possess interspersed pools for foraging (Ministry of Natural Resources and Forestry, 2016). Impacts to candidate Least Bittern habitat are anticipated to be minimal as this species utilizes remote areas of wetlands (Ministry of Natural Resources and Forestry, 2016) and vegetation removal along the road reconstruction consists of reed canary grass along road shoulders and roadside ditches.

◆ **Loss of Potential Bat Species at Risk Habitat and Candidate Bat Maternity Colonies Significant Wildlife Habitat**

Candidate bat cavity trees and Significant Wildlife Habitat for Bat Maternity Colonies were observed within the Mineral Cultural Woodland and Willow Mineral Deciduous Swamp vegetation communities in the Study Area, of which one candidate bat cavity trees was located within the Construction Disturbance Area. Approximately 0.32 hectares of vegetation removal is anticipated within Mineral Cultural Woodland and Willow Mineral Deciduous Swamp communities. Majority of candidate bat roost trees were located outside of the Construction Disturbance Area and will not be impacted. Vegetation removal within the Construction Disturbance Area is not anticipated to impair or eliminate the form and function of the remaining bat Species at Risk habitat and Significant Wildlife Habitat, where the large majority of snags were located.

◆ **Loss Of, and/or Alteration or Disruption To, Fish Habitat**

All alternatives include the widening and extension of Greenhouse Road, which will require the widening of the existing culvert crossing at W C 01 and installation of a new culvert crossing at W C 03 that could result in a potential harmful alteration, disruption, or destruction of fish habitat under the Fisheries Act (1985) during the construction phase. In addition, any work below the high-water mark for the replacement/extension of culverts or installation of new culverts can result in fish mortality or disturbance by equipment operation in water if conducted during periods of flow, or by entrainment or impingement in pump intakes during dewatering of work areas (if required). The temporary footprint of the in-channel work area may also result in the loss of access to habitat during construction.

6.2.1.2 Operational Phase

There are no direct potential effects anticipated during the operational phase, as all of the direct impacts would have occurred during the construction phase (e.g., removal of habitat).

6.2.2 Indirect Potential Impacts

Indirect impacts associated with planning and engineering are not immediately caused by the design (e.g., placement of Project components), but nevertheless cause an effect on the natural environment through one or more intervening variables.

6.2.2.1 Construction Phase

◆ Damage and Disturbance to Adjacent Natural Features

Accidental intrusion may occur from construction into the adjacent natural heritage features, which provide candidate and confirmed Significant Wildlife Habitat and Species at Risk habitat as outlined in **Sections 4.6** and **4.7**. Additionally, machinery use adjacent to natural heritage features can result in soil compaction and trampling of herbaceous vegetation. These impacts can limit a plant's growth and absorption of nutrients and water. These impacts can typically be mitigated with the installation of tree protection fencing along the work limits to exclude machinery and construction personnel.

◆ Migratory Bird Nest and Egg Destruction

Vegetation communities provide breeding habitat and movement corridors for a variety of wildlife, including Species at Risk, Species of Conservation Concern and/or migratory birds protected under the Migratory Birds Convention Act (1994). Vegetation (i.e., trees, shrubs and ground cover) removal has the potential to destroy migratory bird nests and eggs, which are protected under the Migratory Birds Convention Act (1994), if conducted during the overall bird nesting period of April 1 to August 31.

◆ Disturbance to Wildlife

Construction activities within the Study Area have the potential to disturb wildlife (e.g., birds, snakes, amphibians and turtles) within adjacent natural features. Urban wildlife, including Species of Conservation Concern may enter the construction work area and may become susceptible to accidental injury or mortality associated with construction equipment or machinery if not properly mitigated. Wildlife encounters during construction within the active season may result in collisions with construction equipment or disruption of life cycle processes (e.g., nesting, etc.), resulting in injury or mortality. Noise and vibrations from construction activities are anticipated to be temporary, short in duration and are not anticipated to substantially increase from daily existing road use. Wildlife within the Study Area is likely already tolerant of anthropogenic disturbances from traffic on the existing Greenhouse Road and adjacent construction of the Hopewell Crossing subdivision. A certain degree of disturbance can be avoided during construction by restricting rehabilitation activities to certain times of the day and outside of sensitive periods for wildlife identified within the Study Area.

◆ Sediment and Erosion

Soil compaction and trampling of herbaceous vegetation can cause the exposure of soils, which can result in sediment runoff discharging into nearby natural heritage features. Elevated levels of sediment and related turbidity can reduce the productivity of an aquatic system by clogging the gills of fish, covering fry and eggs within the substrate and reducing prey availability. Furthermore, increased sedimentation into the watercourses from the proposed works may impact aquatic fish and mussel habitat, including feeding requirements essential for multiple life stages. Sediment deposition within terrestrial natural features can also lead to suffocation of vegetation. Exposed soils can result in dust deposition within adjacent natural heritage features which may interrupt the ability of vegetation to photosynthesize.

◆ Disturbance to Fish Species and their Habitat

The use of construction equipment/machinery and vehicles on site could result in spills or leaks of oil, gasoline, and other deleterious substances to the watercourses within the Project area. An increase in the concentration of deleterious substances in sediment and water can exceed the acceptable range of chemical constituents within aquatic systems and seriously affect fish and fish habitat. The ecological effects can include, but are not limited to, direct fatality of fish, alteration of the ecosystem structure through changes in the abundance, composition, and diversity of communities and habitats, and persistence and progressive accumulation in sediments or biological tissues (i.e., bioaccumulation and biomagnification). Deformities, alterations in growth, reproductive success, and competitive abilities can also result.

◆ Introduction or Spread of Invasive Species

As mentioned in **Section 4.3**, vegetation communities have already been anthropogenically influenced. A total of 45 (42%) were non-native including some highly invasive species such as reed canary grass, common reed, purple loosestrife, and common buckthorn. Vegetation clearing and grubbing or grading and movement of construction equipment may perpetuate the establishment of invasive species in new areas and further spread in already established areas if control measures are not implemented. Impacts are minimal given that many invasive species are already present.

◆ Soil and Water Contamination

The use of machinery and vehicles on site could result in spills or leaks of oil, gasoline and other fluids which could enter the surrounding natural communities. These impacts can be limited and even avoided with proper machinery inspections and maintenance as well as establishing areas away from natural features that are dedicated to re-fuelling and storing machinery.

◆ Changes in Hydrology Due to Dewatering Activities

Groundwater dewatering may be required for excavation activities during construction which may temporarily affect nearby natural features such as the watercourses and wetlands that are particularly sensitive to changes in the hydrological regime if the zone of influence overlaps with these features. Significant groundwater drawdown may affect the functions of wetlands and the wildlife habitats supported by them (for example, plant assemblage may change the community structure or lowering of groundwater levels may affect amphibian breeding habitat). Generally, this potential impact is considered to be temporary and short in duration.

6.2.2.2 Operational Phase

◆ Change in Hydrology, Drainage and Water Quantity

Increased impervious surfaces as result of installation of the lane way widening, road extension and installation of sidewalks can indirectly affect the hydrology, drainage and water quantity of nearby natural features such as the watercourses and wetlands that are particularly sensitive to changes in the hydrological regime. Hydrologic and hydraulic simulations were conducted for the 2 year to 100 year design storm events and modelling results found peak runoff rates from road drainage areas under the proposed condition are increased due to increases in imperviousness areas (AECOM, 2023a); however, there was no change in water levels at the wetlands on either side of W C 0 1, and only a 0.01 metre increase at wetlands on either side of W C 0 3 with 2, 5 and 25 year storm events. The results indicate that the proposed Greenhouse Road reconstruction work would have little impact on wetlands (AECOM, 2023a).

◆ **Effects on Water Quality**

Anticipated indirect potential effects associated with the long-term operation of the Project may include the potential for road salt loading in the watercourses and wetlands, which may indirectly affect fish and aquatic habitat as well as reptile and amphibian habitat.

◆ **Wildlife Road Mortality**

Road traffic along Greenhouse Road is anticipated to increase as a result of the road reconstruction and extension coupled with the construction of additional residential subdivisions in the future. An increase in road mortality is anticipated, especially for the extended section of Greenhouse Road in the south through the Breslau Provincially Significant Wetland where currently only a small, relatively infrequently used service road is located. This section will be widened and paved over to allow for increased vehicle use from baseline conditions, which will form a barrier between natural habitat features, including Core Natural Features identified by the Region of Waterloo (2016). While some species (e.g., bats and birds) can tolerate breaks in natural features, some species such as herpetofauna and insects are negatively affected by road fragmentation (Region of Waterloo, 2016). It is anticipated that there will be an increase of road mortality as a result of vehicle collisions from baseline conditions of wildlife trying to cross the extended Greenhouse Road to get to suitable habitat on the other side of the road.

◆ **Increased Light Pollution**

Generally, increased illumination as a result of streetlights installed in previously unlit natural areas may disturb and displace nocturnal animals. Increased illumination can disorient and attract or deter different wildlife, which may affect their critical behaviours such as foraging, reproduction and communication, and affect interspecific interactions such as increased predation of prey species due to increased visibility (Longcore and Rich, 2004). Lights and noise near bat SAR habitat can result in increased predation of bats by increasing roost visibility to nocturnal predators of bats, as well as negatively affect a variety of bat behaviours including time of emergence, foraging and commuting activity, and may result in roost abandonment (Stone et. al, 2015; Bat Conservation Trust, 2018). Furthermore, nighttime lights and noise near amphibian breeding habitats may interfere with spring breeding calls, displace individuals and potentially displace the food source, such as insect populations that may be attracted to the lights (Ministry of Natural Resources and Forestry, 2014). Nocturnal migrating birds may become disoriented during flight and the egg-laying behaviours of turtles may also be affected by light pollution (Longcore and Rich, 2004). Increased lighting from the installation of street illumination along the Greenhouse Road extension may affect nocturnal wildlife as this section is currently unlit.

7. Avoidance, Mitigation and Compensation

In order to address the potential impacts identified for any proposed work associated with the Project, there are three general categories of measures:

1. **Avoidance:**..... Avoidance involves the design of a plan that protects natural heritage features and functions by keeping the works outside of natural heritage features wherever possible.
2. **Standard Mitigation:** Mitigation involves the implementation of measures designed to eliminate or reduce impacts by designing facilities or including natural elements that filter or prevent impacts.
3. **Compensation:** Compensation involves the replacement of a feature and/or function that may be lost as a result of the construction and long-term presence of the works.

7.1 Avoidance

The avoidance of potential impacts for the proposed work is inherent in the identification and protection of natural heritage features within the Study Area. The following are the prescribed avoidance measures:

- Item 1:** Minimize vegetation removal to the extent possible and limit it to within the Construction Disturbance Area. Clearly delineate the boundaries of the Breslau Provincially Significant Wetland and the limits of vegetation clearing zones on construction drawings. Wetland vegetation removals for temporary laydown or service roads shall be avoided as much as possible, prior to considering impacts and mitigation.
- Item 2:** Limit construction activities to the daylight hours between March 1 to June 30, especially on rainy evenings, to reduce the amount of noise disturbance on adjacent breeding amphibian populations within the Breslau Provincially Significant Wetland to the extent possible.
- Item 3:** Remove vegetation (ground cover, shrubs, trees) outside of the active bird nesting season (April 1 to August 31) to avoid incidental take and, therefore, contravention of the Migratory Birds Convention Act (1994). Should vegetation removal be required during the active bird nesting season, a nest survey should be conducted by a qualified ecologist or equivalent no more than 48 hours prior to vegetation removal and should only be considered for simple habitats as defined by Environment and Climate Change Canada (2019).
- Item 4:** Remove trees within the Mineral Cultural Woodland and Willow Mineral Deciduous Swamp outside of the bat active season of April 1 to September 30.
- Item 5:** In-water work (i.e., any work within the high-water mark) is prohibited between October 1 and June 30 of the following year for W C –0 1 and W C –0 2 (i.e., in-water work is permitted from July 1 to September 30) and between April 1 and June 30 in any given year for W C –0 3 (i.e., in-water work is permitted from July 1 to March 31), as per the direction received from the Ministry of Natural Resources and Forestry to minimize disturbance to aquatic communities during critical periods, such as fish spawning and early development. Any proposed works in or near water should also follow the mitigation measures detailed in **Section 7.2** as well as adhere to any measures provided by Fisheries and Oceans Canada in response to the submission of a Request for Review to the Fish and Fish Habitat Protection Program.

7.2 Mitigation

Standard mitigation measures are typically associated with construction related impacts. These mitigation measures are commonly implemented with infrastructure projects and include measures intended to minimize the risk of potential impacts to the natural environment. The following measures are proposed to further mitigate the potential impacts:

- Item 6:** Clearly demarcate the limits of the Construction Disturbance Area with the installation of tree protection fencing or sediment erosion fencing to clearly define the construction disturbance area and prevent accidental damage to vegetation or intrusion into adjacent vegetation areas. Sediment erosion fencing should be used to demarcate the construction disturbance area within the Breslau Provincially Significant Wetland to prevent sediment loading into adjacent wetlands.
- Item 7:** Prepare a Tree Preservation Plan during Detail Design which will document which trees may require removal, injury or protection as a result of the proposed works and identify required tree protection and mitigation measures following best management practices and municipal by-laws as appropriate. Tree Protection Zone fencing will be established to protect and prevent tree injuries. Fencing will be clearly staked prior to construction using barriers in accordance with local by-law requirements and in accordance with the Tree Preservation Plan. Regular inspection in areas of vegetation removal will be undertaken as required during construction to ensure that fencing is intact, only specified trees are removed and no damage is caused to the remaining trees and adjacent vegetation communities. Pruning of branches will be conducted through the implementation of proper arboricultural techniques.
- Item 8:** Removal of ash trees, or portions of ash trees, will be carried out in compliance with the Canada Food and Inspection Agency Directive 'D – 03 – 08: Phytosanitary Requirements to Prevent the Introduction into and Spread within Canada of the Emerald Ash Borer. To comply with this Directive, all Ash trees requiring removal, including any wood, bark or chips, will be restricted from being transported outside of the emerald ash borer regulated areas of Canada.
- Item 9:** Install wildlife exclusion fencing in accordance with the Best Management Practices for Mitigation the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (Ministry of Natural Resources and Forestry, 2016) in order to prevent herpetofauna entering the construction work area. Wildlife exclusion fencing should be placed along both sides of the Greenhouse Road extension through the Breslau Provincially Significant Wetland Complex if work is to be done during the turtle active season of April 1 to October 30. Wildlife exclusion fencing should be installed before April 1 of any year so that turtles and other wildlife are deterred from entering the work area but are not inadvertently redirected or funneled towards the existing rail corridor. Temporary wildlife exclusionary fencing should also be installed prior to April 1 along the west and east sides of Greenhouse Road near the confirmed turtle wintering areas for the duration of construction works.
- Item 10:** Develop a detailed Sediment and Erosion Control Plan prior to construction to minimize sediment release to adjacent vegetation communities and watercourses, particularly the Breslau Provincially Significant Wetland. The following principles should be incorporated to minimize sedimentation and erosion:
- i. minimize the duration of soil exposure,
 - ii. retain existing vegetation, where feasible,

- iii. encourage re-vegetation,
- iv. divert runoff away from exposed soils,
- v. keep runoff velocities low, and
- vi. trap sediment as close to the source as possible.

Item 11: Monitor all fencing (silt, tree and wildlife exclusion) during construction on a weekly basis and 24 hours after significant rain or wind events to ensure that all fencing is intact and functioning properly.

Item 12: Use water as a dust control measure to reduce or eliminate generation of dust from heavy equipment construction and earth moving activities, areas of exposed soils and areas of concrete drilling/cutting to mitigate dust deposition into adjacent natural areas and watercourses.

Item 13: Restore temporarily disturbed areas with native trees, shrubs and seed mix. Sections of the Breslau Provincially Significant Wetland that will be temporarily disturbed due to construction activities should be restored back to wetland habitat where possible to retain the wetland's function. Planted species should consist of native species that are present within the adjacent wetland vegetation communities to ensure the composition of adjacent communities is retained.

Item 14: Develop a Spills Response Plan prior to construction to avoid/minimize contaminant release to the adjacent natural areas, particularly the watercourses and the Breslau Provincially Significant Wetland. As part of the Spills Response Plan:

- i. Re-fuelling stations should be located within a centralized location on-site at least 30 metres away from watercourses or wetlands.
- ii. Re-fuelling stations should be constructed in a manner to prevent soil, and/or surface and groundwater contamination from any leaks or spills.
- iii. An emergency response kit should be made available at each re-fuelling station in case of a spill.
- iv. All on-site crew members operating construction vehicles should be appropriately trained in handling a potential spill and have Workplace Hazardous Materials Information System Training.
- v. All chemical transfer/maintenance should be conducted within the refuelling station areas.

Item 15: All machinery, construction equipment and vehicles arriving on site should be in clean condition (e.g., free of fluid leaks, or attached soil potentially containing seeds of plant material from invasive species) and be inspected and washed in accordance with *the Clean Equipment Protocol for Industry* (Halloran et al., 2013) prior to arriving and leaving the construction site.

- i. Machinery, construction equipment and vehicles should be cleaned at least 30 away from any watercourse, water body or wetland, and ideally on mud free, gravel covered, hard surface or well-maintained grassy area (e.g., parking lots or manicured lawns in Park).
- ii. The Contractor shall be provided with a copy of the document "Clean Equipment Protocols for Industry" (Halloran, et al. 2013) and shall prepare a plan to ensure that vehicles and equipment entering the construction work area are clean and inspected prior to entry.

- Item 16:** Machinery should not enter watercourses, even if the channel is dry, and machinery movement in the vicinity of watercourses should be kept to a minimum.
- Item 17:** Develop a Road Salt and Snow Management Plan in accordance with the Region of Waterloo's Salt Management Strategy (2006) during Detail Design to avoid or minimize salt loading into the watercourses and Breslau Provincially Significant Wetland. Salt-tolerant, native plants should be considered for streetscape design.
- Item 18:** Stockpiles of gravel and sand required for construction should not be placed in areas that are accessible to nesting turtles. If this is not possible, then exclusion fencing in accordance with the Best Management Practices for Mitigation the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (Ministry of Natural Resources and Forestry, 2016) around stockpiled gravel and sand should be installed prior to May 1 and maintained until July 30.
- Item 19:** Reduce the slope of stockpiled substrates (gravel, sand, soil) and maintain it at 70 degrees or less during the breeding bird season (April 1 to August 31) to prevent burrowing Migratory Birds Convention Act protected and Species at Risk birds from nesting in the stockpiled material.
- Item 20:** Develop a Wildlife Sighting Response and Handling Plan prior to construction. Construction staff will be made aware of the possible wildlife, including Species at Risk and Species of Conservation Concern, that may occur within the work area. The Plan will include Species at Risk identification and the proper protocols to implement if wildlife or Species at Risk/Species of Conservation Concern are encountered in the work area to reduce harm/injury to the animal. The handling protocol should follow the Ministry of Natural Resources and Forestry's Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (Ministry of Natural Resources and Forestry, no date). The Wildlife Sighting Response and Handling Plan will note the importance of contacting the Ministry of Environment Conservation and Park's Species at Risk Branch (SAROntario@ontario.ca) within 48 hours of any observation of Endangered or Threatened species, and the Ministry of Natural Resources and Forestry for species of Special Concern. Additionally, all species at risk observations should be reported to the Natural Heritage Information Centre (<https://www.ontario.ca/page/report-rare-species-animals-and-plants>) before the end of the Project.
- Item 21:** Do not harass or harm wildlife encountered. If wildlife is encountered within the construction area, stop work immediately within 30 metres of the observation and allow the animal to leave on its own. If it is not leaving on its own, contact a trained Environmental Inspector or Qualified Ecologist to move the animal into an adjacent natural area in a safe and secure manner following wildlife handling methods (as outlined in the Ministry of Natural Resources and Forestry's Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders). Should an injured or orphaned animal be encountered, a trained Environmental Inspector or Qualified Ecologist should transport the animal to the closest wildlife rehabilitation centre. This is to be done in accordance with the Ministry of Natural Resources and Forestry's wildlife handling methods. If a Species at Risk is identified, contact a Qualified Ecologist and then Ministry of Environment Conservation and Parks for further steps.
- Item 22:** Do not feed wildlife.
- Item 23:** Do not litter; garbage can attract wildlife to the work area. All garbage should be thrown out in appropriate waste receptacles.

- Item 24:** Shield any street illumination to reduce light spill along the road extension within the Breslau Provincially Significant Wetland, and ensure the lights are focused downward and away from natural areas.
- Item 25:** Complete daily searches for turtles within the construction work area during the turtle active season, roughly between **April 1 to September 30**, to identify any turtles (or other wildlife) that may be trapped in the construction work area. If any are identified, these may be removed and relocated in accordance with the Wildlife Observation and Handling Protocol to be developed during detail design. Should any nesting turtles or nests be identified within the construction work area, an appropriate setback should be implemented around the nest or nesting individual. No construction activities are to occur within the setback area for the duration of the nesting season (**May 1 – July 15**), as determined by a qualified Ecologist.
- Item 26:** Maintain existing draining patterns between wetland units through proper design and implementation of stormwater management and Low Impact Design measures to maintain the hydrologic function of the Breslau Provincially Significant Wetland and maintain/enhance water quality entering the Provincially Significant Wetland and watercourses.
- Item 27:** Develop a Dewatering Monitoring and Mitigation Plan during detail design if significant groundwater drawdown is anticipated as result of dewatering activities within the Breslau Provincially Significant Wetland or watercourses. The Plan should include a monitoring program pre-, during and post dewatering activities, as well as mitigation measures and adaptive contingency measures to minimize effects on the Provincially Significant Wetland or fish habitat.
- Item 28:** Complete culvert installations in isolated, dewatered work areas. If the channel is wetted at the time of the culvert installation, a fish relocation should be completed by a trained Environmental Inspector or Qualified Ecologist with a valid Licence to Collect Fish for Scientific Purposes from the Ministry of Natural Resources and Forestry prior to commencement of dewatering activities. All native fish species encountered will be salvaged from within the isolated in-water work area and live released outside the work area to mitigate the potential for harm or death of fish during in-water works.
- Item 29:** Consideration shall be provided for retaining walls to minimize the need for fill slopes within the wetland during detail design.

7.3 Compensation, Restoration and Enhancement

While being the least desirable measure, compensation for loss of vegetation or habitat, or the restoration of degraded areas can offer a means of providing a benefit to the natural features and functions that contribute to an overall natural heritage system. The following recommendations are provided with respect to the proposed works:

- Item 30:** Implementation of buffers outlined in the Greenland Network Implementation Guideline (Region of Waterloo, 2016) is not possible given that the proposed road reconstruction and extension will transverse through Breslau Provincially Significant Wetland. Where vegetation removals are required for temporary laydown or service roads, compensation plantings will be implemented to enhance and create higher quality habitat to the extent possible. Compensation planting will include native trees, shrubs and herbaceous species where appropriate. Compensation within meadow communities should utilize the Grand River Conservation Authority's Recommended Native Pollinator Plants guide (Grand River Conservation Authority, no date). Should temporary laydown areas or service roads require

vegetation removal within the Breslau Provincially Significant Wetland Complex, design and remedial measures should adequately restore and enhance wetland features and functions as per the Grand River Conservation Authority's Public Infrastructure Policies (2015).

- Item 31:** An Invasive Plant Control and Monitoring Plan should be developed during detail design. The spatial extent of invasive plants such as purple loosestrife, common buckthorn and common reed within the Breslau Provincially Significant Wetland should be inventoried in the field. The Plan should include control measures for invasive plant species, if feasible, and restoration with native wetland plants suitable to soil conditions in order to increase plant biodiversity and wildlife habitat.
- Item 32:** A culvert installation will be required at a W C 0 3 as a result of the road extension. This culvert can also provide eco-passage opportunities for wildlife. Including these eco-passages could retain linkage and maintain wildlife movement corridors (west to east across the extended portion of Greenhouse Road) and limit wildlife-vehicle collisions. A potential location for an eco passage includes, but is not limited to the proposed locations illustrated on **Figure A6**. An eco-passage in this location could maintain west-east connectivity beyond the Study Area at the landscape level. It is recommended that a large, open bottom box culvert (at least 3 metres high by 2 metres wide) with natural substrate is installed at the W C 0 3 crossing to allow for a variety of wildlife to use the ecopassage, including large mammals, if possible based on the topography and road design. If this is not possible, a smaller ecopassage (for example a box culvert that is 1 metre high by 1 m wide) may be considered for mid-sized to small mammals, as well as herpetofauna. Permanent reptile exclusion fencing should be installed to direct wildlife towards the ecopassage but avoid inadvertently directing wildlife towards the rail corridor to the south. Reptile exclusion fencing should follow the dimensions and installation criteria specified in the Best Management Practices for Mitigation the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (Ministry of Natural Resources and Forestry, 2016). If rehabilitations or extensions for the existing culvert at W C 0 1 are required for the road reconstruction, it is recommended that wildlife ecopassage design is incorporated to facilitate wildlife movement, such as an installation of a dry bench placed over the water mark integrated in the tunnel that has access to dry ground at both entrances of the culvert (Ministry of Natural Resources and Forestry, 2016).
- Item 33:** Compensation requirements for tree removal should be discussed with the Region of Waterloo and/or Woolwich Township tree by-laws as appropriate.

7.4 Net Effects Assessment

The “*net effects*” of potential impacts were assessed based on the degree to which the recommended mitigation measures can prevent or minimize the potential environmental effects. In other words, net effects are those that remain after mitigation, avoidance and/or compensation measures have been implemented.

The following criteria were applied during the assignment of net effects from the design, construction, and existing land use related to the Project. The potential impacts caused by the proposed work for the Project were considered relative to the significance and sensitivity of the ecological features or their functions.

NO Net Effect.....indicates that no impact to the identified ecological features or functions is anticipated;

LOW Net Effect.....indicates loss of habitat possessing limited potential habitat value, or loss of a portion of habitat, which will not result in long-term impact to the remaining habitat, or reduction in associated key ecological functions;

MEDIUM Net Effect indicates loss of habitat possessing moderate potential habitat value, or loss of a portion of habitat that may result in long term impact to the remaining habitat, or loss of associated key ecological functions; and,

HIGH Net Effect Indicates loss of habitat possessing significant potential habitat value, or loss of a portion of habitat that may result in long-term and potentially critical impacts to the remaining habitat, or significant loss of associated key ecological functions.

The anticipated net effects of the proposed work for the Project (**Section 6**) and the recommended mitigation measures (**Section 7.2**) are shown in **Table 7-1**.

Table 7-1: Net Effects Assessment

Phase of Project	Duration of Potential Effect	Source of Potential Effect	Potential Areas Affected/Potential Effects	Mitigation/Compensation	Anticipated Net Effects/ Rationale
Construction	Direct Long Term	■ Removal of natural communities	■ Removal of 0.23 hectares of Mineral Cultural Woodland ■ Removal of 0.64 hectares of Dry-Moist Old Field Meadow Type ■ Removal of 0.01 hectares of Reed-canary Grass Mineral Meadow Marsh ■ Removal of 0.05 hectares of Cattail Organic Shallow Marsh ■ Removal of 0.09 hectares of Willow Mineral Deciduous Swamp	■ Limit vegetation removal to the extent possible. Clearly delineate vegetation clearing zones (i.e., using silt or tree protection fencing) on both construction drawings and in the field prior to clearing and grading (Item 1:). ■ Temporarily disturbed areas will be replanted with native trees, shrubs and seed mix. Sections of the Breslau Provincially Significant Wetland that will be temporarily disturbed due to construction activities should be restored back to wetland habitat where possible in order to retain the function of the wetland. (Item 13:, Item 30:). ■ Implementation of appropriate setbacks and erosion and sediment control fencing to define the construction footprint area and prevent accidental removal (Item 6:). ■ A tree inventory should be completed during detail design and compensation for tree removals should be confirmed with Waterloo and/or Woolwich Township tree by-laws as appropriate(Item 7:, Item 8:, Item 33:).	<u>NO NET EFFECT</u> ■ Anticipated vegetation removal is minimal and within already disturbed, low quality vegetation communities compared to the remaining natural areas. No long-term effects are anticipated on the remaining vegetation communities, including the Breslau Provincially Significant Wetland. Vegetation removal within the Breslau Provincially Significant Wetland will be limited to disturbed edges which are dominated by invasive and non-native plants.
Construction	Direct Long Term	■ Removal of Candidate Significant Wildlife Habitat	■ Removal of 0.64 hectares of candidate habitat for Monarch ■ Removal of 0.32 hectares of vegetation removal of candidate habitat for Eastern Wood-pewee ■ Removal of 0.28 hectares of candidate marsh breeding bird habitat ■ Removal of 0.38 hectares of candidate amphibian breeding habitat and amphibian movement corridors	■ Same mitigation as above. ■ Restrict construction activities to avoid sensitive wildlife windows to the extent possible (Item 2:, Item 3:).	<u>NO NET EFFECT</u> ■ Anticipated vegetation removal is minimal and within already disturbed, low quality vegetation communities compared to the remaining natural areas. No long-term effects are anticipated on the remaining vegetation communities that would impede or degrade ecological function for the candidate significant wildlife habitats.
Construction	Direct Long Term	■ Removal of Candidate Habitat for Bat Species at Risk including Candidate Significant Wildlife Habitat	■ Removal of 0.32 hectares of candidate habitat for bat species at Risk and candidate bat maternity colonies ■ Removal of one snag tree	■ Same mitigation as above. ■ Avoid tree removal within the Mineral Cultural Woodland and Willow Mineral Deciduous Swamp during bat active season (April 1 to September 30) Item 4:.	<u>NO NET EFFECT</u> ■ Anticipated tree removal is minimal and within already disturbed, low quality vegetation communities compared to the remaining natural areas. The form and function of the remaining forest and woodlands will be maintained for continued bat Species at Risk maternity roosting. Avoiding tree removal during the bat active season will avoid impacts (injury or mortality) to individual bats. Compensation for tree removal will be confirmed with the Waterloo Region and/or Woolwich Township.
Construction	Direct Long Term	■ Removal of Candidate Habitat for Bird Species at Risk	■ Removal of 0.05 hectares of candidate habitat for Least Bittern ■ Removal of 0.32 hectares of candidate habitat for Red-headed Woodpecker	■ Same mitigation as above. ■ Remove vegetation outside of the breeding bird nesting season (April 1 to August 31) Item 3:.	<u>LOW NET EFFECT</u> ■ Anticipated vegetation removal is minimal and within already disturbed, low quality vegetation communities compared to the remaining natural areas. No long-term effects are anticipated on the remaining candidate habitat for Least Bittern and Red-headed Woodpecker.
Construction	Direct Long Term	■ In-channel works for existing culvert and installation of new culvert.	■ Alteration, disruption, or destruction of fish habitat and/or death of fish.	■ Restrict in-water work to outside of October 1 to June 30 for W C 0 1 and W C 0 2 and April 1 to June 30 for W C 0 3 (Item 5:). ■ Machinery should not enter watercourses (Item 16:). ■ Maintain existing drainage patterns between wetland units (Item 26:). ■ Develop a Dewatering Monitoring and Mitigation Plan during detail design if significant groundwater drawdown is anticipated as result of dewatering activities within the Breslau Provincially Significant Wetland or watercourses (Item 27:). ■ Fish salvages should be completed prior to culvert installations in dewatered areas (Item 28:).	<u>LOW NET EFFECT</u> ■ The extension of existing culverts and installation of a new culvert will occupy permanent footprints within fish habitat, potentially constituting the harmful alteration, disruption, or destruction of fish habitat requiring review by the Fish and Fish Habitat Protection Program. Removal of fish from work areas following permit conditions and standard protocols will protect those individuals from harm. The relocation will be a temporary disturbance for those individuals. The drainage patterns will be maintained.
Operational	Direct	■ There are no anticipated direct impacts resulting from the operation phase of the Project.	■ None	■ None	<u>NO NET EFFECT</u> ■ No direct impacts are anticipated.
Construction	Indirect Short Term	■ Construction related runoff contributing to erosion of soils	■ Throughout Study Area	■ Installation, maintenance and monitoring of erosion and sediment control measures (Item 10:, Item 11:). ■ Consideration shall be provided for retaining walls to minimize the need for fill slopes in the wetland (Item 29:).	<u>NO NET EFFECT</u> ■ Proper installation and monitoring of sediment control fencing can prevent the deposition of fill and sedimentation.

Table 7-1: Net Effects Assessment

Phase of Project	Duration of Potential Effect	Source of Potential Effect	Potential Areas Affected/Potential Effects	Mitigation/Compensation	Anticipated Net Effects/ Rationale
Construction	Indirect Short Term	■ Incidental Damage and Disturbance to Adjacent Natural Features	■ Potential areas affected include natural heritage features present within the Study Area including the wetland and upland cultural communities.	■ Demarcation of construction disturbance area with appropriate tree protection or sediment erosion fencing (Item 6:). ■ Installation of tree protection fencing in accordance with the Tree Protection Plan and regular monitoring during vegetation removal to ensure no damage occurs to protect trees or adjacent vegetation communities (Item 7:, Item 8:, Item 33:). ■ Restoration of temporarily disturbed areas with native plants appropriate to site conditions and affected vegetation community (Item 13:, Item 30:).	<u>NO NET EFFECT</u> ■ Proper installation of tree protection or sediment erosion fencing and regular monitoring during vegetation removal can prevent incidental damage or intrusion into adjacent vegetation communities.
Construction	Indirect Short Term	■ Degradation of soil/water quality through compaction/contamination	■ Throughout Study Area	■ Installation and maintenance of erosion and sediment control measures (Item 10:, Item 11:). ■ Use of water as a dust control measure (Item 12:). ■ Development and implementation of Spills Response Plan requiring proper equipment maintenances and re-fuelling stations to be located at least 30 m away from watercourses and wetlands (Item 14:).	<u>NO NET EFFECT</u> ■ Proper equipment maintenance and refuelling practices can greatly reduce the risk of leaks and spills. Paired with appropriate emergency spill planning there is no expected impact to Natural Heritage Features.
Construction	Indirect Short Term	■ Disturbance to wildlife through construction and related noise impacts	■ Disturbance to breeding birds, fish and other wildlife	■ Limit construction activities to daylight hours between March 1 to June 30 to reduce noise impacts to amphibian breeding populations (Item 2:). ■ Restrict vegetation removal to outside of the breeding bird season (April 1 to June 30) and tree removal within Mineral Cultural Woodland and Willow Mineral Deciduous Swamp outside of the bat active season of April 1 to September 30 (Item 3:, Item 4:). ■ Installation of wildlife exclusion fencing in accordance with the Best Management Practices for Mitigation the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (Ministry of Natural Resources and Forestry, 2016) to prevent herpetofauna entering the construction work area (Item 9:). ■ Completed daily searches for turtles and other wildlife within the construction work area (Item 25:). ■ Development and implementation of Wildlife Sighting Response and Handling Plan (Item 20:, Item 21:, Item 22:, Item 23:). ■ Proper management of stockpiled material to prevent birds and turtles from nesting (Item 18:, Item 19:).	<u>NO NET EFFECT</u> ■ With the implementation of restrictions on the timing of construction, installation of wildlife exclusion fencing, proper management of stockpiled material and implementation of Wildlife Sighting Response and Handling Plan, temporary disturbance to birds and wildlife can be avoided.
Construction	Indirect Short Term	■ Change in Hydrology, Drainage and Water Quantity through dewatering activities	■ Disturbance to watercourses and wetlands including aquatic habitat, candidate Least Bittern habitat as well as confirmed Significant Wildlife Habitat for Snapping Turtle, Turtle Wintering Areas and Terrestrial Crayfish	■ Maintain existing drainage patterns between wetland units (Item 26:). ■ Develop a Dewatering Monitoring and Mitigation Plan during detail design if significant groundwater drawdown is anticipated as result of dewatering activities within the Breslau Provincially Significant Wetland (Item 27:). ■ Machinery should not enter watercourses (Item 16:). ■ Fish and wildlife salvages should be completed prior to culvert installations in dewatered areas (Item 28:).	<u>NO NET EFFECT</u> ■ Minimal impacts are anticipated if significant groundwater drawdown is required, provided a dewatering monitoring and mitigation plan is developed and implemented.
Construction	Indirect Short Term	■ Introduction or spread of invasive species	■ Throughout Study Area	■ All machinery, construction equipment and vehicles arriving on site should be inspected for soil potentially containing seeds of plant material from invasive species (Item 15:). ■ Develop an Invasive Plant Control and Monitoring Plan (Item 31:).	<u>NO NET EFFECT</u> ■ The Study Area already contains a high number of invasive species. Control measures for invasive species is anticipated to enhance vegetation communities.
Operational	Indirect Long Term	■ Increased illumination	■ Throughout Greenhouse Road and Extension	■ Installation of appropriately designed lighting standards including light shields (Item 24:).	<u>NO NET EFFECT</u> ■ Increased illumination will be installed in a previously unlit area. With the appropriate mitigations in place and considering the significant quantity of artificial light present within the vicinity there are no impacts are expected.
Operational	Indirect Long Term	■ Change in Hydrology, Drainage and Water Quantity through increased impervious area	■ Disturbance to watercourses and wetlands including aquatic habitat, candidate Least Bittern habitat as well as confirmed Significant Wildlife Habitat for Snapping Turtle, Turtle Wintering Areas and Terrestrial Crayfish	■ Maintain existing drainage patterns between wetland units through proper design and implementation of stormwater management and Low Impact Design measures (Item 26:).	<u>NO NET EFFECT</u> ■ Hydrology, drainage and water quantity changes are not anticipated to occur as long as proper design and implementation of stormwater management and Low Impact Design measures are adhered to.
Operational	Indirect Long Term	■ Degradation of water quality through road salt loading and increased impervious area	■ Disturbance to watercourses and wetlands including aquatic habitat, candidate Least Bittern habitat as well as confirmed Significant Wildlife Habitat for Snapping Turtle, Turtle Wintering Areas and Terrestrial Crayfish	■ Develop a Road Salt and Snow Management Plan (Item 17:). ■ Implementation of landscape plantings will reduce contamination from road salt to the watercourses and wetlands (Item 13:, Item 30:, Item 33:).	<u>LOW NET EFFECT</u> ■ Impacts can be reduced with the implementation of a Road Salt and Snow Management Plan and plantings.
Operational	Indirect Long Term	■ Wildlife road mortality through increased road traffic	■ Throughout Study Area.	■ Installation of ecopassages and permanent fencing to reduce wildlife crossing over the road (Item 32:).	<u>LOW NET EFFECT</u> ■ Impacts can be reduced with the implementation of ae ecopassages and fencing.

8. Permits and Approvals

Section 2 outlines the legislative and policy context for the Project. Based on the field investigations and assessment of potential impacts, the required permits and conformance with legislation for the Project have been identified. **Table 8-1** below provides a summary of the anticipated permits and approvals for the proposed works. Applicable permits and approvals will need to be completed and submitted to the appropriate regulatory agencies prior to construction.

Table 8-1: Anticipated Permits and Approvals

Level of Government	Legislation	Governing Authority	Applicability to the Project
Federal	Migratory Birds Convention Act, 1994	Environment and Climate Change Canada	Contravention of the Migratory Birds Convention Act is not anticipated provided that vegetation removal and the installation of any required exclusionary measures occurs outside of the breeding bird season (April 1 to August 31). There were no nesting cavities of Pileated Woodpecker identified within the Construction Disturbance Area.
Federal	Fisheries Act, 1985	Fisheries and Oceans Canada	Required – a Fisheries and Oceans Canada Request for Review to the Fisheries and Oceans Canada Fish and Fish Habitat Protection Program should be submitted during the Project's detailed design phase well in advance of works in or near water, including vegetation removal. The Fisheries and Oceans Canada Fish and Fish Habitat Protection Program review will determine the potential for the project to cause the death of fish or the harmful alteration, disruption, or destruction of fish habitat in contravention of the Fisheries Act requiring a Fisheries Act Authorization or, if not, will issue a Letter of Advice for the project.
Provincial	Endangered Species Act, 2007	Ontario Ministry of the Environment, Conservation and Parks	Authorization under the Endangered Species Act is not anticipated to be required for potential bat Species at Risk, Least Bittern and Red-headed Woodpecker habitat because vegetation removal is minimal along existing infrastructure and/or edge habitat such that the proposed works will not impede or destroy the form and function of the remaining habitats for these Species at Risk. Furthermore, restrictions of construction activities to avoid sensitive wildlife windows will avoid impacts to individual Species at Risk. The following assessment should be confirmed based on additional studies and with the Ministry of the Environment, Conservation and Parks during detail design.
Provincial	Fish and Wildlife Conservation Act, 1997	Ministry of Natural Resources and Forestry	- A Licence to Collect Fish for Scientific Purposes will be required from the Ministry of Natural Resources and Forestry for any in-water works to permit a qualified biologist to handle and relocate fish encountered in the isolated work area, unless the work area is dry and isolated against incoming flows and can remain so for the duration of the works below the high-water mark. - A Wildlife Scientific Collector's Authorization and an approved animal care plan will also be required for a qualified biologist to capture, handle, and/or relocate herpetofauna (e.g., frogs and turtles) from the work area. - The above will be considered during the Project's detailed design phase.

Level of Government	Legislation	Governing Authority	Applicability to the Project
Municipal	Tree Protection By-law 08 026	Region of Waterloo	■ Municipal projects are exempt from the tree protection by-law, however, tree compensation is strongly recommended and will be confirmed with the Township of Woolwich.
Local	Ontario Regulation. 150/06: Grand River Conservation Authority Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses	Grand River Conservation Authority	■ Required as it relates to natural hazards under the Grand River Conservation Authority jurisdictions.

9. Additional Studies and Next Steps

The following additional field studies may be required during detail design:

- Update Species at Risk habitat screening as protection statuses of species under the Endangered Species Act may change over time.
- Potential Species at Risk presence/absence surveys following Ministry of Environment Conservation and Parks approved protocols and guidelines that may be required during detail design and should be confirmed with Ministry of Environment, Conservation and Parks during the early phases of detail design; the following surveys are subject to change based on the updated Species at Risk habitat screening, agency consultation and design-related impacts to suitable Species at Risk:
 - Bat Leaf-off cavity tree searches and acoustic surveys for bat Species at Risk following the Survey Protocols for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis and Tri-coloured Bat (Ministry of Natural Resources and Forestry, 2017). The Ministry of Environment Conservation and Parks guidance documents for Maternity Roost Surveys (2022) and Bat Survey Standards (2022) should also be used.
 - Playback surveys for Least Bittern following the National Least Bittern Survey Protocol (Jobin et al., 2011).
- Breeding Bird Surveys to determine potential presence/absence for Red-headed Woodpecker as well as other bird species.
- Complete a dewatering assessment to confirm impacts on wetlands and watercourses.
- A tree inventory to document required removals based on the construction disturbance area and for use in consideration of replacement plantings.

An Environmental Management Plan is to be prepared during the detail design prior to issuance of contract drawings where the mitigation measures are tailored to the site based on the recommendations identified in this Environmental Impact Study report and shall include the following supporting documents/plans:

- The Clean Equipment Protocol for Industry (Halloran et al., 2013)
- Spill Response Plan
- Invasive Species Management Plan
- Construction Monitoring and Inspection Plan
- Dewatering Monitoring Plan (if determined required)
- Species at Risk and General Wildlife Handling Protocol

10. Summary

The Environmental Impact Study for the Project documented in this report has been prepared in accordance with the relevant municipal, provincial and federal environmental legislation, policies and guidelines as documented in this report.

The existing natural heritage features identified within the Study Area for the Project through the comprehensive natural heritage background review and field program include the following:

- **Municipally/Provincially recognized natural heritage features:**

- Breslau Provincially Significant Wetland Complex; and,
- Waterloo-Guelph Airport Creek.

- **Significant Wildlife Habitat**

- Confirmed
 - Seasonal Concentration Areas: Turtle Wintering Areas, Reptile Hibernaculum and,
 - Specialized Habitat for Wildlife: Terrestrial Crayfish and Habitat for Species of Conservation Concern including Snapping Turtle.
- Candidate
 - Seasonal Concentration Areas: Turtle Nesting Areas and Bat Maternity Colonies;
 - Specialized Habitat for Wildlife: Amphibian Breeding Habitat (Wetlands), Amphibian Breeding Habitat (Woodland) , Habitat for Species of Conservation Concern including Eastern Wood-pewee, Western Chorus Frog (*Pseudacris aculate*) and Monarch;
 - Animal movement corridor was identified as Amphibian Movement Corridors.

- **Species at Risk Habitat**

- Candidate (i.e., potential)
 - Red-headed Woodpecker; and,
 - Bat Species at Risk (Eastern Small-footed Myotis, Northern Myotis, Little Brown Myotis and Tricoloured Bat).

- **Fish Habitat**

- **Hopewell Creek Tributary W C 0 1** – potential direct fish habitat seasonally during periods of flow, or indirect habitat by contributing flow downstream towards the main channel of Hopewell Creek;
- **Hopewell Creek Tributary W C 0 2** – no aquatic habitat capable of supporting fish at any point in the year ; and,
- **Branch B/Airport Creek W C 0 3** – potential direct fish habitat seasonally, if access for fish is feasible during periods of flow, or indirect habitat by contributing flow downstream towards the main channel of Airport Creek.

Potential impacts from the proposed works include damage and disturbance to adjacent natural features, disturbance to terrestrial wildlife, increased sedimentation and erosion potential, and disturbance to fish and their habitat. Avoidance measures, such as the work limit restrictions designed for the Project and compliance with restriction of rehabilitation activities to outside of sensitive periods for local or significant wildlife species, in addition to the incorporation of mitigation measures such as installation of tree protection fencing, wildlife exclusion measures, erosion and sediment control measures, machinery and equipment practices, and invasive species

control strategies can aid in addressing these potential impacts. Compensation measures, including planting of native trees and shrubs can further offset potential impacts to edge habitat and riparian habitat.

The anticipated permits and approvals required to complete the Project include the following:

- Request for Review submission to Fisheries and Oceans Canada for Project review under the Fisheries Act;
- Fish and wildlife handling permits for the handling and relocation of fish and herpetofauna (e.g., frogs and turtles) from construction work areas;
- Potential authorizations under the Endangered Species Act for bat Species at Risk habitat if these cannot be avoided; and,
- Submission of an Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses to the Grand River Conservation Authority under Ontario Regulation 150/06 of the Conservation Authorities Act.

The following additional field studies may be required during detail design:

- Updated Species at Risk habitat screening;
- Bat Leaf-off cavity tree searches and acoustic surveys;
- Breeding Bird Surveys;
- Anuran nocturnal calling surveys; and,
- An updated tree inventory to document required removals based on the construction footprint and for use in consideration of replacement plantings.

An Environmental Management Plan is to be prepared during the detail design prior to issuance of contract drawings where the mitigation measures are tailored to the site based on the recommendations identified in this Environmental Impact Study report and shall include the following supporting documents/plans:

- Tree Preservation Plan;
- Removal of Ash trees in compliance with the Canada Food and Inspection Agency Directive 'D – 0 3 – 0 8: Phytosanitary Requirements to Prevent the Introduction into and Spread within Canada of the Emerald Ash Borer;
- The Clean Equipment Protocol for Industry (Halloran et al., 2013);
- Sediment and Erosion Control Plan;
- Spill Response Plan;
- Invasive Species Management Plan;
- Construction Monitoring and Inspection Plan;
- Wildlife Sighting Response and Handling Plan, including identification of Species at Risk / Species of Conservation Concern and protocols if encountered; and,
- Road Salt Management Plan.

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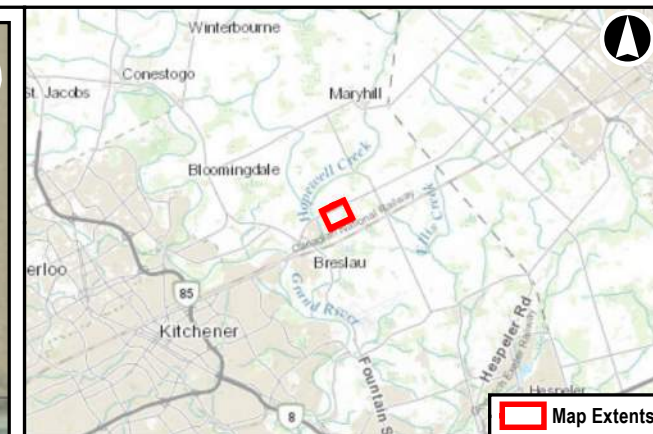
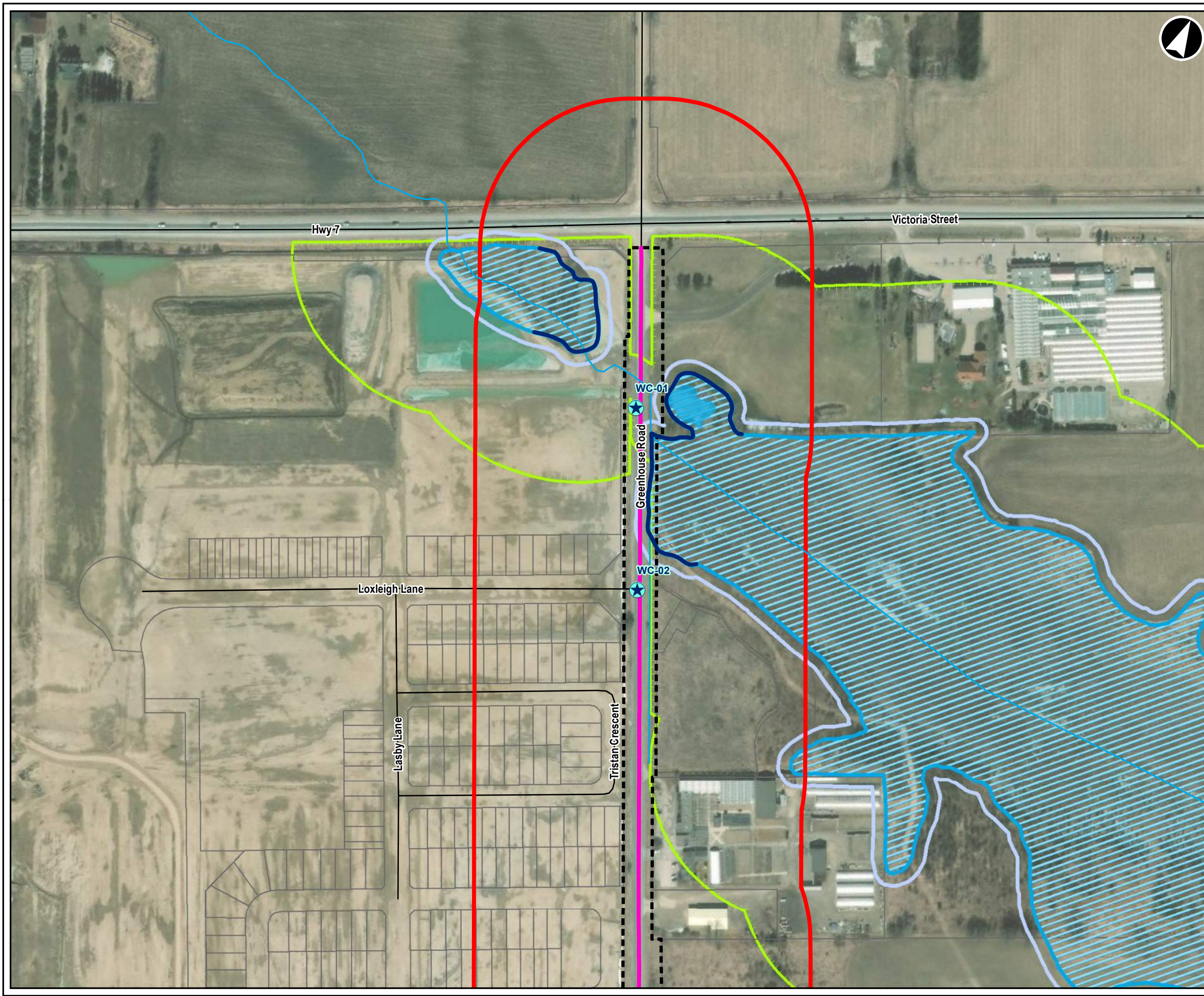
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Appendix **A**

Figures





Legend

- Road Reconstruction
- Road Extension - Alternatives 1, 2, 3
- Limits of Construction Disturbance Area
- Study Area 120 m Buffer
- Water Crossing
- Watercourse
- Constructed Drain
- Waterbody
- Railway
- Parcel
- Growth Plan for the Greater Golden Horseshoe Natural Heritage System
- Grand River Conservation Area Regulation Limit
- Region of Waterloo and Woolwich Township Core Environmental Features

Wetlands

- Breslau Provincially Significant Wetland Complex
- Breslau Provincially Significant Wetland Complex - Field Verified by Grand River Conservation Authority on October 14, 2022

GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT

NATURAL HERITAGE FEATURES AND POLICY AREAS

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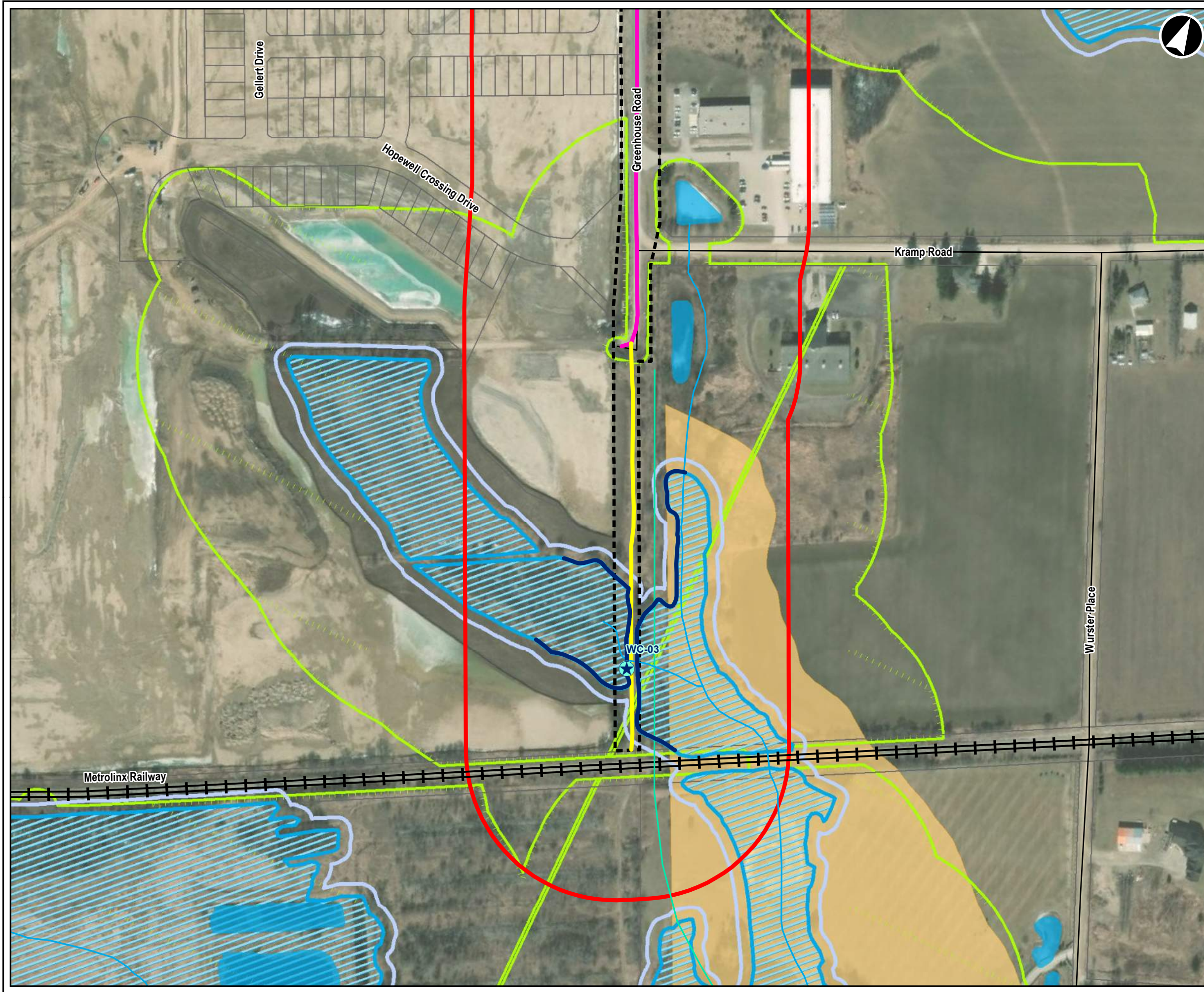
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Figure A2-1

AECOM

Data Sources: Land Information Ontario, City of Waterloo, Grand River Conservation Authority, Esri World Imagery 11/10/2021
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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Legend

- Road Reconstruction
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- Watercourse
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GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT

NATURAL HERITAGE FEATURES AND POLICY AREAS

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Metres

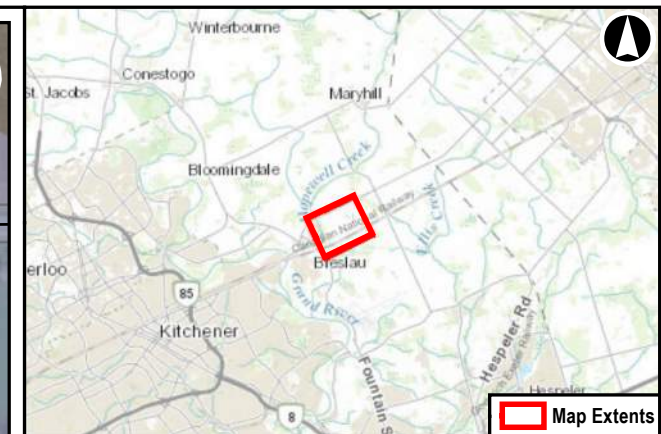
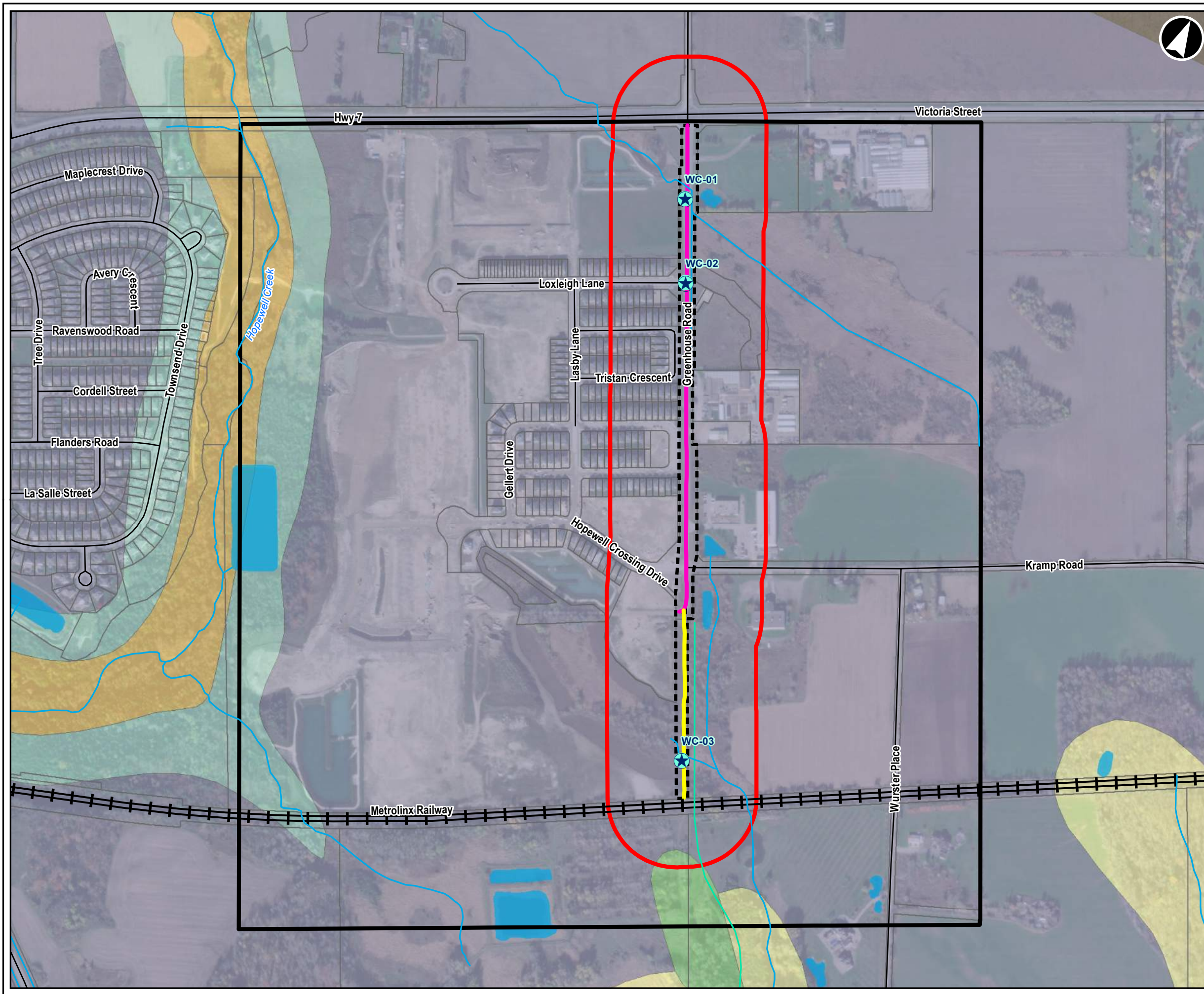
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Feb, 2023	PN#: 60683946	1:3,000 *when printed 11"x17"
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Figure A2-2

AECOM

Data Sources: Land Information Ontario, City of Waterloo, Grand River Conservation Authority, Esri World Imagery 11/10/2021
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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Legend

- Road Reconstruction
- Road Extension - Alternatives 1, 2, 3
- Limits of Construction Disturbance Area
- Study Area 120 m Buffer
- Environmental Assessment Study Area
- Water Crossing
- Watercourse
- Constructed Drain
- Waterbody
- Railway
- Parcel

Surficial Geology

- 5b: Till
- 6: Ice-contact Stratified Deposits
- 7b: Glaciofluvial Deposits
- 19: Modern Alluvial Deposits
- 20: Organic Deposits

GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT

SURFICIAL GEOLOGY

0 50 100 150 200 250 300
Metres

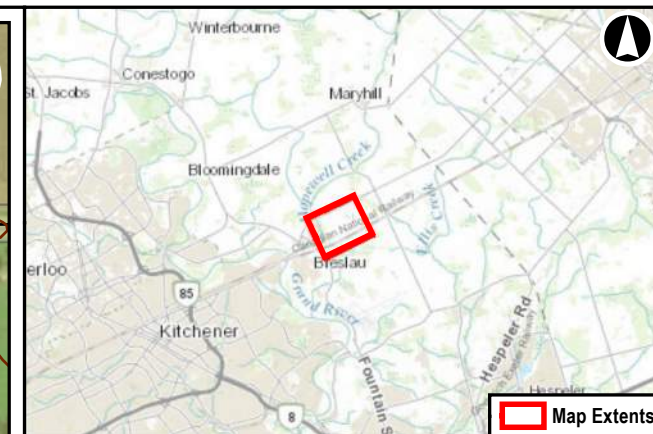
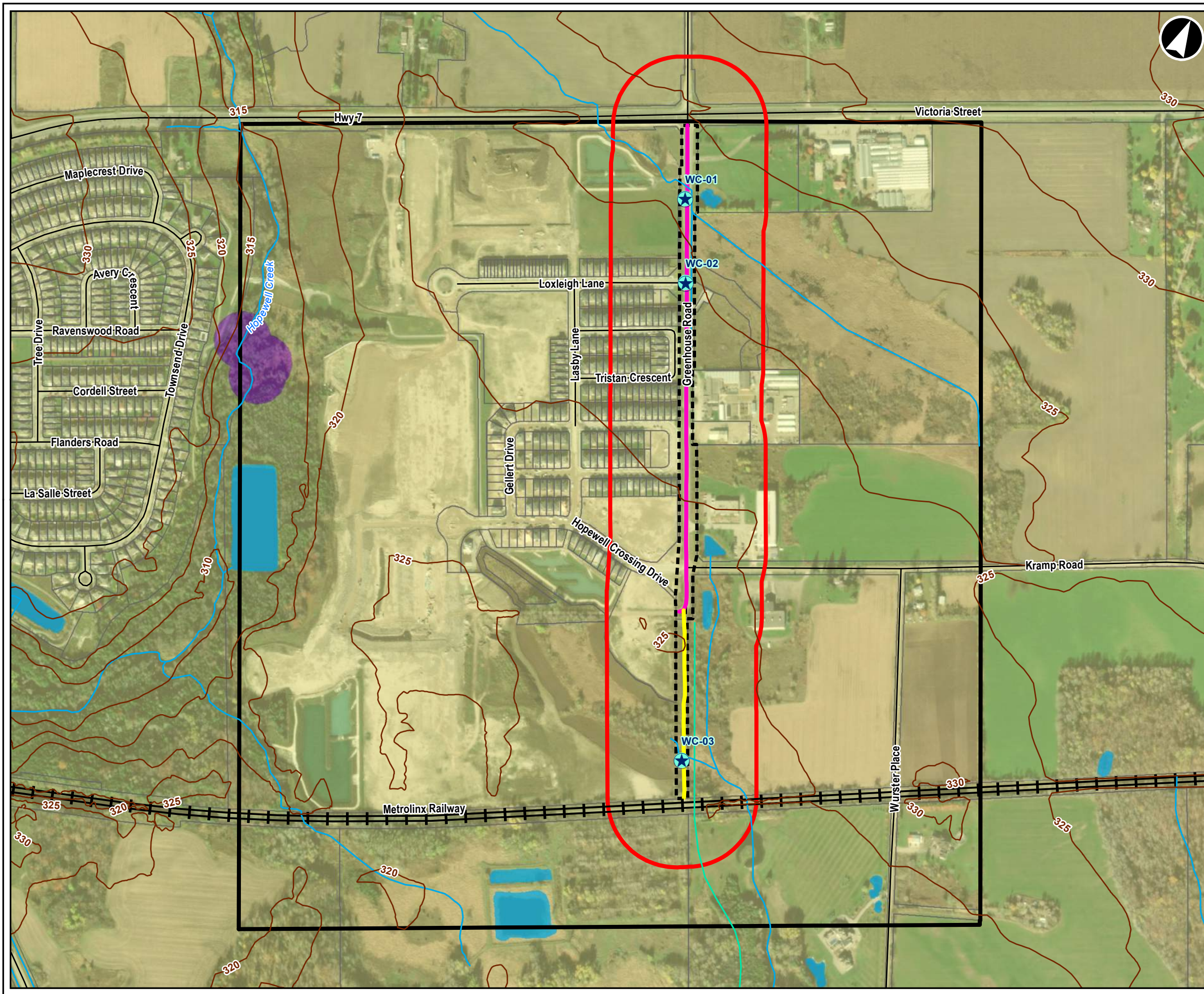
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Figure A3

AECOM

Data Sources: Land Information Ontario, Esri World Imagery 11/10/2021
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Legend

- Road Reconstruction
- Road Extension - Alternatives 1, 2, 3
- Limits of Construction Disturbance Area
- Study Area 120 m Buffer
- Environmental Assessment Study Area
- Water Crossing
- Watercourse
- Constructed Drain
- Waterbody
- Contour
- Railway
- Parcel

Wellhead Protection Area – Vulnerability Score

- 2
- 4

GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT

DRAINAGE AND HYRDOLGY

0 50 100 150 200 250 300
Metres

Datum: NAD 1983 UTM Zone 17N

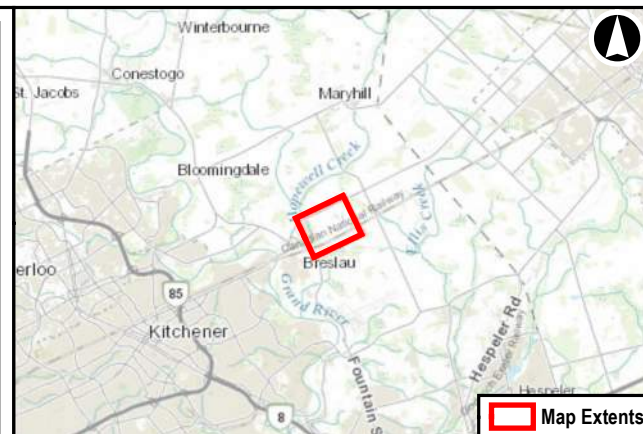
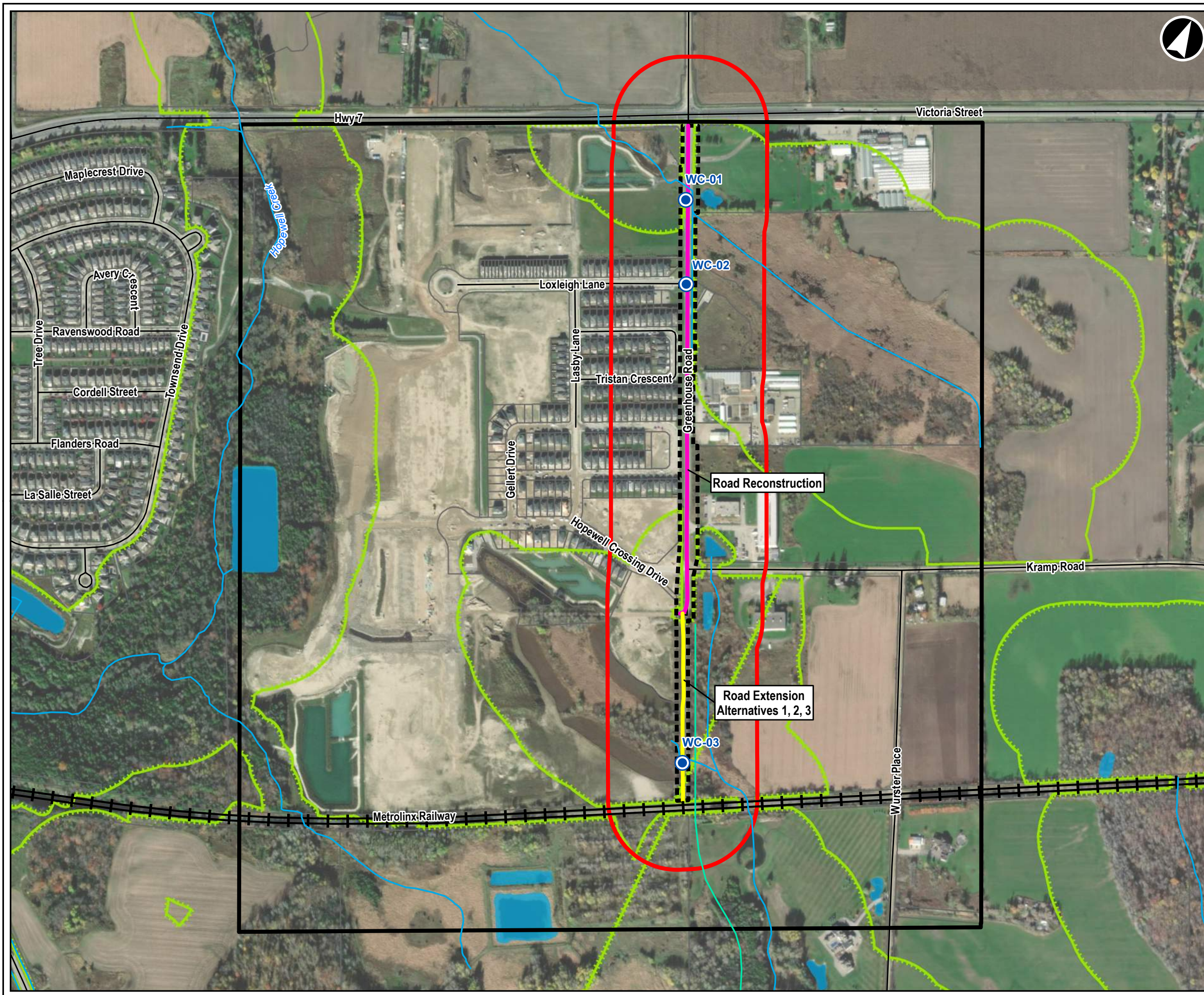
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Figure A4

AECOM

Data Sources: Land Information Ontario, Grand River Conservation Authority, Esri World Imagery 11/10/2021
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
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\\aecom\work\60683946\GIS\MapDocs\MapDocs\Greenhouse_Road_Drainage.mxd; Y:\CAG\GIS\Docs\GIS\Ontario\60683946_NaturalEnv_DrainageHydrology.mxd
Date Saved: 2/7/2023 User Name: Stephanie Clark



Legend

- Road Reconstruction
- Road Extension - Alternatives 1, 2, 3
- Limits of Construction Disturbance Area
- Study Area 120 m Buffer
- EA Study Area
- Aquatic Survey Location
- Watercourse
- Constructed Drain
- Railway
- Waterbody
- Parcel
- Grand River Conservation Area Regulation Limit

GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT MUNICIPAL CLASS EA

AQUATIC HABITAT FEATURES

0 50 100 150 200 250 300
Metres

Datum: NAD 1983 UTM Zone 17N

Jan, 2023	PN#: 60683946	1:6,500 * when printed 11"x17"
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Figure A5

AECOM

Data Sources: LID
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Appendix **B**

Terms of Reference

To: Grand River Conservation Authority
400 Clyde Road
PO Box 729
Cambridge, ON N1R 5W6

November 30, 2022

Date:

Project #: 60693852

From: Olga Hropach (AECOM)

Cc: Steve Buckley (AECOM)

Memorandum

Subject: **Environmental Impact Study Terms of Reference for Greenhouse Road Reconstruction Project – Breslau**

1. Introduction

AECOM Canada Ltd. (AECOM) has been retained by Township of Woolwich to undertake the required investigations for the preparation of Environmental Impact Study (EIS) in support of the proposed Greenhouse Road Reconstruction Schedule B Municipal Class Environmental Assessment (MCEA) and detailed design Project (hereafter “the Project”) in Breslau, Ontario. The following Terms of Reference (TOR) details the work plan for the investigations and assessments required for the preparation for the Project based on the pre-consultation meeting with the Grand River Conservation Authority (GRCA) held on September 29, 2022. The TOR outlines key issues as they relate to the Project as well as the potential for impacts on natural heritage features.

1.1 Study Area

The Project occurs along Greenhouse Road in Breslau, Ontario which is a local road located to the northeast of the Breslau community in the Township of Woolwich. The roadway is approximately 2.1km in length terminating at Township Road 68 in the north, and at an existing cul-de-sac approximately 75m south of Kramp Road in the south and is within the Township’s Ward 3 boundary (Councillors Murray Martin and Larry Shantz). The right-of-way for this road extends an additional 320 m further to the south to the existing rail corridor, where there isn’t any current infrastructure. This Project proposes to reconstruct the existing Greenhouse Road and then extend the road all the way down to the existing rail corridor. **Figure 1** shows the extent and location of the Project.

The Study Area includes a 120 m buffer around the 1.2 km length of Greenhouse Road between Highway 7 (Victoria Street) and the rail corridor. The frontage along this section of roadway is comprised of residential, commercial, industrial, institutional, Breslau Wetland Provincially Significant Wetland (PSW) Complex and green space areas. It includes driveway access to Belgian Nursery (#2615 Victoria Street North), Grobe Nursery (#1787 Greenhouse Road), and National Engineered Fasteners (#1747 Greenhouse Road), maintenance access to the stormwater management pond at the northeast corner of the Hopewell Crossing subdivision as well as to a Union Gas inspection station, and intersections with Loxleigh Lane and Kramp Road/Hopewell Crossing Drive.



Legend

- Road Reconstruction and Extension Project
- Project Extent
- Study Area 120 m Buffer
- ~ Watercourse
- ~ Constructed Drain
- +— Railway
- Waterbody
- Parcel

Wetland Significance

- Evaluated-Provincial

GREENHOUSE ROAD RECONSTRUCTION AND EXTENSION PROJECT

STUDY AREA

0

50

100

150

200

250

300

Metres

Datum: NAD 1983 UTM Zone 17N

Oct, 2022

PN#: 60683946

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*when printed 11"x17"

Figure 1

AECOM

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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Drawn: 10/04/2022

User Name: Stephanie Clark

2. Background Information Review

AECOM has undertaken a preliminary review of available background data within the Study Area using the following available sources:

- Ministry of Natural Resources and Forestry (MNRF)'s Make-a-Map: Natural Heritage Areas application and Natural Heritage Information Centre (NHIC) records (MNRF, 2022a);
- MNRF's Land Information Ontario (LIO) GeoHub database (MNRF, 2022b);
- Ontario Breeding Bird Atlas (OBBA; Bird Studies Canada et al., 2006);
- Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2019);
- Ontario Butterfly Atlas (OBA; Toronto Entomologists' Association [TEA], 2022);
- Bat Conservation International (BCI) species profiles and range maps (BCI, 2022);
- iNaturalist (2022);
- eBird (2022);
- Fisheries and Oceans Canada's (DFO) Aquatic Species at Risk (SAR) Map (DFO, 2022);
- *The Corporation Township of Woolwich Official Plan* (Township of Woolwich, 2022);
- *Ministry of Transportation (MTO) Class EA Greenhouse Road / Highway 7 Intersection* (Natural Resource Solutions Inc. [NRSI], 2019);
- *Breslau Connector Road Environmental Assessment Report* (Township Woolwich, 2021);
- *Intersection Improvements at Victoria Street North (Highway 7) & Greenhouse Road, Breslau EA Report* (AECOM, 2019);
- *Proposed Mixed Use Development Ariss Glen Developments and Thomasfield Homes* (NRSI, 2011); and,
- *Hopewell Crossing Subdivision* (Paradigm Transportation Solutions Limited, 2018).

Based on review of the above sources, the following natural heritage features were identified within the Study Area:

- Breslau Wetland PSW Complex (MNRF, 2022a); and,
- Waterloo-Guelph Airport Creek (MNRF, 2022a).

It should be noted that several natural heritage studies have been undertaken in support of the following adjacent or overlapping projects:

- MTO Class EA Greenhouse Road / Highway 7 Intersection
- Breslau Connector Road EA
- Proposed Mixed Use Development Ariss Glen Developments and Thomasfield Homes (i.e., Hopewell Crossing Subdivision)

Natural heritage data collected from the studies as identified in **Table 1** below will be used to establish existing environmental conditions for the Study Area. Where data gaps were identified, the following tasks will be completed by AECOM as part of this TOR.

Table 1. Previous Environmental Studies Undertaken in the Study Area

Project	Study	Year
Hopewell Crossing Subdivision	Amphibian Call Surveys	2009, 2010
	Breeding Bird Surveys	2009, 2010
	ELC, wildlife incidental observations	2009
	Aquatic habitat assessment	2010
	Wetland habitat assessment and flagging	2010
	Vegetation inventory (summer, fall)	2010
	Butterfly transect survey	2010
	Woodland boundary & tree inventory	2010
	Winter deer surveys, early breeding raptors and nocturnal owl surveys	2011
	Fish and Benthic Monitoring	2011
Greenhouse Road and Hwy 7 Intersection	Confirmatory ELC plant list and wetland boundary site visit	2018
Breslau East Connector Road	Bat Habitat Assessment	2019
	Anuran Call Survey	2019
	Breeding Bird Survey	2019
	ELC and vegetation inventory (summer, fall)	2019
	Nightjar bird survey	2019
	Marsh breeding bird survey	2019
	Aquatic habitat assessment	2019
	Headwater Drainage Feature Assessment	2020

3. Issues & Concerns

The requirement for the preparation of EIS is "triggered" by proposed works being undertaken within 120m of the Breslau Wetland PSW Complex. The EIS will be prepared in accordance with the requirements outlined within the Grand River Conservation Authority Submission Standards for Wetlands (GRCA, 2005).

4. Work Plan

4.1 Environmental Assessment

As noted above, the MCEA Schedule 'B' process is being applied to both the reconstructed and extended portions of the roadway. Alternative cross sections are being reviewed and evaluated for the roadway extension of Greenhouse Road south of Kramp Road to the Metrolinx Corridor. The reconstruction component (north of Kramp Road) of the Project will be described in the project description in combination with the preferred alternative.

Once identified, the preferred alternative will also be subject to stormwater management analysis (**Section 4.4**) to confirm the approach to managing post development flow conditions. Below outlines the approach to the supporting studies that will be of interest to the GRCA including Natural Heritage, Fluvial Geomorphology and Stormwater.

Consultation meetings will be held virtually to discuss specific issues (Section 3) with review agencies and stakeholders including the GRCA. As requested during the meeting held on September 29, 2022, GRCA will receive the supporting studies package outlined in this work plan once they are completed. The complete draft Project File will also be circulated to GRCA staff prior to filing the documentation for public review. Agency approval in principle is being requested as part of the MCEA stage to allow the project to effectively complete and transition to the preliminary and detailed design phases of the Project.

A single Public Consultation Centre (PCC) will be held in early 2023 that will present the preferred solution, including the preliminary design concept.

4.2 Natural Heritage

Based on a review of the background information, as outlined in **Section 2** above, and consultation with the GRCA the following TOR outlines the work plan for investigations and assessments required to complete the EIS Report. An EIS checklist is provided in **Appendix A**.

Task 1 – Background Information Requests & Review - AECOM will conduct a comprehensive review of background information and documentation regarding natural heritage and environmental features within the Study Area, including, but not limited to the MNRF NHIC Online database, the LIO System, the *Township of Woolwich Official Plan* (Township of Woolwich, 2022), applicable online ecological databases and other relevant online secondary sources of ecological information outlined in **Section 2**. AECOM will also gather information pertaining to the PSW from as many sources as possible in accordance with the *Ontario Wetland Evaluation System (OWES) Southern Ontario* protocol (MNRF, 2014). A review of background information will be used to identify rare species including SAR and Species of Conservation Concern (SOCC) that have potential to occur in the Study Area. Information requests will be sent to the GRCA, the MNRF and the Ministry of the Environment, Conservation and Parks (MECP) to obtain the most up-to-date natural heritage information.

Task 2 – Biophysical Inventory – Based on an initial screening of the Greenhouse Road Study Area, AECOM's terrestrial and aquatic biologists have developed the following list of field work to be conducted to support the completion of EIS. Field surveys of natural heritage features within the Study Area will assist in characterizing areas of potential impacts and are anticipated to include the following:

2.1 Terrestrial Communities and Vegetation – Vegetation communities will be delineated and assessed according to the protocols outlined in the *Ecological Land Classification (ELC) system for*

Southern Ontario (Lee et al., 1998) to Vegetation Community Type within and adjacent to the study area. A one season plant inventory will also be completed to document seasonally significant species; this is deemed sufficient as there have been previous studies undertaken in the Study Area to provide a multi-seasonal account of plant assemblages (refer to **Table 1**). AECOM intends to use data collected previous investigations to supplement species lists and other areas as necessary (*Field work to be completed: Fall 2022*).

2.2 Significant Wildlife Habitat Assessment – The presence of candidate habitat for SWH will be assessed by comparing existing conditions based on ELC site investigations to the criteria listed within *Significant Wildlife Habitat Criteria Schedules For Ecoregion 7E* (MNR 2015). (*Field work to be completed: Fall 2022*).

2.3 Wetland Delineation – Wetland delineation of the Breslau Wetland PSW Complex will be completed within 50 m of Greenhouse Road from Hwy 7 to the Rail Corridor using the *Ontario Wetland Evaluation System for Southern Ontario* protocol (MNR 2014). On October 13, 2022, AECOM ecologists walked the along the PSW and staked the wetland boundaries using blue wire flags. Wetland stakes were numbered sequentially. Any boundaries facing the anticipated construction zones were delineated. An AECOM Ecologist certified as an OWES Wetland Evaluator lead the wetland delineation and staking. On October 14, 2022, GRCA joined AECOM ecologists to review and confirm/refine the delineated boundaries. GPS coordinates of stakes along the anticipated construction zones will be recorded using a high accuracy GPS. The GPS coordinates of the wetland boundaries will be provided to GRCA.

2.4 Bird Nest Check – Searches for bird nests will be completed in conjunction with other surveys. All potential nesting structures (i.e., bridges, culverts) will be searched for the presence of bird nests.

2.5 Incidental Wildlife Observations – Incidental wildlife observations will be recorded during each survey including evidence of wildlife (i.e., tracks, scat, etc.). (*Field work to be completed: Fall*).

2.6 Aquatic Habitat Assessments – AECOM biologists will conduct aquatic habitat assessments for water features within the Study Area. Data (including photographs) to be collected during field investigations include: channel type (natural vs. channelized), channel morphology, flow characteristics, substrate, instream cover, presence of specialized fish habitat, habitat function, access for fish or connectivity of a water feature to fish-bearing water, and the potential for direct fish habitat. Fish community data is available through secondary sources and previous assessments. Fish collection is not proposed. (*Field work to be completed: Fall*)

Task 3 – Preliminary Species at Risk Screening and Significant Wildlife Habitat Screening – To determine the potential for SAR within the Study Area, AECOM will create a list of SAR records within and adjacent to the Study Area based off a review of background information outlined in **Section 2**. The habitat preferences of the identified species will then be compared to onsite habitat characteristics to determine the probability for SAR to occur in the Study Area. Similarly, a screening of candidate SWH will be completed as identified above in **Task 2.2**. The results of the SAR and SWH screening will inform the identification of possible natural heritage constraints and recommendations for any additional surveys that may be required for development of the lands.

Task 4 – Reporting - The tasks described above, along with any field work completed (Tasks 2-3) will be documented in the EIS to be submitted to the Township of Woolwich and GRCA for review and approval. The EIS will be prepared to the satisfaction of the GRCA and Region of Waterloo in accordance with the *Environmental Impact Study Guidelines and Submission Standards for Wetlands* (GRCA, 2005) and *Region of Waterloo Greenlands Network Implementation Guideline* (Region of Waterloo, 2016). The EIS will summarize

the findings of the existing natural heritage conditions and identify any environmental constraints with consideration given to the proposed works. The EIS will include an impact assessment based on the issues identified, desktop study and information request receipts, data from field investigations, and the proposed works. Clear descriptions of wetland features, functions, issues and concerns will be provided in the EIS. An impact assessment will be included to describe any direct or indirect effects associated with the proposed works by addressing:

- The potential for impacts on specific wetland features;
- The spatial extent, magnitude, frequency, and duration of wetland impacts;
- The extent and degree to which lands adjacent to wetlands will be affected; and,
- The possibility of cumulative impacts.

The EIS will demonstrate how the proposed works complies with the GRCA's Wetland Policy by addressing opportunities for wetland protection and/or enhancement, impacts that can and cannot be avoided or mitigated, detailed description of the proposed avoidance, protection and/or mitigation measures and development setbacks, wetland buffer zones (if possible), and other development constraints as well as environmental protection opportunities including enhancement opportunities among elements of the Greenlands Network. Compliance and Effectiveness Monitoring requirements will also be identified in the EIS to ensure mitigation measures are properly implemented and the efficacy of protection or mitigation measures are adequate. This EIS will be prepared in support of the EA.

The EIS report will also be updated during the detail design, if required, once the construction footprint, staging areas and access roads are known in order to update the impact assessment and refine the mitigation measures recommended.

4.3 Fluvial Geomorphology

Based on a pre-consultation meeting with the GRCA held on September 29, a high-level fluvial assessment will be completed for along the entirety of the proposed reconstruction and extension segments of Greenhouse Road from the Highway 7 intersection to the existing rail corridor. The high level fluvial geomorphic assessment will be completed for the three watercourses in the Study Area. This will include a desktop assessment summarizing the background information related to the watercourses, a field reconnaissance survey to be completed in November 2022, and a crossing assessment on the existing watercourse crossing closer to the Highway 7 intersection. The fluvial geomorphology assessment will be completed to ensure that the proposed crossing structure has considered the fluvial characteristics of the existing watercourse. Recommendations will align with all policies and guidelines set out by the Grand River Conservation Authority, including Policy 9.1.2, which pertains specifically to watercourse crossings (*Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation - 2015*). This information will be summarized in the fluvial geomorphology technical memo.

4.4 Stormwater Management (SWM)

AECOM completed the Stormwater Management Facility (SWMF) Design for the proposed Hopewell Crossing Development in 2018, including the development of hydrologic and hydraulic model (utilizing PCSWMM) to support the design. For this project, the existing PCSWMM model would be updated to include details of Greenhouse Road drainage for existing and proposed conditions. The following tasks would be included in the SWM/Drainage assessment:

- Develop SWM design criteria: AECOM will review relevant design standards, and guidelines from MECP, MTO, Region of Waterloo, GRCA, etc. to develop applicable SWM design criteria. Specific

attention would be given to the GRCA's Policies and Procedures for Compliance with the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation Ontario Regulation 150/06 to ensure the proposed SWM Plan would satisfy GRCA's requirements. In addition, Municipal Drain criteria would also be considered.

- Update the existing condition PCSWMM model: This task would include details of Greenhouse Road and Kramp Road drainage for existing conditions. AECOM would delineate road drainage within road ROW to update the existing PCSWMM model as baseline conditions. Parameters of road drainage such as flow length, impervious percentage, manning roughness, infiltration, and depression will be updated. The updated existing condition model will be conducted with simulations of 2-year to 100-year as well as regional design storm events. Simulated results will be considered as baseline condition results
- Prepare SWM/drainage design options: Proposed SWM/drainage design options will be prepared for the selected preferred alternative road design and the preferred SWM design option will be selected.
- Revise updated existing condition PCSWMM model: The updated existing condition PCSWMM model would be revised to include the further delineated road drainage (if any) and the preferred SWM/drainage design components as the proposed condition model. The proposed condition model would be used to help identify/assess the impacts of proposed reconstruction works to the PSW, and to ensure the preferred SWM/Drainage design option satisfies applicable design criteria.
- Reporting: A SWM Report would be provided to document the information described above, modeling results and the preferred SWM/Drainage option assessment. The SWM report will be submitted to the Township of Woolwich and GRCA for review and approval.

5. Deliverables

The following are the deliverables that will be provided as part of this TOR:

- Environmental Impact Study Report (refer to **Appendix B** for a proposed Table of Contents)
- Fluvial Geomorphology Report
- Stormwater Management Report

We trust that this TOR meets the requirements of the GRCA for outlining the proposed scope of work. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,
AECOM Canada Ltd.



Olga Hropach, B.Sc. (Hons)
Senior Terrestrial Ecologist
Olga.hropach@aecom.com

6. References

- AECOM, 2019:
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Ontario Butterfly Atlas. Accessed October 2022. <https://www.ontarioinsects.org>

Township of Woolwich, 2022:
Breslau Connector Road Environmental Assessment Report.

Township of Woolwich, 2022:
The Corporation Township of Woolwich Official Plan.

Attachment A

Environmental Impact Study Checklist

APPENDIX A EIS Scoping Checklist

Type of Application: MCEA B Schedule

Proponent or Applicant: Township of Woolwich

Location: Township of Woolwich

Comprehensive Plan (if available): _____

Check **first** box if sufficient information is available; Check **second** box if to be addressed by current EIS)

☒ ☐ Natural Heritage Designations and Zoning: ☒ ☐ Provincially Significant Wetland ☐ ☐ Non-provincially Significant Wetland ☐ ☐ Unevaluated Wetland ☒ ☐ Threatened or Endangered Species Habitat ☐ ☐ Significant Woodland ☐ ☐ Significant Valleyland ☒ ☐ Significant Wildlife Habitat ☒ ☐ Significant Areas of Natural and Scientific Interest (ANSI) ☒ ☐ Fish Habitat ☒ ☐ Other Designations (e.g. ESA, ESPA, Core Greenlands, etc.)	
☒ ☐ Geology, Hydrology, and Hydrogeology: ☒ ☐ Sub-watershed or Wetland Catchment Boundary ☒ ☐ Geomorphology & Topographic Features ☒ ☐ Soils (surface and subsurface) Specify timing of any field studies to be done: _____ ☒ ☐ Surface Drainage Pattern, including all permanent and intermittent watercourses ☒ ☐ Groundwater Recharge/Discharge Areas ☒ ☐ Hydrogeologic Conditions ☐ Winter, ☐ Spring, ☐ Summer, ☐ Fall	
☐ ☐ Natural Hazard Lands: ☐ ☐ Surveyed Flood Plain ☐ ☐ Valley Lands ☐ ☐ Erosion Hazards ☐ ☐ Poorly Drained Soils	
☒ ☐ Biological Inventory: ☒ ☐ Wetland Evaluation (see OMNR 1993) ☒ ☐ Wetland Boundary Delineation (see OMNR 1993) ☒ ☐ Ecological Land Classification (see Lee et al. 1998) ☒ ☐ Wildlife Inventory (see OMNR 1999)	
Complete this section if field work is required	Taxonomic Group: ☐ Amphibians..... ☐ Reptiles..... ☐ Birds..... ☒ Plants ☐ Mammals..... ☐ Rare Species or Subspecies..... Specify: _____ Inventory Date: ☐ March, ☐ April, ☐ May, ☐ June ☐ June, ☐ July, ☐ August, ☐ September ☐ May, ☐ June, ☐ July, ☐ August Specify: October Specify: _____ Specify: _____
Complete this section if existing information is available	☒ ☐ Significant Wildlife Habitat (see OMNR 2000): ☒ Critical Habitat for Species At Risk ☐ Waterfowl Habitat ☐ Colonial Bird Nesting Area ☐ Snake Hibernaculum ☐ Bat Hibernaculum ☒ Winter Deer Yard ☒ Raptor Perching/Feeding/Nesting Area ☐ Forest with springs, seeps, or hummocky topography ☐ Interior Forest ☐ Ephemeral (Vernal) Pond ☒ Cavity Trees

Completed by: Olga Hropach

(please print)

Date Submitted: _____

Signature: _____



Attachment B

Environmental Impact Study Table of Contents

AECOM will prepare an EIS Report in accordance with the GRCA's EIS Guidelines. The EIS Report will generally have the following table of contents:

Environmental Impact Study Report Table of Contents

1. Introduction

- 1.1 Study Area
- 1.2 Scope of Work

2. Legislative Requirements

- 2.1 Federal
 - 2.1.1 Fisheries Act 1985 (amended 2019)
 - 2.1.2 Species at Risk Act, 2002
 - 2.1.3 Migratory Birds Convention Act (MBCA), 1994
- 2.2 Provincial
 - 2.2.1 The Planning Act, 1990
 - 2.2.2 Growth Plan for the Greater Golden Horseshoe, 2019 as amended
 - 2.2.3 Provincial Policy Statement, 2020
 - 2.2.4 Endangered Species Act, 2007
 - 2.2.5 Fish and Wildlife Conservation Act, 1997
 - 2.2.6 Conservation Authorities Act, 1990
- 2.3 Municipal
 - 2.3.1 Woolwich Township Official Plan
 - 2.3.2 City of Waterloo Official Plan

3. Methods

- 3.1 Background Review
- 3.2 Agency Consultation
- 3.3 Field Investigations
 - Fish Habitat Assessments
 - Vegetation Communities and Plants
 - Incidental Wildlife
- 3.4 Significant Wildlife Habitat Screening
- 3.5 Species at Risk Habitat Screening

4. Existing Conditions Results

- 4.1 Physical Environment
 - 4.1.1 Physiography, Bedrock and Surficial Geology
 - 4.1.2 Surface Water and Drainage
 - 4.1.3 Hydrology and Hydrogeology
- 4.2 Aquatic Environment
 - 4.2.1 Watershed
 - 4.2.2 Fish Habitat
- 4.3 Terrestrial Environment
 - 4.3.1 Vegetation Communities and Plants
 - 4.3.1.1 Wetland Delineation
 - 4.3.2. Incidental Wildlife
- 4.4 Significant Natural Heritage Features
 - 4.4.1 Fish Habitat

- 4.4.2 Significant Wetland
- 4.4.3 Significant Woodland
- 4.4.4 Significant Valleyland
- 4.4.5 Significant Areas of Natural and Scientific Interest
- 4.4.6 Significant Wildlife Habitat Screening
- 4.4.7 Species at Risk Habitat Screening
- 4.5 Local and Municipally Significant Features

5. Proposed Project Works

- 5.1 Project Components and Design
- 5.2 Alternative Design Considerations

6. Assessment of Potential Impacts

- 6.1 Existing Impacts
- 6.2 Potential Impacts
 - 6.2.1. Physical Environment
 - 6.2.2 Aquatic Environment
 - 6.2.3 Terrestrial Environment
- 6.3 Cumulative Effects
- 6.4 Avoidance and Mitigation
- 6.5 Environmental Enhancements and Protection
- 6.6 Anticipated Permit Requirements
- 6.7 Next Steps
- 6.8 Summary
- 6.9 References

Appendices

- Appendix A. Figures
 - A1 – Study Area
 - A2 – Policy Area
 - A3 – Surficial Geology
 - A4 – Surface Water Drainage and Significant Ground Water
 - A5– Aquatic Habitat
 - A6 – Ecological Land Classification
 - A7 – Natural Heritage Features
 - A8 – Environmental Management Plan
- Appendix B. Terms of Reference
- Appendix C. Agency Correspondence
- Appendix D. Raw Field Data
- Appendix E. Master Plant List
- Appendix F. Significant Wildlife Habitat Screening
- Appendix G. Species at Risk Habitat Screening

Appendix **C**

Agency Correspondence

From: Trevor Heywood <theywood@grandriver.ca>
Sent: December 2, 2022 4:21 PM
To: Hropach, Olga
Cc: Buckley, Steve; Van Riezen, Rhonneke; Easterling, Katie; Grueneis, Karl; Zandvliet, Samantha; Tony Zammit
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

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Hey Olga,

The terms of reference are generally acceptable. We offer the following comments are offered for consideration:

1. Please show the wetland boundaries verified by the GRCA on October 13, 2022 in the EIS report. We further request that a digital shapefile be submitted to this office as soon as possible.
2. We ask that the EIS discuss the key findings of the fluvial geomorphology and stormwater management reports.
3. We ask that the EIS discuss both direct and indirect impacts on wetlands and watercourse associated with the road and stormwater design alternatives. A more detailed assessment of impacts related to the preferred alternative will also be required.

On another note, we're aware that Metrolinx is doing some work within the study area. I'm not sure if you have any awareness of this work, I intended to reach out to them to get more details.

I trust this helps. Regards,

Trevor Heywood
Resource Planner
Grand River Conservation Authority
400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Phone: 519-621-2763 ext. 2292
Email: theywood@grandriver.ca
www.grandriver.ca | [Connect with us on social media](#)

From: Hropach, Olga <Olga.Hropach@aecom.com>
Sent: Wednesday, November 30, 2022 2:46 PM
To: Tony Zammit <tzammit@grandriver.ca>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

Hi Tony,

Hope all is well. Please see attached our drafted Terms of Reference for your review and approval . Please let us know if you have any questions.

Thanks,

HAPPY HOLIDAYS! VACATION ALERT – Dec 21, 2022 to Jan 3, 2023
Olga Hropach, B.Sc.(Hons)
She/Her/Hers
Senior Terrestrial Ecologist, Manager, Impact Assessment and Permitting, Canada
D +1-905-747-7478
C +1-416-576-2163
olga.hropach@aecom.com

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105 Commerce Valley Dr. W., 7th Floor
Markham, Ontario, L3T7W3, Canada
T +1-905-886-7022
aecom.com

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From: Tony Zammit <tzammit@grandriver.ca>
Sent: Wednesday, October 12, 2022 9:30 AM
To: Hropach, Olga <Olga.Hropach@aecom.com>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

Sounds good, Olga. Thanks for confirming.

Tony

Anthony E. Zammit, MES

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2246
Cell: 519-240-0714
Toll-free: 1-866-900-4722
Email: tzammit@grandriver.ca
www.grandriver.ca | [Connect with us on social media](#)

From: Hropach, Olga <Olga.Hropach@aecom.com>
Sent: Tuesday, October 11, 2022 4:56 PM
To: Tony Zammit <tzammit@grandriver.ca>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

Hi Tony, thank you. 1 pm is perfect. Shall we meet at the end of the existing greenhouse road? The following Ecologists will be on site:

1. Nataliya Simonova, OWES certified Ecologist
519-504-9807
2. Jessica Ballie, Junior Ecologist
416-706-4396

Thanks,

Olga Hropach, B.Sc.(Hons)
She/Her/Hers
Senior Terrestrial Ecologist, Manager, Impact Assessment and Permitting, Canada
D +1-905-747-7478
C +1-416-576-2163
olga.hropach@aecom.com

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Markham, Ontario, L3T7W3, Canada
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aecom.com

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From: Tony Zammit <tzammit@grandriver.ca>
Sent: Tuesday, October 11, 2022 1:26 PM
To: Hropach, Olga <Olga.Hropach@aecom.com>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

I'd like to meet at 1 pm so that we have enough time to finish the job.

Thanks,

Tony

From: Hropach, Olga <Olga.Hropach@aecom.com>
Sent: Tuesday, October 11, 2022 12:41 PM
To: Tony Zammit <tzammit@grandriver.ca>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

Hi Tony,

Thank you so much for the quick response and additional information provided. What time are you and Trevor available to meet on site on October 14? If possible, we would appreciate meeting after 12 pm to allow our staff to finalize any remaining wetland delineations in the morning, if needed.

Thanks,

Olga

From: Tony Zammit <tzammit@grandriver.ca>
Sent: Wednesday, October 5, 2022 5:48 PM
To: Hropach, Olga <Olga.Hropach@aecom.com>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aecom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aecom.com>; Easterling, Katie <katie.easterling@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: RE: Greenhouse Road - Wetland Staking Site Visit

Hi Olga,

Thanks for following up. October 14 works for me and Trevor. Please be sure to stake the wetland boundaries in advance of our arrival using a combination of flagging tape, wire flags and/or wood stakes. Wetland stakes should be numbered sequentially. Generally, we ask that any boundaries facing the anticipated construction zones be delineated. The length of wetland perimeter delineated will depend on the construction alternatives that are being considered and evaluated.

The watercourse/municipal drain (aka Branch B, Airport Creek) east of Greenhouse Road is classified as warm water fish habitat and supports a relatively diverse community of fishes, including Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Central Mudminnow, Creek Chub, Fathead Minnow, Longnose Dace, Northern Redbelly Dace, and White Sucker. We recommend no in water works between March 15 and July 15. The watercourses draining toward the main branch of Hopewell Creek are classified as cold water fish habitat owing to presence of trout and pike in this system. We recommend no in water work between October 1 and July 15. The MNRF, Guelph District Office may be contacted for additional fish community records.

Aquatic species at risk are not known to be present within these watercourses.

I'm attaching the OWES record for the Breslau Swamp but it might be a good idea to check with MNRF in case they have updated information for the wetland complex.

I'm not aware of any local rankings for plant or animal species. The Region of Waterloo is currently in the process of updating its lists of significant plants and birds, which likely will have status under the ROPP in the future.

Will let you know if I come across anything else.

Thanks,

Tony

Anthony E. Zammit, MES
Watershed Ecologist
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2246
Cell: 519-240-0714
Toll-free: 1-866-900-4722
Email: tzammit@grandriver.ca
www.grandriver.ca | [Connect with us on social media](#)

From: Hropach, Olga <Olga.Hropach@aeacom.com>
Sent: Wednesday, October 5, 2022 9:22 AM
To: Tony Zammit <tzammit@grandriver.ca>
Cc: Trevor Heywood <theywood@grandriver.ca>; Buckley, Steve <steve.buckley@aeacom.com>; Van Riezen, Rhonneke <Rhoneke.VanRiezen@aeacom.com>; Easterling, Katie <katie.easterling@aeacom.com>; Grueneis, Karl <Karl.Grueneis@aeacom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aeacom.com>
Subject: Greenhouse Road - Wetland Staking Site Visit

Hi Tony,

Thank you for being on the pre-consultation call for the reconstruction and extension of Greenhouse Road last week. I would like to follow up and confirm your availability on Friday, October 14, 2022 or the early part of the week of October 17th, to join AECOM Ecologists to confirm the staked wetland boundaries. We have permission to enter private property for the majority of the study area and are working towards obtaining access for the remaining sites.

In addition, I would also kindly like to request the following information, if possible, within the 120 m study area (refer to the attached) that is not available on the Grand River Online GIS Data Catalogue:

- ELC mapping
- Reports or inventories on the Provincially Significant Breslau Wetland Complex, if any
- Flora and fauna records, including rare species
- Local ranking for species, if available
- In-water Timing Restrictions;
- Fish Habitat Sensitivity;
- Habitat Information and Location;
- Fish Community Records;
- Benthic Invertebrate Data;
- Known Fish Spawning Areas; and,
- Significant Wildlife Habitat or Wildlife Use of the Area.

Thanks,

Olga Hropach, B.Sc.(Hons)
She/Her/Hers
Senior Terrestrial Ecologist, Manager, Impact Assessment and Permitting, Canada
D +1-905-747-7478
C +1-416-576-2162

From: Denyes, David (MNRF) <David.Deny@ontario.ca>
Sent: January 25, 2023 12:00 PM
To: Ballie, Jessica
Subject: RE: Request for Natural Heritage Information in support of the Township of Woolwich, Greenhouse Road Reconstruction and Extension Project
Attachments: Approved Breslau Wetland Complex 1993.pdf

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Hello Jessica,

Thank you for your request for information on natural heritage features.

Absence or lack of information for a given geographic area does not necessarily mean the absence of natural heritage features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. In addition, new species may be listed and new natural heritage features may be defined over time. For these reasons, the Ministry cannot provide a definitive statement on the presence, absence or condition of natural heritage features in all parts of Ontario.

At this time, the Ministry has the following information for your project location.

1. Tributary of Hopewell Creek
 - a. Cold water thermal regime
 - b. Restricted in-water work timing window: October 1st to June 30th of following year (Note: Dates represent when in-water work should be avoided)
 - c. Species: ARA line segment doesn't provide fish species summary but notes both Trout and Northern Pike present. ARA survey point layer can be used to view species captured at specific sites in main branch of Hopewell Creek.
2. Waterloo- Guelph Airport Creek
 - a. Warm water thermal regime
 - b. Restricted in-water work timing window: April 1st to June 30th (Note: Dates represent when in-water work should be avoided)
 - c. Species: Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Central Mudminnow, Creek Chub, Fathead Minnow, Longnose Dace, Northern Redbelly Dace, and White Sucker
3. Breslau Provincially Significant Wetland Complex (evaluation attached)
4. Species at Risk information is available through the Ministry of Environment, Conservation & Parks (MECP) – Please contact MECP at SAROntario@ontario.ca

I would also recommend that you review the Grand River Fisheries Management Plan since it does highlight some of the fish community objectives within the Grand River Watershed. I only have a hard copy version, but you may be able reach out to the Grand River Conservation Authority to obtain a copy: <https://www.grandriver.ca/en/our-watershed/Fisheries-Management-Plan.aspx>

Thank you.

David

David Denyes
Management Biologist
Ministry of Natural Resources and Forestry
Vineland Field Office
4890 Victoria Avenue North
Vineland Station ON, L0R 2E0
Tel: (289) 241-6872
david.deny@ontario.ca

From: Ballie, Jessica <Jessica.Ballie@aecom.com>
Sent: January 23, 2023 5:24 PM
To: Dickson, Cheryl (MNRF) <Cheryl.Dickson@ontario.ca>
Cc: Hropach, Olga <Olga.Hropach@aecom.com>; Aberdein, Andrew <andrew.aberdein@aecom.com>; Simonova, Nataliya <Nataliya.Simonova@aecom.com>; Grueneis, Karl <Karl.Grueneis@aecom.com>; Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: Request for Natural Heritage Information in support of the Township of Woolwich, Greenhouse Road Reconstruction and Extension Project

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Dear Cheryl Dickson,

Please find attached a formal information request letter. AECOM has been retained by Township of Woolwich to undertake the required investigations for the preparation an of Environmental Impact Study in support of the proposed Greenhouse Road Reconstruction and Extension Schedule B Municipal Class Environmental Assessment, Preliminary Design and Detailed Design Project in Breslau, Ontario. The purpose of the attached letter is to request additional natural heritage information to be considered as part of the background review process for the Project.

Thank you in advance for any assistance you may provide. Please let me know if you have any questions or require any additional information in order to process our request.

Thank you,

Jessica Ballie (she/her)

Junior Terrestrial Ecologist, AECOM, Markham ON

Appendix **D**

Photographic Logs

Appendix D1. Terrestrial Photographic Log

Appendix D2. Aquatic Photographic Log

Appendix D1. Terrestrial Photographic Log



Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 1. ↑

C U M 1 - 1: Dry – Moist Old Field Meadow Type vegetation community within Study area



Photograph 2. ↑

C U W 1: Mineral Cultural Woodland Ecosite within Study Area



Photograph 3. ↑

Cavity tree within C U W 1: Mineral Cultural Woodland Ecosite located at 548955 m E and 4815087 m N



Photograph 4. ↑

M A M 2 - 2: Reed-canary Grass Mineral Meadow Marsh Type vegetation community with CUW1: Mineral Cultural Woodland Ecosite inclusion within Study Area

Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 5. ↑

Reed-canary Grass Mineral Meadow Marsh (M A M 2 - 2) community contained Mineral Cultural Woodland (C U W 1) inclusions within south portion of Study Area.



Photograph 6. ↑

M A S 3 - 1: Cattail Organic Shallow Marsh Type within Study Area



Photograph 7 ↑

O A O: Open Aquatic Ecosite with inclusions of Cattail Mineral Shallow Marsh (M A S 2 - 1) mostly consisted of broad-leaved cattail and reed canary grass.



Photograph 8 ↑

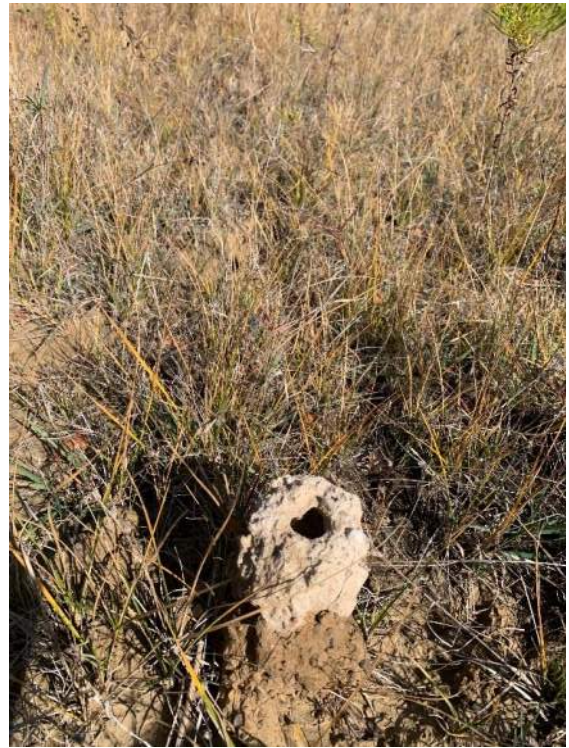
S W D 4 - 1: Willow Mineral Deciduous Swamp Type

Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 9. ↑

A snapping turtle was observed within the Study Area



Photograph 10. ↑

Crayfish burrows within M A M 2 - 2: Reed-canary Grass Mineral Meadow Marsh Type vegetation community



Photograph 11. ↑

The pond was observed to be of sufficient depth for overwintering for snapping turtle.



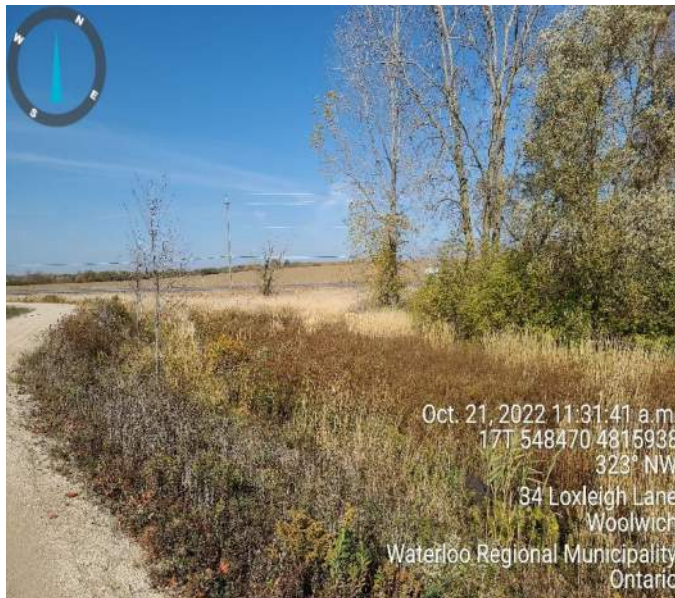
Photograph 12. ↑

Approximately 50 burrows belonging to a species of Terrestrial Crayfish were observed within the M A M 2 - 2 community.

Appendix D2. Aquatic Photographic Log



Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 1. ↑

October 21, 2022. View of W C 0 1 facing downstream (northwest) from west of Greenhouse Road.



Photograph 2. ↑

October 21, 2022. View of W C 0 1 existing culvert crossing facing upstream (east) from west of Greenhouse Road.



Photograph 3. ↑

October 21, 2022. View of existing culvert crossing at W C 0 1 from upstream (east) of Greenhouse Road.



Photograph 4. ↑

October 21, 2022. View of W C 0 1 facing upstream (south) from the culvert inlet at Greenhouse Road

Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 5. ↑

October 21, 2022. View of W C 0 2 facing east from Greenhouse Road.



Photograph 6. ↑

October 21, 2022. View of W C 0 2 facing downstream (north) from Greenhouse Road.



Photograph 7 ↑

October 21, 2022. View of W C 0 2 upstream (southeast) along Greenhouse Road.



Photograph 8 ↑

October 21, 2022. View of no culvert crossing Greenhouse Road at W C 0 2.

Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 9. ↑

October 21, 2022. View of W C 0 3 facing upstream (northwest) along east side of Greenhouse Road



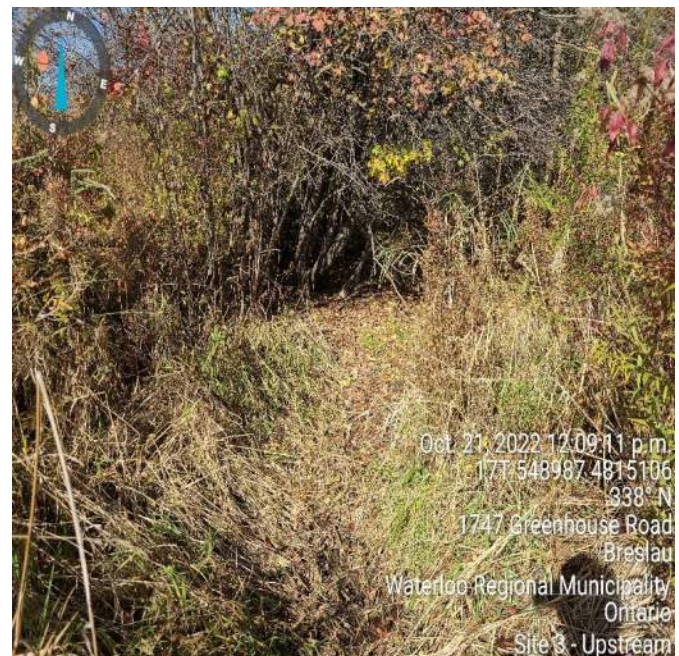
Photograph 10. ↑

October 21, 2022. View of poorly defined channel at W C 0 3 facing downstream (south) along Greenhouse Road



Photograph 11. ↑

October 21, 2022. View of W C 0 3 facing downstream (southeast) at rail corridor – new earthen berm and perched culvert.



Photograph 12. ↑

October 21, 2022. View of branch of W C 0 3 across Greenhouse Road right of way extension.

Client Name: Township of Woolwich	Report Name Greenhouse Road Reconstruction Project - Breslau – EIS	Project No. 60683946
---	--	--------------------------------



Photograph 13. ↑

October 21, 2022. View of staff gauge in the branch of W C 0 3 crossing the Greenhouse Road right of way extension.



Photograph 14. ↑

October 21, 2022. View of staff gauge measurement in the branch of W C 0 3 crossing the Greenhouse Road right of way extension.



Photograph 15. ↑

October 21, 2022. View of the branch of W C 0 3 upstream (west) of the Greenhouse Road right of way extension.

Appendix **E**

Raw Field Notes

 Community Description and Classification		Site: <u>St. Michaels</u>	Map #:	Polygon: <u>4</u>
Survey(s): <u>NS JB</u>	Date: <u>Oct 14, 2002</u>	Time start:	Time finish:	
UTMZ:	UTEZ:	UTMN:		

Polygon Description

1

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

Stand Description

Layer	HT	CVR	Species in Order of Decreasing Dominance (up to 4 sp)
> 10	2	2	(?) Much Greater Than: > Greater Than: = About Equal To) SALIC = ACER = FRAX = POPULUS
2 - 10 m	3	3	PHALC > ACER = FRAX = POPULUS
0.5 - 2 m	4	3	PHALC > CORNUS > CORYLUS
0 - 0.5 m	5	4	PHALC > BRUNIA > DAUCUS > SYMP
0 (surface)			
0 - 0.5 m deep			
> 0.5 m deep			

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%		

Size Class Analysis	O	<10	A	10-24	R	25-50	N	>50
Standing Snags	R	<10	R	10-24	N	25-50	N	>50
Deadfall / Logs	O	<10	O	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:	Marine Cultural Woodland	Code:	2222
Vegetation Type:		Code:	
Inclusion:		Code:	
Complex:		Code:	

Roadside/edge survey only ☒

Photo: 0338, 0340, 0344-0364, 0391-0392, 0774-0778

ELC

Site: Indian Creek Map #: 7

Community Description and Classification: 3B, N5 Date: 10/17/14 Time: start 11:30

UTM-Z: UTM-E: UTM-N:

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 Bedk.	☐ Terrace	☒ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedk.	☐ Valley Slope	☐ Forb	☐ Marsh
☐ Shallow Water	☐ Surficial Dep.	☐ Soil, Upland	☐ Lichen	☐ Swamp
☐ Bedrock	☐ History	☐ Cliff	☐ Bryophyte	☐ Fen
☐ Bedrock	☐ Natural	☐ Talus	☐ Deciduous	☐ Bog
☐ Bedrock	☐ Cultural	☐ Cravical/Cave	☐ Coniferous	☐ Barren
☒ Open	☐ Cover	☐ Alvar	☐ Mixed	☐ Meadow
☐ Shrub	☐ Open	☐ Rockland	☐ Prairie	☐ Thicket
☐ Tree	☐ Shrub	☐ Beach / Bar	☐ Savanna	☐ Savannah
	☐ Tree	☐ Sand Dune	☐ Woodland	☐ Woodland
		☐ Bluff	☐ Forest	☐ Forest
			☐ Plantation	

Stand Description

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp)
> 10			(> Much Greater Than; > Greater Than; = About Equal To)
2 - 10 m			
0.5 - 2 m			
0 - 0.5 m			
0 (surface)			
0 - 0.5 m deep			
> 0.5 m deep			

HT Code: 7 < 0.2m 6 > 0.2-0.5m 5 > 0.5-1m 4 > 1-2m 3 > 2-3m 2 > 3-4m 1 > 4m

CVR Code: 0 = none 10% - 10% 2 10-25% 3 25-50% 4 > 50%

Size Class Analysis	70	10-24	25-50	> 50
Standing Snags	10	10-24	25-50	> 50
Deadfall / Logs	10	10-24	25-50	> 50

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

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

Ecotype: Cultural Meadow Code: CUM

Vegetation Type: Dry-Moist Old Field Meadow Type Code: CUM1-1

Inclusion: Code:

Complex: Code:

Roadside/edge survey only ☐

Layers: 1 = Canopy 2 = Subcanopy 3 = Understory 4 = Ground Layer

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

Species	Layer	C	Species	Layer	C
DRYCLARK			ACELINEN		
MELIAR	4		LEHMAN	0	
SACAL	4		FEARAME	0	
SYMPER	4		FEAROV	0	
SOLDAT	4		VIKOV	0	
LOTPOLE	4		CURSED	0	
SYMPONOV	0		CORNLAGE	0	
VICTOR	0				
SOLICEN	0				
ERIGAN	0				
SALINEN	0				
SONCALV	0				
VERBATA	0				
KUMERI	0				
MECHAGASS	0				
POA PRAT	0				
REUMINE	0				
UTALIC	0				
LUKUPDA	0				
EVTHGARA	0				

Soils

UTM:

Depth to bedrock: Depth of organics:

Depth to mottles: Depth to gley:

Texture: Moisture Regime:

UTM:

Depth to bedrock: Depth of organics:

Depth to mottles: Depth to gley:

Texture: Moisture Regime:

Note: Depth to mottles and ley is measured from the top of the mineral soil only.

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

Layer	HT	CVR	Species in Order of Decreasing Dominance (up to 4 sp) (? > Much Greater Than; > Greater Than; = About Equal To)
> 10 m			
2 - 10 m			
0.5 - 2 m	<	4	KROMINER PALAROS SPURTEL SSAL
0 - 0.5 m			
0 (surface)			
D = 0.5 m diam			
> 0.5 m diam			

Size Class Analysis	<10	10-24	25-50	>50
Standing Snags	<10	10-24	25-50	>50
Deadfall / Logs	<10	10-24	25-50	>50

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

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

Ecotype:	Cultural Meadow	Code:	CUM
Vegetation Type:	Dry-Moist Old Field Meadow Type	Code:	CUM14
Inclusion:		Code:	
Complex:		Code:	

Roadside/edge survey only ☐

Species	Layer	C
HYALINITE		
PHLEBAU	H	
SILICAN		
SUMPTU	A	
DAUCAL		
SOLPHI	O	
CYMPNVA	O	
SYMPLOT	O	
DOBRAT	O	
GALIMAT	O	
VALICAT	O	
SALIGEN	K	
SALINEM		
ASCSTR	O	
ZUCUCOL	O	
DIPSEUL	O	
EUMECAL	K	
SILEBUL	K	
ECTIVUL	K	
INCLIALB	K	
BROB-VUL	K	
THANWUL	K	
PUCOMAS	K	
FOKSEDE	O	
CYTHAL		

Species	Layer	C
SALICIN	K	
CHAMCAT	K	
CONSTR	K	
PLAVVUL	K	

UTM :		Depth of organics :
Depth to bedrock :		Depth to molles :
Texture :		Moisture Regime :
UTM :		
Depth to bedrock :		Depth of organics :
Depth to molles :		Depth to gley :
Texture :		Moisture Regime :

Note: Depth to mollies and ley is measured from the top of the mineral sgr only.

Polygon Description

System	Substrate	Topographic Features	Plant Form	Community
☒ Terrestrial	☒ Organic	☒ Lacustrine	☐ Plandon	☐ Lake
☐ Wetland	☐ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☐ Aquatic	☐ Parent Min.	☐ Bottomland	☐ Floating-LV.D.	☐ River
☐ Site	☐ Acidic Bedrk	☐ Terrace	☐ Conimoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☐ Valley Slope	☐ Forb	☐ Marsh
☐ Shallow Water	☐ Carb. Bedrk	☐ Ttableland	☐ Lichen	☐ Swamp
☒ Structural Dep.		☐ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☐ Deciduous	☐ Bog
☐ History		☐ Talus	☐ Coniferous	☐ Barren
☐ Natural		☐ Crevices/Cave	☐ Mixed	☒ Meadow
☒ Cultural		☐ Alvar		☐ Prairie
☐ Cover		☐ Rockland		☐ Thicket
☒ Open		☐ Beach / Bar		☐ Savannah
☐ Shrub		☐ Sand Dune		☐ Woodland
☐ Tree		☐ 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)
> 10			
2-10 m	3	2	QUERCUS ILEX QUERCUS PETRAEA QUERCUS
0.5-2 m	5	4	QUERCUS PETRAEA QUERCUS ILEX QUERCUS
0-0.5 m			
0 (surface)			
0-0.5 m deep			
> 0.5 m deep			

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%		

Size Class Analysis	<10	10-24	25-50	>50
Standing Snags	<10	10-24	25-50	>50
Deadfall / Logs	<10	10-24	25-50	>50

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

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

Ecotone:	Vegetation Type:	Inclusion:	Complex:	Code:	Code:
Mineral Cultural	dry-plant old forest	Mineral	Cultural	Code:	Code:

Roadside/edge survey only ☐[illegible]

UTM :	Depth of organics :
Depth to bedrock :	Depth to clay :
Depth to mottles :	Moisture Regime :
Texture :	
UTM :	Depth of organics :
Depth to bedrock :	Depth to clay :
Depth to mottles :	Moisture Regime :
Texture :	

Note: Depth to mottles and ley is measured from the top of the mineral soil only.

WILDLIFE AND WILDLIFE HABITAT FORM

AECOM

Project Name: <u>Greenview, SE Rd</u> Polygon: <u>478 1,3</u> UTM: _____ Date (DDMMYYYY): <u>19/10/2022</u> Time (1300HRS): <u>1000</u> Surveyor(s): <u>JB NS</u>		Temp (°C): <u>4°C</u> Wind (Beaufort): <u>4</u> Precip: <u>None</u> Cloud Cover (%): <u>10</u>	
Wildlife Habitat (Check all that apply AND Record UTM & Mark on Field Map) *please note that you do not need to see wildlife to record wildlife habitat			
INCIDENTAL WILDLIFE OBSERVATIONS:			
Species <u>AMKO</u> <u>BLU</u> <u>AMR</u> <u>RTLA</u>	Evidence <u>V1</u> <u>V0</u> <u>1/13</u> <u>1/13</u>	Photo No. 	Birds: — Stick Nests — Snags — Tree Cavity Nests — Seeps/Springs — Flooded Fields (Agricultural) — Adjacent to Woodland — Cyp (indicate type below) — Bridges / culverts Description of Feature: <u>- old say bird nest</u>
Hierps — Vernal Pools/Woodland Ponds — Sand/Sand-Gravel (turtle Nesting) — Burrows (Snake hibernacula) — Fallen Rotting Logs (Snake hibernacula) — Rock Piles (Snake hibernacula) — Log Pile (Snake hibernacula) — Karst (Snake hibernacula) — Stone Wall/Rock Piles — Broken/Fissured Rock — Old Foundation — Old Bridge/Culvert Description of Feature:		Mammals — Caves — Mines — Snags (>10 cm DBH) — Other: — Crayfish Chimney Description of Feature: <u>- large cavity</u> <u>tree beside</u> <u>road - 548033</u> <u>4815076</u>	Evidence Codes DP - Distinctive Parts TK - Tracks VO - Vocalization HO - House/Den FE - Feeding Evidence CA - Carcass FY - Eggs or Young SC - Scal OE - Other evidence (Specify) OB - Observed Other Notes: <u>Canal side!</u> <u>-Maricela</u>
UTM: _____ Photo #: _____		UTM: _____ Photo #: _____	

AECOM

Page __ of __

A=COM



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

Layer	HT	CVR	Species in Order of Decreasing Dominance (up to 4 sp) (> Much Greater Than; > Greater Than; = About Equal To)
> 10 m			
2 - 10 m			
0.5 - 2 m	5	4	PHALARIS >> TYPHANE > LYTHISMS > JUNCUS
0 - 0.5 m			
0 (surface)			
0 - 0.5 m deep			
> 0.5 m deep			

Size Class Analysis	<10	10-24	25-50	>50
Standing Snags	<10	10-24	25-50	>50
Deadfall / Logs	<10	10-24	25-50	>50

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

Ecosite:	Code:
Mineral Meadow Natchez	MAA2
Vegetation Type:	Code:
Red-tanary Grass Mineral Meadow	MAA2-2
Inclusion:	Code:
Natchez	
Complex:	Code:

Photo: 0385-0387, 0339

[illegible]

UTM:	
Depth to bedrock:	Depth of organics:
Depth to mottles:	Depth to gley:
Texture:	Moisture Regime:
UTM:	
Depth to bedrock:	Depth of organics:
Depth to mottles:	Depth to gley:
Texture:	Moisture Regime:

Note: Depth to mottles and ley is measured from the top of the mineral soil only.

A=COM

to the recipients
and old
foundation

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

Species in Order of Decreasing Dominance (up to 4 sp) > Much Greater Than; > Greater Than; = About Equal To)			
Layer	HT	CVR	
> 10			
2 - 10 m	5	4	TYPHANGA > PHALARIS > LYTHAL > EQUIAN
0.5 - 2 m			
0 - 0.5 m			
0 (surface)			
0 - 0.5 m deep			
> 0.5 m deep			

Size Class Analysis	<10	10-24	25-50	50-100
Standing Snags	<10	10-24	25-50	50-100
Deadfall / Log	<10	10-24	25-50	50-100

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

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

Eccleston:	Shallow Marsh	Code:	MAS
Vegetation Type:	Cattail Organic Shallow Marsh	Code:	MAS 3-1
Inclusion:	Willow Mineral Thicket Swamp Type	Code:	SWT 2-2
Complex:		Code:	

Roadside/edge survey only ☐[illegible]

UT M :	Depth of organics :
Depth to bedrock :	Depth to gley :
Depth to mollies :	Moisture Regime :
Texture :	
UT M :	Depth of organics :
Depth to bedrock :	Depth to gley :
Depth to mollies :	Moisture Regime :
Texture :	

Note: Depth to mollics and ley is measured from the top of the mineral soil only.

AECOM

Page of

(elc community description/forms/1-g11-forms/042004)

Photo: 0371-0375

Community Description and Classification	ELC	
	Site: <i>Greenhouse</i> Map #: _____	Polygon: <i>5</i>
Surveyor(s): <i>N5JB</i>	Date: <i>02/14/2002</i>	Time
UTMZ: _____	UTEZ: _____	start: <i>11:05 am</i>
		finish: <i>11:20 am</i>
		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-L.V.D.	☐ 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

Layer	HT	CVR	Species In Order of Decreasing Dominance (up to 4 sp) (> Much Greater Than; > Greater Than; = About Equal To)
> 10	2	4	SALTATING >>> FRAXPEN > ACERSACH
2 - 10 m	3	2	SALTINIG = FRAXPEN = FRAXAME = AC
0.5 - 2 m	4	4	SALT EX = CORN SED > CORNAC > RHA
0 - 0.5 m	5	4	EGUTARY > LYTHSALS > PHALARDUN
0 (surface)			
0 - 0.5 m deep			
> 0.5 m deep			

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%		

Size Class Analysis	A	<10	B	10-24	R	25-50	N	>50
Standing Snags	0	<10	R	10-24	R	25-50	N	>50
Deadfall / Logs	0	<10	R	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 Deciduous Swamp	Code:	SWD4-1
Vegetation Type:	Willow Mineral Deciduous	Code:	SWD4-1
Inclusion:	Swamp 1/2	Code:	
Complex:		Code:	

Roadside/edge survey only ☐

Layers:	1 = Canopy	2 = Subcanopy	3 = Understory	4 = Ground Layer
Abundance Codes:	D = Dominant	A = Abundant	O = Occasional	R = Rare N = None

Species	Layer	C
SHALTING		
ACERSON	A	
ERAXME	O	
ERAXPEN	O	
ACERNEG	O	
PODUBAS	R	
SHALTING		
ACERSON		
ERAXME		
ERAXPEN		
ACERNEG		
PODUBAS		
SHALTING		
ACERSON		
ERAXME		
ERAXPEN		
ACERNEG		
PODUBAS		
SHALTING		
ACERSON		
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Soils	
UTM :	
Depth to bedrock :	Depth of organics :
Depth to mottles :	Depth to gley :
Texture :	Moisture Regime :
UTM :	
Depth to bedrock :	Depth of organics :
Depth to mottles :	Depth to gley :
Texture :	Moisture Regime :

~~Note: Depth to mottles and ley is measured from the top of the mineral soil only.~~

Habitat Assessment Data Collection Form

Site ID:	1	Date:	Oct 21, 2022	Field Crew:	Sara Turner
Name of Waterbody:	Site Location (e.g. nearby intersection, town, general location, etc.)		Drainage System:		
North end of greenhouse Road					
Time Start:	10:30	Time End:	11:15	Channel Type	
Weather Conditions:				Natural Channel	☐
2°C, Full Sun				Channelized	☒
				Flow Regime	
				Permanent	☐
				Intermittent	☐
				Ephemeral	☒
Surrounding Land Use			Existing Crossing Structure		
Residential ☒	Agriculture ☐	Bridge	☐	Box Culvert	☐
Forest ☐	Meadow ☐	Open-foot Culvert	☐	Corrugated Steel Pipe	☒
Wetland ☒	Commercial ☐	NA ☐	Size:	0.4 m	
Industrial ☐	Transportation ☐	Other/Notes:			
Livestock ☐	Other: ☐				
Notes (include inputs to the system, sources of pollution, etc.) Road salt, storm pond					
Flow Description		Velocity (check box for method of collection)			
Low ($\leq 30\%$ of Bankfull)	☒ ddy	m/s	☐	Hydraulic Head (mm)	
Moderate (30-70% Bankfull)	☐	No water			
High ($\geq 70\%$ Bankfull)	☐	Additional Notes:			
		ddy			
Water Quality					
pH	Conductivity (µS/cm)				
Dissolved Oxygen (mg/L)	Water Temperature (°C)				

Fish and Fish Habitat Habitat Assessment Data Collection Form

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<u>Upstream Reach</u>		Site ID: 7		Waterbody Name:	
Length/description of assessment reach: (e.g. within right-of-way, from 0 to 25 m upstream of rail line or centreline)				25 m north + south of crossing	
Right Bank Description			Left Bank Description		
Vegetation Type			Vegetation Type		
None (>75% of the reach with no vegetation) ☐			None (>75% of the reach with no vegetation) ☐		
☒ Cultivated (Manicured lawns and actively farmed lands)			Cultivated (Manicured lawns and actively farmed lands) ☒		
Meadow (Unmanicured grasses, little to no woody vegetation) ☐			Meadow (Unmanicured grasses, little to no woody vegetation) ☐		
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐			Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐		
Forest (Dominated by trees >10 cm diameter) ☐			Forest (Dominated by trees >10 cm diameter) ☐		
Riparian (approximate width, species, additional notes) hybrid cotton, noddy heppers trees, red canopy grasses, phragmites			Riparian (approximate width, species, additional notes) Same		
Bank Stability			Bank Stability		
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐			Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐		
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐			Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐		
Protected Bank (>45°, non-erodible material) ☒			Protected Bank (>45°, non-erodible material) ☒		
Deposition (<45°, generally materials deposited, gentle slope) ☐			Deposition (<45°, generally materials deposited, gentle slope) ☐		
Substrate (% composition):		Large Boulder (>500 mm)	Boulder (250 – 500 mm)		
Bedrock		Cobble (80 – 250 mm) 50% (40-60%)	Coarse Gravel (40-80 mm)		
Gravel (5-40 mm)		Sand (0.123 – 5 mm)	Silt (<0.123 mm)		
Muck		Detritus	Clay 50% 50%		
Groundwater Indicators		Iron Staining ☐	Bubbling ☐		
Upstream Reach		Site ID:	Waterbody Name:		
Bank Seepage ☐		Watercress/Speedwell/Marsh Marigold ☐	None ☒		

Habitat Assessment Data Collection Form

Other ☐		Describe:			
Morphology (% composition)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)		Flat (Water surface smooth and typically fine and/or organic substrate. Low gradient, depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)		
Glide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.			Riffle (Shallower section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).		
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity).			Notes roadside ditch		
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).					
Total Instream Cover (Total % surface area providing cover for fish):		NA, roadside ditch			
Instream Cover Composition (% composition of the total provide above)		Instream Woody Debris			
Overhanging Woody Debris	Boulders	Cobble			
Instream Aquatic Vegetation	Overhanging Vegetation		Organic Debris		
Undercut Banks	Other				
Aquatic Vegetation Composition (% composition of each, and names)					
Submergent Vegetation					
Floating Vegetation					
Emergent Vegetation cattail, phragmites					
Canopy Cover (% of stream shaded):	80-100% ☒	50-80% ☐	30-50% ☐	0-30% ☐	
Canopy Cover Composition (% composition)	Trees	Shrubs	Grasses	50 phrag	
Upstream Reach	Site ID:	Waterbody Name:			
Herbaceous ☒	Man-made	Other (describe)			

cattail

Habitat Assessment Data Collection Form

Obstructions to Fish Passage		None ☐	Seasonal ☐	Permanent ☐
Gradient ☒	low-flow ☐	Man-made ☐	Debris ☐	Other ☐
Description: Dry roadside ditch				
Dimensions (m)				
Mean Wetted Width		Mean Wetted Depth		
Mean Bankfull Width 1.5 m		Mean Bankfull Depth 0.3 m		
Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)				
Significant Habitat Features (e.g. suitable spawning habitat, SAR habitat, nursery, migration, etc.) Describe: ☒ no				
Additional Comments Dry roadside ditch. likely conveys flow from west side of Greenhase Road to east side where it outlets from double CSP. water may then flow south through roadside ditch to catchment				
Photo numbers with brief description				
Downstream Reach	Site ID:	Waterbody Name:		
Length/description of assessment reach: (e.g. within right-of-way, from 0 to 25 m upstream of rail line or centreline)				

upstream

Habitat Assessment Data Collection Form

Right Bank Description		Left Bank Description	
Vegetation Type		Vegetation Type	
None (>75% of the reach with no vegetation) ☐		None (>75% of the reach with no vegetation) ☐	
Cultivated (Manicured lawns and actively farmed lands) ☒		Cultivated (Manicured lawns and actively farmed lands) ☒	
Meadow (Unmanicured grasses, little to no woody vegetation) ☐		Meadow (Unmanicured grasses, little to no woody vegetation) ☐	
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐		Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐	
Forest (Dominated by trees >10 cm diameter) ☐		Forest (Dominated by trees >10 cm diameter) ☐	
Riparian (approximate width, species, additional notes) <i>Hybrid cotton, Phragmites, need canopy grass</i>		Riparian (approximate width, species, additional notes) <i>same</i>	
Bank Stability		Bank Stability	
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐		Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐		Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	
Protected Bank (>45°, non-erodible material) ☒	<i>r.p. - r.p.</i>	Protected Bank (>45°, non-erodible material) ☒	
Deposition (<45°, generally materials deposited, gentle slope) ☐		Deposition (<45°, generally materials deposited, gentle slope) ☐	
Substrate (% composition):		Substrate (% composition):	
Bedrock	Cobble (80 – 250 mm) <i>50 r.p.</i>	Boulder (250 – 500 mm)	
Gravel (5-40 mm)	Sand (0.123 – 5 mm)	Coarse Gravel (40-80 mm)	
Muck	Detritus	Clay	<i>50% 50</i>
Groundwater Indicators	Iron Staining ☐	Bubbling ☐	
Downstream Reach		Waterbody Name:	
Bank Seepage ☐	Watercress/Speedwell/Marsh Marigold	☐	None ☒
Other ☐	Describe:		

upstream

Habitat Assessment Data Collection Form

Morphology (% composition)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)	Flat (Water surface smooth and typically fine and/or organic substrate, low gradient, depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)
Glide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.		
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity).		Riffle (Shallow section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).	Notes rockside ditch	
Total Instream Cover (Total % surface area providing cover for fish):	Not applicable	
Instream Cover Composition (% composition of the total provide above)	Instream Woody Debris	
Overhanging Woody Debris	Boulders	Cobble
Instream Aquatic Vegetation	Overhanging Vegetation	Organic Debris
Undercut Banks	Other	
Aquatic Vegetation Composition (% composition of each, and names)		
Submergent Vegetation		
Floating Vegetation		
Emergent Vegetation cattail, phragmites, reed canopy grass 45% 10% 45%		
Canopy Cover (% of stream shaded):	80-100% ☐	50-80% ☐
	30-50% ☐	0-30% ☐
Canopy Cover Composition (% composition)	Trees	Shrubs
Downstream Reach	Site ID:	Waterbody Name:
Herbaceous 50	Man-made	Other (describe)
Obstructions to Fish Passage	None ☐	Seasonal ☐
		Permanent ☐

Habitat Assessment Data Collection Form

Gradient	☐ Low-flow	☐ Man-made	☐ Debris	☐ Other
Description: Dry roadside ~~can~~ ditch				
Dimensions (m)				
Mean Wetted Width			Mean Wetted Depth	
Mean Bankfull Width	2 ~		Mean Bankfull Depth	0.4 m
Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)				
Significant Habitat Features (e.g., suitable spawning habitat, SAR habitat, nursery, migration, etc.) Yes ☐ No ☒				
Describe:				
Additional Comments: Storm pond as thought to outlet into marsh which then outlets into culvert that conveys flow into roadside ditch. Double CSP then convey flow East across greenhouse road into roadside ditch. water then may flow south into cattail marsh				
Photo numbers with brief description				
Site ID: 1	Waterbody Name:			
Site Sketch (if required)				

Habitat Assessment Data Collection Form

Legend	
10d depth (cm)	10d depth (cm)
6w width	6w width
⇨ Riffle	⇨ Riffle
⇨ Run/Glide	⇨ Run/Glide
○ Pool	○ Pool
■ Island/Bar	■ Island/Bar
••• Fine Substrate	••• Fine Substrate
### Gravel Substrate	### Gravel Substrate
o o o o Cobble/Boulder	o o o o Cobble/Boulder
* * * Debris	* * * Debris
CT Cattail	CT Cattail
SV/FV Submergent/Float Veg	SV/FV Submergent/Float Veg
EV Emergent Vegetation	EV Emergent Vegetation
W Watercress	W Watercress
Fe Iron Staining	Fe Iron Staining
///// Eroded Bank	///// Eroded Bank
xxx Riprap/Other Stabilization	xxx Riprap/Other Stabilization
□ Instream Log/Tree	□ Instream Log/Tree
ΔΔ Dam/Weir/Obstruction	ΔΔ Dam/Weir/Obstruction
⊙ Riparian Tree	⊙ Riparian Tree
└▶ Seep/Spring	└▶ Seep/Spring
----- Undercut Bank	----- Undercut Bank
— Barrier to Fish Movement	— Barrier to Fish Movement
-S- Seasonal Barrier	-S- Seasonal Barrier
-x-x- Fence line	-x-x- Fence line
┌ Culvert	┌ Culvert

Habitat Assessment Data Collection Form

Site ID:	~~2~~ 2	Date:	Oct 21, 2012	Field Crew:	Sam Turner
Name of Waterbody:	Greenhouse Road South North end		Drainage System:		
Site Location (e.g. nearby intersection, town, general location, etc.)					
Time Start:	0:00	Time End:	10:30	Channel Type	
Weather Conditions:				Natural Channel	☐
5°C, Fall sun				Channelized	☐
				Flow Regime	
				Permanent	☐
				Intermittent	☐
				Ephemeral	☐
Surrounding Land Use			Existing Crossing Structure		
Residential ☒	Agriculture ☐	Bridge ☐	Box Culvert	☐	
Forest ☐	Meadow ☐	Open-foot Culvert	☐	Corrugated Steel Pipe	☐
Wetland ☒	Commercial ☒	NA ☒ Size:			
Industrial ☐	Transportation ☒	Other/Notes:	No culvert / crossing		
Livestock ☐	Other: ☐				
Notes (include inputs to the system, sources of pollution, etc.) Road salt, residential garbage + run off					
Flow Description		Velocity (check box for method of collection)			
Low ($\leq 30\%$ of Bankfull)	☒ None	m/s	☐	Hydraulic Head (mm)	☐
Moderate (30-70% Bankfull)	☐				
High ($\geq 70\%$ Bankfull)	☐	Additional Notes: No Flow, no water			
Water Quality					
pH	Conductivity (µS/cm)				
Dissolved Oxygen (mg/L)	Water Temperature (°C)				

Habitat Assessment Data Collection Form

Upstream Reach	Site ID: 2	Waterbody Name:	
Length/description of assessment reach: (e.g. within right-of-way, from 0 to 25 m upstream of rail line or centreline)		No reach to assess, 1 50 m radius around point	
Right Bank Description		Left Bank Description	
Vegetation Type	Vegetation Type		
None (>75% of the reach with no vegetation) ☐	None (>75% of the reach with no vegetation) ☐		
Cultivated (Manicured lawns and actively farmed lands) ☐	Cultivated (Manicured lawns and actively farmed lands) ☐		
Meadow (Unmanicured grasses, little to no woody vegetation) ☒	Meadow (Unmanicured grasses, little to no woody vegetation) ☒		
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐	Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐		
Forest (Dominated by trees >10 cm diameter) ☐	Forest (Dominated by trees >10 cm diameter) ☐		
Riparian (approximate width, species, additional notes) Cultural meadow = smooth bone, flat top aster, May eagle, cat red, grey grass, Canada golden rod, blueberry, red aster	Riparian (approximate width, species, additional notes) Hybrid cattail, red canary, phragmites, purple loosestrife		
Bank Stability		Bank Stability	
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐		
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐		
Protected Bank (>45°, non-erodible material) ☐	Protected Bank (>45°, non-erodible material) ☐		
Deposition (<45°, generally materials deposited, gentle slope) ☐	Deposition (<45°, generally materials deposited, gentle slope) ☐		
Substrate (% composition):		Boulder (250 – 500 mm)	
Bedrock	Cobble (80 – 250 mm)	Coarse Gravel (40-80 mm)	
Gravel (5-40 mm)	Sand (0.123 – 5 mm)	Silt (<0.123 mm)	
Muck	Detritus	Clay	
Groundwater Indicators	Iron Staining ☐	Bubbling ☐	
Upstream Reach	Site ID: 2	Waterbody Name:	
Bank Seepage ☐	Watercross/Speedwell/Marsh Marigold ☐	None ☒	

Habitat Assessment Data Collection Form

Other ☐		Describe:			
Morphology (% composition)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)		Flat (Water surface smooth and typically fine and/or organic substrate. Low gradient-depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)		
Glide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.)			Riffle (Shallow section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).		
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity).			Notes N/A no feature		
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).					
Total Instream Cover (Total % surface area providing cover for fish):					
Instream Cover Composition (% composition of the total provide above)		Instream Woody Debris			
Overhanging Woody Debris	Boulders		Cobble		
Instream Aquatic Vegetation	Overhanging Vegetation		Organic Debris		
Undercut Banks	Other No water / channel for cover to be applicable				
Aquatic Vegetation Composition (% composition of each, and names)					
Submergent Vegetation					
Floating Vegetation					
Emergent Vegetation					
Canopy Cover (% of stream shaded):		80-100% ☒	50-80% ☐	30-50% ☐	0-30% ☐
Canopy Cover Composition (% composition)		Trees	Shrubs	Grasses	
Upstream Reach	Site ID:	Waterbody Name:			
Herbaceous 30	Man-made	Other (describe)			

Habitat Assessment Data Collection Form

No

N/A

Obstructions to Fish Passage	None ☐	Seasonal ☐	Permanent ☐	☒ Crossing
Gradient	☐ Low-flow	☐ Man-made	☐ Debris	☐ Other ☐
Description: No crossing @ this site, no scale, no channel, no aquatic habitat				
Dimensions (m)				
Mean Wetted Width	☒		Mean Wetted Depth	☒
Mean Bankfull Width	☒		Mean Bankfull Depth	☒
Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)				
Significant Habitat Features (e.g., suitable spawning habitat, SAR habitat, nursery, migration, etc.) Describe: Just a wetland. No evidence of flow. No crossing				
Additional Comments No feature to assess, no evidence of scale channel. No crossing over Greenhouse Rd.				
Photo numbers with brief description				
Downstream Reach	Site ID: 2	Waterbody Name:		
Length/description of assessment reach: (e.g., within right-of-way, from 0 to 25 m upstream of rail line or centreline)		50 m radius around point		

Habitat Assessment Data Collection Form

Right Bank Description		Left Bank Description	
Vegetation Type		Vegetation Type	
None (>75% of the reach with no vegetation) ☐		None (>75% of the reach with no vegetation) ☐	
Cultivated (Manicured lawns and actively farmed lands) ☒		Cultivated (Manicured lawns and actively farmed lands) ☒	
Meadow (Unmanicured grasses, little to no woody vegetation) ☐		Meadow (Unmanicured grasses, little to no woody vegetation) ☐	
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐		Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐	
Forest (Dominated by trees >10 cm diameter) ☐		Forest (Dominated by trees >10 cm diameter) ☐	
Riparian (approximate width, species, additional notes) <i>red canopy, kentucky bluggers, Canada fl. site, common duckweed</i>		Riparian (approximate width, species, additional notes) <i>same</i>	
Bank Stability		Bank Stability	
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐		Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐		Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	
Protected Bank (>45°, non-erodible material) ☐		Protected Bank (>45°, non-erodible material) ☐	
Deposition (<45°, generally materials deposited, gentle slope) ☐		Deposition (<45°, generally materials deposited, gentle slope) ☐	
Substrate (% composition):			
Bedrock	Large Boulder (>500 mm)	Boulder (250 – 500 mm)	
Gravel (5-40 mm)	Cobble (80 – 250 mm)	Coarse Gravel (40-80 mm)	
	Sand (0.123 – 5 mm)	Silt (<0.123 mm)	
Muck	Detritus	Clay	<i>50% 100%</i>
Groundwater Indicators	Iron Staining ☐	Bubbling ☐	
Downstream Reach		Waterbody Name:	
Bank Seepage ☐	Watercress/Speedwell/Marsh Marigold ☐	None	☒
Other ☐	Describe:		

Habitat Assessment Data Collection Form

Morphology (%)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)				
Guide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.	Flat (Water surface smooth and typically fine and/or organic substrate. Low gradient, depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)				
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity).	Riffle (Shallow section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).				
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).	Notes No crossing / feature / channel. No water cover not applicable				
Total Instream Cover (Total % surface area providing cover for fish):					
Instream Cover Composition (% composition of the total provide above)	Instream Woody Debris				
Overhanging Woody Debris	Boulders	Cobble			
Instream Aquatic Vegetation	Overhanging Vegetation		Organic Debris		
Undercut Banks	Other				
Aquatic Vegetation Composition (% composition of each, and names)					
Submergent Vegetation					
Floating Vegetation					
Emergent Vegetation					
Canopy Cover (% of stream shaded):	80-100% ☐	50-80% ☐	30-50% ☐	0-30% ☒	0%
Canopy Cover Composition (% composition)	Trees	Shrubs	Grasses		
Downstream Reach	Site ID:	Waterbody Name:			
Herbaceous	Man-made	Other (describe)			
Obstructions to Fish Passage	None ☐	Seasonal ☐	Permanent ☐		

Habitat Assessment Data Collection Form

Gradient

☐

Low-flow

☐

Man-made

☐

Debris

☐

Other

☐

Description:

Not applicable

Dimensions (m)

Mean Wetted Width

Mean Wetted Depth

Mean Bankfull Width

Mean Bankfull Depth

Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)

No feature / crossing.
Not applicable

Significant Habitat Features (e.g. suitable spawning habitat, SAR habitat, nursery, migration, etc.)

yes ☐ no ☒

Describe:

Additional Comments

Roadside culvert runs north down green house
Road, carries flow from road + subdivision. No
crossing. No water.

Photo numbers with brief description

Site ID:

Waterbody Name:

Site Sketch (if required)

Fish and Fish Habitat
Habitat Assessment Data Collection Form

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Legend

10d depth (cm)
6w width
→ Rifle
⇨ Run/Glide
○ Pool
■ Island/Bar
▨ Fine Substrate
Gravel Substrate
oOoO Cobble/Boulder
*** Debris
CT Cattail
SV/FV Submergent/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
///// Eroded Bank
xxx Riprap/Other Stabilization
□ Instream Log/Tree
m Dam/Weir/Obstruction
⊙ Riparian Tree
▶ Seep/Spring
----- Undercut Bank
— Barrier to Fish Movement
-S- Seasonal Barrier
-x-x- Fence line
□ Culvert

Habitat Assessment Data Collection Form

Site ID:	3	Date:	9/21/2012	Field Crew:	Sam Turner
Name of Waterbody:	Drainage System:				
Site Location (e.g. nearby intersection, town, general location, etc.)					
South end of Greenhaze Road					
Time Start:	12:00	Time End:	1:30	Channel Type	
Weather Conditions:				Natural Channel ☐	
10°C Full Sun				Channelized ☒	
				Flow Regime	
				Permanent ☐	
				Intermittent ☐	
				Epheermal ☒	
Surrounding Land Use			Existing Crossing Structure		
Residential ☐	Agriculture ☒	Bridge ☐	Box Culvert ☐		
Forest ☐	Meadow ☐	Open-foot Culvert ☐	Corrugated Steel Pipe ☐		
Wetland ☐	Commercial ☐	NA ☐	Size:		
Industrial ☐	Transportation ☒	Other/Notes:			
Livestock ☐	Other: ☒	Construction			
Notes (include inputs to the system, sources of pollution, etc.)					
Flow Description		Velocity (check box for method of collection)			
Low (< 30% of Bankfull) ☐	☐	m/s	☐	Hydraulic Head (mm) ☐	
Moderate (30-70% Bankfull) ☐	☐				
High (≥ 70% Bankfull) ☐	☐	Additional Notes:			
Dry, no water					
Water Quality					
pH			Conductivity (µS/cm)		
Dissolved Oxygen (mg/L)			Water Temperature (°C)		

Habitat Assessment Data Collection Form

Upstream Reach	Site ID: 3	Waterbody Name:
Length/description of assessment reach: (e.g. within right-of-way, from 0 to 25 m upstream of rail line or centreline)		100 m reach around point
Right Bank Description		Left Bank Description
Vegetation Type	Vegetation Type	
None (>75% of the reach with no vegetation) ☐	None (>75% of the reach with no vegetation) ☐	
Cultivated (Manicured lawns and actively farmed lands) ☐	Cultivated (Manicured lawns and actively farmed lands) ☐	
Meadow (Unmanicured grasses, little to no woody vegetation) ☒	Meadow (Unmanicured grasses, little to no woody vegetation) ☐	
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☒	Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☐	
Forest (Dominated by trees >10 cm diameter) ☐	Forest (Dominated by trees >10 cm diameter) ☐	
Riparian (approximate width, species, additional notes) <i>Reed, Cane grass, Buckhorn</i>		Riparian (approximate width, species, additional notes) <i>Same</i>
Bank Stability	Bank Stability	
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	
Protected Bank (>45°, non-erodible material) ☐	Protected Bank (>45°, non-erodible material) ☐	
Deposition (<45°, generally materials deposited, gentle slope) ☐	Deposition (<45°, generally materials deposited, gentle slope) ☐	
Substrate (% composition):	Large Boulder (>500 mm)	Boulder (250 – 500 mm)
Bedrock	Cobble (80 – 250 mm)	Coarse Gravel (40-80 mm)
Gravel (5-40 mm)	Sand (0.123 – 5 mm)	Silt (<0.123 mm)
Muck	Detritus	Clay <i>Soil 100%</i>
Groundwater Indicators	Iron Staining ☐	Bubbling ☐
Upstream Reach	Site ID: 3	Waterbody Name:
Bank Seepage ☐	Watercress/Speedwell/Marsh Marigold ☐	None ☒

Habitat Assessment Data Collection Form

Other ☐	Describe:				
Morphology (%) composition)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)				
Glide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.	Flat (Water surface smooth and typically fine and/or organic substrate, low gradient, depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)				
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity).	Riffle (Shallower section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).				
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).	Notes <i>Constructed by dam / embankment</i>				
Total Instream Cover (Total % surface area providing cover for fish):		<i>100%</i>			
Instream Cover Composition (% composition of the total provide above)		Instream Woody Debris			
Overhanging Woody Debris	Boulders		Cobble		
Instream Aquatic Vegetation	Overhanging Vegetation		Organic Debris		
<i>50% red maple</i>	<i>50 - Brookton</i>				
Undercut Banks	Other				
Aquatic Vegetation Composition (% composition of each, and names)					
Submergent Vegetation					
Floating Vegetation					
Emergent Vegetation					
Canopy Cover (% of stream shaded):	80-100% ☐	50-80% ☒	30-50% ☐	0-30% ☐	
Canopy Cover Composition (% composition)	Trees	Shrubs	Grasses		
		<i>80%</i>	<i>25%</i>		
Upstream Reach	Site ID: <i>3</i>	Waterbody Name:			
Herbaceous	Man-made	Other (describe)			

Habitat Assessment Data Collection Form

Obstructions to Fish Passage		None	Seasonal	Permanent
Gradient	☐ Low-flow	☒ Man-made	☒ Debris	☐ Other
Description: Dry, no flow observed, no substrate sectioning potentially buried culvert @ rail crossing				
Dimensions (m)				
Mean Wetted Width	Mean Wetted Depth			
Mean Bankfull Width	Mean Bankfull Depth			
2 m	0.3 m			
Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)				
Significant Habitat Features (e.g. suitable spawning habitat, SAR habitat, nursery, migration, etc.) Describe: Adjacent to terrestrial crayfish meadow but not connected				
Additional Comments Culvert conceals flow under train tracks. Agricultural ditch / embankment across flow through road canopy grass marsh → into Badhorn corridor → trap road * Does not cross Greenhouse Road* road side of greenhouse				
Photo numbers with brief description				
Downstream Reach	Site ID:	Waterbody Name:		
Length/description of assessment reach: (e.g. within right-of-way, from 0 to 25 m upstream of rail line or centreline) 350 m from greenhouse road to laneway in front of storm pond 4				

Habitat Assessment Data Collection Form

Right Bank Description		Left Bank Description	
Vegetation Type		Vegetation Type	
None (>75% of the reach with no vegetation) ☐		None (>75% of the reach with no vegetation) ☐	
Cultivated (Manicured lawns and actively farmed lands) ☐		Cultivated (Manicured lawns and actively farmed lands) ☐	
Meadow (Unmanicured grasses, little to no woody vegetation) ☒		Meadow (Unmanicured grasses, little to no woody vegetation) ☒	
Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☒		Scrubland (Small trees or shrubs interspersed with grasses and sedges) ☒	
Forest (Dominated by trees >10 cm diameter) ☐		Forest (Dominated by trees >10 cm diameter) ☐	
Riparian (approximate width, species, additional notes) <i>Salix</i> sp, sandbar willow, trailing aspen, hybrid cotton, purple/white, red over degraded		Riparian (approximate width, species, additional notes) <i>same</i>	
Bank Stability		Bank Stability	
Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐		Eroding Bank (>45°, erodible materials, undercut or signs of slumping) ☐	
Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐		Vulnerable Bank (>45°, erodible materials, no recent signs of erosion and protected by mat of vegetation) ☐	
Protected Bank (>45°, non-erodible material) ☐		Protected Bank (>45°, non-erodible material) ☐	
Deposition (<45°, generally materials deposited, gentle slope) ☐		Deposition (<45°, generally materials deposited, gentle slope) ☐	
Substrate (% composition):			
Bedrock	Cobble (80 – 250 mm)	Boulder (250 – 500 mm)	
Gravel (5-40 mm)	Sand (0.123 – 5 mm)	Coarse Gravel (40-80 mm)	
Muck	Detritus	Silt (<0.123 mm)	
Groundwater Indicators	Iron Staining ☐	Clay ☒	<i>50% 100%</i>
		Bubbling ☐	<i>50%</i>
Downstream Reach			
Site ID:		Waterbody Name:	
Bank Seepage ☐	Watercress/Speedwell/Marsh Marigold ☐	None ☒	
Other ☐	Describe:		

Habitat Assessment Data Collection Form

Morphology (% composition)	Pool (Deeper area with reduced velocity, full or partial width of stream, velocity <0.2 m/s)		Flat (Water surface smooth and typically fine and/or organic substrate. Low gradient, depth consistent with the reach and flat bed, as opposed to deeper bowl in a pool.)	
Glide (Wide, shallow pool flowing smoothly and gently, low to moderate velocity, little to no surface turbulence.)				
Run (Swiftly flowing, may have some surface agitation but no major flow obstructions, coarser substrate, moderate velocity.)			Riffle (Shallow section of swiftly-flowing, turbulent water with some partially-exposed substrate, typically cobble/boulder).	
Cascade (Steeper gradient with rapid flows, turbulent, white water, may have step pools).			Notes gate stake through sc/x corridor. No water present	
Total Instream Cover (Total % surface area providing cover for fish):	not applicable			
Instream Cover Composition (% composition of the total provide above)	Instream Woody Debris			
Overhanging Woody Debris	Boulders	Cobble		
Instream Aquatic Vegetation	Overhanging Vegetation	Organic Debris		
Undercut Banks	Other			
Aquatic Vegetation Composition (% composition of each, and names)				
Submergent Vegetation				
Floating Vegetation				
Emergent Vegetation				
Canopy Cover (% of stream shaded):	80-100% ☒	50-80% ☐	30-50% ☐	0-30% ☐
Canopy Cover Composition (% composition)	Trees	Shrubs <i>Sc/x</i>	Grasses <i>100</i>	
Downstream Reach	Site ID: <i>3</i>	Waterbody Name:		
Herbaceous	Man-made	Other (describe)		
Obstructions to Fish Passage	None ☐	Seasonal ☐	Permanent ☐	

Habitat Assessment Data Collection Form

Gradient	☐ Low-flow	☐ Man-made	☐ Debris	☒ Other
Description:	No access to scale. Greenhaze Road intercepts any historic scale that may have connect the downstream reach to the upstream. No potential historical evidence of connection found.			
Dimensions (m)				
Mean Wetted Width	Mean Wetted Depth			
Mean Bankfull Width	Mean Bankfull Depth			
Notes (e.g., width of active floodplain, active channel in wetland, wetland width, etc. where applicable)				
Significant Habitat Features (e.g., suitable spawning habitat, SAR habitat, nursery, migration, etc.)				
Describe:				
Additional Comments Scale begins @ west side of greenhaze road is no connection to east. Continues into Salix swamp where evidence of ephemeral pooling (dark soil, water level on trunks), scale/corridor continues Northwest until intercepted by raised foreway - water has no connection to dis hopeful creek. Land is raised by construction to west is marsh Photo numbers with brief description water can only remain in south cattail marsh				
Site ID:	Waterbody Name:			
Site Sketch (if required)				

Fish and Fish Habitat
Habitat Assessment Data Collection Form

AECOM
Delivered

Legend

- 10d depth (cm)
- 6w width
- Rifle
- ⇄ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- ### Gravel Substrate
- oOoO Cobble/Boulder
- *** Debris
- CT Cattail
- SV/FV Submergent/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- ///// Eroded Bank
- xxx Riprap/Other Stabilization
- Instream Log/Tree
- ΔΔΔ Dam/Weir/Obstruction
- ③ Riparian Tree
- ▶ Seep/Spring
- Undercut Bank
- Barrier to Fish Movement
- S- Seasonal Barrier
- x-x- Fence line
- Culvert

Hand-drawn map details:

- Kamp Rd**: A road running horizontally across the middle of the map.
- Ag ditch**: A dashed line representing a ditch, curving from the bottom left towards the center.
- Chimney Creek**: An oval-shaped feature labeled "Chimney Creek" near the center.
- yard**: A rectangular area labeled "yard" near the top center.
- cattails**: A cluster of circles labeled "cattails" near the top center.
- Salix**: A cluster of circles labeled "Salix" near the top center.
- Construction Berm**: A line with arrows pointing outwards, labeled "Construction Berm" near the top left.
- fence line**: A dashed line with cross-ticks, labeled "fence line" near the bottom left.
- tracks**: A line with cross-ticks, labeled "tracks" near the bottom left.
- North Arrow**: Located in the top right corner, pointing towards the top of the page.

Appendix **F**

Plant List



Appendix F: Vascular Plant List



Botanical Name		Plant Species Information										ELC ID#:	1	2	3	4	5	6
Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	NRANK	GRank	COSEWIC	SARO	ELC Code:	CUM1-1	CUW1	MAM2-2	MAS3-1	OAO	SWD4-1
Manitoba Maple	Acer negundo	Aceraceae	0	0	N	Y	S5	N5	G5				X	X	X			X
Norway Maple	Acer platanoides	Aceraceae	0	5	I	Y	SE5	NNA	GNR								X	
Silver Maple	Acer saccharinum	Aceraceae	5	-3	N	N	S5	N5	G5				X					
Sugar Maple	Acer saccharum	Aceraceae	4	3	N	N	S5	N5	G5				X					X
(Acer rubrum X Acer saccharinum)	Acer x freemanii	Aceraceae	6	0	N	N	SNA	NNA	GNA					X	X			
Wild Carrot	Daucus carota	Apiaceae	0	5	I	N	SE5	NNA	GNR				X	X			X	
Common Milkweed	Asclepias syriaca	Apocynaceae	0	5	N	N	S5	N5	G5				X				X	
Nodding Beggarticks	Bidens cernua	Asteraceae	2	-5	N	N	S5	N5	G5							X		
Devil's Beggarticks	Bidens frondosa	Asteraceae	3	-3	N	N	S5	N5	G5							X		
Wild Chicory	Cichorium intybus	Asteraceae	0	3	I	N	SE5	NNA	GNR				X				X	
Canada Thistle	Cirsium arvense	Asteraceae	0	3	I	Y	SE5	NNA	G5				X	X	X			
Bull Thistle	Cirsium vulgare	Asteraceae	0	3	I	N	SE5	NNA	GNR				X				X	
Annual Fleabane	Erigeron annuus	Asteraceae	0	3	N	N	S5	N5	G5				X					
Slender Fragrant Goldenrod	Euthamia caroliniana	Asteraceae	10	-3	N	N	S1	N4	G5									
Grass-leaved Goldenrod	Euthamia graminifolia	Asteraceae	2	0	N	N	S5	N5	G5				X	X	X	X		
Tall Goldenrod	Solidago altissima	Asteraceae	1	3	N	N	S5	N5	G5				X	X	X	X	X	X
Canada Goldenrod	Solidago canadensis	Asteraceae	1	3	N	N	S5	N5	G5				X	X	X		X	
Early Goldenrod	Solidago juncea	Asteraceae	3	5	N	N	S5	N5	G5				X					
Grey-stemmed Goldenrod	Solidago nemoralis ssp. nemoralis	Asteraceae	2	5	N	N	S5	N5	G5T5				X					
Rough-stemmed Goldenrod	Solidago rugosa	Asteraceae	4	0	N	N	S5	N5	G5							X		
Field Sow-thistle	Sonchus arvensis	Asteraceae	0	3	I	N	SE5	NNA	GNR				X				X	
White Heath Aster	Symphyotrichum ericoides	Asteraceae	4	3	N	N	S5	N5	G5				X	X	X		X	
Panicled Aster	Symphyotrichum lanceolatum	Asteraceae	3	-3	N	N	S5	N5	G5				X		X		X	X
New England Aster	Symphyotrichum novae-angliae	Asteraceae	2	-3	N	N	S5	N5	G5					X	X	X		X
Purple-stemmed Aster	Symphyotrichum puniceum	Asteraceae	6	-5	N	N	S5	NNR	G5							X	X	X
Common Tansy	Tanacetum vulgare	Asteraceae	0	5	I	N	SE5	NNA	GNR				X					
Coltsfoot	Tussilago farfara	Asteraceae	0	3	I	Y	SE5	NNA	GNR				X		X	X	X	
Spotted Jewelweed	Impatiens capensis	Balsaminaceae	4	-3	N	N	S5	N5	G5						X	X		X
Paper Birch	Betula papyrifera	Betulaceae	2	3	N	N	S5	N5	G5				X					
Common Viper's Bugloss	Echium vulgare	Boraginaceae	0	5	I	N	SE5	NNA	GNR				X					
Bitter Wintercress	Barbarea vulgaris	Brassicaceae	0	0	I	N	SE5	NNA	GNR				X					
Tatarian Honeysuckle	Lonicera tatarica	Caprifoliaceae	0	3	I	Y	SE5	NNA	GNR					X	X			X
Black Elderberry	Sambucus nigra	Caprifoliaceae	0	-3	I	N	SEH	NNA	G5									X
Wayfaring Viburnum	Viburnum lantana	Caprifoliaceae	0	5	I	N	SE2	NNA	GNR				X	X	X			
Cranberry Viburnum	Viburnum opulus	Caprifoliaceae	5	-3	N	N	S5	N5	G5				X	X	X	X		
Bladder Campion	Silene vulgaris	Caryophyllaceae	0	5	I	N	SE5	NNA	GNR				X					
Common Lamb's-quarters	Chenopodium album	Chenopodiaceae	0	3	I	N	SE5	NNA	G5					X	X			
Grey Dogwood	Cornus racemosa	Cornaceae	2	0	N	N	S5	N5	G5				X	X	X			X
Round-leaved Dogwood	Cornus rugosa	Cornaceae	6	5	N	N	S5	N5	G5									X
Red-osier Dogwood	Cornus sericea	Cornaceae	2	-3	N	N	S5	N5	G5				X	X	X			X
Eastern White Cedar	Thuja occidentalis	Cupressaceae	4	-3	N	N	S5	N5	G5					X	X			
Fox Sedge	Carex vulpinoidea	Cyperaceae	3	-5	N	N	S5	N5	G5				X					
Soft-stemmed Bulrush	Schoenoplectus tabernaemontani	Cyperaceae	5	-5	N	N	S5	N5	G5				X			X		
Common Teasel	Dipsacus fullonum	Dipsacaceae	0	3	I	Y	SE5	NNA	GNR				X					
Russian Olive	Elaeagnus angustifolia	Elaeagnaceae	0	3	I	Y	SE3	NNA	GNR				X					
Field Horsetail	Equisetum arvense	Equisetaceae	0	0	N	N	S5	N5	G5				X	X	X	X		X
Variegated Scouring-rush	Equisetum variegatum	Equisetaceae	5	-3	N	N	S5	N5	G5						X	X		
Honey Locust	Gleditsia triacanthos	Fabaceae	8	0	N	N	S2?	N2?	G5								X	
Garden Bird's-foot Trefoil	Lotus corniculatus	Fabaceae	0	3	I	Y	SE5	NNA	GNR				X					
Black Medick	Medicago lupulina	Fabaceae	0	3	I	N	SE5	NNA	GNR				X					
White Sweet-clover	Melilotus albus	Fabaceae	0	3	I	Y	SE5	NNA	G5				X	X	X			
White Clover	Trifolium repens	Fabaceae	0	3	I	N	SE5	NNA	GNR					X	X			
Tufted Vetch	Vicia cracca	Fabaceae	0	5	I	Y	SE5	NNA	GNR				X					
Whorled Water-milfoil	Myriophyllum verticillatum	Haloragaceae	7	-5	N	N	S5	N5	G5							X		
Black Walnut	Juglans nigra	Juglandaceae	5	3	N	N	S4?	N4?	G5					X	X			
Soft Rush	Juncus effusus	Juncaceae	4	-5	N	N	S5	N5	G5							X		
Path Rush	Juncus tenuis	Juncaceae	0	0	N	N	S5	N5	G5					X	X			
American Water-horehound	Lycopus americanus	Lamiaceae	4	-5	N	N	S5	N5	G5						X	X		
Wild Bergamot	Monarda fistulosa	Lamiaceae	6	3	N	N	S5	N5	G5					X				
Common Self-heal	Prunella vulgaris	Lamiaceae	0	0	N	N	S5	N5	G5				X					
Garden Asparagus	Asparagus officinalis	Liliaceae	0	3	I	N	SE5	NNA	G5?									X
Purple Loosestrife	Lythrum salicaria	Lythraceae	0	-5	I	Y	SE5	NNA	G5				X		X	X		X
White Ash	Fraxinus americana	Oleaceae	4	3	N	N	S4	N5	G5				X	X	X			X
Red Ash	Fraxinus pennsylvanica	Oleaceae	3	-3	N	N	S4	N5	G5				X					X

Appendix F: Vascular Plant List



Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	NRANK	GRank	COSEWIC	SARO	ELC Code:	CUM1-1	CUW1	MAM2-2	MAS3-1	OAD	SWD4-1
Yellow Lady's-slipper	Cypripedium parviflorum	Orchidaceae	5	0	N	N	S5	N5	G5				X					
Tamarack	Larix laricina	Pinaceae	7	-3	N	N	S5	N5	G5								X	
Blue Spruce	Picea pungens	Pinaceae	0	3	I	N	SE1	NNA	G5								X	
Red Pine	Pinus resinosa	Pinaceae	8	3	N	N	S5	N5	G5								X	
Scots Pine	Pinus sylvestris	Pinaceae	0	3	I	Y	SE5	NNA	GNR				X					
English Plantain	Plantago lanceolata	Plantaginaceae	0	3	I	N	SE5	NNA	G5				X					
Common Plantain	Plantago major	Plantaginaceae	0	3	I	N	SE5	NNA	G5				X	X	X			
Sycamore	Platanus occidentalis	Platanaceae	8	-3	N	N	S4	N4	G5				X					
Creeping Bentgrass	Agrostis stolonifera	Poaceae	0	-3	I	N	SE5	N5	G5						X			
Smooth Brome	Bromus inermis	Poaceae	0	5	I	Y	SE5	NNA	G5				X	X			X	
Orchard Grass	Dactylis glomerata	Poaceae	0	3	I	N	SE5	NNA	GNR				X					
Reed Canarygrass	Phalaris arundinacea	Poaceae	0	-3	N	Y	S5	N5	G5				X	X	X	X	X	X
Common Timothy	Phleum pratense	Poaceae	0	3	I	N	SE5	NNA	GNR				X					
European Reed	Phragmites australis ssp. australis	Poaceae	0	-3	I	Y	SE5	NNA	G5T5				X	X				
Kentucky Bluegrass	Poa pratensis	Poaceae	0	3	N	N	S5	N5	G5				X	X			X	
Spotted Lady's-thumb	Persicaria maculosa	Polygonaceae	0	-3	I	N	SE5	NNA	G3G5						X			
Curled Dock	Rumex crispus	Polygonaceae	0	0	I	N	SE5	NNA	GNR				X					X
Creeping Yellow Loosestrife	Lysimachia nummularia	Primulaceae	0	-3	I	Y	SE5	NNA	GNR					X	X			
Swamp Yellow Loosestrife	Lysimachia terrestris	Primulaceae	6	-5	N	N	S5	N5	G5									X
Common Buttercup	Ranunculus acris	Ranunculaceae	0	0	I	N	SE5	NNA	G5				X					
Cursed Buttercup	Ranunculus sceleratus	Ranunculaceae	2	-5	N	N	S5	N5	G5							X		
Glossy Buckthorn	Rhamnus alnus	Rhamnaceae	0	0	I	Y	SE5	NNA	GNR									X
European Buckthorn	Rhamnus cathartica	Rhamnaceae	0	0	I	Y	SE5	NNA	GNR				X	X	X			X
Common Apple	Malus pumila	Rosaceae	0	5	I	N	SE4	NNA	G5					X	X			
Chokecherry	Prunus virginiana	Rosaceae	2	3	N	N	S5	N5	G5				X					
Red Raspberry	Rubus idaeus	Rosaceae	2	3	N	N	S5	N5	G5				X					
European Red Raspberry	Rubus idaeus ssp. idaeus	Rosaceae	0	3	I	N	SE1	NNA	G5T5				X	X				
Smooth Bedstraw	Galium mollugo	Rubiaceae	0	5	I	Y	SE5	NNA	GNR				X					
Balsam Poplar	Populus balsamifera	Salicaceae	4	-3	N	N	S5	NNR	G5									X
Eastern Cottonwood	Populus deltoides	Salicaceae	4	0	N	N	S5	N5	G5						X			
Eastern Cottonwood	Populus deltoides ssp. deltoides	Salicaceae	4	0	N	N	S5	N5	G5T5					X	X			
Trembling Aspen	Populus tremuloides	Salicaceae	2	0	N	N	S5	N5	G5				X					
Cottony Willow	Salix eriocephala	Salicaceae	4	-3	N	N	S5	N5	G5				X			X		X
Sandbar Willow	Salix interior	Salicaceae	1	-3	N	N	S5	N5	G5					X	X	X		X
Black Willow	Salix nigra	Salicaceae	6	-5	N	N	S4	N4N5	G5				X	X	X			X
Meadow Willow	Salix petiolaris	Salicaceae	3	-3	N	N	S5	N5	G5								X	
(Salix babylonica X Salix euxina)	Salix x pendulina	Salicaceae	0	-3	I	N	SNA	NNA	GNA							X		
Common Mullein	Verbascum thapsus	Scrophulariaceae	0	5	I	N	SE5	NNA	GNR				X					
Narrow-leaved Cattail	Typha angustifolia	Typhaceae	0	-5	I	Y	SE5	N5	G5						X	X		
Broad-leaved Cattail	Typha latifolia	Typhaceae	1	-5	N	N	S5	N5	G5				X		X	X	X	X
(Typha angustifolia X Typha latifolia)	Typha x glauca	Typhaceae		-5	N	Y	SNA	NNA	GNA							X		
Blue Vervain	Verbena hastata	Verbenaceae	4	-3	N	N	S5	N5	G5						X			
Riverbank Grape	Vitis riparia	Vitaceae	0	0	N	N	S5	N5	G5				X	X				X

Appendix F: Vascular Plant List

Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	NRANK	GRank	COSEWIC	SARO	ELC Code:	CUM1-1	CUW1	MAM2-2	MAS3-1	OAO	SWD4-1
Floristic Summary and Analysis for Entire Study Area																		
Summary																		
Total Species:	107	N/A																
Native Species:	62	58%																
Introduced Species:	45	42%																
Invasive Species:	21	20%																
ESA Status																		
END	0	0%																
THR	0	0%																
SC	0	0%																
COSEWIC Status																		
END	0	0%																
THR	0	0%																
SC	0	0%																
Provincially Rare (S-rank of S1-S3)																		
S1	1	1%																
S1?	0	0%																
S1S2	0	0%																
S1S3	0	0%																
S2	0	0%																
S2?	1	1%																
S2S3	0	0%																
S2S4	0	0%																
S3	0	0%																
S3?	0	0%																
S3S4	0	0%																
Total S1-S3:	2	2%																
Local Rank																		
None																		
Co-efficient of Conservatism and Floral Quality Index																		
Co-efficient of Conservatism (CC) (average):	1.98																	
CC 0 to 3	lowest sensitivity	75	121%															
CC 4 to 6	moderate sensitivity	25	40%															
CC 7 to 8	high sensitivity	5	8%															
CC 9 to 10	highest sensitivity	1	2%															
Floral Quality Index (FQI)																		
FQI:	15.60																	
Presence of Wetland Species																		
Wetness Value (CW) (average):																		
	0.299065421																	
upland	5	15	14%															
facultative upland	2 to 4	34	32%															
facultative	1 to -1	19	18%															
facultative wetland	-2 to -4	25	23%															
obligate wetland	-5	14	13%															
Physiognomy																		
Plant Form	No. of Total Species	% of Total Species																
Fern	6	19%																
Forb	15	48%																
Grass	1	3%																
Sedge	2	6%																
Shrub	3	10%																
Trees	2	6%																
Vine	1	3%																
Woody Vine	1	3%																
Grand Total	31	100%																

Present

No. of Total Species

% of Total Species

Values

Plant Form of All Species

Fern
19%

Forb
48%

Grass
3%

Sedge
7%

Shrub
10%

Trees
7%

Vine
3%

Woody Vine
3%

Floristic Summary and Analysis Per ELC						
Summary						
Total Species:	65	36	43	25	21	29
Native Species:	34	22	28	20	13	22
Introduced Species:	31	14	15	5	8	7
Invasive Species:	15	9	10	6	4	6
ESA Status						
END	0	0	0	0	0	0
THR	0	0	0	0	0	0
SC	0	0	0	0	0	0
COSEWIC Status						
END	0	0	0	0	0	0
THR	0	0	0	0	0	0
SC	0	0	0	0	0	0
Provincially Rare (S-rank of S1-S3)						
S1	0	0	0	0	0	0
S1?	0	0	0	0	0	0
S1S2	0	0	0	0	0	0
S1S3	0	0	0	0	0	0
S2	0	0	0	0	0	0
S2?	0	0	0	0	1	0
S2S3	0	0	0	0	0	0
S2S4	0	0	0	0	0	0
S3	0	0	0	0	0	0
S3?	0	0	0	0	0	0
S3S4	0	0	0	0	0	0
Total S1-S3:	0	0	0	0	1	0
Local Rank						
None						
Co-efficient of Conservatism and Floral Quality Index						
Co-efficient of Conservation	1.29	1.53	1.84	2.38	2.00	2.14
CC 0 to 3	55	27	30	14	16	20
CC 4 to 6	9	9	13	9	2	9
CC 7 to 8	1	0	0	1	3	0
CC 9 to 10	0	0	0	0	0	0
Floral Quality Index (FQI)						
FQI:	7.54	7.17	9.72	10.62	7.21	10.03
Presence of Wetland Species						
Wetness Value (CW) (a	1.28	0.92	-0.60	-3.12	1.33	-1.21
upland	12	4	2	0	4	1
facultative upland	26	14	12	2	10	5
facultative	12	9	9	3	1	8
facultative wetland	10	8	14	8	4	10
obligate wetland	5	1	6	12	2	5

Glossary

Rarity Ranks	
RANK	DEFINITION
EXP	Extirpated - A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.
END	Endangered - A wildlife species facing imminent extirpation or extinction.
THR	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	Special Concern - A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

SARO Status	
RANK	DEFINITION
EXP	Extirpated -A species that no longer exists in the wild in Ontario but still occurs elsewhere.
END	Endangered - A species facing imminent extinction or extirpation in Ontario.
THR	Threatened - A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC	Special Concern - A species with characteristics that make it sensitive to human activities or natural events.

Global (G) Conservation Status Ranks	
GLOBAL RANK	DEFINITION
GX	Presumed Extinct (species) - Not located despite intensive searches and virtually no likelihood of rediscovery
	Presumed Eliminated (ecosystems, i.e., ecological communities and systems) - Eliminated throughout its range, due to loss of key dominant and characteristic taxa and/or elimination of the sites and ecological processes on which the type depends
GH	~~Possibly Extinct (species) or Possibly Eliminated (ecosystems) - Known from only historical occurrences but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or eliminated throughout its range~~
G1	Critically Imperiled - At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled - At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable - At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	~~Apparently Secure - At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors~~
G5	Secure - At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

Variant Global Conservation Status Ranks	
RANK	DEFINITION
G#G#	~~Range Rank - A numeric range rank (e.g., G2G3, G1G3) is used to indicate uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).~~
GU	~~Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.~~
GNR	Unranked - Global rank not yet assessed.
GNA	Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities. A global conservation status rank may be not applicable for several reasons, related to its relevance as a conservation target. For species, typically the species is a hybrid without conservation value, or of domestic origin. For ecosystems, the type is typically non-native (e.g, many ruderal vegetation types), agricultural (e.g. pasture, orchard) or developed (e.g. lawn, garden, golf course).

Plant Form or Type Codes		
CODE	FORM	DESCRIPTION
FE	Fern	non-flowering, vascular plant, reproducing by spores - Pteridophytes. Including the fern allies such as horsetail, club-
FO	Forb	herbaceous broad-leaved plant
GR	Grass	graminoid plants in the Poaceae
RU	Rush	graminoid plants in the Juncaceae
SE	Sedge	graminoid plants in the Cyperaceae
SH	Shrub	plants with erect, reclining or prostrate woody stems (usually with more than one stem)
TR	Tree	woody perennial plant having a single (1-3) stem, usually with an elongate main stem (trunk)
VI	Vine	herbaceous plant that trail, cling, or twine, and requires support to grow vertically
VW	Woody Vine	a vine with a perennial woody stem

Coefficient of Wetness				
CW VALUE	ABBRV.	INDICATOR STATUS	% OCCUR. IN WETLANDS	DEFINITION
-5	OBL	Obligate Wetland	99	Almost always occur in wetlands. With few exceptions, these plants (herbaceous or woody are found in standing water or seasonally saturated soils (14 or more consecutive days) near the surface.
-4	FACW+			
-3	FACW	Facultative Wetland	67-99	Usually occur in wetlands, but may occur in non-wetlands. These plants predominately occur with hydric soils, often in geomorphic settings where water saturates the soils or floods the soil surface at lease seasonally.
-2	FACW-			
-1	FAC+			
0	FAC	Facultative	34-66	Occur in wetlands and nonwetlands. These plants can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in differenct habitats represents responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil pH, and elevation, and they have a wide tolerance of soil moisture conditions.
1	FAC-			
2	FACU+			Usually occur in non-wetlands, but may occur in wetlands.
3	FACU	Facultative Upland	1-33	These plants predominately occur on drier or more mesic sites in geomorphic settings where water rarely saturates the soils or floods the soil surface seasonally.
4	FACU-			
5	UPL	Obligate Upland	1	Almost never occur in wetlands. These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include ~~herbaceous shrubs, woody vines, and trees~~

"+" or "-" signs have been attached to the three Facultative categories to express exaggerated tendencies for those species. The "+" sign denotes that the species generally has a greater estimated probability of occurring in wetlands than species having the general indicator category, but a lesser estimated probability of occurring in wetlands than those having the next higher general indicator. The "-" sign denotes that the species generally has a lesser estimated probability of occurring in wetlands than those having the general indicator status, but a greater estimated probability of occurring in wetlands than those having the next lowest general indicator.

Flowering Season		
CODE	FORM	DESCRIPTION
Win	Winter	Flowers from from December through March.
Spr	Spring	Flowers from mid-March through to about mid-June.
Sum	Summer	Flowers from about early June through to the end of August.
Aut	Autumn	Flowers from late August through to the end of November.
The flowering seasons, as they are used within the 'Species List' worksheet, utilize the convention applied by the Ontario Wildflowers website. The seasons are not defined in the strict calendar sense (i.e., summer starting on June 21, etc). Rather, a looser definition is used in order to more accurately characterize a species flowering phenology for southern Ontario. Species with longer flowering periods are listed as flowering during multiple seasons (e.g., Spr-Sum - flowers in the Spring and Summer seasons if it typically blooms from late May through mid June).		

Rank Qualifiers	
RANK	DEFINITION
?	Inexact Numeric Rank - Denotes inexact numeric rank; this should not be used with any of the Variant Global Conservation Status Ranks or GX or GH.
Q	Questionable taxonomy that may reduce conservation priority - Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level and not at a national or subnational level.
C	Captive or Cultivated Only - Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The "C" modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to "Extinct in the Wild (EW) in IUCN's Red List terminology (IUCN 2001).

Intraspecific Taxon Global Conservation Status Ranks	
RANK	DEFINITION
T#	Intraspecific Taxon (trinomial) - The status of intraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species, for example, a G1T2 subrank should not occur. A vertebrate animal population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an intraspecific taxon and given a T rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.
National (N) and Subnational (S) Conservation Status Ranks	
RANK	DEFINITION
NX SX	Presumed Extirpated - Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., 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. [equivalent to "Regionally Extinct" in IUCN Red List terminology]
NH SH	Possibly Extirpated - Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.
N1 S1	Critically Imperiled - At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
N2 S2	Imperiled - At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
N3 S3	Vulnerable — At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
N4 S4	Apparently Secure - At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
N5 S5	Secure - At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

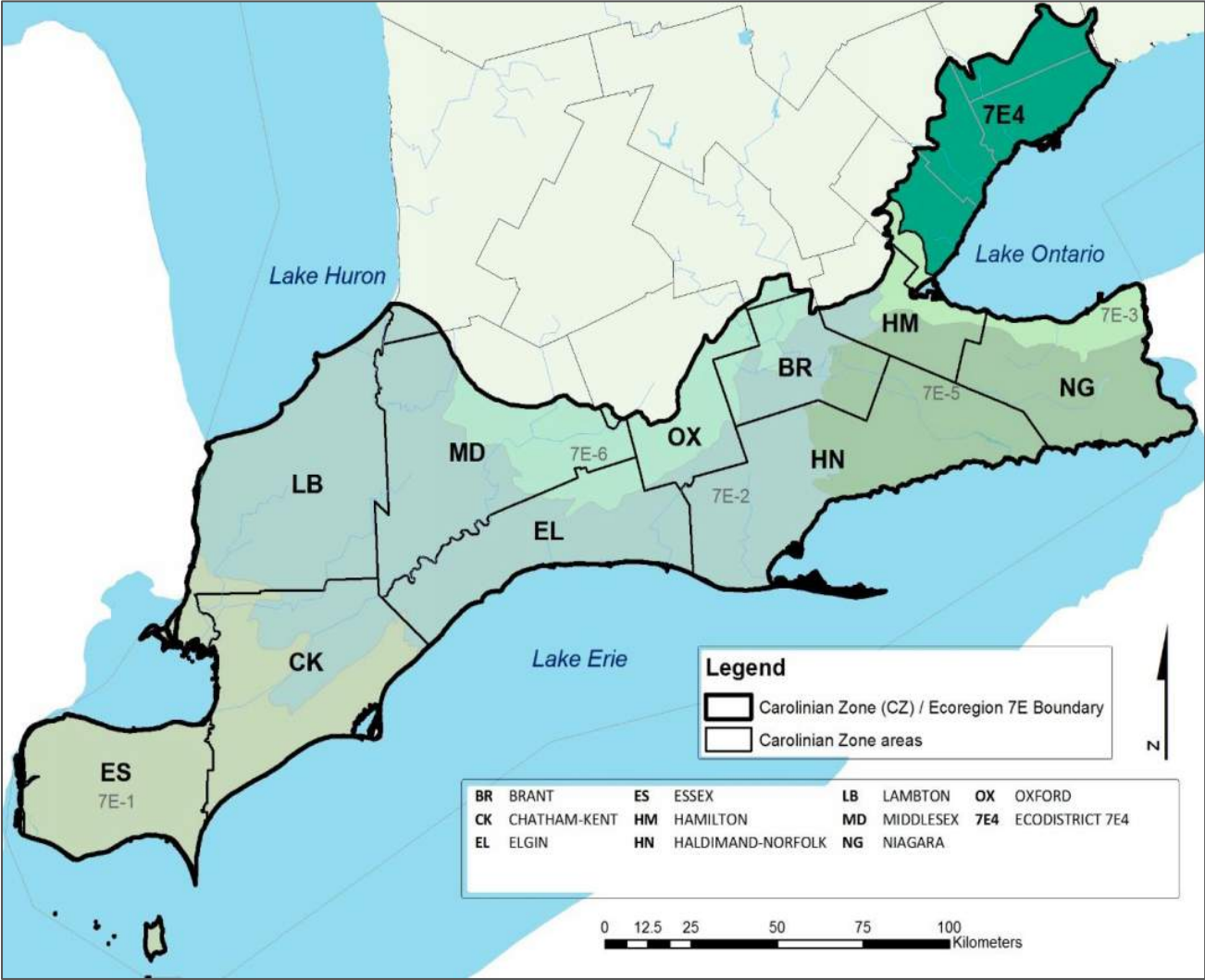
Climate Change Vulnerability Index (CCVI)	
CCVI Score Abbreviations	
CODE	DEFINITION
EV	Extremely Vulnerable - Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.
HV	Highly Vulnerable - Abundance and/or range extent within geographical area assessed likely to decrease significantly by 2050.
MV	Moderately Vulnerable - Abundance and/or range extent within geographical area assessed likely to decrease by 2050.
LV	Less Vulnerable - Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will increase/decrease substantially by 2050. Actual range boundaries may change.

CCVI Confidence Levels	
LEVEL	DEFINITION
VH	Very High - >90% confidence.
High	High - 80–90% confidence.
Mod	Moderate - 60 - 80% confidence.
Low	Low - <60% confidence.

Variant National and Subnational Conservation Status Ranks	
RANK	DEFINITION
N#	Range Rank - A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1S4).
S#	
NU	
SU	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNR	
SNR	
NNA	Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., long distance aerial and aquatic migrants, hybrids without conservation value, and non-native species or ecosystems (see Master et al. 2012, Appendix A, pg 70 for further details).
SNA	
Not Provided	Species or ecosystem is known to occur in this nation or state/province. Contact the appropriate NatureServe network program for assignment of conservation status.

Rank Qualifier	
RANK	DEFINITION
N#?	Inexact Numeric Rank - Denotes inexact numeric rank; this should not be used with any of the Variant National or Subnational Conservation Status Ranks, or NX, SX, NH, or SH.
S#?	

Carolinian Status	
REGION	DEFINITION
CZ	CZ status (see below)
RANK	DEFINITION
H	Historic. Native in all Carolinian Zone areas and no known records for at least 30 years in all areas where native and ranked (i.e. not X). Occasionally used for a native species known to be extirpated from its only known Carolinian Zone location(s).
R	Rare. Native to the Carolinian Zone and (a) rare (as defined in source lists; sometimes including "very uncommon") or historic (no records in ≥30 years) in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X); or (b) if rare or historic in <6 areas it must be uncommon or common in no more than one area
U	Uncommon. Native in the Carolinian Zone and (a) listed as common in no more than one Carolinian Zone area; and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X)
C	Common. Native in the Carolinian Zone and (a) common in at least two Carolinian Zone areas, and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X)
X	No status. Present and native in the Carolinian Zone but no status assigned because of lack of information, often due to confusion with similar species.
note	In a few cases, based on professional opinion, Carolinian zone status ranks departed from the above criteria, particularly if the species is not ranked (i.e. X) in at least four Carolinian Zone areas
CZ RESTR	restricted in Ontario as a native species to CZ (=CZ) or nearly restricted (approximately 90%+ records) in Ontario as a native species to CZ (=cz)
ES	Essex County
CK	Municipality of Chatham-Kent County
LB	Lambton County
MD	Middlesex County (including City of London)
EL	Elgin County
HN	Haldimand-Norfolk County (now split into Haldimand County and Norfolk County)
BR	Brant County
NG	Niagara Regional Municipality
HM	City of Hamilton (formerly Hamilton-Wentworth County)
HA	Halton
Ham	Hamilton
7E4	Ecodistrict 7E4 (comprising the City of Toronto, and southern portions of York, Peel, and Halton Regional Municipalities)
WC	Wellington County (2012)



RANK	DEFINITION
I	introduced, thought to have been present in the Carolinian zone or individual CZ area prior to European settlement; believed to be deliberately or inadvertently introduced to the CZ by humans (followed by a status - below)
C	common
U	uncommon
R	rare
H	historic records only (generally >30 years)
X	present; status unknown or not specified in source lists
?	unconfirmed report
hyb	hybrid
Rank for Wellington County	DEFINITION
R-A	Identified by the Flora of Wellington County (Anderson and Frank, in press) as rare based on occurrence at between 1 and 10 sites (mainly natural areas) in the County
R-B	Added from updated rare species list provided by Allan Anderson for Wellington, Oct. 8, 2007
R-C	Added based by Charlie Cecile in consultation with Allan Anderson based on new records collected in Guelph over 2005 and 2006.
R-D	Added based on new record for Guelph with provincial significance which would likely make it significant in the County as well.
R-E	Added based on records provided by Mike Oldham (NHIC) for Wellington County in 2005.
R-F	Added based on discussions with Allan Anderson, Mike Oldham and verification of records in OAC herbarium Jan-Feb. 2008
L-Rank. TRCA local rank (assigned June 2024)	DEFINITION
L1-L3	species of regional conservation concern
L4	species of conservation concern in urban area
L5	species not of conservation concern at this time
LX	species is extirpated from TRCA
L+	introduced species, not native to TRCA
L+?	species is likely introduced to TRCA
LU	presence of species in TRCA unverified/unknown

Appendix **G**

Significant Wildlife Habitat Screening



Significant Wildlife Habitat Ecoregion 6 E Criterion Schedule – January 2015

Table 1.1 Seasonal Concentration Areas of Animals.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl Stopover and Staging Areas (Terrestrial) Rationale: Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	- 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 Significant Wildlife Habitat 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 - Sites documented through waterfowl planning processes (e.g. 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”. - Any mixed species aggregations of 100 or more individuals required. - The flooded field ecosite habitat plus a 100-300m radius area, dependant on local site conditions and adjacent land use is the significant wildlife habitat - 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). - Significant Wildlife Habitat MiST Index #7 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. The Study Area does not contain fields with sheet water and does not contain historical records of aggregations of 100 or more individuals utilizing sheet water on fields.	No; Candidate habitat was not identified.
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 one of a few in the eco-district.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail 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 Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	- Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a Significant Wildlife Habitat, however a reservoir managed as a large wetland or pond/lake does qualify. - These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water) 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 (e.g. EHJV implementation plan) - Ducks Unlimited projects - Element occurrence specification by Nature Serve: http://www.natureserve.org - Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	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 Significant Wildlife Habitat - The combined area of the Ecological Land Classification ecosites and a 100m radius area is the Significant Wildlife Habitat - Wetland area and shorelines associated with sites identified within the Significant Wildlife Habitat TG Appendix K are significant wildlife habitat. - Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” 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). - Significant Wildlife Habitat MiST Index #7 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Wetlands within the Study Area is of insufficient size to support large numbers of waterfowl species.	No; Candidate habitat was not identified.
Shorebird Migratory Stopover Area Rationale: 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	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1	- 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 Significant Wildlife Habitat.	Studies confirming: Presence of 3 or more of listed species and > 1000 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)	No; Candidate Habitat is not present within the Study Area. Suitable shoreline habitat is not present within the Study Area.	No; Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
	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	MAM2 MAM3 MAM4 MAM5	<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 - Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	- Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. - The area of significant shorebird habitat includes the mapped Ecological Land Classification shoreline ecosites plus a 100m radius area - Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” - Significant Wildlife Habitat MiST Index #8 provides development effects and mitigation measures.	Meadow Marsh communities are present within the Study Area, however areas of open water or suitable habitat are likely too small.	
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 Ecological Land Classification Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. <u>Bald Eagle:</u> Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	- The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. - Raptor wintering sites (hawk/owl) need to be > 20 ha , with a combination of forest and upland. , , i, - Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands - Field area of the habitat is to be wind swept with limited snow depth or accumulation. - Eagle sites have open water, large trees and snags available for roosting <u>Information Sources:</u> - OMNRF Ecologist or Biologist - Field Naturalist Clubs - Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area - Data from Bird Studies Canada - Results of Christmas Bird Counts - Reports and other information available from Conservation Authorities.	Studies confirm the use of these habitats by: - One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two of the listed hawk/owl species.. - To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. - The habitat area for an Eagle 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” - Significant Wildlife HabitatMiST Index #10 and #11 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. A combination of upland and forest communities are present within the Study Area however, communities do not meet the size criteria.	No; Candidate habitat was not identified.
Bat Hibernacula <u>Rationale:</u> Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be Significant Wildlife Habitat)	- Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. - Active mine sites should not be considered as Significant Wildlife Habitat - The locations of bat hibernacula are relatively poorly known. <u>Information Sources:</u> - OMNRF 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 (e.g. Sierra Club) - University Biology Departments with bat experts.	- All sites with confirmed hibernating bats are Significant Wildlife Habitat . - The habitat area includes a 200m radius around the entrance of the hibernaculum, 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 “Bats and Bat Habitats: Guidelines for Wind Power Projects”. - Significant Wildlife HabitatMiST Index #1 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. None of the listed ecosites are within or adjacent to the Study Area.	No; Candidate habitat was not identified.
Bat Maternity Colonies <u>Rationale:</u> Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered Significant Wildlife Habitat are found in forested Ecosites. All Ecological Land Classification Ecosites in Ecological Land Classification Community Series: FOD FOM SWD SWM	- Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be Significant Wildlife Habitat). - Maternity roosts are not found in caves and mines in Ontario. - Maternity colonies located in Mature deciduous or mixed forest stands, ,with >10/ha large diameter (>25cm dbh) wildlife trees - Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. - 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, <u>Information Sources:</u> - OMNRF for possible locations and contact for local experts - University Biology Departments with bat experts.	- Maternity Colonies with confirmed use by; >10 Big Brown Bats >5 Adult Female Silver-haired Bats - The area of the habitat includes the entire woodland or a forest stand Ecological Land Classification Ecosite or an Ecoelement containing the maternity colonies. - Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”. - Significant Wildlife HabitatMiSTIndex #12 provides development effects and mitigation measures.	Yes; Forested communities may provide candidate Significant Wildlife Habitat.	Candidate; Candidate Significant Wildlife Habitat exists within the Willow Mineral Deciduous Swamp (S W D 4 - 1) and Mineral Cultural Woodland (C U W 1) communities.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Turtle Wintering Areas Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Midland Painted Turtles; Ecological Land Classification Community Classes; SW, MA, OA and SA, Ecological Land Classification 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 , xi, - Man-made ponds such as sewage lagoons or storm water ponds should not be considered Significant Wildlife Habitat. <u>Information Sources:</u> - EIS studies carried out by Conservation Authorities. - Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. - OMNRF Ecologist or Biologist - Field Naturalist clubs - Natural Heritage Information Center (NHIC)	- Presence of 5 over-wintering Midland Painted Turtles is significant. - One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. - The mapped Ecological Land Classification ecosite area with the over wintering turtles is the Significant Wildlife Habitat. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the Significant Wildlife Habitat. - 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) cv. - Congregation of turtles is more common where wintering areas are limited and therefore significant , xi, - Significant Wildlife HabitatMiST Index #28 provides development effects and mitigation measures for turtle wintering habitat.	Yes; Swamp, Marsh Open Aquatic and Shallow Water communities are present within the Study Area and may be deep enough to provide overwintering habitat.	Confirmed; A Snapping Turtle (Chelydra serpentina) was observed near the pond located southeast of Greenhouse Road and Victoria Street N. The pond was observed to be of sufficient depth for overwintering.
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 Lizard: Special Concern (Southern Shield population): Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, Ecological Land Classification Community Series of FOD and FOM and Ecosites: FOC1 FOC3	- 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 Significant Wildlife Habitat. - Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line - 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. - Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures.. <u>Information Sources:</u> - 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 Naturalists clubs - University herpetologists - Natural Heritage Information Center (NHIC) - OMNRF ecologist or biologist may be aware of locations of wintering skinks	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 (e.g. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) <u>Note:</u> If there are Special Concern Species present, then site is Significant Wildlife Habitat <u>Note:</u> 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 radius area is the Significant Wildlife Habitat - Significant Wildlife HabitatMiST Index #13 provides development effects and mitigation measures for snake hibernacula. - Presence of any active hibernaculum for skink is significant. - Significant Wildlife HabitatMiST Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.	Yes; Old building foundations may be present in any Ecological Land Classification community.	Assumed Confirmed Old building foundation found within Reed-canary Grass Mineral Meadow Marsh (M A M 2 - 2) and Mineral Cultural Woodland (C U W 1). Three Eastern Gartersnakes (Thamnophis sirtalis sirtalis) were observed in close vicinity to the old foundation, assumed confirmed as there may be more but basking surveys were not completed as part of the field investigations.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
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 population are declining in Ontario.	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. 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. <u>Information Sources</u> - Reports and other information available from Conservation Authorities. - Ontario Breeding Bird Atlas - Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ - Field Naturalist Clubs.	Studies confirming: - Presence of 1 or more nesting sites with 8or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. - A colony identified as Significant Wildlife Habitat will include a 50m radius habitat area from the peripheral nests - Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” - Significant Wildlife HabitatMiSTIndex #4 provides development effects and mitigation measures	Candidate; Steep slopes with exposed soils may be present.	No; Confirmed habitat was not observed during field investigations. No eroding banks or steep slopes with exposed soils were observed.
Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs) Rationale: 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, 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 CAs. - MNRF District Offices. - Local naturalist clubs.	Studies confirming: - Presence of 5 or more active nests of Great Blue Heron or other listed species. - The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the Significant Wildlife Habitat cc, ccv - 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 - Significant Wildlife HabitatMiST Index #5 provides development effects and mitigation measures.	Yes; Suitable swamp communities may be present within the Study Area.	No; Nests were not observed within the Study Area during field investigations.
Colonially -Nesting Bird Breeding Habitat (Ground) Rationale: 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 low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> - Ontario Breeding Bird Atlas, rare/colonial species records. - Canadian Wildlife Service - Reports and other information available from CAs. - Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area - MNRF District Offices. - Field Naturalist clubs.	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 Ecological Land Classification ecosites containing the colony or any island <3.0ha with a colony is the Significant Wildlife Habitat , - Studies would be done during May/June when actively nesting. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” - Significant Wildlife HabitatMiST Index #6 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. No rocky islands or peninsulas associated with a large lake or river are present within the Study Area.	No; Confirmed habitat was not observed during field investigations.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Migratory Butterfly Stopover Areas Rationale: 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 Ecological Land Classification Community Series; need to have present one Community Series from each land class: <u>Field:</u> CUM CUT CUS <u>Forest:</u> FOC FOD FOM CUP Anecdotally, a candidate site 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 Ontario . - 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 - 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 , . - Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes <u>Information Sources</u> - OMNRF (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). 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, significant variation can occur between years and multiple years of sampling should occur - 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. - Significant Wildlife HabitatMiST Index #16 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. The Study Area is more than 5 km away from Lake Ontario and Lake Erie.	No; Candidate habitat was not identified.
Landbird Migratory Stopover Areas Rationale: 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: Specially Protected Birds (Raptors)	All Ecosites associated with these Ecological Land Classification Community Series; FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 ha in size and within 5 km of Lake Ontario. - If multiple woodlands are located along the shoreline those Woodlands <2km from Lake Ontario are more significant - Sites have a variety of habitats; forest, grassland and wetland complexes. - The largest sites are more significant - Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and located within 5km of Lake Ontario are Candidate Significant Wildlife Habitat. <u>Information Sources</u> - Bird Studies Canada - Ontario Nature - Local birders and naturalist club - Ontario Important Bird Areas (IBA) Program	Studies confirm: - Use of the habitat 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 (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” - Significant Wildlife HabitatMiST Index #9 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. The Study Area is more than 5km away from Lake Ontario and Lake Erie.	No; Candidate habitat was not identified.
Deer Yarding Areas Rationale: Winter habitat for deer is considered to be the main limiting factor for northern deer populations. In winter, deer congregate in “yards” to survive severe winter conditions. Deer yards typically have a long history of annual use by deer; yards typically represent 10-15% of an areas summer range.	White-tailed Deer	Note: OMNRF to determine this habitat. Ecological Land Classification Community Series providing a thermal cover component for a deer yard would include; FOM, FOC, SWM and SWC. Or these Ecological Land Classification Ecosites; CUP2 CUP3 FOD3 CUT	- Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20 cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30 cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. - The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%. - OMNRF determines deer yards following methods outlined in “Selected Wildlife and Habitat Features: Inventory Manual” - Woodlots with high densities of deer due to artificial feeding are not significant.	No Studies Required: - Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as Significant Wildlife Habitat. Ivi, Iv, Ivi, lix, lx, - Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO). - Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations. - If a Significant Wildlife Habitat is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. - Significant Wildlife HabitatMiST Index #2 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Ministry of Natural Resources and Forestry identified deer yarding areas are absent from the Study Area.	No; Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Found Within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Deer Winter Congregation Areas <u>Rationale:</u> Deer movement during winter in the southern areas of Ecoregion 6E 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 .	White-tailed Deer	All Forested Ecosites with these Ecological Land Classification Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	- Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. - Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. - If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. - 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. - Woodlots with high densities of deer due to artificial feeding are not significant. <u>Information Sources</u> - MNRF District Offices. - LIO/NRVIS	Studies confirm: - Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF. - 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, ground or road surveys. or a pellet count deer density survey. - If a Significant Wildlife Habitat is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. - Significant Wildlife Habitat MiST Index #2 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Ministry of Natural Resources and Forestry identified deer winter congregation areas are absent from the Study Area.	No; Candidate habitat was not identified.

Table 1.2.1 Rare Vegetation Communities.

Rare Vegetation Community	Candidate Significant Wildlife Habitat			Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
	Ecological Land Classification 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 Ecological Land Classification Ecosite within Community Series: TAO TAS TAT CLO CLS 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. <u>Information Sources</u> - The Niagara Escarpment Commission has detailed information on location of these habitats. - OMNRF District - Natural Heritage Information Center (NHIC) has location information available on their website - Field Naturalist clubs - Conservation Authorities	- Confirm any Ecological Land Classification Vegetation Type for Cliffs or Talus Slopes - Significant Wildlife HabitatMiST Index #21 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Cliff or talus slope ecosites are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Cliffs and talus slope ecosites were not observed within the Study Area during Ecological Land Classification field investigations.
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	Ecological Land Classification 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. <u>Information Sources</u> - OMNRF Districts. - Natural Heritage Information Center (NHIC) has location information available on their website. - Field Naturalist clubs - Conservation Authorities	- Confirm any Ecological Land Classification Vegetation Type for Sand Barrens - Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). - Significant Wildlife HabitatMiST Index #20 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Sand barren ecosites are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Sand barren ecosites were not observed within the Study Area during Ecological Land Classification field investigations.
Alvar Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregions 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 Five Alvar Indicator Species: 1) <i>Carex crawei</i> 2) <i>Panicum philadelphicum</i> 3) <i>Eleocharis compressa</i> 4) <i>Scutellaria parvula</i> 5) <i>Trichostema brachiatum</i> These indicator species are very specific to Alvars within Ecoregion 6E	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 of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover li.	An Alvar site > 0.5 ha in size <u>Information Sources</u> - Alvars of Ontario (2000), Federation of Ontario Naturalists. - Ontario Nature – Conserving Great Lakes Alvars. - Natural Heritage Information Center (NHIC) has location information available on their website - OMNRF Districts - Feld Naturalist clubs. - Conservation Authorities.	- Field studies that identify four of the five Alvar Indicator Species at a Candidate Alvar site is Significant. - Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). - The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses l - Significant Wildlife HabitatMiST Index #17 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Alvar ecosites are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Alvar ecosites were not observed within the Study Area during Ecological Land Classification field investigations.
Old Growth Forest Rationale: Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	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 a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest.. <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 are >140 years old, then the area containing these trees is Significant Wildlife Habitat - The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) - The area of forest ecosites combined or an eco-element within an ecosite that contains the old growth characteristics is the Significant Wildlife Habitat.	No; Candidate Habitat is not present within the Study Area. Old growth forests are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Forested communities are present (e.g., swamp) within the Study Area however, dominate trees species were not >140 years.

Rare Vegetation Community	Candidate Significant Wildlife Habitat			Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
	Ecological Land Classification Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
				- Determine Ecological Land Classification vegetation types for the forest area containing the old growth characteristics i - Significant Wildlife HabitatMiST Index #23 provides development effects and mitigation measures.		
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%.lx, lxxx, lx, lx, lxi	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 Significant Wildlife Habitat. <u>Information Sources</u> - Natural Heritage Information Center (NHIC) has location information available on their website - OMNRF Districts - Feld Naturalist clubs. - Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in Appendix N should be present.. Note: Savannah plant spp. list from Ecoregion 6E should be used . - Area of the Ecological Land Classification Ecosite is the Significant Wildlife Habitat. - Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). - Significant Wildlife HabitatMiSTIndex #18 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Savannah ecosites are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Savannah ecosites were not observed within the Study Area during Ecological Land Classification field investigations.
Tallgrass Prairie <u>Rationale:</u> Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. lx, lxxx, lx, lx, lxi	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 Significant Wildlife Habitat. <u>Information Sources</u> - Natural Heritage Information Center (NHIC) has location information available on their website - OMNRF Districts - Feld Naturalist clubs. - Conservation Authorities.	Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present.. Note: Prairie plant spp. list from Ecoregion 6E should be used - Area of the Ecological Land Classification Ecosite is the Significant Wildlife Habitat. - Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). - Significant Wildlife HabitatMiST Index #19 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Tallgrass prairie ecosites are not anticipated to be present within the Study Area.	No; Candidate habitat was not identified. Tallgrass prairie ecosites were not observed within the Study Area during Ecological Land Classification field investigations.
Other Rare Vegetation Communities <u>Rationale:</u> 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 Significant Wildlife HabitatTG . Any Ecological Land Classification Ecosite Code that has a possible Ecological Land Classification Vegetation Type that is Provincially Rare is Candidate Significant Wildlife Habitat.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	Ecological Land Classification Ecosite codes that have the potential to be a rare Ecological Land Classification Vegetation Type as outlined in appendix M The OMNRF/NHIC will have up to date listing for rare vegetation communities. <u>Information Sources</u> - Natural Heritage Information Center (NHIC) has location information available on their website - OMNRF Districts - Feld Naturalist clubs. - Conservation Authorities.	Field studies should confirm if an Ecological Land Classification Vegetation Type is a rare vegetation community based on listing within Appendix M of Significant Wildlife HabitatTG . - Area of the Ecological Land Classification Vegetation Type polygon is the Significant Wildlife Habitat. - Significant Wildlife HabitatMiST Index #37 provides development effects and mitigation measures.	Yes; Rare vegetation communities may be present.	No; No rare vegetation communities were identified within the Study Area during Ecological Land Classification field investigations.

Table 1.2.2 Specialized Habitats of Wildlife considered Significant Wildlife Habitat.

Specialized Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl Nesting Area Rationale: 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 Ecological Land Classification Ecosites are Candidate Significant Wildlife Habitat: 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 from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any 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 . - Upland areas should be at least 120 m 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” - A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the Significant Wildlife Habitat, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. - Significant Wildlife Habitat MiST Index #25 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Wetlands do not meet size criteria	No; Candidate habitat was not identified.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat Rationale: Nest sites are fairly uncommon in Eco-region 6E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey Special Concern Bald Eagle	Ecological Land Classification 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 Significant Wildlife Habitat (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 represent all the habitat. - Nature Counts, Ontario Nest Records Scheme data. - OMNRF Districts. - Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented - Reports and other information available from Conservation Authorities. - Field Naturalists clubs	Studies confirm the use of these nests by: - One or more active Osprey or Bald Eagle nests in an area. - 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 Significant Wildlife Habitat. - For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the Significant Wildlife Habitat , maintaining undisturbed shorelines with large trees within this area is important.. - For a Bald Eagle the active nest and a 400-800 m radius around the nest is the Significant Wildlife Habitat. Area of the habitat from 400-800m is dependent 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. ccv - 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” - Significant Wildlife Habitat MiST Index #26 provides development effects and mitigation measures	No; Candidate Habitat is not present within the Study Area. No forested communities near large bodies of open water.	No; Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecological Land Classification Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Woodland Raptor Nesting Habitat <u>Rationale:</u> Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested Ecological Land Classification Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat. Interior habitat determined with a 200m buffer - Stick nests found in a variety of intermediate-aged to mature coniferous, 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 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. - Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha area of habitat is the Significant Wildlife Habitat. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) - Barred Owl – A 200m radius around the nest is the Significant Wildlife Habitat ccv. - Broad-winged Hawk and Coopers Hawk – A 100m radius around the nest is the Significant Wildlife Habitat ccv. - Sharp-Shinned Hawk – A 50m radius around the nest is the Significant Wildlife Habitat ccv. - 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. - Significant Wildlife Habitat MiST Index #27 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Forests communities are of insufficient size.	No; Candidate habitat was not identified.
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) or within the following Ecological Land Classification Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1	- 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 Significant Wildlife Habitat. - 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 Summary 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 Significant Wildlife Habitat. - 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 Significant Wildlife Habitat - Travel routes from wetland to nesting area are to be considered within the Significant Wildlife Habitat as part of the 30-100m area of habitat. - 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. - Significant Wildlife Habitat MiST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	Yes; Suitable nesting habitat in proximity to wetlands may be present within Study Area.	Candidate; Suitable exposed areas with sandy and gravel substrates were identified on the edges of the Reed-canary Grass Mineral Meadow Marsh (M A M 2 -2). Suitable nesting areas of exposed soils were also noted in Dry-Moist Old Field Meadow (C U M 1 - 1).
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 , . - Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species <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 Significant Wildlife Habitat. - The area of an Ecological Land Classification forest ecosite or an Ecoelement within ecosite containing the seeps/springs is the Significant Wildlife Habitat. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat. - Significant Wildlife Habitat MiST Index #30 provides development effects and mitigation measures	No; Candidate Habitat is not present within the Study Area. No seeps/springs or groundwater indicator vegetation species (i.e. Skunk-cabbage) were observed within the Study Area.	No; Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecological Land Classification 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 Ecological Land Classification 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) >500m2 (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size). 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 <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 District. • OMNRF 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 newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (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 woodland area li, lxv, l, I, li, lxix, lxx, l. 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. • Significant Wildlife Habitat MiST Index #14 provides development effects and mitigation measures.	Yes; Forest communities are present within the Study Area.	Candidate; Suitable vernal pools may be present within the Study Area however, seasonally appropriate surveys were not completed to determine presence/absence. Surveys by Natural Resource Solutions Inc. in 2019, documented Spring Peeper and Gray Treefrog with Call Level Codes of 3 nearby the Study Area (Natural Resource Solutions Inc. 2021).
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	Ecological Land Classification 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) ccv), 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 . • 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) 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 Ecological Land Classification ecosite wetland area and the shoreline are the Significant Wildlife Habitat. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a Significant Wildlife Habitat is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • Significant Wildlife Habitat MiST Index #15 provides development effects and mitigation measures.	Yes; Qualifying vegetation communities were identified within the Study Area.	Candidate; Suitable Ecological Land Classification communities present to support amphibian breeding. While Natural Resource Solutions Inc. completed anuran call surveys near the Study Area, targeted salamander surveys were not conducted.
Woodland Area-Sensitive Bird Breeding Habitat <u>Rationale:</u> 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 Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these Ecological Land Classification 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. • Interior forest habitat is at least 200 m from forest edge habitat. <u>Information Sources</u> • Local bird 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 Warblers is to be considered Significant Wildlife Habitat. • 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” • Significant Wildlife Habitat MiST Index #34 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. No forested communities meet size criteria.	No; Candidate habitat was not identified.

Table 1.3. Habitats of Species of Conservation Concern considered Significant Wildlife Habitat.

Wildlife	Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecological Land Classification Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
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 Sandhill Crane 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. - 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. <u>Information Sources</u> - OMNRF District and wetland evaluations. - Field Naturalist clubs - Natural Heritage Information Center (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 1 pair of Sandhill Cranes; or breeding by any combination of 5 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 Significant Wildlife Habitat.. - Area of the Ecological Land Classification ecosite is the Significant Wildlife Habitat. - 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” - Significant Wildlife Habitat MiST Index #35 provides development effects and mitigation measures	Yes; Qualifying vegetation communities were identified within the Study Area.	Candidate; Suitable wetland communities are present. Targeted surveys were not completed along Provincially Significant Wetland in the south portion of the Study Area.
Open Country Bird Breeding Habitat Rationale: 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 - 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. <u>Information Sources</u> - Agricultural land classification maps, Ministry of Agriculture. - Local bird clubs. - Ontario Breeding Bird Atlas - 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 Significant Wildlife Habitat. - The area of Significant Wildlife Habitat is the contiguous Ecological Land Classification 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” - Significant Wildlife Habitat MiST Index #32 provides development effects and mitigation measures	No; Candidate Habitat is not present within the Study Area. No meadow communities meet size criteria.	No; Candidate habitat was not identified.
Shrub/Early Successional Bird Breeding Habitat Rationale: 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 .	<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 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 . - Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. <u>Information Sources</u> - Agricultural land classification maps, Ministry of Agriculture. - Local bird clubs. - Ontario Breeding Bird Atlas - Reports and other information available from Conservation Authorities.	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 Significant Wildlife Habitat is the contiguous Ecological Land Classification 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 - Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” - Significant Wildlife Habitat MiST Index #33 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. Communities do not meet size criteria.	No; Candidate habitat was not identified.

Wildlife	Species	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecological Land Classification Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
Terrestrial Crayfish <u>Rationale:</u> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. cc	Chimney or Digger Crayfish; (<i>Fallicambarus fodiens</i>) Devil Crayfish or Meadow Crayfish; (<i>Cambarus diogenes</i>)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.	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 - Area of Ecological Land Classification ecosite or an Ecoelement area of meadow marsh or swamp within the larger ecosite area is the Significant Wildlife Habitat. - 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 - Significant Wildlife Habitat MiST Index #36 provides development effects and mitigation measures.	Yes; Qualifying vegetation communities were identified within the Study Area.	Confirmed; Approximately 50 burrows were observed within the Reed- canary Mineral Meadow Marsh (M A M 2 – 2) community.
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.	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 Ecological Land Classification Ecosites li <u>Information Sources</u> - 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 Ecological Land Classification scale that protects the habitat form and function is the Significant Wildlife Habitat; 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. - Significant Wildlife Habitat MiST Index #37 provides development effects and mitigation measures.	Yes; There are records of Special Concern and rare species within or in the vicinity of the Study Area.	Candidate habitat identified for: - Eastern Wood-pewee (<i>Contopus virens</i>); - Monarch (<i>Danaus plexippus</i>); - and, - Western Chorus Frog (<i>Pseudacris triseriata</i>) Confirmed habitat identified for: - Terrestrial Crayfish - Snapping Turtle

Table 1.4 Animal Movement Corridors

Habitat	SPECIES	Candidate Significant Wildlife Habitat		Confirmed Significant Wildlife Habitat	Candidate Habitat Present Within the Study Area	Confirmed Habitat Present within the Study Area
		Ecological Land Classification Eco-sites	Habitat Criteria and Information Sources	Defining Criteria		
Amphibian Movement Corridors Rationale: 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 Movement corridors must be determined when Amphibian breeding habitat is confirmed as Significant Wildlife Habitat from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule.. <u>Information Sources</u> - MNR District Office. - Natural Heritage Information Center (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 - Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m.. - Shorter corridors are more significant than longer corridors; however amphibians must be able to get to and from their summer and breeding habitat . - Significant Wildlife Habitat MiST Index #40 provides development effects and mitigation measures	Yes; Qualifying vegetation communities were identified within the Study Area.	Candidate; Candidate amphibian breeding Significant Wildlife Habitat was identified as present within the Study Area. Movement corridors may be present along the watercourses within the Study Area.
Deer Movement Corridors Rationale: Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as Significant Wildlife Habitat from Table 1.1 of this schedule. - A deer wintering habitat identified by the OMNR as Significant Wildlife Habitat in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion - Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> - MNR District Office. - Natural Heritage Information Center (NHIC). - Reports and other information available from Conservation Authorities. - Field Naturalist Clubs.	- Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. - Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas. - Corridors should be at least 200m wide with gaps < 20m and if following riparian area with at least 15m of vegetation on both sides of waterway. - Shorter corridors are more significant than longer corridors, . - Significant Wildlife Habitat MiST Index #39 provides development effects and mitigation measures	No; Candidate Habitat is not present within the Study Area. Ministry of Natural Resources and Forestry Deer wintering habitat is absent from the Study Area.	No; Candidate habitat was not identified.

Table 1.5.1 Significant Wildlife Habitat Exceptions for Ecodistricts within EcoRegion 6E

EcoDistrict	Wildlife Habitat and Species	Candidate Significant Wildlife Habitat			Confirmed Significant Wildlife Habitat	Candidate Habitat within the Study Area	Confirmed Habitat within the Study Area
		Ecosites	Habitat Description	Habitat Criteria and Information	Defining Criteria		
6E-14 <u>Rationale:</u> The Bruce Peninsula has an isolated and distinct population of black bears. Maintenance of large woodland tracts with mast-producing tree species is important for bears. ,	Mast Producing Areas Black Bear	All Forested habitat represented by Ecological Land Classification Community Series: FOM FOD	- Black bears require forested habitat that provides cover, winter hibernation sites, and mast-producing tree species. - Forested habitats need to be large enough to provide cover and protection for black bears.	Woodland ecosites >30ha with mast-producing tree species, either soft (cherry) or hard (oak and beech), <u>Information Sources</u> Important forest habitat for black bears may be identified by OMNRF.	All woodlands > 30ha with a 50%composition of these Ecological Land Classification Vegetation Types are considered significant: FOM1-1 FOM2-1 FOM3-1 FOD1-1 FOD1-2 FOD2-1 FOD2-2 FOD2-3 FOD2-4 FOD4-1 FOD5-2 FOD5-3 FOD5-7 FOD6-5 Significant Wildlife HabitatMiST Index #3 provides development effects and mitigation measures.	No; Candidate Habitat is not present within the Study Area. The Study Area is not within Eco-district 6 E – 1 4	No; Candidate habitat was not identified.
6E- 17 <u>Rationale:</u> Sharp-tailed grouse only occur on Manitoulin Island in Eco-region 6E, Leks are an important habitat to maintain their population	Lek Sharp-tailed Grouse	CUM CUS CUT	- The lek or dancing ground consists of bare, grassy or sparse shrubland. There is often a hill or rise in topography. - Leks are typically a grassy field/meadow >15ha with adjacent shrublands and >30ha with adjacent deciduous woodland. Conifer trees within 500m are not tolerated.	Grasslands (field/meadow) are to be >15ha when adjacent to shrubland and >30ha when adjacent to deciduous woodland - Grasslands are to be undisturbed with low intensities of agriculture (light grazing or late haying) - Leks will be used annually if not destroyed by cultivation or invasion by woody plants or tree planting <u>Information Sources</u> - OMNRF district office - Bird watching clubs - Local landowners - Ontario Breeding Bird Atlas	Studies confirming lek habitat are to be completed from late March to June. - Any site confirmed with sharp-tailed grouse courtship activities is considered significant - The field/meadow Ecological Land Classification ecosites plus a 200 m radius area with shrub or deciduous woodland is the lek habitat - Significant Wildlife HabitatMiST Index #32 provides development effects and mitigation measures	No; Candidate Habitat is not present within the Study Area. The Study Area is not within Eco-district 6 E – 1 7	No; Candidate habitat was not identified.

Appendix **H**

Species at Risk and Species of Conservation Concern Screening

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Associated ELC Communities	Known Species Range ^{1, 2}	Source Identifying Species Record	Species Probability of Occurrence with the Study Area	SAR/ SOCC
Birds	Acadian Flycatcher <i>Empidonax virescens</i>	END	END Schedule 1	END	It is typically found in mature, shady forests with ravines, or in forested swamps with lots of maple and beech trees. The nest is placed near the tip of a lower limb on a tree, and is loosely woven, with strands of plant material hanging down. In Canada, the Acadian Flycatcher nests only in southwestern Ontario, mostly in large forests and forested ravines near the shore of Lake Erie. The Acadian Flycatcher requires large areas of mature undisturbed forest. Most individuals occur in forests more than 40 hectares in size. The species is also considered to be a forest interior species, meaning that it avoids forest edges and build their nests in areas that are more than 100 meters from the forest edge. The bird lives in the understory of woods with a closed canopy. It is often found in well-wooded swamps and ravines. Acadian Flycatchers also occupy dry woods but they usually prefer to hang their nests over water. Prior to the 1800's, the Carolinian area of Ontario would have had abundant suitable habitat for this species. Currently, very little of the forest remains and the remnants are highly fragmented. Throughout the Carolinian Forest region of Ontario, most of the remaining forest patches are very small (less than three hectares) and only an extremely small percentage of them is large enough to meet the species' requirements.	SWD, FOD communities that are mature, have a closed canopy, and are of sufficient size.	In Ontario, the Acadian Flycatcher primarily lives in the warmer climate of southern Ontario's Carolinian forests. It needs large, undisturbed forests, often more than 40 hectares in size. It has also been known to nest at a few sites in the Greater Toronto Area but this is unusual. In Canada, the Acadian Flycatcher occurs in very low numbers in the Carolinian area of southern Ontario. The species is thought to have been more widespread and numerous in Canada prior to the clearing of forests in the early 1800s. Today, there is relatively little habitat remaining that is suitable for the species.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SAR
Birds	Bank Swallow <i>Riparia riparia</i>	THR	THR Schedule 1	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 r	Not Applicable. Associated with bare cliffs in silt and sand.	The bank Swallow is found all across southern Ontario, with sparser populations scattered across northern Ontario. The largest populations are found along the Lake Erie and Lake Ontario shorelines, and the Saugeen River (which flows into Lake Huron).	OBBA	Low Probability - no suitable habitat present within the Study Area.	SAR
Birds	Barn Swallow <i>Hirundo rustica</i>	SC	THR Schedule 1	THR	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges, and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces. 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.	TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1 ; containing or adjacent structures that are suitable for nesting.	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.	OBBA	Low Probability - buildings may be suitable in the larger Study Area however, no suitable nesting habitat present within the Project Limits.	SAR
Birds	Bobolink <i>Dolichonyx oryzivorus</i>	THR	THR Schedule 1	THR	Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses. Both parents usually tend to their young, sometimes with a third Bobolink helping. 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.	NHIC, OBBA	Low Probability - meadow communities are present but are of insufficient size. No suitable habitat present within the Study Area.	SAR

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Associated ELC Communities	Known Species Range ^{1, 2}	Source Identifying Species Record	Species Probability of Occurrence with the Study Area	SAR/ SOCC
Birds	Cerulean Warbler <i>Setophaga cerulea</i>	THR	END Schedule 1	END	Cerulean Warblers spend their summers (breeding seasons) in mature, deciduous forests with large, tall trees and an open understory. They are found in both wet bottomland forests and upland areas. At a finer spatial scale, canopy configuration (e.g., foliage stratification, gap distribution, tree species distribution) are predictors of habitat suitability.	FOD and SWD that are mature and contain an open understory.	The Cerulean Warbler's breeding range extends from extreme southwestern Quebec and southern Ontario west to Minnesota and Nebraska and south to Texas and other Gulf states across to North Carolina. In southern Ontario, populations appear to be separated into two distinct bands: one from southern Lake Huron to western Lake Ontario, and further north, the other from the Bruce Peninsula and Georgian Bay area to the Ottawa River. This species breeds in the deciduous forests of eastern North America but has a patchy distribution. The Canadian breeding range consists of two main geographic clusters in southwestern and southeastern Ontario, plus a small number of breeding individuals in southwestern Quebec.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SAR
Birds	Chimney Swift <i>Chaetura pelagica</i>	THR	THR Schedule 1	THR	Before European settlement, Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. However, due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. 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. It is likely that a small portion of the population continues to use hollow trees. They also tend to stay close to water as this is where the flying insects they eat congregate. The Chimney Swift spends the major part of the day in flight feeding on insects. In the northern part of the breeding range, the Chimney Swift favours sites where the ambient temperature is relatively stable.	TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1 containing or adjacent structures with suitable nesting habitat (i.e. chimneys).	The 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. The Chimney Swift breeds mainly in eastern North America, from southern Canada down to Texas and Florida. The species breeds in east central Saskatchewan, southern Manitoba, southern Ontario, southern Quebec, New Brunswick, Nova Scotia, and possibly in Prince Edward Island and southwestern Newfoundland.	OBBA	Low Probability - buildings with chimneys may be suitable in the larger Study Area however, no suitable nesting habitat present within the Project Limits.	SAR
Birds	Eastern Meadowlark <i>Sturnella magna</i>	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.	TPO, TPS, CUM1, CUS, and MAM2 with elevated song perches.	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.	NHIC, OBBA	Low Probability - meadow communities are present but are of insufficient size. No suitable habitat present within the Study Area.	SAR
Birds	Least Bittern <i>Ixobrychus exilis</i>	THR	THR Schedule 1	THR	In Ontario, the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. This bird builds its nest above the marsh water in stands of dense vegetation, hidden among the cattails. The nests are almost always built near open water, which is needed for foraging. This species eats mostly frogs, small fish, and aquatic insects. The Least Bittern breeds strictly in marshes dominated by emergent vegetation surrounded by areas of open water. Most breeding grounds in Canada are dominated by cattails, but breeding also occurs in areas with other robust emergent plants and in shrubby swamps. The presence of stands of dense vegetation is essential for nesting because the nests of Least Bittern sit on platforms of stiff stems. The nests are almost always within 10 m of open water. Open water is also needed for foraging, because Least Bitterns forage by ambushing their prey in shallow water near marsh edges, often from platforms that they construct out of bent vegetation. Access to clear water is essential for the birds to see their prey. This small heron prefers large marshes that have relatively stable water levels throughout the nesting period. Adults can raise nests somewhat to deal with rising waters, but persistent or sudden increases will flood nests. Conversely, drops in water level can reduce foraging opportunities and increase the species' exposure to predators. Needs for wintering habitat are less specific, and appear to be met by a wide variety of wetlands—not only emergent marshes like those used for breeding, but also brackish and saline swamps. Habitat use during migration is poorly known, but presumably is similar to breeding and wintering habitat.	MAS2-1, MAS3-1, SA and OAO .	In Ontario, the Least Bittern is mostly found south of the Canadian Shield, especially in the central and eastern part of the province. Small numbers also breed occasionally in northwest Ontario. This species has disappeared from much of its former range, especially in southwestern Ontario, where wetland loss has been most severe. The Least Bittern breeds from southern Canada to South America. In Canada, the Least Bittern has been observed in every province, but most individuals occur in Ontario. The species breeds primarily in southern Ontario.	OBBA	Medium Probablility - the large Cattail Organic Shallow Marsh (MAS3-1) possessed dense stands of vegetation as well as interspersed shallow aquatic communities.	SAR

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Associated ELC Communities	Known Species Range ^{1, 2}	Source Identifying Species Record	Species Probability of Occurrence with the Study Area	SAR/ SOCC
Birds	Red-headed Woodpecker <i>Melanerpes erythrocephalus</i>	END	THR Schedule 1	END	The Red-headed Woodpecker lives in open woodland and woodland edges, and is often found in parks, golf courses, and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching. A few of these birds will stay the winter in woodlands in southern Ontario if there are adequate supplies of nuts. The Red-headed Woodpecker is found in a variety of habitats, including oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, beaver ponds, and burns.	TPS, TPW, CUW, FOD1, FOD2, FOD4-1, FOD6, FOD7, and FOD9 that are open and have an abundance of dead trees.	The Red-headed Woodpecker is found across southern Ontario, where it is widespread but rare. In Canada, its range includes southern Saskatchewan, Manitoba, Ontario, and Quebec.	OBBA	Moderate Probability - suitable habitat for nesting was identified within the Mineral Cultural Woodland within the	SAR
Birds	Louisiana Waterthrush <i>Parkesia motacilla</i>	THR	THR Schedule 1	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 Probability - no suitable habitat present within the study area.	SAR
Birds	Yellow-breasted Chat <i>Icteria virens</i> Yellow-breasted Chat (virens subspecies) <i>Icteria virens virens</i>	END	END Schedule 1	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 Probability - Study Area is outside of range. Species occurrence is rare in the Study Area.	SAR
Mammals	Eastern Small-footed Myotis (Eastern Small-footed Bat) <i>Myotis leibii</i>	END	N/A	N/A	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	Moderate Probability - forested and wooded communities may provide suitable roost habitat.	SAR
Mammals	Little Brown Myotis (Little Brown Bat) <i>Myotis lucifugus</i>	END	END Schedule 1	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. Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies, often in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.		The Little Brown Bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. In Canada, <i>Myotis lucifugus</i> occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories and Yukon.	BCI	Moderate Probability - forested and wooded communities may provide suitable roost habitat.	SAR

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Associated ELC Communities	Known Species Range ^{1, 2}	Source Identifying Species Record	Species Probability of Occurrence with the Study Area	SAR/ SOCC
Mammals	Northern Myotis (Northern Long-eared Bat) <i>Myotis septentrionalis</i>	END	END Schedule 1	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. The Northern Long-eared Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs along waterways, forest edges, and in gaps in the forest. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.	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. In Canada, <i>Myotis septentrionalis</i> occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories, and Yukon.	BCI	Moderate Probability - forested and wooded communities may provide suitable roost habitat.	SAR
Mammals	Tri-colored Bat <i>Perimyotis subflavus</i>	END	END Schedule 1	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group. The Tri-colored Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.	FOC, FOM, FOD, SWC, SWM, and SWD where suitable roosting (i.e. cavity trees and trees with loose bark) habitat is available.	This bat is found in southern Ontario and as far north as Espanola near Sudbury. Because it is very rare, it has a scattered distribution. It is also found from eastern North America down to Central America. In Canada, <i>Perimyotis subflavus</i> occurs in Nova Scotia, New Brunswick, Quebec, and Ontario.	BCI	Moderate Probability - forested and wooded communities may provide suitable roost habitat.	SAR
Plants	<i>Black Ash</i> <i>Fraxinus nigra</i>	END	N/A	THR	Black Ash is a medium-sized, shade-intolerant hardwood tree species that occurs on moist to wet sites such as swamps, bogs, and riparian areas. Like other Ash (<i>Fraxinus</i>) species, black ash has wind-dispersed pollen and seeds and regenerates readily from seed and via stump sprouting	SWD, SWM, SWC	Black Ash occurs from western Newfoundland to southeastern Manitoba and North Dakota, ranging southward to Iowa, Illinois, Virginia and Delaware. Black Ash's range extends farther north than any other ash and approximately 51% of the species' global range is within Canada. Black Ash occurs throughout most of Ontario, except the Far North, ranging from southern Ontario east to the Quebec border, west to the Manitoba border and north to approximately 51° latitude.	NHIC	Low Probability - this species was not observed during field investigations.	SAR
Plants	<i>Butternut</i> <i>Juglans cinerea</i>	END	END Schedule 1	END	Butternut occurs primarily in neutral to calcareous soils of pH 5.5 to 8, often in regions with underlying limestone, and is generally absent from acidic regions. It tends to reach greatest abundance in rich well-drained mesic loams in floodplains, streambanks, terraces and ravine slopes, but can occur in a wide range of other situations. In closed-canopy stands, it must be in the overstory to thrive. Seedling establishment, growth and survival to maturity are most frequent in stand openings, riparian zones and forest edges.	Not Applicable.	Butternut's native Canadian range is restricted to southern Ontario and Quebec (primarily south of the area bounded by Georgian Bay, the Ottawa Valley and the Quebec City region), and western and southern portions of New Brunswick. Population size is not well documented. Remaining occurrences are still very incompletely documented and it is unclear how many of the 863 occurrences compiled by Canadian conservation data centres are still extant. Experts estimate that from tens of thousands to 100,000+ live trees remain in Ontario and Quebec and thousands to 10,000+ are in New Brunswick, but numbers are declining rapidly.	NHIC, iNaturalist	Low Probability - this species was not observed during field investigations.	SAR

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Associated ELC Communities	Known Species Range ^{1, 2}	Source Identifying Species Record	Species Probability of Occurrence with the Study Area	SAR/ SOCC
Amphibians	Western Chorus Frog (Great Lakes / St. Lawrence - Canadian Shield population) <i>Pseudacris triseriata</i>	No Status	THR Schedule 1	THR	The Western Chorus Frog is primarily a lowland terrestrial species. In marshes or wooded wetland areas, it is found on the ground or in low shrubs and grass. It is a poor climber. Like all other frogs, the Western Chorus Frog requires both terrestrial and aquatic habitats in close proximity. For breeding and tadpole development, it requires seasonally dry temporary ponds devoid of predators, particularly fish. The Western Chorus Frog is very rarely found in permanent ponds. Although it uses aquatic habitat during the breeding season, the Western Chorus Frog is a poor swimmer. The species hibernates in its terrestrial habitat, under rocks, dead trees, or leaves, or in loose soil or animal burrows, even though these sites are sometimes flooded.		In Canada, the Western Chorus Frog is found in southern Ontario and southwestern Quebec. In southern Ontario, its range is bounded by the United States border in the south, Georgian Bay in the northwest, and south of Algonquin Park and up the Ottawa River valley to the vicinity of Eganville in the east. There are approximately 100 locations, divided into two distinct populations: the Carolinian population (southwestern Ontario) and the Great Lakes/St. Lawrence–Canadian Shield population (other regions of Ontario and Quebec).	ORAA (2010)	Moderate Probability - wetlands in vicinity to terrestrial habitat may provide suitable habitat.	SOCC
Birds	Bald Eagle <i>Haliaeetus leucocephalus</i>	SC	No Status	Not at Risk	Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. While fish are their main source of food, Bald Eagles can easily catch prey up to the size of ducks, and frequently feed on dead animals, including White-tailed Deer. They usually nest in large trees such as pine and poplar. During the winter, Bald Eagles sometimes congregate near open water such as the St. Lawrence River, or in places with a high deer population where carcasses might be found.	FOC, FOM, FOD, SWC, SWM and SWD . Nests typically located near major bodies of water.	In Ontario, they nest throughout the north, with the highest density in the northwest near Lake of the Woods. Historically they were also relatively common in southern Ontario, especially along the shore of Lake Erie, but this population was all but wiped out 50 years ago. After an intensive re-introduction program and environmental clean-up efforts, the species has rebounded and can once again be seen in much of its former southern Ontario range.	OBBA, iNaturalist (2020)	Low Probability - no suitable habitat present within the Study Area.	SOCC
Birds	Black Tern <i>Chlidonias niger</i>	SC	No Status	Not at Risk	Black Terns build floating nests in loose colonies in shallow marshes, especially in cattails.	MAS2-1 and OA0 . These two communities must be present immediately adjacent each other and with sufficient water to provide suitable nesting habitat.	The Black Tern breeds in the temperate regions of Europe, and in North America where it ranges from northern British Columbia and Alberta south to Arizona and Kansas and east to New Brunswick. In Ontario, Black Terns are found scattered throughout the province, but breed mainly in the marshes along the edges of the Great Lakes.	ORAA	Low Probability - no suitable habitat present within the Study Area.	SOCC
Birds	Common Nighthawk <i>Chordeiles minor</i>	SC	THR Schedule 1	SC	Traditional Common Nighthawk habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings, and along gravel roads and railways, they tend to occupy natural sites. The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, rocky outcrops, grasslands, pastures, marshes, and river banks. This species also inhabits mixed and coniferous forests. The Common Nighthawk probably benefited from the newly-opened habitats created by the massive deforestation associated with the arrival of European settlers in eastern Canada and United States. The appearance of gravel roofs contributed to the expansion of the Common Nighthawk's habitat in North America.	SD, BB, RB, CUM, BO, FOM, FOC and FOD with openings with little vegetation.	The range of the Common Nighthawk spans most of North and Central America. In Canada, the species is found in all provinces and territories except Nunavut. In Ontario, the Common Nighthawk occurs throughout the province except for the coastal regions of James Bay and Hudson Bay.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC
Birds	Canada Warbler <i>Cardellina canadensis</i>	SC	THR Schedule 1	THR	The Canada Warbler breeds in a range of deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer. Dense shrub and understory vegetation help conceal Canada Warbler nests that are usually located on or near the ground on mossy logs or roots, along stream banks or on hummocks. It is also found in riparian shrub forests on slopes and in ravines and in old-growth forests with canopy openings and a high density of shrubs, as well as in stands regenerating after natural disturbances, such as forest fires, or anthropogenic disturbances, such as logging. Canada Warbler habitat is believed to be in decline, especially in South America, where the Canada Warbler overwinters. Habitat loss has also been observed in the eastern part of its breeding range, where wet forests have been drained for urban development or farming.	FOC3, FOC4, FOM6, FOM7, FOM8, FOD6, FOD7, FOD8, FOD9, SWC, SWM and SWD with a well-developed shrub layer.	The Canada Warbler only breeds in North America and 80% of its known breeding range is in Canada. Its primary breeding range is in the Boreal Shield, extending north into the Hudson Plains and south into the Mixedwood Plains. Although the Canada Warbler breeds at low densities across its range, in Ontario it is most abundant along the Southern Shield. The Canada Warbler breeds primarily across much of southeastern Canada, the northeastern United States, the Great Lakes region. In Canada, it breeds in all provinces and territories except Nunavut and Newfoundland and Labrador.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC

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Birds	Eastern Whip-poor-will Antrostomus vociferus	THR	THR Schedule 1	THR	The Eastern Whip-poor-will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands, or openings in more mature deciduous, coniferous, and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators. Whip-poor-will breeding habitat is not dependent upon species composition, but rather on forest structure, although common tree associations in both summer and winter are pine and oak. The species shuns both wide-open spaces and dense forest. It prefers to nest in semi-open forests or patchy forests with clearings, such as barrens or forests that are regenerating following major disturbances. Other necessary breeding habitat elements are thought to involve ground-level vegetation and woodland size. Individuals will often feed in nearby shrubby pastures or wetlands with perches. Areas with decreased light levels where forest canopies are closed are generally not occupied, perhaps because of reduced forage success for this aerial-feeding insectivore.	TPS, TPW, CUW, FOD, FOC and FOM where open areas are present.	The Eastern Whip-poor-will's breeding range includes two widely separate areas. It breeds throughout much of eastern North America, reaching as far north as southern Canada. In Ontario they breed as far north as the shore of Lake Superior. Although Eastern Whip-poor-wills were once widespread throughout the central Great Lakes region of Ontario, their distribution in this area is now fragmented.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC
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.	FOC, FOM, FOD, SWD, SWM and CUW.	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	Moderate Probability - forested and wooded communities may provide suitable habitat.	SOCC
Birds	<i>Evening Grosbeak</i> <i>Coccothraustes vespertinus</i>	SC	SC Schedule 1	SC	During the breeding season, the Evening Grosbeak is generally found in open, mature mixed-wood forests dominated by fir species, White Spruce, and/or Trembling Aspen. Its abundance is strongly linked to the cycle of its primary prey, the Spruce Budworm. Outside the breeding season, the species depends mostly on seed crops from tree species in the boreal forest, such as firs and spruces. It is also attracted to ornamental trees that have seeds or fruit, and may visit bird feeders.	FOC and FOM	The Evening Grosbeak is found in all Canadian provinces and territories except Nunavut. In Ontario, it breeds in coniferous forests across northern Ontario, as far south as southern Georgian Bay. Evening Grosbeak breeds in Canada, the United States, and Mexico. In winter, it is nomadic and can range widely, depending on the quantity of seeds produced in the boreal forest. Historically, this species was restricted to western North America, but expanded eastward in the late 19th and early 20th centuries.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC
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	Low Probability - no suitable habitat present within the Study Area.	SOCC

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Birds	<i>Grasshopper Sparrow</i> <i>Ammodramus</i> <i>savannarum</i> Grasshopper Sparrow (pratensis subspecies; Eastern Grasshopper Sparrow) <i>Ammodramus</i> <i>savannarum pratensis</i>	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 southeastern 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	Low Probability - meadow communities are present but are of insufficient size. No suitable habitat present within the Study Area.	SOCC
Birds	Peregrine Falcon Falco peregrinus Peregrine Falcon (anatum/tundrius) Falco peregrinus anatum/tundrius	SC	SC Schedule 1	Not At Risk	Peregrine Falcons usually nest on tall, steep cliff ledges close to large bodies of water. Although most people associate Peregrine Falcons with rugged wilderness, some of these birds have adapted well to city life. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas. Cities offer peregrines a good year-round supply of pigeons and starlings to feed on. The Peregrine Falcon is found in various types of habitats, from Arctic tundra to coastal areas and from prairies to urban centres. It usually nests alone on cliff ledges or crevices, preferably 50 to 200 m in height, but sometimes on the ledges of tall buildings or bridges, always near good foraging areas. Suitable nesting sites are usually dispersed, but can be common locally in some areas. The natural nesting habitat has not changed significantly since the population crash and is still largely available. In addition, structures built by humans in both rural and urban areas provide the Peregrine Falcon with other potential nesting sites. And though urbanization and other land uses have had a significant impact on some areas where they feed, Peregrine Falcons can usually modify their diet based on the prey species present in a given area.	CLO	The historic North American distribution of the eastern subspecies is east of the Rocky Mountains and south of the tree line. Although Peregrine Falcons now nest in and around Toronto and several other southern Ontario cities, the majority of Ontario's breeding population is found around Lake Superior in northwestern Ontario. The anatum Peregrine Falcon breeds in the interior of Alaska and throughout northern Canada up to southern Greenland, and across continental North America up to northern Mexico. In Canada it is found in all territories and provinces except Prince Edward Island, Nunavut, and the Island of Newfoundland. The tundrius Peregrine Falcon breeds in Alaska and throughout northern Canada up to Greenland. In Canada, it breeds from northern Yukon, the low Arctic islands, northern Northwest Territories, and northern Nunavut up to Baffin Island, Hudson Bay, Ungava, and northern Labrador.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC
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.	FOD and FOM that are greater than 1 ha in size.	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	Low Probability - NRSI (2022) idnetfied Wood Thrush in the large woodlands south of the Study Area however, forest communities within the Study Area arefragmented and do not meet size criteria.	SOCC
Birds	Olive-sided Flycatcher Contopus cooperi	SC	THR Schedule 1	SC	The Olive-sided Flycatcher is most often found along natural forest edges and openings. It will use forests that have been logged or burned if there are ample tall snags and trees to use for foraging perches. Olive-sided Flycatchers' breeding habitat usually consists of coniferous or mixed forest adjacent to rivers or wetlands. In Ontario, Olive-sided Flycatchers commonly nest in conifers such as White and Black Spruce, Jack Pine, and Balsam Fir. The Olive-sided Flycatcher is most often associated with open areas containing tall live trees or snags for perching. These vantage points are required for foraging. This species generally forages from a high, prominent perch from which it sallies forth to intercept flying insects and then returns to the same perch. Open areas may be forest clearings, forest edges located near natural openings (such as rivers or swamps) or human-made openings (such as logged areas), burned forest, or openings within old-growth forest stands; these forests are characterized by mature trees and large numbers of dead trees. There is evidence that the breeding success of birds nesting in harvested habitats is lower than the breeding success of birds nesting in natural openings. In the boreal forest, suitable habitat is more likely to be in or near wetland areas. Although the amount of old-growth forest obviously decreased during the 20th century, the amount of habitat attractive to Olive-sided Flycatchers may have remained more or less constant, since logging operations continue to create openings favoured by these birds. However, recent studies indicate that these sites are less suitable for breeding.	CUW , FOC , and FOM that contain White Spruce, Black Spruce, Jack Pine, or Balsam Fir and are adjacent open areas, rivers, or wetlands.	The Olive-sided Flycatcher has a broad breeding range across Canada and the western and northeastern United States. Just over half the range is found in Canada, where it breeds in every province and territory except Nunavut. In Ontario, it is widely distributed throughout the central and northern areas of the province.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC

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Birds	Short-eared Owl Asio flammeus	THR	SC Schedule 1	SC	The Short-eared Owl makes use of a wide variety of open habitats, including arctic tundra, grasslands, peat bogs, marshes, sand-sage concentrations, and old pastures. It also occasionally breeds in agricultural fields. Preferred nesting sites are dense grasslands, as well as tundra with areas of small willows. While the Short-eared Owl has a marked preference for open spaces, the main factor influencing the choice of its local habitat is believed to be the abundance of food, in both summer and winter. It nests on the ground and hunts for small mammals, especially voles. Suitable breeding, migration, and wintering habitat has declined significantly throughout the 20th century, resulting in a reduction in the number of owls. In North America, it breeds sporadically in arctic areas, coastal marshes, and interior grasslands, where voles and other small rodents proliferate.		The Short-eared Owl's North American range extends from the tundra south to the central United States. In Ontario, the species has a scattered distribution, found along the James Bay and Hudson Bay coastlines, along the Ottawa River in eastern Ontario, in the far west of the Rainy River District, and elsewhere in southern Ontario, at places such as Wolfe and Amherst Islands near Kingston. Most northern populations are migratory, moving southward in the winter. The Short-eared Owl breeds in all of Canada's provinces and territories. It generally heads southward in the winter and is found in open habitats along the extreme southern coast of British Columbia and in southern Ontario.	OBBA	Low Probability - no suitable habitat present within the Study Area.	SOCC
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.	AI, TP, and CUM where milkweed plants are present.	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.	OBA; iNaturalist (2021)	Moderate Probability - suitable meadows that contain milkween were observed within the Study Area.	SOCC

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Reptiles	<i>Snapping Turtle</i> <i>Chelydra serpentina</i>	SC	SC Schedule 1	SC	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.	OA, SA near gravelly or sandy areas.	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; iNaturalist (2022)	High Probability - species observed incidentally during field investigations. Species was was observed near the pond located southeast of Greenhouse Road and Victoria Street N. It was noted that suitable overwintering habitat and nesting habitat was observed nearby.	SOCC

Glossary

EXP	ESA - Extirpated - a species that no longer exists in the wild in Ontario but still occurs elsewhere. SARA - Extirpated - a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild.
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.
Schedule 2	Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3	Species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
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.

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