



Final

East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment

Environmental Impact Study

Prepared for:

Associated Engineering (Ont.) Ltd.
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NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

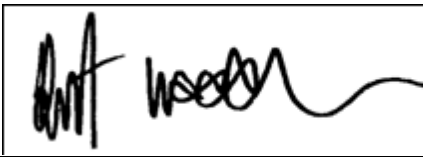
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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by Associated Engineering (Ont.) Ltd. in March 2023 to complete a natural heritage inventory and Environmental Impact Study (EIS) for the East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (EA).

Building on the approved 2018 East Side Lands Sanitary Servicing EA, as well as the recent Airport Master Plan (Region of Waterloo 2017) and other known development plans, the Woolwich Sanitary Servicing EA evaluated alternative solutions for the extension of sanitary servicing infrastructure that is required to support existing and future developments within the Township of Woolwich's portion of the East Side Lands. Specifically, suitable infrastructure is required to collect and convey flows from areas south of the future Hwy 7 corridor near the existing Breslau Community to the southwest limit of the Township of Woolwich at Fountain Street and Kossuth Road. From this point flows will be conveyed by sanitary servicing infrastructure that is being implemented by the Region of Waterloo and the City of Cambridge.

The focus of the Woolwich Sanitary Servicing EA study as a whole is to identify the future sanitary servicing infrastructure that will be required, with a focus on the alignment of the main trunk sewer(s) and location of a new pumping / lift station at the southwest limits, anticipated to be needed to service the Woolwich lands south of Menno Street. Furthermore, the EA identified the future sewer alignment(s) and potential additional pumping stations that may be required to service the lands north of Menno Street.

As part of Phase 2 of the Municipal Class EA planning and design process, this EIS contains the characterization of existing natural features based on the results of a background review and field surveys. The detailed characterization was used to inform an analysis of the significance and sensitivity of natural features, the identification of any natural feature constraints in association with land use policy designations, and the assessment of potential impacts and mitigation measures associated with details of the proposed development. Eleven alternative trunk alignments, each of which follow an existing road or a future (assumed) road alignment, were assessed by the Project Team to determine the preferred alternative in terms of the natural, social, cultural, technical and economic environment. The preferred design alternative was selected based on these criteria and the anticipated impacts of the preferred design alternative are discussed in this report as well as appropriate mitigations.

2.0 Project Scoping

The original scope of work focused on the preferred location and preliminary design of a sanitary lift/pumping station for the East Side Lands. The Township of Woolwich defined a smaller study area during the Request for Proposal requirements which is referred to as the “subject lands” in Map 1. However, early in the project, but after the completion of the 2023 field program, the project focus evolved to determine how to provide servicing to a broader study area through the alignment of a main trunk sewer and the location of pumping or lift stations (Map 1).

Study Area

The current EA study area focuses on the Township of Woolwich lands and includes the existing and expanding Breslau Community. The study area is bounded by the future Highway 7 to the north, Shantz Station Road to the east, the Grand River to the west and Kossuth Road to the south. Natural features identified within the study area include two Provincially Significant Wetland (PSW) complex's, Breslau and Kossuth respectively, unevaluated wetlands, Significant Woodlands, Randall Drain, multiple watercourses (Map 1).

2.1 Background Information

2.1.1 Collection and Review of Background Information

Existing natural heritage information was collected and reviewed to identify key natural heritage features, habitats and species that are reported from, or have the potential to occur within the subject lands. The following background information sources were reviewed to provide an accurate understanding of the physical and biological attributes within the subject lands:

- Land Information Ontario (LIO) (Government of Ontario 2015),
- Region of Waterloo Official Plan mapping (Region of Waterloo 2015),
- Grand River Conservation Network: Interactive Mapping Tool (GRCA 2015b),
- Region of Waterloo International Airport Master Plan (WSP & MMM Group 2017b),
- East Side Lands - Stage 2 - Master Environmental Servicing Plan & Secondary Plan Study (WSP & MMM Group 2016),
- Breslau Wetland Complex – Southern Ontario Wetland Evaluation, Data and Scoring Record (MNR 1993),
- Kossuth Wetland Complex Evaluation – Southern Ontario Wetland Evaluation, Data and Scoring Record (MNR 1995),

- Natural Heritage Information Center (NHIC) (MNRF 2014),
- SAR for the Region of Waterloo (MNRF 2018),
- Ontario Breeding Bird Atlas (BSC et al. 2008),
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019),
- Atlas of the Mammals of Ontario (Dobbyn 1994),
- Department of Fisheries and Oceans Canada (DFO) Aquatic SAR Mapping (2018)
- Ontario Butterfly Atlas (MacNaughton et al. 2019), and
- Ontario Odonata Atlas Database (2019).

The wildlife and insect atlases listed above provide data based on 10x10km survey squares. Information was compiled from the atlas square that overlaps the subject lands (squares 17NJ41, 17NJ51).

2.1.2 Significant Species Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (MECP 2023). These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern. Species listed as Endangered or Threatened are protected under the *Endangered Species Act* (ESA), which includes protection to their habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- Species designated provincially as Special Concern;
- Species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (MNRF 2023); and,
- Species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal *Species at Risk Act* (SARA) if they are listed as Threatened or Endangered on Schedule 1 of the SARA.

Habitat for SCC is considered Significant Wildlife Habitat (SWH) (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2020) and municipal natural heritage protection policies. For the purposes of this report, the term “SAR” will refer to

provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

Based on the initial species lists, a total of 30 SAR and 24 SCC were identified as having records from within the vicinity of the subject lands. Full SAR/SCC screening results are provided in Appendix I.

2.1.3 Significant Wildlife Habitat Screening

A screening exercise was completed to assess the presence of Significant Wildlife Habitat (SWH) within the subject lands. SWH is protected under the Ontario Provincial Policy Statement (PPS) (OMMAH 2020) and is described in the MNRF Significant Wildlife Habitat Technical Guide (SWHTG) (MNRF 2000) as being comprised of four major categories of habitat:

- Seasonal concentration areas;
- Rare vegetation communities and specialized wildlife habitat;
- Habitats of species of conservation concern; and
- Animal movement corridors.

Specific criteria defining wildlife habitat significance for Ecoregion 6E are described in the SWHTG Addendum (MNRF 2015). Individual SWH types within these four broad categories were assessed as either not present, candidate, or confirmed for the subject lands based on a comparison of significance criteria against information obtained from relevant background documents.

Based on the results of this preliminary screening exercise, 14 SWH types were considered to be candidate SWH for the subject lands. Detailed results of the SWH screening are provided in Appendix II.

2.2 Relevant Policies, Legislation and Planning Studies

Table 1. Relevant Polices, Legislation and Planning Studies

Policy/Legislation/Planning Study	Description	Project Relevance
<i>Environmental Assessment Act</i> , 1990	- The Environmental Assessment Act (EAA) was issued in 1990 and outlines a planning and decision-making process to evaluate the potential environmental impacts of a proposed undertaking. Proponents must document their planning and decision-making process and submit results from the environmental assessment to the Minister for approval. - The purpose of the EAA is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in Ontario.	- The Municipal Class Environmental Assessment guideline document provides municipalities with a planning and decision-making process that is approved under the EAA that outlines how to plan and undertake municipal projects that occur frequently, are limited in scale and have a predictable range of environmental impacts. - Schedule 'C' projects have the potential for significant adverse environmental impacts, and must proceed under the full planning and documentation procedures outlined in the Class EA guideline document. A Schedule 'C' project is required to complete an Environmental Study Report.
<i>Endangered Species Act</i> , 2007	- The original ESA, written in 1971, underwent a year-long review which resulted in a number of changes which came into force in 2007. - The ESA prohibits killing, harming, harassing or capturing Species at Risk and protects their habitats from damage and destruction.	Potential habitat for Endangered and Threatened Species within study area was observed for the following species: Eastern Meadowlark, Henslow's Sparrow, and Bank Swallow.
<i>Canadian Fisheries Act</i> (Government of Canada 2019)	- Manages threats to the sustainability and productivity of Canada's commercial, recreational and Aboriginal fisheries. - The Act prohibits "serious harm to fish" including destruction of habitat.	- Randall Drain, Breslau Drain and drainage features within the study area may contain seasonal fish habitat or contribute to downstream fish habitat. - If alteration or removal of direct or indirect fish habitat is proposed, the DFO must be consulted through their Request for Review process to determine if a permit under the <i>Fisheries Act</i> may be required.
Regional Municipality of Waterloo Official Plan (2015)	The Region of Waterloo Official Plan (2015) outlines current policies for the protection of natural features within the Region.	A number of Core Natural Heritage Features were identified within the subject lands as having potential implications under the Official Plan:

Policy/Legislation/Planning Study	Description	Project Relevance
	The Ministry of Municipal Affairs and Housing issued a Notice of Decision to approve the Official Plan, with modifications, on December 22, 2010. Several parties subsequently appealed the Ministry's decision to the Ontario Municipal Board for adjudication. The Municipal Board issued an Oral Decision to approve the Official Plan, in part, with further modifications, on June 18, 2015. As a result, the new Official Plan came into effect on June 18, 2015.	- Potentially Significant Habitat of Endangered and Threatened Species; - Provincially Significant Wetlands; - Environmentally Sensitive Policy Area; and - Significant Woodlands. - Potential Fish Habitat also has implications under the Official Plan.
<i>Conservation Authorities Act</i> (1990) Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits	This Minister's regulation replaced Ontario Regulation 150/06 (and all other individual conservation authority regulations) as of April 1, 2024.	- Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits - The Regulation Limit is considered to be 30m for wetlands and 15m for watercourses.
Township of Woolwich Official Plan (2012)	The Township's Official Plan provides direction on the protection of natural heritage features and functions through Section 13 of the plan. Policies in this section of the plan provide direction to support the identification and protection of a Natural Habitat Network (NHN). The policies and definitions for most features that comprise the NHN in the Plan are generally consistent with the Regional Official Plan.	- A number of natural features were identified within the subject lands as having potential implications under the Official Plan: - Provincially Significant Wetlands; - Potential Fish Habitat; - Significant Wildlife Habitat; - Significant Woodlands; and - Environmentally Sensitive Policy Area.

2.3 Net Developable Area

To inform the alternative trunk alignment solutions, a general Net Developable Area was defined within the study area by NRSI (Map 2). Net Developable Area was determined by subtracting the area of protected natural features and their setback distances through a desktop mapping exercise. Set-back distances were based on relevant policy and guideline documents (Natural Heritage Reference Manual (OMNR 2010); Greenlands Network Implementation Guideline, Guideline for Determining Buffers around Environmental Features (Region of Waterloo 2016) and the Region of Waterloo Official Plan (2015)). Below are the set-back distances for protected natural features as well as the criteria for adding features into the developable zone.

Wetlands

- Provincially Significant Wetlands (PSW): 30 m
- Evaluated Non-PSW Wetland: 15 m

As part of the constraints analysis, non-PSW wetlands were removed (added to developable area) if they were less than 0.5 ha and were not adjacent to PSW complexes.

Woodlands and Hedgerows

- Woodlands: 10 m

Woodlands are considered significant if they are greater than 4 ha, consist primarily of native species, and meet the regional definitions of a woodland. All other woodlands that are greater than 1 ha are protected under the Regional Woodland Conservation By-law. As part of the constraints analysis, woodland less than 1 ha and communities that would be classified as hedgerows were added to the developable area.

Watercourses and Waterbodies

- Waterbodies connected to watercourse features: 15 m
- Significant Watercourses (within Core Environmental Features and or provincial NHS): 30 m wide
- Permanent watercourses (not within Core Environmental Features and or provincial NHS): 15 m wide

As part of the constraints analysis, intermittent watercourses, and headwater drainage features (HDF's) not protected or within Core Environmental Features and or provincial NHS were added

to the developable area. These features would be subject to further studies and surveys to confirm removal or if functions are required to be replicated.

All watercourses and HDF's are regulated by the GRCA under Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits. Any future development, construction, reconstruction and /or site alteration within the regulated areas (regulation limit is 30m for wetlands and 15m for watercourses) will require the prior issuance of a permit under the *Conservation Authority Act*.

3.0 Field Methods

3.1 Terrestrial Field Surveys

Terrestrial field surveys were undertaken within the subject lands and areas north of the Waterloo Airport to characterize natural features and identify significant and sensitive natural heritage features and species that have potential to be adversely affected by the proposed development. A total of 9 field visits were completed between April and September, 2023. A variety of field surveys were undertaken which are described in detail below. Surveys conducted were undertaken in accordance with provincial and local guidance documents as indicated below.

Table 2. Field Survey Summary

Survey	Protocol	Dates
Anuran Call Survey	Marsh Monitoring Program (BSC 2009b)	April 20, May 25, and June 15, 2023
Breeding Bird Survey	Ontario Breeding Bird Atlas (BSC 2001)	May 30, June 9, and June 23, 2023
Ecological Land Classification and Vegetation Inventory	Ecological Land Classification for Southern Ontario (Lee et al. 1998)	May 26, July 5, and September 14 2023
Aquatic Habitat Assessment	N/A	June 6, 2023

3.1.1 Vegetation Surveys

Vegetation community delineation was completed using aerial photography and thorough investigations in the field on May 26, July 5, and September 14 2023. The standard Ecological Land Classification (ELC) System for southern Ontario was applied (Lee et al. 1998, Lee 2008). Details of vegetation communities were recorded including species composition, dominance, uncommon species or features, evidence of human impact, and surficial soil characterization.

All observed species of vascular flora within the subject lands were recorded during summer, spring and fall vascular flora inventories conducted in conjunction with vegetation community delineations.

The wetland and woodland boundaries were not staked in the field within the subject lands.

3.1.2 Breeding Bird Surveys

Breeding bird surveys were completed on May 30, June 9, and June 23, 2023 between sunrise and 10:00hrs during appropriate weather conditions. Surveys consisted of 10-minute point counts at 12 locations within the subject lands (Map 3b). All visual and auditory observations of

birds at, and between, monitoring stations, were recorded and evidence of breeding was collected as per the standard Ontario Breeding Bird Atlas (OBBA) methodology (BSC 2001).

3.1.3 Amphibian Surveys

Anuran Call Surveys

Evening anuran (frog and toad) call surveys were conducted on April 20, May 25, and June 15, 2023 using the Marsh Monitoring Program protocol (BSC 2009) at eight stations (Map 3b).

Monitoring focused on calling frogs and toads during 3-minute call counts, which included call intensity and an estimated number of individuals. Additional information, including survey time, air and water temperature, wind speed, and cloud cover were recorded at each survey station.

3.1.4 Additional Wildlife

All observations of mammals, herpetofauna, odonates and butterflies were documented on all field visits. This included actual direct observations of individuals, as well as signs of wildlife presence (i.e. tracks, scats, dens, nests etc.).

3.2 Aquatic Surveys

NRSI aquatic biologists characterized existing aquatic habitat features at five aquatic habitat points within the subject lands and four within the study area (Map 3b) to assess for permanency and fish habitat suitability. Habitat characterization was completed following a modified version of the Ontario Stream Assessment Protocol and the methods described in Aquatic Habitat Assessments Common Methods (Stanfield 2017, Bain and Stevenson 1999). In order to characterize aquatic habitats within the study area, a wide range of aquatic habitat characteristics were recorded within Randall Drain and Breslau Drain and their tributaries, including visual inspection of in-water habitat features (flow conditions, abiotic conditions, etc.), channel dimension morphometrics (widths, depths, slope etc.), near-shore habitat inspection (aquatic vegetation, bank vegetation, bank stability, etc.), critical life stage area assessment (spawning, nursery habitat, etc.) and in-situ water quality.

4.0 Existing Conditions

As mentioned in Section 2.2, the study area was expanded beyond the outlined subject lands after the completion of the 2023 field program (Map 1). Therefore, NRSI relied on the following NRSI published reports to supplement our understanding of the existing conditions of the study area:

- Comprehensive Environmental Impact Study for Proposed Mixed Use Development Ariss Glen Developments & Thomasfield Homes Woolwich Township (Breslau) (NRSI 2011);
- Natural Environment Study Greenhouse Road – Highway 7 Intersection, MTO EA (NRSI 2019);
- Breslau East Connector Road Class Environmental Assessment Environmental Impact Study (NRSI 2021a);
- Scoped Environmental Impact Study 5179 Fountain Street North, Breslau (NRSI 2021b);
- Region of Waterloo International Airport Runway Extension Scoped Environmental Impact Study (NRSI 2021c); and
- 22 Ebycrest Road, Breslau Scoped Environmental Impact Study (NRSI 2023).

It is recommended that the reader refer to these reports for detailed existing conditions since the subsequent sections only summarize the results of the 2023 field program for the subject lands. The characterization results of the aforementioned reports, specifically ecological land classification, are shown on Map 3a.

4.1 Soil, Terrain and Drainage

The subject lands and study area are located within the physiographic region described by Chapman and Putnam (1984) as Guelph Drumlin Field. The Guelph Drumlin Field consists of a series of northwest-southeast trending drumlins that are regionally situated to the northwest of the Paris Moraine. The drumlins are mild in form with moderate slopes, seldom more than 8%. The till in these drumlins is primarily composed of dolostone, with the fine sand fraction containing nearly half dolostone. It is moderately stony, loamy, and calcareous in nature. There are two types of soils within the subject lands: sandy loam and silty loam.

The study area is located within the Breslau Drain and Randall Drain sub-watersheds. Breslau Drain has a watershed area of 2.86km² and a total stream length of 4.2km. The watershed consists mainly of rural and agricultural land use, and drains in a westerly direction (MMM Group 2016). The majority of the natural areas within the watershed are wetlands with some forest features. Randall Drain has a watershed area of 11.17km² and a total stream length of 11.2km. The headwaters begin east of Breslau Drain and drain in a southerly direction. The lower reaches flow in a westerly and south-westerly direction and discharge into the Grand River. The watershed has a gently rolling terrain and mainly consists of open agricultural land and early successional meadows.

4.2 Vegetation

4.2.1 Vegetation Communities

The majority of the subject lands comprise wetland communities, with large areas of mature swamp as well as swamp thicket and meadow marsh. Additionally, there is a large mixed forest with high species diversity. These communities are south of the Waterloo Airport, and are surrounded by agricultural fields on all other sides. A few agricultural drains run through the communities on the west side.

Eleven ELC communities are delineated within the subject lands as shown on Map 3a and described in detail in Table 3. As mentioned under Section 4.0, NRSI also provided available ELC data for the greater study area (Map 3a). The ELC communities located outside of the subject lands are not described within this report.

Table 3. Vegetation Community Descriptions

ELC Ecosite Type	Description
Forest	
FOC4-1 Fresh - Moist White Cedar Coniferous Forest Type	There is an area of White Cedar coniferous forest near the eastern edge of the subject lands, on either side of a drainage ditch. This community is dominated by White Cedar (<i>Thuja occidentalis</i>) in the canopy and subcanopy layers, with Red Elderberry (<i>Sambucus racemosa</i>), Riverbank Grape (<i>Vitis riparia</i>), and Bittersweet Nightshade (<i>Solanum dulcamara</i>) in the understorey. Herbaceous species near the drain were primarily facultative and obligate wetland species including Spotted Jewelweed (<i>Impatiens capensis</i>) and Tall Mannagrass (<i>Glyceria grandis</i>). Upland species were present farther from the drain and include Herb-robert (<i>Geranium robertianum</i>) and Calico Aster (<i>Symphyotrichum lateriflorum</i>).
FOM3-2 Dry - Fresh Sugar Maple - Hemlock Mixed Forest Type	There are two areas of Sugar Maple – Hemlock mixed forest. The larger area is near the centre of the subject lands, and is the primary community in the west half of the lands. There is another smaller area near the east end of the subject lands.

ELC Ecosite Type	Description
	These communities are dominated by Sugar Maple (<i>Acer saccharum</i>) in the canopy, with Eastern Hemlock (<i>Tsuga canadensis</i>) and Black Cherry (<i>Prunus serotina</i>) associates. The subcanopy is characterized by Sugar Maple, with White Ash (<i>Fraxinus americana</i>) and Ironwood (<i>Ostrya virginiana</i>). European Buckthorn (<i>Rhamnus cathartica</i>), Alternate-leaved Dogwood (<i>Cornus alternifolia</i>), and Choke Cherry (<i>Prunus virginiana</i>) make up the understory layer, and Broad-leaved Enchanter's Nightshade (<i>Circaea canadensis</i>), White Avens (<i>Geum canadense</i>), and Long-stalked Sedge (<i>Carex pedunculata</i>) are the most common herbaceous species.
FOD7 Fresh - Moist Lowland Deciduous Forest Ecosite	There are two small lowland deciduous forest communities. One is in the northeast corner of the subject lands, adjacent to agricultural fields, and the second is near the west end. In these communities, the canopy is somewhat open and made up of Black Walnut (<i>Juglans nigra</i>), White Cedar, and Balsam Poplar (<i>Populus balsamifera</i>), with Glossy Buckthorn (<i>Frangula alnus</i>) in the subcanopy. European and Glossy Buckthorn, and Red Raspberry (<i>Rubus idaeus</i> ssp. <i>strigosus</i>) are present in the shrub layer. The herbaceous layer includes a mix of wetland and upland species, but is dominated by non-native, weedy species, with Smooth Brome (<i>Bromus inermis</i>), Garlic Mustard (<i>Alliaria petiolata</i>), and Cleavers (<i>Galium aparine</i>) being the most abundant.
FOD8-1 Fresh – Moist Poplar Deciduous Forest Type	A small portion on the southeast side of the woodland is a Poplar deciduous forest community. The canopy and subcanopy are dominated by Trembling Aspen (<i>Populus tremuloides</i>), with Glossy Buckthorn and Wild Black Currant in the shrub layer. Groundcover coverage is somewhat sparse and includes Rough-stemmed Goldenrod (<i>Solidago rugosa</i>), and Broad-leaved Enchanter's Nightshade.
Cultural	
CUP3 Coniferous Plantation	There is a narrow coniferous plantation on the west side of the property. The canopy primarily comprises Scots Pine (<i>Pinus sylvestris</i>), Norway Spruce (<i>Picea abies</i>), and White Pine (<i>Pinus strobus</i>). The subcanopy is made up of European Buckthorn, White Ash, and Black Cherry, while the understory comprises European Buckthorn, Glossy Buckthorn, and Choke Cherry. Groundcover includes Broad-leaved Enchanter's Nightshade, Garlic Mustard, and Fragrant Bedstraw (<i>Galium triflorum</i>).
CUM1 Mineral Cultural Meadow Ecosite	There is a small area of cultural meadow surrounding the driveway in the centre-south of the subject lands and extending north in a narrow band. Common species include Smooth Brome, Kentucky Bluegrass, and Tall Goldenrod (<i>Solidago altissima</i>). This area appears to be maintained by occasional mowing or removal of brush.
CUS1 Mineral Cultural Savanna Ecosite	There is a small area of Cultural Savanna between the eastern mixed forest and Swamp Maple swamp communities. This area is characterized by groundcover species including Canada Goldenrod (<i>Solidago canadensis</i>) and New England Aster (<i>Symphyotrichum novae-angliae</i>), with scattered Green Ash (<i>Fraxinus pennsylvanica</i>) trees. Glossy Buckthorn is present occasionally in the understory.
Wetland	
SWD6-3 Swamp Maple Organic Deciduous Swamp Type	There is a large area of Swamp Maple organic swamp characterizing the east side of the subject lands. The canopy is dominated by Freeman's Maple (Swamp Maple, <i>Acer x freemanii</i>), with American Elm (<i>Ulmus americana</i>) and Yellow Birch (<i>Betula alleghaniensis</i>) associates. The subcanopy comprises Freeman's Maple, Green Ash,

ELC Ecosite Type	Description
	and American Elm. European and Glossy Buckthorn are becoming dominant in some areas of the understory. Groundcover species include Sensitive Fern (<i>Onoclea sensibilis</i>), Tall Mannagrass, and upland species White Avens and Calico Aster. A second Swamp Maple swamp community is on the west side, and was flooded due to beaver activity during 2024 surveys.
SWD7/SWT3 Birch - Poplar Organic Deciduous Swamp Ecosite/Organic Thicket Swamp Ecosite	South of the Swamp Maple swamp there is a Birch – Poplar organic swamp community that is complexed with thicket swamp. The canopy comprises Trembling Aspen (<i>Populus tremuloides</i>) and Green Ash, with Glossy Buckthorn making up a sparse subcanopy. Glossy Buckthorn, Green Ash, and European Buckthorn make up a dense shrub layer throughout the community. Groundcover includes a mix of upland and wetland species, including Broad-leaved Enchanter's Nightshade, Sensitive Fern, White Avens, and Calico Aster.
SWT3/MAM3 Organic Thicket Swamp Ecosite/Organic Meadow Marsh Ecosite	The land nearest to the airstrip, on the north side of the swamp communities, has a history of management by vegetation clearing and grubbing. This area has early successional communities that respond to the frequent disturbance, and where roots and stumps are not removed, trees and shrubs have suckered. Glossy Buckthorn is abundant in the shrub layer, with dense patches. Near the Swamp Maple swamp edge, Freeman's Maple has resprouted vigorously where it was cut back. Willows (<i>Salix</i> spp.) and Dogwoods (<i>Cornus sericea</i> , <i>C. obliqua</i>) are also common throughout. Herbaceous species include Swamp Aster (<i>Symphotrichum puniceum</i>), and Sensitive Fern.
MAM2-2 Reed-canary Grass Mineral Meadow Marsh Type	There is a small, partially flooded, Reed Canary Grass meadow marsh along a drainage channel south of the western Swamp Maple swamp community. There are occasional shrubs including Heart-leaved Willow (<i>Salix eriocephala</i>). Abundant species in this community include Reed Canary Grass (<i>Phalaris arundinacea</i> var. <i>arundinacea</i>), Spotted Jewelweed, and Rice Cut Grass (<i>Leersia oryzoides</i>).

4.2.2 Vascular Flora

In total, 250 species were documented within the subject lands. Of these, 185 species are native to Ontario (74%). A complete list of species documented within the subject lands is appended to this report (Appendix III).

No plant SAR were recorded within the subject lands. Seven plant species designated as rare in Waterloo Region (Richardson and Martin 1999) were inventoried within the subject lands:

- Virginia Stickseed (R*) – located in FOM3-2
- Black Walnut (R+*) – located in FOD7 and FOD7-4
- Common Hackberry (R*) – located in FOC4-1
- Foxtail Sedge (R) – located in SWD6-3
- Bristle-stalked Sedge (R) – located in SWT3/MAM3
- Wood Lily (R) – located in FOM3-2

- Sheathed Dropseed (R*) – located in CUM1

R Rare in the Regional Municipality of Waterloo (RMW)

* Significant but with the expectation that additional research may prove otherwise

+ Significant only if native – most population in RMW are thought to be non-native

4.3 Wildlife

4.3.1 Birds

In total, 119 species are reported from within 10km of the study area based on the OBBA (BSC et al. 2008) and NHIC data (MNRF 2023). Fifty-three (53) bird species were documented within the study area during site investigations. Of these, 50 were recorded with possible, probable, or confirmed breeding evidence. A complete list of all observed species and species reported from the vicinity of the subject lands is provided in Appendix IV.

Based on available background information, 14 bird SAR and 11 bird SCC are reported from the vicinity of the subject lands (BSC et al. 2009). Appendix I provides a summary of significant species reported from the vicinity of the subject lands, including their current status ranks and preferred habitats. Of these reported species, NRSI biologists observed three bird SAR, three bird SCC within the study area.

- Eastern Meadowlark (*Sturnella magna*) - provincially and federally Threatened;
- Henslow's Sparrow (*Ammodramus henslowii*) - provincially and federally Endangered
- Bank Swallow (*Riparia riparia*) - provincially and federally Threatened
- Eastern Wood-pewee (*Contopus virens*) – provincial species of Special Concern
- Wood Thrush (*Hylocichla mustelina*) – provincial species of Special Concern and federally Threatened
- Barn Swallow (*Hirundo rustica*) – provincial species of Special Concern and federally Threatened

Eastern Meadowlark was recorded within the CUM1 and agricultural habitats near BMB-001 and BMB-014 during the June 15 and 27, 2023 breeding bird surveys. Henslow's Sparrow was recorded incidentally within the CUM1-1, 100m east of BMB-001 during the June 15 and July 1, 2023 breeding bird surveys (Map 3b). Probable breeding is assumed for Eastern Meadowlark based on two consistent observations of adult birds in suitable nesting habitat, one week or more apart, during the breeding season. The Henslow's Sparrow observation is presumed to be an unmated vagrant male as no females or any other individuals were observed with the

CUM1-1 habitat. No OBBA observations of Henslow's Sparrow exist for the Region of Waterloo (BSC et al. 2008).

Three Bank Swallow were observed foraging in the agricultural field located south of BMB-006 (Map 3b). No breeding evidence was observed. Bank Swallows require steep banks of easily crumbled soil material for nesting, which is not present within the subject lands.

The Eastern Wood-pewee and Wood Thrush were present throughout the various woodland habitats located within the study area. Probable breeding for Eastern Wood-pewee was observed at BMB-013, and BMB-015, while possible breeding was observed at BMB-002, BMB-003, BMB-010 and BMB-012 (Map 3b). Probable breeding for Wood Thrush was observed at BMB-015 (Map 3b). Barn Swallow breeding habitat was not directly observed during breeding bird surveys, rather several individuals were observed foraging within the agricultural fields or CUM1 habitats near BMB-010, BMB-011, and BMB-014 (Map 3b).

A total of 14 species that are considered rare in the Waterloo Region (Appendix IV) were also observed within the study area in 2023 (Martin 1996).

4.3.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (Ontario Nature 2019) and NHIC (MNRF 2022), 22 species of herpetofauna are reported from within 10km of the study area. Based on available background information, one herpetofauna SAR and three herpetofauna SCC are reported from the study area. Appendix V provides a summary of significant species reported from the study area, including their current status ranks and preferred habitats.

Anurans

Five species of anurans were recorded during anuran call surveys (Table 4), including American Toad (*Anaxyrus americanus*), Gray Treefrog (*Dryophytes versicolor*), Spring Peeper (*Pseudacris crucifer*), Northern Leopard Frog (*Lithobates pipiens*) and Green Frog (*Lithobates clamitans*). No SAR or SCC anurans were observed during targeted surveys or incidentally by NRSI Biologists.

Table 4. Anuran Call Survey Results - 2023

Survey Station	April 20	May 29	July 4
ANR-001	None	GRTR 1(2), GRTR 1(2), AMTO 2(3)	GRFR 2(4)
ANR-002	None	GRTR 3, GRTR 2(3), GRTR 1(1), GRFR1(2)	GRFR 2(4), GRTR 2(3)
ANR-003	None	GRTR 1(3)	GRTR 1(1)
ANR-004	SPPE 3	GRTR3	GRTR 1(2)
ANR-005	SPPE 3, NLFR 1(1)	GRTR 1(3), GRTR 1(2), AMTO 1(1)	GRTR 1(1)
ANR-006	SPPE 3	GRTR 3	None
ANR-007	None	GRTR 1(2)	None
ANR-008	None	GRTR 2(5)	None

SPPE = Spring Peeper, NLFR = Northern Leopard Frog, GRTR = Gray Treefrog, GRFR = Green Frog, AMTO = American Toad

Code 1 = Individuals can be counted; calls not simultaneous. Number of individuals in brackets.

Code 2 = Calls distinguishable; some simultaneous calling. Estimated number of individuals in brackets.

Code 3 = Full chorus; calls continuous and overlapping. Number of individuals cannot be estimated.

* Noted outside the 100m radius from the station

4.3.3 Mammals

A total of 46 mammal species are reported from the subject lands or vicinity based on the Ontario Mammal Atlas, MNRF Region of Waterloo SAR List and NHIC Database (Dobbyn 1994, MNRF 2018, MNRF 2019a). Three of these species were observed by NRSI biologists within the subject lands in 2023, however no targeted mammal surveys were completed. A complete list of all observed species and species reported from the vicinity of the subject lands is provided in Appendix VI.

Based on available background information, five mammal SAR and one mammal SCC are reported from the vicinity of the subject lands (Dobbyn 1994, MNRF 2018, MNRF 2019a). Appendices I and II provide a summary of significant species reported from the vicinity of the subject lands, including their current status ranks and preferred habitats. NRSI biologists did not observe any provincially, federally or regionally significant species.

4.3.4 Lepidoptera

A total of 81 lepidoptera species are reported from the subject lands or vicinity based on the Ontario Butterfly Atlas, MNRF Region of Waterloo SAR List and NHIC Database (MacNaughton et al. 2019, MNRF 2018, MNRF 2019a). Five of these species were observed by NRSI biologists within the subject lands in 2023, however no targeted lepidoptera surveys were completed. A complete list of all observed species and species reported from the vicinity of the subject lands is provided in Appendix VII.

The Monarch (*Danaus plexippus*) is listed as Special Concern provincially and Endangered federally (MNRF 2019c, Government of Canada 2019). Monarchs exist primarily wherever milkweed and wildflowers exist including abandoned farmland, along roadsides, and other open spaces. One Monarch was incidentally observed within the subject lands on September 14, 2023. Common Milkweed (*Asclepias syriaca*), the Monarch's larval foodplant, was documented within the FOD7 and MAM2 community.

4.4 Aquatic Habitat Characterization

Randall Drain

Within the study area, Randall Drain represents the largest and most significant watercourse. Randall Drain was assessed at 7 general assessment locations, (AHP-001, AHP-002, AHP-003, AHP-004, AHP-005, AHP-008 and AHP-009), representing the east, west, and main branches of Randall Drain, and their tributaries (Map 3b). Each Randall Drain watercourse was assessed at existing road crossings within the study area. Randall Drain and its tributaries fall within the Grand River Watershed with no critical habitat for Aquatic Species at Risk reported by the Department of Fisheries and Oceans Fish and Fish Habitat Protection Program (2023). Each of the identified watercourses provide direct or indirect fish habitat.

Randall Drain Main Branch (AHP-005)

Along the south-western extent of the study area the main branch of Randall Drain (along Fountain Street North) was assessed at AHP-005 (Map 3b). Within this assessment reach, the main branch of Randall Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant and tolerant, warm and coolwater fish species (MNRF 2023b). Upstream of Fountain Street North the main branch of Randall Drain was characterized as an entrenched (~1 m below grade) gently meandering channel, flowing through a series of shallow riffles (max depth 0.36 m) with abundant overhanging terrestrial grasses, flowing through a densely vegetated shallow valley land, with limited canopy cover presented by terrestrial grasses and shrubs. Downstream of Fountain Street North the main branch of Randall Drain is characterized as a gently meandering channel, flowing through a series of shallow riffles (max depth 0.1 m) with dense woody debris accumulations along both banks, and areas of extensive bank erosion immediately downstream of the existing culvert crossing. Throughout this reach of Randall Drain wetted widths were observed to range from 2.65 - 3.0 m with bankfull widths ranging from 4.6 - 4.8 m, with substrates consisting primarily of cobble and gravel, with traces of sand, silt, and woody

detritus. Within the main branch of Randall Drain aquatic vegetation consisted of sparse patches of Pondweed (*Potamogeton* sp.) and filamentous algae along the stream bed. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.64, with a surface water temperature of 20.9°C (air temperature 23°C recorded 13:55hr June 6, 2023), a conductivity of 0.71 ms/cm (Total Dissolved Solids 0.37 ppt), and a Dissolved Oxygen concentration of 11.5 mg/L (122.1%) with low turbidity. Aquatic habitat and cover were provided by pools, riffles, aquatic vegetation, cobble, and dense woody debris accumulations. No barriers to upstream fish movement were observed within this assessment reach, and based on the background fish community data the main branch of Randall Drain represents direct fish habitat.

Randall Drain East Branch (AHP-001)

The east branch of Randall Drain was characterized along the eastern extent of the study area (along Cober Road) was assessed at AHP-001 (Map 3b). Within this assessment reach, the east branch of Randall Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant and Tolerant, warm and coolwater fish species (MNRF 2023b). Immediately upstream of the existing culvert crossing structure, a beaver dam and perched culvert has resulted in the formation of a barrier upstream to fish migration, with minimal water flow observed. Upstream of Cober Road the east branch of Randall Drain was characterized as a large (>10 m wide) ponded area created by a beaver dam along the upstream extent of the culvert crossing structure, with abundant overhanging deciduous shrubs and dense floating algae blooms. Downstream of Cober Road the east branch of Randall Drain is characterized as a shallow gently meandering channel, flowing through a series of shallow riffles (max depth 0.15 m) from an isolated scour pool along the downstream extent existing culvert crossing structure, with areas of extensive bank erosion immediately downstream of the existing culvert crossing. Throughout this reach of the east branch of Randall Drain wetted widths were observed to range from 1.0 – 1.5 m with bankfull widths ranging from 2 – 2.9 m, with substrates consisting primarily of gravel and sand, with traces of pebble. Within the east branch of Randall Drain aquatic vegetation consisted of sparse patches of watercress sp. (*Nastrium* sp.), suggesting potential groundwater seepages within this reach, and dense patches of Common Reed (*Phragmites australis*) downstream of the existing culvert crossing structure and filamentous algae along the stream bed. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.46, with a surface water temperature of 13.7°C (air temperature 22°C recorded 16:35hr June

6, 2023), a conductivity of 0.45 ms/cm (Total Dissolved Solids 0.23 ppt), and a Dissolved Oxygen concentration of 7.05 mg/L (66.7%) with low turbidity. The low surface water temperature relative to air temperature and presence of groundwater indicating vegetation, suggests the presence of groundwater seepages within the vicinity of this reach. Aquatic habitat and cover were provided by pools, riffles, and aquatic vegetation. Based on the background fish community data the east branch of Randall Drain represents direct fish habitat.

Randall Drain East Branch Tributaries (AHP-002, AHP-003, AHP-004)

Along the eastern and southern extents of the study area three tributaries of the east branch of Randall Drain were observed directing surface flows from the surrounding lands toward the east branch of Randall Drain (Map 3b). Each of these tributaries was observed at an existing culvert crossing structure designated Tributary A, B, and C and assessed at assessment reaches AHP-004, AHP-003, and AHP-002 respectively.

Along the southern extent of the study area, Tributary A of the east branch of Randall Drain was assessed at AHP-004 (along Kossuth Road) was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant and tolerant, warm and coolwater fish species (MNRF 2023b) (Map 3b). Immediately upstream of the existing culvert crossing structure Tributary A of the east branch of Randall Drain was characterized as a poorly defined watercourse draining through active agricultural fields with no channel definition or in stream or bank vegetation. Downstream of Kossuth Road, Tributary A of the east branch of Randall Drain is characterized as a shallow (max depth 0.1 m) channelized drain with minimal flow and numerous tile-drain outlets along the edge of the active agricultural fields north of Kossuth Road (Map 3b). Throughout this reach of the Tributary A of the east branch of Randall Drain wetted widths were observed to range from 0.8 – 3.1 m with bankfull widths ranging from 1.4 -4.1 m, with substrates consisting primarily of sand and silt, with traces of organic detritus. Within Tributary A of the east branch of Randall Drain aquatic vegetation consisted of dense patches of Reed Canary Grasses and European Common Reed (*Phragmites australis spp. australis*), with patches of dense floating algal blooms. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.44, with a surface water temperature of 13.5°C (air temperature 23°C recorded 14:35hr June 6, 2023), a conductivity of 0.39 ms/cm (Total Dissolved Solids 0.20 ppt), and a Dissolved Oxygen concentration of 6.19 mg/L (66.4%) with low turbidity. No fish were observed within Tributary A of the east branch of Randall Drain however background fish community composition data suggests that Tributary A presents direct fish habitat within the study area.

Aquatic habitat and cover within Tributary A of the east branch of Randall Drain were provided by pools, and aquatic vegetation.

Further to the east along the southern extent of the study area, Tributary B of the east branch of Randall Drain was assessed at AHP-003 (along Kossuth Road) (Map 3b). Immediately upstream of the existing culver crossing structure Tributary B of the east branch of Randall Drain was represented only by a grated tile drain inlet with no indication of water or recent water flows within the active agricultural field. Downstream of Kossuth Road Tributary B of the east branch of Randall Drain is characterized as a shallow (max depth 0.1 m) poorly defined channel, flowing through a gently sloping, densely vegetated (terrestrial grasses and deciduous shrubs) channel draining into the Dry-Fresh White Birch Deciduous Forest to the north of Kossuth Road. Throughout this reach of the Tributary of B of the east branch of Randall Drain wetted widths were observed to range from 0.8 – 1.0 m with bankfull widths ranging from 1.0 – 2.5 m, with substrates consisting primarily of sand and gravel, with traces of silt and organic detritus. Within Tributary B of the east branch of Randall Drain aquatic vegetation consisted of dense patches of Reed Canary Grass and filamentous algae. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.15, with a surface water temperature of 15.5°C (air temperature 23°C recorded 15:30hr June 6, 2023), a conductivity of 0.35 ms/cm (Total Dissolved Solids 0.18 ppt), and a Dissolved Oxygen concentration of 4.75 mg/L (46.8%) with low turbidity. No fish were observed within Tributary B of the east branch of Randall Drain, the conditions present within Tributary B of the east branch of Randall Drain suggest that the aquatic habitat conditions present indirect fish habitat contributing to the base flow conditions and nutrients to downstream resources. Aquatic habitat and cover within Tributary B of the east branch of Randall Drain were provided by pools, and aquatic vegetation.

Along the eastern extent of the study area, Tributary C of the east branch of Randall Drain was assessed at AHP-002 (along Cober Road) (Map 3b). Immediately upstream of the existing culvert crossing structure Tributary C of the east branch of Randall Drain was characterized as a poorly defined watercourse draining the Kossuth Wetland Complex toward the east branch of Randall Drain. Upstream of Cober Road Tributary C of the east branch of Randall Drain is characterized as a shallow (max depth 0.25 m) relatively straight channel, with numerous small tile drain outlets directing flow from the surrounding lands toward Tributary C of the east branch of Randall Drain. Upstream of Cober Road abundant overhanging and instream terrestrial grasses with dense floating algae blooms and very minimal flows were observed throughout the

channel with wetted widths ranging from 2.0 - 3.0 m and bankfull widths ranging from 4.0 - 5.5 m. Downstream of Cober Road Tributary C of the east branch of Randall Drain was characterized as a relatively straight channelized drain cutting through the dense deciduous forest habitat with abundant overhanging and bank vegetation, predominantly terrestrial grasses and deciduous shrubs with isolated patches of woody debris accumulation and evidence of active erosion along the banks suggesting periods of significant flow variation. Wetted widths downstream of Cober Road were observed to range from 0.75 - 1.5 m with bankfull widths ranging from 2.0 - 3.0 m, and a maximum depth of 0.1 m. Substrates throughout this reach of the Tributary C of east branch of Randall Drain were observed to consist primarily of sand and silt, with traces of organic detritus. Within Tributary C of the east branch of Randall Drain aquatic vegetation consisted of dense patches of Pondweed sp. with patches of dense floating and filamentous algae. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.25, with a surface water temperature of 20.4°C (air temperature 23°C recorded 16:00hr June 6, 2023), a conductivity of 0.33 ms/cm (Total Dissolved Solids 0.17 ppt), and a Dissolved Oxygen concentration of 14.93 mg/L (164.4%) with low turbidity. Dense schools of small-bodied fish indicate the presence of direct fish habitat within this reach of the Tributary C of the east branch of Randall Drain, with aquatic habitat and cover were provided by pools, and aquatic vegetation.

Randall Drain West Branch (AHP-008, AHP-009)

Along the northern and eastern extents of the study area the west branch of Randall Drain directs flows in a generally southerly direction toward the main branch of Randall Drain. The west branch of Randall Drain was assessed at existing culvert crossing structures at two general assessment reaches AHP-008, and AHP-009.

The west branch of Randall Drain where it flows along the eastern extent of the study area (along Lonsdale Road) was assessed at AHP-009. Within this assessment reach, the west branch of Randall Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant and tolerant, warm and coolwater fish species (MNRF 2023b). Upstream of Lonsdale Road the west branch of Randall Drain was characterized as a channelized relatively straight channel, flowing through a series of shallow riffles (max depth 0.36 m) with abundant overhanging terrestrial grasses, flowing through a densely vegetated shallow valley land, with limited canopy cover presented by terrestrial grasses and shrubs. Upstream of Lonsdale Road this reach of the west branch of Randall Drain wetted widths were observed to range from 1.0 - 1.5 m with bankfull widths

ranging from 1.3 - 2.8 m, with substrates consisting primarily of sand and gravel, with traces of silt. Upstream of Lonsdale Road the west branch of Randall Drain aquatic vegetation consisted of sparse patches of Pondweed and filamentous algae along the stream bed. Downstream of Lonsdale Road the west branch of Randall Drain flows through a perched culvert, further obstructed by woody debris accumulations within the existing culvert structures, serving as a barrier to upstream fish migration. Immediately downstream of Lonsdale Road a shallow scour pool (max depth 0.15 m) was observed with a large school of small bodied fish suggesting the presence of direct fish habitat within the west branch of Randall Drain. Downstream of Lonsdale Road the west branch of Randall Drain wetted widths were observed to range from 1.5 - 2.85 m with bankfull widths ranging from 3.0 - 4.75 m, and substrates composing primarily of sand and cobble, with traces of silt. Downstream of Lonsdale Road the west branch of Randall Drain aquatic vegetation consisted of sparse patches of Pondweed and filamentous algae along the stream bed. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 9.04, with a surface water temperature of 25.7°C (air temperature 22°C recorded 12:45hr June 6, 2023), a conductivity of 0.74 ms/cm (Total Dissolved Solids 0.39 ppt), and a Dissolved Oxygen concentration of 7.5 mg/L (118.6%) with low turbidity. Aquatic habitat and cover were provided by pools, riffles, undercut banks, aquatic vegetation, cobble, and dense woody debris accumulations.

Along the northern extent of the study area the upstream most extent of the west branch of Randall Drain (along Menno Street) was assessed at AHP-008. Within this assessment reach, the west branch of Randall Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant and tolerant, warm and coolwater fish species (MNRF 2023b). Both upstream and downstream of Menno Street the west branch of Randall Drain was observed to be dry during the Spring 2023 assessment and characterized as a channelized relatively straight channel, with bankfull widths ranging from 2.0 - 4.3 m and abundant overhanging and stream bed terrestrial grasses. Substrates throughout this assessment reach were observed to consist primarily of silt and sand, with traces of clay and organic detritus. No aquatic vegetation or algae were observed throughout this assessment reach upstream of Lonsdale Road the west branch of Randall Drain aquatic vegetation consisted of sparse patches of Pondweed and filamentous algae along the stream bed. During the Spring 2023 aquatic habitat characterization no surface water quality sampling was completed due to the lack of surface water features present within this assessment range. The lack of flowing water during the Spring 2023 assessment and barriers to upstream fish

migration suggest that this reach of the west branch of Randall Drain provides only indirect fish habitat.

Breslau Drain

Within the study area, Breslau Drain and its Tributary Crosses through the north western extent of the study and diverts into a secondary watercourse within the study area (Map 3b). Breslau Drain and its tributary was assessed at two general assessment locations, AHP-006 and AHP-007 respectively (Map 3b). Each Breslau Drain watercourse was assessed at existing road crossings within the study area, Breslau Drain and its tributary fall within the Grand River Watershed with no critical habitat for Aquatic Species at Risk reported by the Department of Fisheries and Oceans Fish and Fish Habitat Protection Program (2023). Each of the identified watercourses present direct or indirect fish habitat.

Breslau Drain Main Branch (AHP-006)

Along the western edge of the study area the main branch of Breslau Drain (along Fountain Street North) was assessed at AHP-006 (Map 3b). Within this assessment reach, the main branch of Breslau Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant warmwater fish species (MNRF 2023b). Upstream of Fountain Street North the main branch of Breslau Drain was characterized as a dry poorly defined gently meandering channel draining the Breslau Wetland Complex, with abundant overhanging and streambed terrestrial grasses with no indication of continuous water flow. Downstream of Fountain Street North the main branch of Breslau Drain continues as a dry gently meandering channel with an isolated scour pool immediately downstream of the Fountain Street culvert crossing structure, with evidence of multiple poorly defined surface water channels draining the surrounding agricultural lands. Throughout this reach of Breslau Drain substrates were observed to consist primarily of silt and organic detritus with deposits of cobble in the immediate vicinity of the culvert crossing structure. In-channel vegetation was observed to consist primarily of terrestrial grasses and Common Reed. Surface water quality sampling within the isolated scour pool reported a pH of 7.52, with a surface water temperature of 15.52°C (air temperature 19°C recorded 10:45hr June 6, 2023), a conductivity of 0.61 ms/cm (Total Dissolved Solids 0.32 ppt), and a Dissolved Oxygen concentration of 2.15 mg/L (16.9%) with low turbidity and no indication of recent or continuous water flow. No barriers to upstream fish movement were observed within this assessment reach, however the lack of evidence of continuous water flow suggests that this reach of Breslau Drain represents indirect fish habitat contributing baseflow and nutrients to downstream resources.

Breslau Drain Main Branch Tributary (AHP-007)

The tributary of the main branch of Breslau Drain was characterized along the northern extent of the study area (along Menno Street) at AHP-007 (Map 3b). Within this assessment reach, the tributary of the main branch of Breslau Drain was characterized by the GRCA as a warmwater watercourse with a fish community predominantly composed of intermediately tolerant, warmwater fish species (MNR 2023b). Immediately upstream of the existing culvert crossing structure the tributary of the main branch of Breslau Drain was characterized as a very shallow poorly defined channelized drain with very minimal water flow (max depth 0.02 m) with wetted widths ranging from 0.3 - 0.5 m and a bankfull width ranging from 0.75 - 1.5 m, with abundant overhanging bank and instream vegetation composed primarily of terrestrial grasses.

Downstream of Menno Street the tributary of the main branch of Breslau Drain flows through a relatively straight, entrenched (1 - 2 m below grade) historically channelized drain flowing from a shallow scour pool along the immediately downstream extent of the culvert crossing structure (max depth 0.1 m). Wetted widths downstream of Menno Street were observed to range from 1.0 - 1.9 m with bankfull widths ranging from 1.5 - 4.0 m. Bank and instream vegetation downstream of Menno Street were observed to be composed of terrestrial grasses, with no evidence of aquatic vegetation throughout this reach of the tributary of the main branch of Breslau Drain. Substrates composition was observed to consist primarily of silt with traces of clay and organic detritus. During the Spring 2023 aquatic habitat characterization surface water quality monitoring reported a pH of 8.44, with a surface water temperature of 12.6°C (air temperature 20°C recorded 11:15hr June 6, 2023), a conductivity of 0.41 ms/cm (Total Dissolved Solids 0.21 ppt), and a Dissolved Oxygen concentration of 2.25 mg/L (20.1%) with low turbidity. The low surface water temperature relative to air temperature and presence of groundwater indicating iron staining along the banks, suggests the presence of groundwater seepages within the vicinity of this reach. No barriers to upstream fish movement were observed within this assessment reach, however the lack of evidence of continuous water flow suggests that this reach of the tributary of the main branch of Breslau Drain represents indirect fish habitat contributing baseflow and nutrients to downstream resources.

5.0 Natural Feature Significance and Sensitivity Analysis

An analysis of the significance and sensitivity of existing natural features within the study area was completed to identify those features and habitats that are sensitive to disturbance. This analysis is based on the rarity or significance of features and/or associated functions/processes and/or current policies, legislation, or planning related studies. Such features and functions identified as sensitive to disturbance are further identified as 'constraints' to development, prohibiting or constraining aspects of any proposed development around or within them. The analysis is also used to identify 'opportunity' areas that have been previously disturbed or contain no natural features where potential for habitat rehabilitation or enhancement exists. Results of this analysis are provided in the following sections to inform the evaluation of proposed alternatives and assist in the selection of an alternative that will avoid and reduce impacts to natural features and their ecological functions.

Ontario Regulation 41/24 has replaced Ontario Regulation 150/06 as of April 1, 2024, and thus the wetlands are considered within the context of this regulation in the EIS. All of the wetlands identified are regulated features.

5.1 Wetlands

Wetlands are important for many reasons including collecting and storing surface water and groundwater and providing habitat for plants, wildlife, and fish. Wetlands operate on a water budget, where the hydrologic character of the wetland is determined by the combination of water inflow/outflow, topography, and groundwater conditions (Mitsch and Gosselink 1993). Wetlands receive water through precipitation, surface inflow, groundwater inflow, and lose water through evapotranspiration, surface and groundwater outflow. In the Region of Waterloo, wetlands are typically identified as PSW (evaluated and identified to be of provincial significance) or locally significant (evaluated and identified to be of non-provincial significance or unevaluated).

Two PSWs are present within the study area including the Breslau and Kossuth Wetland Complexes (Map 1). The PPS states that development and site alteration shall not be permitted in significant wetlands (PSW) and development and site alteration shall not be permitted on adjacent lands to significant wetlands unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions. The Region of Waterloo Official Plan (RMOW 2015) designates PSWs as a Core Environmental Feature.

Several unevaluated wetlands are present within the study area (Map 1). None of these wetlands were located within the subject lands and therefore were not inventoried or assessed by NRSI biologists.

5.2 Significant Woodlands

The Natural Heritage Reference Manual (MNRF 2010) provides guidance for assessing the ecological function of woodlands. It outlines criteria for determining the significance of woodlands within Ontario considering four broad categories: woodland size, ecological function, uncommon characteristics, and economic and social values. Woodlands identified as 'significant' according to the criteria outlined in the Natural Heritage Reference Manual are considered within the PPS (MMAH 2014). The PPS states that development and site alteration shall not be permitted in significant woodlands and development and site alteration shall not be permitted on adjacent lands to significant woodlands unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions. The Natural Heritage Reference Manual and the policies of the PPS can also be used by municipalities to further refine local policies, objectives, and evaluation criteria for woodlands.

According to the Region of Waterloo Official Plan (RMOW 2015) policies, Significant Woodlands are defined as all woodlands that are (a) greater than four hectares in size, excluding any adjoining hedgerows; (b) consisting primarily of native species of trees; and (c) meet the criteria of a woodland in accordance with the provisions of the Regional Woodland Conservation By-law. Based on these criteria, there are several areas of Significant Woodland that are identified within the study area. These areas are generally mapped as the non-wetland components of the Core Environmental Features shown on Map 1.

5.3 Habitat of Threatened and Endangered Species

5.3.1 Confirmed Habitats

Based on the results of wildlife-specific field surveys detailed in Section 3.0, habitat for one Threatened species was confirmed to be present within the subject lands and study area.

Eastern Meadowlark

Breeding habitat for Eastern Meadowlark was identified within the study area based on the results of breeding bird surveys. This species receives general habitat protection under the ESA. Category 1 habitat is defined as the nest and the area within 10 m of the nest which are

highly sensitive features supporting the species reproduction life cycle and have the lowest tolerance to alteration (MNRF 2013a). Category 2 habitat is the area between 10 m and 100 m of the nest or centre of the approximated defended territory. This habitat is considered to have a moderate level of tolerance to alteration and includes the species' defended territory, which is depended on for courtship, mating, rearing of young, feeding, resting and bathing. Category 3 habitat is the area of continuous suitable habitat between 100 m and 300 m of a nest or centre of approximated defended territory. This habitat has a high level of tolerance to alteration. Eastern Meadowlarks depend on this area for feeding, rearing or young, resting, dispersal and concealment from predators. No confirmed nests were identified in the study area, however the habitat for Eastern Meadowlark was identified within the study area within the CUM1 and agricultural habitats near BMB-001 and BMB-014 based on the anticipated defended territory. Considerations for impacts to general habitat will need to be considered during Detailed Design and permitting.

5.3.2 Candidate Habitats

Based on the background screening, suitable habitat for 23 SAR has been identified within the study area (Appendix I). Targeted surveys for these species should be completed at the Detailed Design stage and when the study area has been refined.

5.4 Significant Wildlife Habitat

Based on background information review, and desktop analyses, 15 SWH types are considered candidate and four SWH types were confirmed for the study area. Candidate and confirmed SWH habitats are discussed in Table 5. Impacts to SWH should be discussed and addressed at the Detailed Design stage.

Table 5. Significant Wildlife Habitat Summary

Significant Wildlife Habitat Type	Presence Within Study Area	Assessment Details
Seasonal Concentration Areas		
Waterfowl Stopover and Staging Areas (Terrestrial)	Candidate	The larger study area was not surveyed to identify candidate waterfowl stopover and staging areas. Based on aerial imagery interpretation and available ELC mapping, CUM1 is present. Agricultural fields within the study area may contain sheet water during spring. However, for safety purposes, airport wildlife management limits opportunities for this SWH within the Region of Waterloo airport section of the study area.

Significant Wildlife Habitat Type	Presence Within Study Area	Assessment Details
Waterfowl Stopover and Staging Areas (Aquatic)	Candidate	Potential habitat is present in the Breslau PSW Complex (with SAF1, MAS2 and SWD vegetation communities). Canada Goose, American Black Duck, Blue-winged Teal, Hooded Merganser and Ruddy Duck have been observed within the study area or vicinity (BSC et al. 2009).
Shorebird Migratory Stopover Area	Not Present	There are no beach areas, bars or seasonally flooded, muddy and un-vegetated shoreline habitats large enough within the study area to support SWH. Spotted Sandpiper has been observed within the study area or vicinity (BSC et al. 2009).
Raptor Wintering Area	Candidate	Based on aerial imagery and available ELC data, a combination of forest and upland habitats are present within the larger study area. The study area contains fields and adjacent woodlands >20 ha that may provide suitable habitat for raptors. Red-tailed Hawk, Northern Harrier, American Kestrel and Short-eared Owl have been observed within the study area or vicinity (BSC et al. 2009). Raptor surveys have not been completed within the study area.
Bat Hibernacula	Not Present	There are no mine shafts, caves, or Karts within the study area.
Bat Maternity Colonies	Candidate	The study area contains forested areas and treed habitats (i.e., hedgerows) which contain suitable maternity habitat for bats. Targeted bat surveys have not been completed within the study area.
Turtle Wintering Area	Confirmed	The study area includes Randall Drain which has been confirmed to provide suitable habitat (NRSI 2021) for Snapping Turtle.
Reptile Hibernaculum	Candidate	Easter Gartersnake, Northern Red-bellied Snake, Northern Brownsnake, Smooth Greensnake, Eastern Ribbonsnake and Eastern Milksnake have been observed within the study area or vicinity (Ontario Nature 2018). No targeted snake surveys have been completed within the study area.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	Candidate	Cliff Swallow and Northern Rough-winged Swallow have been observed within the study area or vicinity (BSC et al.2009).
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	Candidate	Based on aerial imagery and available ELC data, swamp communities are present within the larger study area. Great Blue Heron and Green Heron have been observed within the study area or vicinity (BSC et al. 2009).
Colonially - Nesting Bird Breeding Habitat (Ground)	Not Present	The study area does not contain suitable islands or peninsulas in open water or marshy areas.
Migratory Butterfly Stopover Areas	Not Present	The study area is not within 5km of Lake Ontario.
Landbird Migratory Stopover Areas	Not Present	The study area is not within 5km of Lake Ontario.
Deer Yarding Areas	Possible	No Deer Yarding Areas have been mapped by the MNRF in the study area.
Deer Winter Congregation Areas	Not Present	No Deer Wintering Areas have been mapped by the MNRF in the study area.

Significant Wildlife Habitat Type	Presence Within Study Area	Assessment Details
Rare Vegetation Communities		
Cliff and Talus Slopes	Not Present	Based on aerial imagery interpretation and knowledge of the study area, there are no cliff or talus slopes present.
Sand Barrens	Not Present	Based on aerial imagery interpretation and knowledge of the study area, there are no sand barrens present.
Alvar	Not Present	Based on aerial imagery interpretation and knowledge of the study area, there are no alvars present.
Old Growth Forest	Not Present	Based on aerial imagery interpretation and knowledge of the study area, there are no old growth forest habitats present.
Savannah	Not Present	Based on aerial imagery interpretation and knowledge of the study area, none of the listed ELC Communities are present.
Tallgrass Prairie	Not Present	Based on aerial imagery interpretation and knowledge of the study, none of the listed ELC Communities are present.
Other Rare Vegetation Communities	Not Present	No other rare vegetation communities are present within the study area based on aerial imagery interpretation and knowledge of the study area.
Specialized Wildlife Habitat		
Waterfowl Nesting Area	Candidate	Based on aerial imagery interpretation and available ELC mapping, upland areas adjacent to wetland areas (including PSW) are present. American Black Duck, Bluewinged Teal, Wood Duck, Hooded Merganser and Mallard have been documented within the study area or vicinity (BSC et al. 2009). Breeding bird surveys have not been completed within the entire study area.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Candidate	Candidate nesting / foraging / perching habitat for Osprey and potentially suitable nesting / foraging / perching for Bald Eagle is present along the Grand River. Targeted bird surveys have not been completed within the study area.
Woodland Raptor Nesting Habitat	Not Present	No wooded areas with >10 ha of interior habitat (200m buffer) is present within the study area. Cooper's Hawk, Sharpshinned Hawk have been documented within the study area or vicinity (BSC et al. 2009).
Turtle Nesting Areas	Candidate	Based on aerial imagery interpretation, exposed soil adjacent to marsh communities may be present in the larger study area. Midland Painted Turtle and Snapping Turtle have been documented within the study area or vicinity (Ontario Nature 2018).
Seeps and Springs	Candidate	Seeps/springs may occur within the forested areas of the study area. Wild Turkey, Ruffed Grouse, White-tailed Deer and Salamander spp. have been observed within the study area or vicinity (BSC et al. 2009, Dobbyn 1994, Ontario Nature 2018).

Significant Wildlife Habitat Type	Presence Within Study Area	Assessment Details
Amphibian Breeding Habitat (Woodland)	Confirmed	This SWH was confirmed in the Breslau Wetland Complex PSW north of the airport (NRSI 2021). SWH was confirmed at ANR-004 (Map 3b) by Call Level 3 of two listed species: Gray Treefrog and Spring Peeper.
Amphibian Breeding Habitat (Wetland)	Candidate	Based on aerial imagery interpretation and available ELC mapping suitable swamp and marsh communities may be present within the northern half of the study area. Eastern Newt, American Toad, Spotted Salamander, Blue-spotted Salamander, Gray Tree frog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog and Bullfrog have been documented within the study area or vicinity (Ontario Nature 2018).
Woodland Area-Sensitive Bird Breeding Habitat	Candidate	Based on aerial imagery interpretation and available ELC mapping, large forest and swamp communities are present within the northern half of the study area Yellow-Bellied Sapsucker, Red-breasted Nuthatch, Veery, Blue-headed Vireo, Black-throated Green Warbler, Ovenbird, Scarlet Tanager and Winter Wren have been documented within the study area or vicinity (BSC et al. 2009). Cerulean Warbler and Canada Warbler have the potential to occur in Waterloo Region (MNRF 2018). Breeding bird surveys conducted by NRSI in 2023 found possible breeding by Veery, but no other woodland area sensitive species.
Habitat for Species of Conservation Concern		
Marsh Bird Breeding Habitat	Candidate	Based on aerial imagery interpretation and available ELC mapping, suitable marsh communities may be present. American Bittern, Virginia Rail, Sora, Common Gallinule, American Coot, Pied-billed Grebe, Marsh Wren and Green Heron have been observed within the study area or vicinity (BSC et al. 2009). Targeted breeding bird surveys were not been completed within suitable ELC ecosites.
Open Country Bird Breeding Habitat	Not Present	Based on aerial imagery interpretation and available ELC mapping, suitable meadow communities may be present within the study area. However, these meadows are less than 30 ha in size. All of the target species have been observed within the study area or vicinity (BSC et al. 2009).
Shrub/Early Successional Bird Breeding Habitat	Not Present	Areas with suitable successional habitat (CUT, CUS or CUW) within the study area are likely too small to support candidate or confirmed habitat.
Terrestrial Crayfish	Confirmed	Suitable habitat for terrestrial crayfish is present in the wetland habitats within the study area. Terrestrial Crayfish chimneys were observed by NRSI around wetlands in 2019.

Significant Wildlife Habitat Type	Presence Within Study Area	Assessment Details
Special Concern and Rare Wildlife Species	Confirmed	Several Species of Conservation Concern (Special Concern or S Ranks S1-S3) were reported within the study area (see SAR/SCC screening and species lists for more information). Breeding bird surveys detected two species of SCC.
Animal Movement Corridors		
Amphibian Movement Corridors	Candidate	Candidate amphibian breeding SWH was identified as present within the study area. Movement corridors may be present along the watercourses within the study area. Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog and Bullfrog have been documented from the study area or vicinity (Ontario Nature 2018). Amphibian Breeding Habitat (Woodland) was confirmed at ANR-004 (Map 3b).
Deer Movement Corridors	Not Present	No suitable wintering habitat in the study area; therefore, there is no potential for deer movement corridors.

5.5 Fish Habitat

Fish habitat as defined in the *Fisheries Act*, means spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

Development or site alteration within fish habitat is not permitted under the PPS except in accordance with legislation and policies administered by the provincial and federal governments for the purpose of fisheries protection (including fish and fish habitat), and related, scientifically established standards such as water quality criteria for protecting lake trout populations (OMMAH 2020). Specifically, development and site alteration within watercourses and their associated fish habitat are prohibited unless permitted by the GRCA and DFO. Limiting works in and around water will limit the potential need for project Authorization under the federal *Fisheries Act*.

5.6 Buffers

Buffers are typically required for natural heritage features such as woodlands, wetlands, significant wildlife habitats, and watercourses to protect them from impacts during development and to provide long-term protection to their form and function. Woodland buffers are prescribed based on protecting the trees and their root zones as well as providing associated open habitats required by forest species or for movement. Wetland and watercourse buffers are required to

protect the form and function of these features and the species that inhabit them. Significant woodlands, PSWs, non-PSWs, unevaluated wetlands, SWH, and watercourses which provide direct fish habitat, are present within the study area. The East Side Lands (Stage 2) Master Environmental Servicing Plan provides recommended buffers for these features within the study area (WSP & MMM Group 2016). Rationale for the recommended setbacks and buffer management measures were based on:

- Analysis of natural heritage features and functions, including consideration of the specific requirements and sensitivities of: vegetation communities and flora; wildlife breeding, foraging and movement habitat; and aquatic resources.
- Anticipated land uses in a future urban context, including roads, trails, development and required infrastructure.
- Relevant policy and guideline documents (e.g., Natural Heritage Reference Manual [OMNR 2010]; Greenlands Network Implementation Guideline. Guideline for Determining Buffers around Environmental Features [Region of Waterloo 2016; How Much Habitat is Enough? [Environment Canada 2004]).

Recommended development setbacks are shown on Map 1 and listed below:

- Provincially Significant Wetland: 30 m
- Evaluated Non-PSW Wetland: 15 m
- Region of Waterloo Core Environmental Features (includes SWH): 15 m
- Locally Significant Natural Area / Feature: 10m
- Non-Significant Wooded Area: 10 m
- Regulated Coolwater Watercourse: 20 m
- Regulated Coldwater Watercourse: 30 m
- Floodplain: no set-back, edge of floodplain represents development setback limit.

It is recommended that these standard buffer widths be considered during detailed design for the proposed undertaking.

Please note that woodland dripline and wetland boundaries have not yet been delineated or confirmed/reviewed in the field. This is recommended to be completed at the design detail stage and prior to the initiation of any construction activities.

6.0 Impact Analysis

The following impact analysis is based available background information and the 2023 surveys completed by NRSI. As certain sections of the preferred sanitary servicing infrastructure are based on assumed road alignments (Map 5), some impact details will be determined at future stages of the Municipal Class EA planning process which will rely on future Environmental Impact Study results and approvals. In such cases, recommendations are made for consideration at future stages in the process.

6.1 Proposed Undertaking

A total of 11 trunk sewer alignment options, consisting of 4 main trunk alignments (with alignment #3 having four variations and alignment #4 having five variations) were considered to service the entire study area (Map 4). The 11 alternative sewer alignments were created on the assumption that as lands develop over time and existing roads are upgraded, new sanitary sewers can be built within the right-of-way boundaries for existing and proposed road corridors. Consequently, technical and economic factors played a significant role in selecting the preferred trunk alternative, while the ecological impacts were deemed negligible.

The preferred trunk sewer alignment is detailed on Map 5. The alignment will extend from future development lands north of Victoria Street North south along future Street 'M' and Kramp Road, along Wurster Place and an assumed road extension to Menno Street at Lonsdale Drive. From there the sewer will extend along Lonsdale Drive south to the bend, where it will split. One branch will extend west across the airport lands and along Jetliner Court to Fountain, and along Fountain to Kossuth. The other branch will go east through airport lands along Lonsdale Dr., south along Cober, and then west along Kossuth where the two branches will converge. This alignment was selected because it allows for a sanitary system that has a gravity outlet and does not require a large Lift Station at the downstream end near Fountain and Kossuth.

6.2 Approach to Impact Analysis

Potential impacts arising from the proposed sewer realignment are determined by comparing the details of the proposed undertaking with the characteristics of the existing natural features and their functions. Where the development limits overlap with the natural features or indirectly affect their functions, impacts may arise. The following is a description of the types of impacts which will be discussed.

- Direct impacts to the natural features within the study area associated with disruption or displacement caused by the actual proposed 'footprint' of the development, including impacts caused by site grading and vegetation removal.
- Indirect impacts associated with changes in site conditions such as drainage, water balance and water quantity/quality, and effects of construction on adjacent natural features and habitats.
- Induced impacts associated with post-construction use of the development such as disturbance or degradation of adjacent natural features and species habitats caused by increased use of the area.

6.3 Direct Impacts

As the proposed trunk alignment will occur within existing or future road networks, direct impacts are expected to be minor for natural features. However, further studies and delineation of natural heritage features will likely be required before the Detailed Design stage is finalized. At the Detailed Design stage, wetlands and significant woodlands within or near the realignment footprint will need to be delineated and verified by GRCA and Regional staff.

The following is a list of potential sources of direct impacts associated with the proposed trunk alignment:

- Tree and vegetation removal;
- Site grading;
- Aquatic Features and fish habitat;
- Development footprint; and
- Wildlife displacement due to construction

6.3.1 Tree and Vegetation Removal

For the trunk alignment options 3b-opt and 3d (Map 5), trees will likely be removed during the construction of the proposed road extension to Menno Street, specifically trees within the Breslau Wetland Complex. To connect Wurster Place with Menno Street, the proposed road would extend off Wurster Place and bisect the PSW at the least impactful point. Additional tree removal may be required where the proposed alignment crosses existing agricultural hedgerows and right-of-way trees. However, it is expected that the trunk alignments will primarily affect meadows and agricultural habitats.

A fulsome tree inventory should be completed at a future point in the process to identify trees required for removal, retention and final details should be included in a Tree Preservation Plan at the Detailed Design stage.

The following mitigation measures are recommended and will reduce negative residual impacts as a result of vegetation removal:

- The limit of the alignment development should be clearly delineated in the field prior to construction beginning;
- Temporary Tree Protection Fencing (TPF) should be installed along the buffers to woodlands and PSW's adjacent to the proposed development. Specifically, along the assumed road extension to Menno Street and Longsdale Road. TPF must be installed and inspected by a Certified Arborist prior to construction and maintained during construction;
- Any limbs or roots of trees to be retained which are damaged during construction should be pruned using appropriate arboricultural techniques. Hazard trees should be identified by a Certified Arborist or tree professional and removed as warranted;
- TPF should be inspected on a regular basis by an Environmental Inspector or qualified biologist and should be inspected by a Certified Arborist or qualified other to ensure no roots or limbs are damaged during installation;
- The limit of construction should be inspected by a qualified biologist on a regular basis to document any potential negative impacts to the woodland (e.g., construction garbage, ineffective boundary markings, erosion, etc.);
- Vegetation removal should occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service. The peak breeding period for birds in southern Ontario extends from approximately April 1 through August 31 (CWS 2018);
- The Ministry of Environment, Conservation and Parks (MECP) should be consulted to confirm approach to removal of any trees that provide potential bat habitats to avoid contravention of the ESA. Correspondence with the MECP regarding the removal of candidate SAR bat roosting trees should be shared with the other reviewing agencies;
- It is recommended that planting of new trees be incorporated into the Detailed Design stage in order to compensate for any tree loss;

- Suitable regionally native species should be selected for planting, and these should be maintained appropriately; and
- The retained natural areas of the Breslau Wetland Complex should be enhanced through the removal of non-native plant species, which will improve the woodlands resilience to the proposed disturbance that is likely to occur to from tree removal and sewer network installation.

6.3.2 Site Grading

A proposed grading plan is not yet available, and thus cannot inform this EIS. However, general potential impacts associated with site grading can be mitigated as follows:

- The limit of all grading should be protected by heavy-duty silt fencing in areas around isolated features or isolated trees to be retained. Adjacent to wetland buffers, heavy-duty fencing is to be doubled; and
- Grading areas are to be revegetated as soon as possible to minimize erosion and should consist of an herbaceous seed mix that is complementary to the surrounding vegetation communities and comprised entirely of native species.

6.3.3 Aquatic Features and Fish Habitat

Fish habitat, both direct and indirect, is present within the subject lands, presented by the branches of Randall and Breslau Drains, and their tributaries. The proposed sewer and forcemain alignment will require the replacement of existing watercourse crossings (i.e. culverts) at four (4) locations along route 3b-opt and five (5) locations on route 3d (Map 5). Potential impacts to fish and fish habitat may include a direct loss of fish habitat, temporary disturbances to direct and indirect fish habitat, direct injury to fish as a result of construction activity, or indirect changes to fish habitat that may occur in the long-term. The DFO provides measures to protect fish and fish habitat and recommended codes of practice to ensure compliance with the *Fisheries Act*. If all of the measures can be followed, then further review by the DFO is not required. However, if all recommended mitigation measures cannot be implemented completely, a Request for Review must be initiated from the DFO.

A high-level aquatic habitat assessment was carried out to determine the presence of fish habitat and to identify if the proposed work has the potential to impact aquatic habitat in the study area. This assessment determined that the recommended mitigation measures and codes of practice outlined by the DFO to protect fish and fish habitat are not feasible; as the

proposed culvert replacements include the expansion and improvement of the existing culvert structures, and riparian vegetation removal and in-water works will be required. It is recommended that a Request for Review be submitted to the DFO for approval at the Detailed Design stage, when full details of the watercourse crossing design are known.

The following mitigation measures are recommended to reduce negative direct and residual impacts as a result of the proposed culvert replacements:

- At the Detailed Design stage, a Request for Review should be submitted to the DFO to confirm that the proposed avoidance and mitigation measures are appropriate. The response from the DFO will be provided as a Letter of Advice;
- Follow the Pathways of Effects and Codes of Practice outlined by the DFO to ensure appropriate mitigation measures are followed and implemented;
- During the construction phase complete a fish relocation within the vicinity of each culvert replacement, the fish relocation should be completed prior to any in-water works at any of the proposed culvert replacements.
- In-water works should not be completed between March 15 - July 15th to prevent potential impacts to spawning fish, developing eggs and fry;
- Any temporary stockpiled soil, construction debris, etc., should be stockpiled at least 30m from the watercourse and should be contained properly;
- Removal of riparian vegetation should be avoided where possible, following construction, any areas of exposed soil adjacent to the watercourse should be re-vegetated with appropriate native plant species;
- Ensure downstream flows at each proposed culvert crossing are maintained at all times by implementing a dewatering and pumping plan, to be developed by a qualified engineer and reviewed by a qualified biologist. Settling areas or filtration bags should be utilized, as necessary, to prevent sedimentation to any watercourse;
- A comprehensive ESC plan must be developed by a qualified engineer and implemented during construction to ensure sediment does not enter the watercourse during construction. Sediment fencing should be installed prior to the initiation of construction and maintained over the course of the project. ESC measures should be monitored by an environmental monitor on a regular basis (e.g. weekly) and following precipitation events to ensure it is functioning correctly.

- Develop an Emergency Spill Response Plan to be implemented in the event of a spill of deleterious substances.

6.3.4 Development Footprint

The proposed development footprint overlaps with candidate SWH habitat features and confirmed SWH and SAR habitat features located within the subject lands and study area.

The following SWH types are considered candidate within the Breslau Wetland Complex (Appendix II).

- Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)
- Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)
- Wildlife Habitat: Amphibian Breeding Habitat (Woodland)
- Wildlife Habitat: Marsh Bird Breeding Habitat
- Wildlife Habitat: Bat Maternity Colonies
- Woodland Area-Sensitive Bird Breeding Habitat

Therefore, detailed surveys to confirm the presence/absence of these habitats within the proposed area of impact are recommended at the Detailed Design stage and mitigation measures should be addressed within an EIS. The proposed field surveys should be outlined in a Terms of Reference and submitted to the Region of Waterloo.

No other areas of candidate or confirmed SWH are proposed to be impacted by the selected alternate trunk alignment.

NRSI field studies confirmed habitat for two Special Concern and Rare Wildlife Species.

- Eastern Wood-pewee – provincial species of Special Concern
- Wood Thrush – provincial species of Special Concern and federally Threatened

The 2023 observations for these species are located outside of the proposed areas of impact. However, it is likely that these species are also breeding within the Breslau Wetland Complex which provides similar FOD and SWD habitat. Therefore, it is recommended that proposed vegetation removal within the PSW is completed outside of the breeding and nesting season for migratory birds (April 1-August 31).

Habitat for two bird SAR was noted within the study area. Eastern Meadowlark habitat has the potential to be impacted during the installation of the preferred trunk alignment along Longsdale Drive. It is also recommended that the proposed works within meadow habitats be completed outside of the breeding and nesting season for migratory birds. If works are proposed within the breeding and nesting season, targeted surveys for Eastern Meadowlark should be completed following Bobolink/Eastern Meadowlark Survey Methodology (MNRF 2015) to avoid contravention of the ESA (2007).

Although the Henslow's Sparrow was observed calling in suitable breeding habitat during more than one breeding bird survey, this observation has been categorized as a rare sighting of a vagrant male. The last known observation of breeding Henslow's Sparrow was in 1946 for the Region of Waterloo (eBird 2023). A female was not observed within the study area and therefore impacts are not anticipated to Henslow's Sparrow habitat.

Targeted surveys for bat SAR habitat were not completed for the study area or subject lands. It is recommended that leaf off assessments be conducted for all trees located within the determined area of impact. The bat habitat assessments are to be completed in accordance with the guidelines outlined in the Species at Risk Bats Survey Note 2022 (MECP 2022a) and the Survey Protocol for Maternity Roost Surveys (Forests/Woodlands) (MECP 2022b).

6.3.5 Wildlife Displacement

The proposed development will temporarily displace wildlife species that are currently using the areas surrounding the alternate trunk route, while the roads and sewer lines are under construction. Given that the majority of the habitats along the proposed alignment are considered edge habitats, species are expected to return to the adjacent natural areas post-development and/or utilize the larger areas of undisturbed habitats within the study area. In addition, generalist species in these areas are already accustomed to some level of disturbance from vehicle traffic along the existing road infrastructure that will be used.

The following mitigations are proposed to avoid negative impacts to wildlife:

- Vegetation removal should occur outside of the breeding and nesting season for migratory birds (April 1-August 31);
- Erosion and sediment control (ESC) fencing is to be erected along the limit of development prior to any on-site works to ensure that construction activities and equipment are maintained outside of the protected areas and their buffers;

- Wildlife exclusion fencing should be installed around the perimeter of the construction zone prior to the initiation of construction activities in order to exclude herpetofauna from the construction zone. This is particularly important for proposed works adjacent to the Breslau Wetland Complex. Fencing should follow the guidelines outlined in the documents, Reptile and Amphibian Exclusion Fencing (MECP 2022c) and Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (OMNRF 2016); and
- Wildlife salvages should be completed (led by a qualified biologist) during the active season for herpetofauna, which is generally from early spring until late fall, within the fenced area prior to the initiation of any construction activities to relocate any individuals that may have become trapped inside the development area during fence installation.

6.4 Indirect Impacts

The following section outlines potential sources of indirect impacts associated with the proposed development:

- Sedimentation and erosion; and
- Indirect impacts to wildlife and vegetation.

6.4.1 Sedimentation and Erosion

During construction, areas of bare soil will be exposed, which have the potential to erode during rainfall events and impact adjacent natural features. In the event of a heavy rain, sediment-laden runoff can enter adjacent natural areas by way of overland flow. In order to protect off-site natural features from potential impacts due to sediment, an Erosion and Sediment Control (ESC) Plan must be developed and implemented prior to any construction activities for the installation of the alternate sewer route.

During the site grading work, suitable sedimentation controls will be required to help control and reduce the turbidity of run-off water which may flow towards the surface water features. As construction work progresses at the site, regular maintenance and additional sedimentation measures may be required to limit the effect of siltation of run-off water in localized areas. The following mitigation measures should be followed:

- Develop and implement an Erosion and Sediment Control Plan prior to construction. Siltation control measures such as silt fencing, and tree protection fencing are recommended;
- Disturbed areas should be kept to a minimum and re-vegetated in a reasonable timeframe in order to minimize dust;
- Inspection and maintenance of the installed Erosion and Sediment measures throughout the duration of construction, to ensure they are functioning as originally intended; and
- An environmental monitoring program is recommended to ensure that the sediment and erosion control measures are installed, maintained and functioning as intended.

6.4.2 Indirect Impacts to Wildlife and Vegetation

Indirect disturbances can stress natural features and weaken their ecological integrity. In these states, natural features are more prone to the establishment and proliferation of invasive, non-native species such as Common Buckthorn, which is present within the study area. Proliferation of invasive, non-native species within natural communities decreases their ecological value by suppressing native species, decreasing biodiversity, and reducing habitat suitability. The proposed alignment has been developed to maintain and buffer the more important natural features within the study area by utilizing existing and proposed road networks. Potential indirect impacts to wildlife in the retained natural areas may arise from noise and dust associated with construction activities. Indirect impacts associated with construction are predicted to be minimized, localized, and temporary, and it is expected that displaced wildlife species will return to the vicinity of the development footprint following construction. Therefore, no negative impacts to wildlife from noise and dust are expected. The following mitigation measures will lessen indirect impacts:

- In order to suppress dust, areas of bare soil should be moistened with water during construction activities to ensure that the amount of dust within the subject property is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers;
- Disturbed areas with exposed soils should be kept to a minimum and re-vegetated with an approved seed mix in a reasonable timeframe in order to stabilize soils and minimize dust;
- All machinery, storage and refueling to be maintained outside of the natural features and their buffers;

- Daily timing of construction activities should be limited to between 0700 and 1900 to avoid noise-related impacts during construction;
- In order to prevent wildlife from entering the development area, permanent wildlife fencing should be considered in areas of high wildlife diversity. These measures should be refined at the Detailed Design stage through the submission of an EIS.

6.5 Induced Impacts

Induced impacts are described as those that are not directly related to the construction or operation of the facilities in question, but rather arise from the use of the natural areas as a result of the development. Major induced impacts are not anticipated from the proposed trunk sewer alignment, but rather the activities that are facilitating the route installation such as updating and creating new road infrastructure. New roads will likely cause a potential increase in wildlife vehicle collisions. The following mitigation measures are recommended:

- Road mortality surveys should be completed along the anticipated route to determine the suitable placement of road signage which should indicate where wildlife crossings are present and alert people to slow down; and
- A crossing structure in accordance with *Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario* (OMNRF 2016) should be considered during the installation of the proposed road extension to Menno Street, specifically where the road proposes to bisect the Breslau Wetland Complex. Crossing structures can play an integral role in mitigating the impacts of roads on amphibian and reptiles in Ontario.

7.0 Summary

Natural Resource Solutions Inc. (NRSI) was retained by Associated Engineering (Ont.) Ltd. in March 2023 to complete a natural heritage inventory and Environmental Impact Study (EIS) for the East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (EA). The focus of the Woolwich Sanitary Servicing EA study as a whole is to identify the future sanitary servicing infrastructure that will be required, with a focus on the alignment of the main trunk sewer and location of a new pumping / lift station at the southwest limits.

The selected trunk sewer alignment was created on the assumption that as lands develop over time and existing roads are upgraded, new sanitary sewers can be built within the existing and proposed road networks. A combination of alignment 3b-opt and 3d was selected. The alignment proposes to extend from future development lands north of Victoria Street North south along future Street 'M' and Kramp Road, along Wurster Place and an assumed road extension to Menno Street at Lonsdale Drive. From there the sewer will extend along Lonsdale Drive south to the bend, where it will split. One branch will extend west across the airport lands and along Jetliner Court to Fountain, and along Fountain to Kossuth. The other branch will go east through airport lands along Lonsdale Dr., south along Cober, and then west along Kossuth where the two branches will converge.

Recommendations have been provided based on the described high-level plan. As the scope of the project changed and NRSI did not specifically survey the entire study area, it is recommended that additional targeted surveys are completed along the selected trunk sewer alignment route. These surveys will better inform potential impacts to SAR and SWH. It is recommended that a Terms of Reference is submitted to Region of Waterloo to document the project scope as well as proposed field surveys and their methodologies. Wetlands and significant and non-significant woodlands within or near the realignment footprint will need to be delineated and verified by GRCA and Regional staff as well.

The implementation of effective mitigation measures will ensure that potential negative impacts to the vegetation, wildlife, and aquatic resources within the study area are minimal. Where possible, riparian, wetland and woodland enhancement should be considered as some habitat loss is proposed within future road network plans.

The selected alternative relied on technical and economic factors, rather than natural, social and cultural. Natural factors are likely to provide further refinements at the detailed design stage when further studies and delineations have been conducted.

8.0 References

- Alberta Sustainable Resource Development (ASRD). 2002. Handbook of Inventory Methods and Standard Protocols for Surveying Bats in Alberta. Government of Alberta.
- Bird Studies Canada (BSC), Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas Website. Available:
<https://www.birdsontario.org/jsp/datasummaries.jsp>
- Chapman, L.J. and D.F. Putnam. 1984. The Physiography of Southern Ontario 3rd Edition. Ontario Ministry of Natural Resources. Toronto, Ontario. Ontario Geological Survey, Special Volume 2.
- Canadian Wildlife Service (CWS). 2018. Core Breeding Periods in Ontario for Birds Protected Under the Migratory Birds Convention Act, by Bird Conservation Region (BCR) and Habitat Type. Ontario Region.
- Dougan and Associates (Dougan). 2019. Map 2: Vegetation Communities Breslau Secondary Plan. December 16, 2019.
- Government of Canada. 1985. Fisheries Act (R.S.C., 1985, c. F-14). Revised in 2019.
- Government of Canada. 1994. Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22).
- Government of Canada. 2002. Species at Risk Act (S.C. 2002, c. 29).
- Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available at: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>
- Government of Ontario. 2007. Endangered Species Act. S.O. 2007, c.6.
- Government of Ontario. 2019. Fish and Wildlife Conservation Act. Page S.O. 1997, c. 41.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Ministry of the Environment, Conservation, and Parks (MECP). 2023. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-05-23. Available:
<https://www.ontario.ca/page/species-risk-ontario>
- Ministry of Environment, Conservation and Parks (MECP). 2022a. Maternity Roost Surveys (Forests/Woodlands).
- Ministry of Environment, Conservation and Parks (MECP). 2022b. Bat Survey Standards Note.
- Ministry of Environment, Conservation and Parks (OMECP). 2022c. Reptile and amphibian exclusion fencing. <https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing>

- Ministry of Natural Resources and Forestry (MNRF). 2015. Eastern Meadowlark/Bobolink Survey Methodology. Aurora District MNRF.
- Ministry of Natural Resources and Forestry (MNRF). 2016. Survey Protocol for Ontario's Species at Risk Snakes. Ontario Ministry of Natural Resources and Forestry, Species Conservation Policy Branch. Peterborough, Ontario. ii + 17 pp.
- Ministry of Natural Resources and Forestry (MNRF). 2023a. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-map>
- Ministry of Natural Resources and Forestry (MNRF). 2000. Significant Wildlife Habitat Technical Guide. Last updated October 2000.
- Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Ecoregion 6E Criterion Schedule: Addendum to Significant Wildlife Habitat Technical Guide. MNRF, January 2015.
- MMM Group and WSP. 2016. East Side Lands (Stage 2) Master Environmental Servicing Plan. Technical Appendix: Draft Randall and Breslau Drains Subwatershed Study.
- Natural Resource Solutions Inc. (NRSI). 2019. Natural Environment Study Greenhouse Road – Highway 7 Intersection, MTO EA. January 14, 2019.
- Natural Resource Solutions Inc. (NRSI). 2021a. Region of Waterloo International Airport Runway Extension Scoped Environmental Impact Study. June 2021
- Natural Resource Solution Inc. (NRSI). 2021
- Ontario Ministry of Natural Resources (OMNR). 2010. Natural Heritage Reference Manual. Second Edition.
- Ontario Ministry of Natural Resources and Forestry (OMNRF). 2000. Significant Wildlife Habitat Technical Guide. October 2000.
- Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015a. Land Information Ontario (LIO) Data Warehouse. Available at: https://www.gisapplication.lrc.gov.on.ca/LIODataWarehouse/DDS_Index.html?site=DDS&viewer=DDS&locale=en-US
- Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015b. Significant Wildlife Habitat Ecoregion 6E Criterion Schedule: Addendum to Significant Wildlife Habitat Technical Guide. OMNRF, January 2015
- Ontario Ministry of Natural Resources and Forestry (OMNRF). 2016. Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario. https://files.ontario.ca/bmp_herp_2016_final_final_resized.pdf
- Ontario Nature. 2019. Ontario Reptile and Amphibian Atlas Program: Interactive Range Maps. Available: <https://www.ontarioinsects.org/herp/index.html>

- Ontario Odonata Atlas Database. 2023. Natural Heritage Information Centre, Ontario Ministry of Natural Resources and Forestry. Species list from atlas squares 17MH18, 17MH26, 17MH27, and 17MH28 queried on April 12, 2021.
- Taylor, P. D., L. Fahrig, K. Henein, and G. Merriam. 1993. Connectivity is a vital element of the landscape structure. *Oikos* 68:571–573.

Appendix I
Species at Risk and Species of Special Concern Screening

#3119 East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9,?}
Plants										
<i>Castanea dentata</i>	American Chestnut	E	Schedule 1	S1S2	END	MNRF 2018	Moist to well drained forests on sand, occasionally heavy soils.	Forests within the Study Area may provide suitable habitat for this species.	Yes	No
<i>Juglans cinerea</i>	Butternut	E	Schedule 1	S2?	END	MNRF 2018	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	Forests and hedgerows within Study Area may provide suitable habitat for this species.	Yes	No
<i>Panax quinquefolius</i>	Ginseng	E	Schedule 1	S2	END	MNRF 2018	Deep leaf litter in rich, moist deciduous woods, especially on rocky, shaded cool slopes in sweet soil.	Forests within the Study Area may provide suitable habitat for this species.	Yes	No
<i>Arisaema dracontium</i>	Green Dragon	SC	Schedule 3	S3	SC	MNRF 2018	Somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees.	Forests within the Study Area may provide suitable habitat for this species.	Yes	No
Birds										
<i>Empidonax virescens</i>	Acadian Flycatcher	E	Schedule 1	S2S3B	END	MNRF 2018	Mature, shady, deciduous forests; heavily wooded ravines; creek bottoms or river swamps; availability of good quality habitat is limiting factor; needs at least 30 ha of forest.	Forests within the Study Area may be large enough for this species; however the amount of interior forest is limited.	No	No
<i>Haliaeetus leucocephalus</i>	Bald Eagle	NAR	-	S2N, S4B	SC	MNRF 2018	Require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching. 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. They usually nest in large trees such as pine and poplar.	Given Study Area's proximity to the Grand River, there may be suitable habitat for this species.	Yes	No
<i>Riparia riparia</i>	Bank Swallow	T	Schedule 1	S4B	THR	Bird Studies Canada et al. 2008; MNRF 2018; MMM 2014	Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	Suitable foraging habitat is present within the Study Area. This species was also documented foraging within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes - This species was documented by NRSI foraging over the agricultural field near BMB-006
<i>Tyto alba</i>	Barn Owl	E	Schedule 1	S1	END	MNRF 2018	Open areas such as fields, agricultural lands with scattered woodlots, buildings and/or orchards; grasslands, sedge meadows, marshes; snow-cover limits ability to catch prey; species has intolerance to severe cold; nests in hollow trees and live trees >46 cm dbh; also nests in barns, abandoned buildings.	There may be suitable habitat. The Study Area are on the City's boundary, adjacent to a rural area. The open fields and meadows could provide suitable foraging habitat, while treed area may provide suitable nesting habitat.	Yes	No

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9?}
<i>Hirundo rustica</i>	Barn Swallow	T	Schedule 1	S4B	THR	Bird Studies Canada et al. 2008; MNRF 2018; MMM 2014	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	Suitable foraging habitat is present within the Study Area. This species was also documented foraging within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes, this species was documented foraging within the Study Area by NRSI.
<i>Chlidonias niger</i>	Black Tern	NAR	-	S3B	SC	MNRF 2018	Black Terns build floating nests in loose colonies in shallow marshes, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows; returns to same area to nest each year in loose colonies; must have shallow (0.5 to 1 m deep) water and areas of open water near nests; requires marshes >20 ha in size; feeds over adjacent grasslands for insects; also feeds on fish, crayfish and	There are no marshes large enough within the Study Area to provide suitable habitat for this species.	No	No
<i>Dolichonyx oryzivorus</i>	Bobolink	T	Schedule 1	S4B	THR	Bird Studies Canada et al. 2008; MNRF 2014; MNRF 2018; MMM 2014	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha.	There is suitable open grasslands within the Study Area and this species was confirmed breeding within the Study Area (WSP & MMM Group, 2017, 2018).	Yes	No
<i>Cardellina canadensis</i>	Canada Warbler	T	Schedule 1	S4B	SC	MNRF 2018	Canada Warblers breed in mixed conifer and deciduous forest with a shrubby and mossy understory often near water. They frequent aspen and poplar forests in Canada, and forested wetlands in the central part of their range. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Suitable forest habitat, with a shrubby and mossy understory may be present.	Yes	No
<i>Setophaga cerulea</i>	Cerulean Warbler	E	Schedule 1	S3B	THR	MNRF 2018	Mature deciduous woodland of Great Lakes- St. Lawrence and Carolinian forests, sometimes coniferous; swamps or bottomlands with large trees; area sensitive species needing extensive areas of forest (>100 ha)	The forests within the subject property are not large, or mature, enough to be considered suitable habitat for this species.	No	No
<i>Chaetura pelagica</i>	Chimney Swift	T	Schedule 1	S4B,S4N	THR	Bird Studies Canada et al. 2008; MNRF 2018	Nest on cave walls and in hollow trees or tree cavities in old growth forests. Also likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.	Although there are no structures with suitable chimneys for nesting by this species within the Study Area, there may be suitable foraging habitat.	Yes	No
<i>Chordeiles minor</i>	Common Nighthawk	T	Schedule 1	S4B	SC	MNRF 2018	Generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof tops).	There is suitable vegetation-free habitat within the Study Area as well as flat roof-tops	Yes	No
<i>Sturnella magna</i>	Eastern Meadowlark	T	Schedule 1	S4B	THR	Bird Studies Canada et al. 2008; MNRF 2014; MNRF 2018; MMM 2014	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	Suitable habitat is present within the Study Area. This species was also documented in suitable breeding habitat during breeding bird surveys conducted within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes, this species was documented with probable breeding evidence.

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9?}
<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	T	Schedule 1	S4B	THR	MNRF 2018	Dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaf litter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population.	The forests within the Study Area are not dry, open deciduous woodlands of suitable size (>100ha) for this species.	No	No
<i>Contopus virens</i>	Eastern Wood-Pewee	SC	Schedule 1	S4B	SC	Bird Studies Canada et al. 2008; MNRF 2018; MMM 2014	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.	Forests within the Study Area may provide suitable habitat for this species.	Yes	Yes, this species was documented with probable breeding evidence.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	T	Schedule 1	S4B	SC	MNRF 2018	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Although there are field edges, there are no large areas of early successional vegetation within the Study Area.	No	No
<i>Ammodramus savi</i>	Grasshopper Sparrow	SC	-	S4B	SC	MMM 2014	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.	Suitable habitat is present within the Study Area. This species was also documented in suitable breeding habitat during breeding bird surveys conducted within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	No
<i>Ammodramus henslowii</i>	Henslow's Sparrow	E	Schedule 1	SHB	END	MNRF 2018	It has been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest.	There is potentially suitable meadow habitat in the Study Area for this species.	Yes	Yes, a vagrant male was documented by NRSi during 2023 breeding bird surveys.
<i>Ixobrychus exilis</i>	Least Bittern	T	Schedule 1	S4B	THR	MNRF 2018	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants.	The Kosuth and Breslau Wetland Complexes may provide suitable habitat for this species.	Yes	No
<i>Parkesia motacilla</i>	Louisiana Waterthrush	T	Schedule 1	S3B	THR	MNRF 2018	Prefers wooded ravines with running streams; also woodlands swamps; large tracts of mature deciduous or mixed forests; canopy cover is essential; has strong affinity to nest sites: nests on ground.	Woodland swamps are present and may provide suitable habitat within the Study Area.	Yes	No
<i>Colinus virginianus</i>	Northern Bobwhite	E	Schedule 1	S1	END	MNRF 2018	Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; cropland growing corn, soybeans or small grains and clover or grass; well-drained sandy or loamy soil; pond edges.	Suitable habitat may be present within the agricultural fields, meadows, or woodland edges within the Study Area.	Yes	No
<i>Falco peregrinus anatum/tundrius</i>	Peregrine Falcon	SC	Schedule 1	S3B	SC	MNRF 2018	Breed in open landscapes with cliffs (or skyscrapers) for nest sites, as well as along rivers and coastlines or in cities.	There is no suitable habitat for this species within the Study Area.	No	No
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	T	Schedule 1	S4B	SC	MNRF 2018	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	Forest and forest edges within the Study Area may provide suitable habitat for this species.	Yes	No
<i>Asio flammeus</i>	Short-eared Owl	SC	Schedule 1	S2N, S4B	SC	MNRF 2018	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat.	There may be suitable marsh and grasslands habitat present within the Study Area.	Yes	No

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<i>Hylocichla mustelina</i>	Wood Thrush	T	Schedule 1	S4B	SC	Bird Studies Canada et al. 2008; MMM 2014	Mature deciduous and mixed 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.	Suitable forest habitat is present within the Study Area for this species. This species was also documented in suitable breeding habitat during breeding bird surveys conducted within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes - This species was documented by NRSI as probable breeding at BMB-013.
<i>Icteria virens</i>	Yellow-breasted Chat	E	Schedule 1	S2B	END	MNRF 2018	Dense thickets around wood edges, riparian areas, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. The Ontario population is very dependent on successional habitats of thick shrubbery.	Dense thickets, and shrubbery beside ponds and wetlands are present in the Study Area.	Yes	No
Herpetofauna										
<i>Emydoidea blandingii</i>	Blanding's Turtle	END	Schedule 1	S3	THR	MNRF 2018, Linton pers. Comm. 2020	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed.	Wetlands within the Study Area may provide suitable habitat for this species. In addition a Blanding's Turtle was observed by NRSI in June, 2020 just south of Kossuth Road within the Study Area.	Yes	No
<i>Thamnophis sauritus</i>	Eastern Ribbonsnake (Great Lakes population)	SC	Schedule 1	S4	SC	ORAA 2019; MNRF 2018	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups.	Wetlands, and adjacent upland habitats within the Study Area may provide suitable habitat for this species.	Yes	No
<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	E	Schedule 1	S2	END	ORAA 2019; MNRF 2018	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs.	Suitable habitat for this species may be present in the small fishless wetlands (breeding) and surrounding upland habitat.	Yes	No
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	SC		S5		Paragon 1994	Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Wetlands within the Study Area may provide suitable habitat for this species. This species was also documented previously on site (Paragon 1994).	Yes	Yes - Midland Painted Turtles have been observed in Study Area wetlands by NRSI in previous years.
<i>Graptemys geographica</i>	Northern Map Turtle	SC	Schedule 1	S3	SC	MNRF 2018	Rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	There are no rivers or lakes within the Study Area.	No	No
<i>Regina septemvittata</i>	Queensnake	E	Schedule 1	S2	END	MNRF 2018	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock.	There are no rivers or streams within the subject property.	No	No

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9?}
<i>Chelydra serpentina serpentina</i>	Snapping Turtle	SC	Schedule 1	S3	SC	ORAA 2019; MNRF 2018	Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Wetlands within the Study Area may provide suitable habitat for this species. This species was also documented previously within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes - Snapping Turtles have been observed in Study Area wetlands by NRSI in previous years.
<i>Ambystoma laterale</i> (2) <i>jeffersonianum</i>	Unisexual <i>Ambystoma</i> Jefferson dependent population	E	Schedule 1	S2	END	ORAA 2019; MNRF 2018	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	Suitable habitat for this species may be present in the small fishless wetlands (breeding) and surrounding upland habitat	Yes	No
<i>Pseudacris triseriata</i> pop. 2	Western Chorus Frog (Great Lakes/St. Lawrence - Canadian Shield Population)	T	Schedule 1	S3	NAR	ORAA 2019	Roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools ponds and temporary pools	Wetlands within the Study Area may provide suitable habitat for this species.	Yes	No
Mammals										
<i>Taxidea taxus jacksoni</i>	American Badger	E	Schedule 1	S1	END	MNRF 2018	Open grasslands and oak savannahs; dens in new hole or enlarged existing hole; sometimes makes food caches.	Suitable habitat for this species may be present in fields and forest edges throughout the Study Area	Yes	No
<i>Myotis leibii</i>	Eastern Small-footed Myotis	-	-	S2S3	END	Dobbyn 1994, MNRF 2018	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Trees present within the subject property may provide suitable roosting habitat. No potential hibernation sites are present	Yes	Unknown, surveys required.
<i>Myotis lucifungus</i>	Little Brown Myotis	E	Schedule 1	S4	END	Dobbyn 1994, MNRF 2018	Caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges.	Trees present within the subject property may provide suitable roosting habitat. No potential hibernation sites are present	Yes	Unknown, surveys required.
<i>Myotis septentrionalis</i>	Northern Myotis	E	Schedule 1	S3	END	Dobbyn 1994, MNRF 2018	Northern Myotis roosts within tree crevices, hollows and under the bark of live and dead trees, particularly when trees are located within a forest gap.	Trees present within the subject property may provide suitable roosting habitat. No potential hibernation sites are present	Yes	Unknown, surveys required.
<i>Perimyotis subflavus</i>	Tri-coloured Bat	E	Schedule 1	S3?	END	Dobbyn 1994, MNRF 2018	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free, warm caves, mines or rock crevices.	Trees present within the subject property may provide suitable roosting habitat. No potential hibernation sites are present	Yes	Unknown, surveys required.
Fish										
<i>Moxostoma duquesnei</i>	Black Redhorse	T	-	S2	THR	MNRF 2018	The Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools.	There are no medium-sized rivers or streams within the Study Area.	No	No

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9?}
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey (GL-USL Pop.)	SC	Schedule 1	S3	SC	MNRF 2018	The Northern brook lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.	There are no clear, coolwater streams within the Study Area.	No	No
<i>Notropis photogenis</i>	Silver Shiner	T	Schedule 3	S2S3	THR	MNRF 2014; MNRF 2018	Silver shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles.	There are no large streams within the Study Area.	No	No
Molluscs										
<i>Villosa iris</i>	Rainbow	SC	Schedule 1	S2S3	SC	MNRF 2014; DFO 2019	The Rainbow mussel prefers small to medium-sized rivers with a moderate to strong current and sand, rocky, or gravel bottoms. It is found in or near riffle areas and along the edges of vegetation in water less than one metre deep. The Rainbow mussel uses a variety of fish hosts in Ontario, including Striped shiner, Smallmouth bass, Largemouth bass, Green sunfish, Greenside darter, Rainbow darter, and Yellow perch.	There are no small to medium-sized rivers or streams within the Study Area.	No	No
<i>Lampsilis fasciola</i>	Wavy-rayed Lampmussel	SC	Schedule 1	S1	THR	MNRF 2014; DFO 2019	The Wavy-rayed lampmussel is usually found in small to medium rivers with clear water. It lives in shallow riffle areas with clean gravel or sand bottoms. The Wavy-rayed lampmussel's fish hosts are the Largemouth bass and Smallmouth bass.	There are no small to medium-sized rivers or streams within the Study Area.	No	No
Butterflies										
<i>Danaus plexippus</i>	Monarch Butterfly	E	Schedule 1	S2N, S4B	SC	MNRF 2018; Macnaughton et al. 2019	Monarch 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.	Open areas with milkweed are present within Study Area. This species was also documented in suitable breeding habitat during breeding bird surveys conducted within the Study Area previously (WSP & MMM Group, 2017, 2018).	Yes	Yes
<i>Erynnis brizo</i>	Sleepy Duskywing	-	-	S1	-	Macnaughton et al. 2019	Dry areas; usually scrubby oak barrens, woodlands or dry	Scrubby oak barrens and dry oak forests are not present within the subject property.	No	No
<i>Asterocampa clyton</i>	Tawny Emperor	-	-	S3	-	Macnaughton et al. 2019	Most typical in edge or riparian areas where hackberry trees are present. Less tolerant of suburbia compared to <i>A. celtis</i> , as hibernating larvae may be destroyed when leaves are raked.	Wetland/Riparian area within the Study Area may provide suitable habitat for this species.	Yes	No
<i>Pieris virginiensis</i>	West Virginia White	-	-	S3	SC	Macnaughton et al. 2019	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (<i>Cardamine diphylla</i>), which is a small, spring-blooming plant of the forest floor. It avoids edges and open fields in fragmented landscapes.	The woodlands within the Study Area may provide suitable habitat for this species.	Yes	No

Scientific Name	Common Name	COSEWIC ³	SARA ⁴	S-Rank ¹	COSSARO ²	Background Source	Habitat Preference ^{2,3,5,6}	Suitable Habitat Present within Study Area: Rationale	Suitable Habitat Within Study Area	Documented Within Study Area ^{7,8,9} ?
Odonates										
<i>Phanogomphus graslinellus</i>	Pronghorn Clubtail			S3		Ontario Odonata Atlas Database 2019	Occurs at slow-flowing sandy or muddy streams with or without rocks and in or out of woodland, also medium to large lakes in northern part of range. Larvae burrow in bottom substrates	There are no streams or lakes within the Study Area.	No	No
<i>Arigomphus villosipes</i>	Unicorn Clubtail			S2S3		Ontario Odonata Atlas Database 2019	Semi-permanent and artificial ponds, lakes and slow-areas of small streams with muddy bottoms.	Wetlands within the Study Area may provide suitable habitat for this species.	Yes	No
Other Insects										
<i>Bombus affinis</i>	Rusty-patched Bumble Bee	E	Schedule 1	S1	END	MNRF 2018d; MNRF 2019	Open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes. The most recent sightings have been in oak savannah, which contains both woodland and grassland flora and fauna.	Some potentially suitable open habitat exists in the Study Area, however the only recent observations in Ontario were in the Pinery Provincial Park in 2002, so it is highly unlikely.	Yes	No

¹MNRF 2016a, ²MNRF 2017a, ³Government of Canada 2017, ⁴OMNR 2000, ⁵Oldham and Brinker 2009, ⁶Reznicek et al. 2011

⁷Paragon 1994; ⁸WSP & MMM Group 2017; ⁹WSP & MMM Group 2018

Appendix II
Significant Wildlife Habitat Screening

#3119 East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment
Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					Possible	Not Present
<u>Rationale:</u> 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 SWH unless they have spring sheet water available^{exlviii}. <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat^{cxlviii}. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMiST^{cxlix} Index #7 provides development effects and mitigation measures.	The larger study area was not surveyed to identify candidate waterfowl stopover and staging areas. Based on aerial imagery interpretation and available ELC mapping, CUM1 is present. Agricultural fields within the study area may contain sheet water during spring. However, for safety purposes, airport wildlife management limits opportunities for this SWH within the Region of Waterloo airport section of the study area. No confirmed habitat was identified within the subject lands during NRSI field investigations.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)					Candidate	Not Present
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	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 SWH, 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 (eg. 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 100ⁱ or more of listed species for 7 daysⁱ, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH^{cxlix} • The combined area of the ELC ecosites and a 100m radius area is the SWH^{cxlviii} • Wetland area and shorelines associated with sites identified within the SWHTG^{cxlviii} Appendix K^{cxlix} are significant wildlife habitat. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHMiST^{cxlix} Index #7 provides development effects and mitigation measures.	Potential habitat is present in the Breslau PSW Complex (with SAF1, MAS2 and SWD vegetation communities). Canada Goose, American Black Duck, Blue-winged Teal, Hooded Merganser and Ruddy Duck have been observed within the study area or vicinity (BSC et al. 2009). Migratory bird surveys were not completed, however the subject lands do not provide suitable habitats.	
Wildlife Habitat: Shorebird Migratory Stopover Area					Not Present	Not Present
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 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 Whimbrel	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. Information Sources • 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	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) • 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 ELC shoreline ecosites plus a 100m radius area^{cxlviii} • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} • SWHMiST^{cxlix} Index #8 provides development effects and mitigation measures.	There are no beach areas, bars or seasonally flooded, muddy and un-vegetated shoreline habitats large enough within the study area or subject lands to support SWH. Spotted Sandpiper has been observed within the study area or vicinity (BSC et al. 2009).	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Raptor Wintering Area					Candidate	Not Present
<u>Rational:</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	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC Upland: CUM, CUT, CUS, CUW	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha^{cxlviii, cxlix} with a combination of forest and upland.^{xvi, xvii, xviii, xix, xx, xxi} Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands^{cxlix} Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting <u>Information Sources</u> • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	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 listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years)^{cxlix} for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} • SWHMiST^{cxlix} Index #10 and #11 provides development effects and mitigation measures.	Based on aerial imagery and available ELC data, a combination of forest and upland habitats are present within the larger study area. The study area contains fields and adjacent woodlands >20 ha that may provide suitable habitat for raptors. Red-tailed Hawk, Northern Harrier, American Kestrel and Short-eared Owl have been observed within the study area or vicinity (BSC et al. 2009). Raptor surveys have not been completed within the study area. The subject lands do not provide suitable habitat due to the presence of actively farmed agricultural fields.	
Wildlife Habitat: Bat Hibernacula					Not Present	Not Present
<u>Rationale</u> Bat hibernacula are rare habitats in 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 SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. <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 (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH. • The habitat area includes a 200m radius around the entrance of the hibernaculum^{cxlviii, ccvii} for most. • 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”^{ccv} • SWHMiST^{cxlix} Index #1 provides development effects and mitigation measures.	There are no mine shafts, caves, or Karts within the subject property or study area.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Bat Maternity Colonies					Candidate	Candidate
<u>Rationale:</u> Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	Maternity colonies can be found in tree cavities, vegetation and often in buildings ^{xxii, xxv, xxvi, xxvii, xxxi} (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario ^{xxii} • Maternity colonies located in Mature deciduous or mixed forest stands ^{ccix, ccx} with >10/ha large diameter (>25cm dbh) wildlife trees ^{ccvii} • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 ^{ccxiv} or class 1 or 2 ^{ccxii} • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred ^{ccx} <u>Information Sources</u> • 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 ELC 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 ^{ccv} • SWHMiS T ^{cxlix} Index #12 provides development effects and mitigation measures.	Study area and subject property both contain forested areas and treed habitats (i.e., hedgerows) which contain suitable maternity habitat for bats. Targeted bat surveys have not been completed within the study area.	
Wildlife Habitat: Turtle Wintering Area					Confirmed	Candidate
<u>Rationale:</u> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle <u>Special Concern:</u> Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen ^{cix, cx, cxi, cxviii} . • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <u>Information Sources</u> • EIS studies carried out by Conservation Authorities. • Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNRF ecologist or biologist • 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 ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May) ^{cvii} • Congregation of turtles is more common where wintering areas are limited and therefore significant ^{cix, cx, cxi, cxii} . • SWHMiST ^{cxlix} Index #28 provides development effects and mitigation measures for turtle wintering habitat.	The study area includes Randal Drain which has been confirmed to provide suitable habitat (NRSI 2021) for Snapping Turtle. The subject lands contain suitable ELC community classes; however, targeted turtle surveys have not been completed.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Snake Hibernaculum					Candidate	Possible
<u>Rationale:</u> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	<u>Snakes:</u> Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake <u>Special Concern:</u> Milksnake Eastern Ribbonsnake <u>Lizard:</u> <u>Special Concern</u> (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 and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC 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 locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. - Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line^{xliv, l, li, lii, cxii}. - Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. - Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii. Information Sources - In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). - Reports and other information from CAs. - Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs - 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. <u>or</u>; individuals of two or more snake spp. - Congregations of a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). <u>Note:</u> If there are Special Concern Species present, then site is SWH <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 30m buffer is the SWH^l - SWHMiST^{cxlix} Index #13 provides development effects and mitigation measures for snake hibernacula. - Presence of any active hibernaculum for skink is significant. - SWHMiST^{cxlix} Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.	Easter Gartersnake, Northern Red-bellied Snake, Northern Brownsnake, Smooth Greensnake, Eastern Ribbonsnake and Eastern Milksnake have been observed within the study area or vicinity (Ontario Nature 2018). No targeted snake surveys have been completed within the study area or subject lands.	
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					Candidate	Not Present
<u>Rationale:</u> 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 populations 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. Information Sources - Reports and other information available from CAs - Ontario Breeding Bird Atlas^{ccv} - Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ - Field Naturalist clubs	Studies confirming: - Presence of 1 or more nesting sites with 8^{cxlvix} or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. - A colony identified as SWH will include a 50m radius habitat area from the peripheral nests^{ccvii} - Field surveys to observe and count swallow nests are to be completed during the breeding season Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} - SWHMiST^{cxlix} Index #4 provides development effects and mitigation measures	Cliff Swallow and Northern Rough-winged Swallow have been observed within the study area or vicinity (BSC et al.2009). Breeding bird surveys did not detect indicator species within the subject lands.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)					Candidate	Not Present
<u>Rationale:</u> Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15m from ground, near the top of the tree. <u>Information Sources</u> • Ontario Breeding Bird Atlas^{ccv}, colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • 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 5ⁱ 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 SWH^{cc, ccvii} • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWHMiST^{cxlix} Index #5 provides development effects and mitigation measures.	Based on aerial imagery and available ELC data, swamp communities are present within the larger study area. Great Blue Heron and Green Heron have been observed within the study area or vicinity (BSC et al. 2009). Breeding bird surveys did not detect indicator species breeding within the subject lands.	
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)					Not Present	Not Present
<u>Rationale:</u> Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas^{ccv}, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from 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 Ternⁱ. • 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 area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH^{cc, ccvii} • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} • SWHMiST^{cxlix} Index #6 provides development effects and mitigation measures.	The study area and subject lands do not contain suitable islands or peninsulas in open water or marshy areas.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Migratory Butterfly Stopover Areas					Not Present	Not Present
<u>Rationale:</u> Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral <u>Special Concern:</u> Monarch	Combination of ELC Community Series: Need to have present one Community Series from each landclass: <u>Field:</u> CUM CUS CUT <u>Forest:</u> FOC FOM FOD CUP Anecdotaly, a candidate sight for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario^{cxlix}. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south^{xxxii, xxxiii, xxxiv, xxxv, xxxvi}. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlvi, cxlii. • 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^{xxxvii, xxxviii, xxxix, xl, xli}. <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)^{xliii}. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day^{xxxvii}, significant variation can occur between years and multiple years of sampling should occur^{xl, xlii}. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWHMiST^{cxlix} Index #16 provides development effects and mitigation measures.	The study area is not within 5km of Lake Ontario.	
Wildlife Habitat: Landbird Migratory Stopover Areas					Not Present	Not Present
<u>Rationale:</u> Sites with a high diversity of species as well as high number are most significant	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html 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 ELC Community Series: FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 haⁱ in size and within 5km^{iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv} of Lake Ontario. • If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant^{cxlix} • Sites have a variety of habitats; forest, grassland and wetland complexes^{cxlix}. • The largest sites are more significant^{cxlix} • Woodlots and forest fragments are important habitats to migrating birds^{ccxviii}, these features located along the shore and located within 5km of Lake Ontario are Candidate SWH^{cxlviii}. <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 woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} • SWHMiST^{cxlix} Index #9 provides development effects and mitigation measures.	The study area is not within 5km of Lake Ontario.	

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Lands
Wildlife Habitat: Deer Yarding Areas					Possible	Possible
<u>Rationale:</u> Winter habitat for deer is considered to be the main 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. ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC. Or these ELC 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 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm 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%^{cxciiv}. • OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"^{cxcv} • 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 SWH^{lvi, lvii, lviii, lix, lx, l}. • 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^{cxcv}. • If a SWH 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. • SWHMiST^{cxlix} Index #2 provides development effects and mitigation measures.	No Deer Yarding Areas have been mapped by the MNRF in the study area.	
Wildlife Habitat: Deer Winter Congregation Areas					Not Present	Not Present
<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^{exlviii}	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50ha 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 Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands^{cxlviii}. • 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^{ccxxiv}. • 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^{cxlviii}. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRⁱ. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques^{ccxxiv}, ground or road surveys, or a pellet count deer density survey^{ccxxv}. • If a SWH is determined for Deer Wintering Area of 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. • SWHMiST^{cxlix} Index #2 provides development effects and mitigation measures.	No Deer Wintering Areas have been mapped by the MNRF in the study area.	

Significant Wildlife Habitat Assessment Tables
Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Cliff and Talus Slopes					Not Present	Not Present
<u>Rationale:</u> Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	Most cliff and talus slopes occur along the Niagara Escarpment. <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 on their website • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes^{lxxviii} • SWHMiST^{cxlix} Index #21 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, there are no cliff or talus slopes present.	
Sand Barrens					Not Present	Not Present
<u>Rationale:</u> Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. 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%.	Any sand barren area, >0.5ha in size. <u>Information Sources</u> • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens^{lxxviii} • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)^l. • SWHMiST^{cxlix} Index #20 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, there are no sand barrens present.	

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Alvar					Not Present	Not Present
<u>Rationale:</u> Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 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) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema branchiatum 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 plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover^{lxxviii}.	An Alvar site > 0.5 ha in size^{lxxv}. <u>Information Sources</u> • Alvars of Ontario (2000), Federation of Ontario Naturalists^{lxxvi}. • Ontario Nature – Conserving Great Lakes Alvars^{ccviii}. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities	Field studies identify four of the five Alvar indicator species^{lxxv, cxlix} at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses^{lxxv}. • SWHMiST^{cxlix} Index #17 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, there are no alvars present.	
Old Growth Forest					Not Present	Not Present
<u>Rationale:</u> 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 Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest l. <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat^{cxlviii} • The stand will have experienced no recognizable forestry activities^{cxlviii} • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand^{lxxviii} • SWHDSS^{cxlix} Index #23 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, there are no old growth forest habitats present.	

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Savannah					Not Present	Not Present
<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%.	• No minimum size to site • Site must be restored or a natural site. • Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in ^{lxv} Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used ^{cxlviii} . • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMiST^{cxlix} Index #18 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, none of the listed ELC Communities are present.	
Tallgrass Prairie					Not Present	Not Present
<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.	• No minimum size to site • Site must be restored or a natural site. • Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in ^{lxv} Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used ^{cxlviii} . • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMiST^{cxlix} Index #19 provides development effects and mitigation measures.	Based on aerial imagery interpretation and knowledge of the study area and subject lands, none of the listed ELC Communities are present.	

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Other Rare Vegetation Communities					Not Present	Not Present
<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 SWHTG ^{cxlviii} . Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M ^{cxlviii} The OMNR/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 • Field naturalists clubs • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG ^{cxlviii} . • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST ^{cxlix} Index #37 provides development effects and mitigation measures.	No other rare vegetation communities are present within the study area based on aerial imagery interpretation and knowledge of the study area.	

#3119 East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment
Significant Wildlife Habitat Assessment Tables
Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Waterfowl Nesting Area					Candidate	Not Present
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 ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120m ^{cxlix} 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 120m of each individual wetland where waterfowl nesting is known to occur ^{cxlix} . • Upland areas should be at least 120m wide so that predators such as raccoons, 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 CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” ^{ccxi} • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120m ^{cxlviii} from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST ^{cxlix} Index #25 provides development effects and mitigation measures.	Based on aerial imagery interpretation and available ELC mapping, upland areas adjacent to wetland areas (including PSW) are present. American Black Duck, Bluewinged Teal, Wood Duck, Hooded Merganser and Mallard have been documented within the study area or vicinity (BSC et al. 2009). Breeding bird surveys have not been completed within the entire study area. However, surveys within the subject lands did not confirm habitat presence.	

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					Candidate	Not Present
<u>Rationale:</u> Nest sites are fairly uncommon in Eco-region 6E are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey <u>Special Concern:</u> Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas^{ccv} or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area^{cxlviii}. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWH^{ccvii}, maintaining undisturbed shorelines with large trees within this area is important^{cxlviii}. • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH^{cv}, ^{ccvii}. 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^{cv}. • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant^{ccvii} • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} • SWHMIST^{cxlix} Index #26 provides development effects and mitigation measures	Candidate nesting / foraging /perching habitat for Osprey and potentially suitable nesting / foraging / perching for Bald Eagle is present along the Grand River. Targeted bird surveys have not been completed within the subject lands; however, these species were not observed incidentally during breeding bird surveys.	

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Woodland Raptor Nesting Habitat					Not Present	Not Present
<u>Rationale:</u> Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat ^{lxxxviii, lxxxix, xc, xci, xciii, xciv, xcv, xcvi, cxxxiii} . Interior habitat determined with a 200m buffer ^{cxlviii} . • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Cooper's 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 • Check the Ontario Breeding Bird Atlas ^{ccv} or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from CAs	Studies confirm: • Presence of 1 or more active nests from species list is considered significant ^{cxlviii} . • Red-shouldered Hawk and Northern Goshawk – a 400m radius around the nest or 28ha area of habitat is the SWH ^{ccvii} . • Barred Owl – a 200m radius around the nest is the SWH ^{ccvii} . • Broad-winged Hawk and Coopers Hawk – a 100m radius around the nest is the SWH ^{ccvii} . • Sharp-shinned Hawk – a 50m radius around the nest is the SWH ^{ccvii} . • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHMiST ^{cxlix} Index #27 provides development effects and mitigation measures.	No wooded areas with >10 ha of interior habitat (200m buffer) are present within the study area or subject lands. Cooper's Hawk, Sharpshinned Hawk have been documented within the study area or vicinity (BSC et al.2009).	
Wildlife Habitat: Turtle Nesting Area					Candidate	Not Present
<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:</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) ^{cxlviii} or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal 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 and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH ⁱ • 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 dependent on slope, riparian vegetation and adjacent land use is the SWH ^{cxlviii} . • Travel routes from wetland to nesting area are to be considered within the SWH ^{cxlix} . • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWHMiST ^{cxlix} Index #28 provides development effects and mitigation measures for turtle nesting habitat.	Based on aerial imagery interpretation, exposed soil adjacent to marsh communities may be present in the larger study area. Midland Painted Turtle and Snapping Turtle have been documented within the study area or vicinity (Ontario Nature 2018). The subject lands do not contain suitable ELC nesting communities.	

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Seeps and Springs					Candidate	Possible
<u>Rationale:</u> Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system ^{cxvii, cxlix} . • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species ^{cxix, cxx, cxxi, cxxii, cxiii, cxiv} <u>Information Sources</u> • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat ^{cxlviii} • SWHMiST ^{cxlix} Index #30 provides development effects and mitigation measures	Seeps/springs may occur within the forested areas of the study area. Wild Turkey, Ruffed Grouse, White-tailed Deer and Salamander spp. have been observed within the study area or vicinity (BSC et al. 2009, Dobbyn 1994, Ontario Nature 2018). Targeted surveys were not completed within the subject land forested ecosites which are to be protected.	
Wildlife Habitat: Amphibian Breeding Habitat (Woodland)					Confirmed	Confirmed
<u>Rationale:</u> These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m ² (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size) ^{cbxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx} Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat ^{cxlviii} <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF 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) ^{lxxi} or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys ^{cviii} will be required during the spring March-June when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the woodland area plus a 230m radius of woodland area ^{lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi} if a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is the be included in the habitat. • SWHMiST ^{cxlix} Index #14 provides development effects and mitigation measures.	This SWH was confirmed in the Breslau Wetland Complex PSW north of the airport (NRSI 2021). SWH was confirmed at ANR-004 by Call Level 3 of two listed species: Gray Treefrog and Spring Peeper.	

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH	Assessment Details	
	Wildlife Species	ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)					Candidate	Not Present
<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 American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	- Wetlands >500m2 (about 25m diameter)^{ccvii} supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats^{clxxxiv}. - 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 CAs.	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 and with at least 20 individuals (adults or eggs masses)^{lxxi, lxxiii}, or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant. - The ELC ecosite wetland area and the shoreline are the SWH. - A combination of observational study and call count surveys^{cviii} will be required during spring March to June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. - If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. - SWHMiST^{cxlix} Index #15 provides development effects and mitigation measures.	Based on aerial imagery interpretation and available ELC mapping suitable swamp and marsh communities may be present within the northern half of the study area. Eastern Newt, American Toad, Spotted Salamander, Blue-spotted Salamander, Gray Tree frog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog and Bullfrog have been documented within the study area or vicinity (Ontario Nature 2018). Anuran surveys completed within the subject lands did not confirm SWH.	
Woodland Area-Sensitive Bird Breeding Habitat					Candidate	Not Present
<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 ELC Community Series: FOC FOM FOD SWC SWM SWD	- Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.^{cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxv, cxxvi, cxxxvii, cxxxviii, cxxxix, cxi, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvii, clviii, clix} - Interior forest habitats are at least 200m 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 greatest value to interior species - Reports and other information available from CAs.	- 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 SWH. - Conduct field investigations in spring and early summer when birds are singing and defending their territories. - Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi} - SWHMiST^{cxlix} Index #34 provides development effects and mitigation measures.	Based on aerial imagery interpretation and available ELC mapping, large forest and swamp communities are present within the northern half of the study area Yellow-Bellied Sapsucker, Red-breasted Nuthatch, Veery, Blue-headed Vireo, Black-throated Green Warbler, Ovenbird, Scarlet Tanager and Winter Wren have been documented within the study area or vicinity (BSC et al. 2009). Cerulean Warbler and Canada Warbler have the potential to occur in Waterloo Region (MNRF 2018). Breeding bird surveys conducted by NRSI within the subject lands found possible breeding by Veery, but no other woodland area sensitive species.	

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	Wildlife Species	ELC Ecosites	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Marsh Bird Breeding Habitat					Candidate	Candidate
<u>Rationale:</u> Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan <u>Special Concern:</u> Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present^{cxxiv}. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. <u>Information Sources</u> • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas^{ccv}	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^l. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH^l. • Area of the ELC ecosite is the SWH • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi}. • SWHMiST^{cxlix} Index #35 provides development effects and mitigation measures	Based on aerial imagery interpretation and available ELC mapping, suitable marsh communities may be present. American Bittern, Virginia Rail, Sora, Common Gallinule, American Coot, Pied-billed Grebe, Marsh Wren and Green Heron have been observed within the study area or vicinity (BSC et al. 2009). Targeted breeding bird surveys were not been completed within suitable ELC ecosites.	
Wildlife Habitat: Open Country Bird Breeding Habitat					Not Present	Not Present
<u>Rationale:</u> This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow <u>Special Concern:</u> Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha^{clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix}. Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)^l. 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. • Ask local birders • Ontario Breeding Bird Atlas^{ccv} • Reports and other information available from CAs.	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 Owl is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”^{ccxi}. • SWHMiST^{cxlix} Index #32 provides development effects and mitigation measures.	Based on aerial imagery interpretation and available ELC mapping, suitable meadow communities may be present within the study area. However, these meadows are less than 30 ha in size. All of the target species have been observed within the study area or vicinity (BSC et al. 2009). Suitable habitat is not present within the subject lands.	

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	Wildlife Species	ELC Ecosites	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat					Not Present	Not Present
<u>Rationale:</u> This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records cxcix.	<u>Indicator spp.:</u> Brown Thrasher Clay-coloured Sparrow <u>Common spp.:</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher <u>Special Concern:</u> Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Large field areas succeeding to shrub and thicket habitats>10ha ^{clxiv} in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years) ^l . Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species ^{clxxiii} . Shrub and thicket habitat sites considered significant should have a 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 ^{ccv} • Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species ^l . • A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” ^{ccxi} • SWHMiST ^{cxlix} Index #33 provides development effects and mitigation measures.	Areas with suitable successional habitat (CUT, CUS or CUW) within the study area and subject lands are likely too small to support candidate or confirmed habitat.	
Wildlife Habitat: Terrestrial Crayfish					Confirmed	Possible
<u>Rationale:</u> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. ^{ccii}	Chimney or Digger Crayfish: (<i>Fallicambarus fodiens</i>) Devil Crawfish or Meadow Crayfish: (<i>Cambarus Diogenes</i>)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) identified 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 marsh meadow or terrestrial sites ^{cci} • Area of ELC Ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August during in temporary or permanent water Note the presence of burrows or chemistry are often the only indicator of presence, observance or collection of individuals is very difficult ^{cci} • SWHMiST ^{cxlix} Index #36 provides development effects and mitigation measures.	Suitable habitat for terrestrial crayfish is present in the wetland habitats within the study area. Terrestrial Crayfish chimneys were observed by NRSI around wetlands in 2019. Suitable habitat is present within the subject lands.	

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	Wildlife Species	ELC Ecosites	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Special Concern and Rare Wildlife Species					Confirmed	Confirmed
<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 ELC Ecosites ^{lxxviii} . <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) will have the 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 ^{ccv} • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST ^{cxlix} Index #37 provides development effects and mitigation measures.	Several Species of Conservation Concern (Special Concern or S Ranks S1-S3) were reported within the study area (see SAR/SCC screening and species lists for more information). Breeding bird surveys detected two species of SCC.	

Significant Wildlife Habitat Assessment Tables

Table 5. Characteristics of Animal Movement Corridors for Ecoregion 6E.

Rationale	Candidate SWH			Confirmed SWH		
	Wildlife Species	Habitat Description	Detailed Information and Sources	Defining Criteria	Study Area	Subject Property
Wildlife Habitat: Amphibian Movement Corridors					Candidate	Confirmed
Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.	Movement corridors between breeding habitat and summer habitat ^{clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi} . Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule ^l . <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant ^{cxlix} . • Corridors should have at least 15m of vegetation on both sides of waterway ^{cxlix} or be up to 200m wide ^{cxlix} of woodland habitat and with gaps <20m ^{cxlix} . • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat ^{cxlix} . • SWHMiST ^{cxlix} Index #40 provides development effects and mitigation measures.	Candidate amphibian breeding SWH was identified as present within the study area. Movement corridors may be present along the watercourses within the study area. Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog and Bullfrog have been documented from the study area or vicinity (Ontario Nature 2018). Amphibian Breeding Habitat (Woodland) was confirmed within the subject lands.	
Wildlife Habitat: Deer Movement Corridors					Not Present	Not Present
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 SWH from Table 1.1 of this schedule ^l . • A deer wintering habitat identified by the OMNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion ^{clxxxii, clxxxiii, cxlix, cxliv} . • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • 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 yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide ^{cxlix} with gaps <20m ^{cxlix} and if following riparian area with at least 15m of vegetation on both sides of waterway ^{cxlix} . Shorter corridors are more significant than longer corridors ^{cxlix} . • SWHMiST ^{cxlix} Index #39 provides development effects and mitigation measures.	No suitable wintering habitat in the study area; therefore there is no potential for deer movement corridors.	

Appendix III
Vascular Flora Species Observed within the Subject Lands

Plant Species Reported from the Study Area - East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (Project #3119)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Waterloo Region	NHIC Data*	NRSI Observed	CUP3	CUS1	CUM1	MAM2-2	FOD7	FOD8-1	FOM3-2	FOC4-1	SWT3/MAM3	SWD7/SWT3	SWD6-3
		MNRFP 2023a	MECP 2023	Government of Canada 2023	Government of Canada 2023	Government of Canada 2023	Richardson & Martin 1999	MNRFP 2023a	NRSI Results From 2023											
Pteridophytes	Ferns & Allies																			
Dennstaedtiaceae	Bracken Fern Family																			
<i>Pteridium aquilinum</i>	Bracken Fern	S5							X									X		
Dryopteridaceae	Wood Fern Family																			
<i>Athyrium filix-femina</i>	Common Lady Fern	S5							X				X				X		X	X
<i>Cystopteris bulbifera</i>	Bulblet Fern	S5							X										X	X
<i>Dryopteris carthusiana</i>	Spirulose Wood Fern	S5							X							X				
<i>Dryopteris cincta</i>	Clinton's Wood Fern	S4							X											X
<i>Dryopteris cristata</i>	Crested Wood Fern	S5							X										X	X
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	S5							X	X				X						X
<i>Matteuccia struthiopteris</i>	Ostrich Fern	S5							X		X									X
<i>Onoclea sensibilis</i>	Sensitive Fern	S5							X				X							X
<i>Polystichum acrostichoides</i>	Christmas Fern	S5							X				X		X	X	X		X	X
Equisetaceae	Horsetail Family																			
<i>Equisetum arvense</i>	Field Horsetail	S5							X				X						X	X
<i>Equisetum variegatum</i>	Variegated Horsetail	S5							X							X				
Osmundaceae	Royal Fern Family																			
<i>Osmunda regalis</i>	Royal Fern	S5							X											X
<i>Osmundastrum cinnamomeum</i>	Cinnamon Fern	S5							X									X	X	X
Thelypteridaceae	Beech Fern Family																			
<i>Thelypteris palustris</i>	Marsh Fern	S5							X									X	X	X
Gymnosperms	Conifers																			
Cupressaceae	Cypress Family																			
<i>Thuja occidentalis</i>	Eastern White Cedar	S5							X					X			X			X
Pinaceae	Pine Family																			
<i>Abies balsamea</i>	Balsam Fir	S5							X	X										X
<i>Pinus strobus</i>	Eastern White Pine	S5							X	X										
<i>Pinus sylvestris</i>	Scots Pine	SE5							X	X										
<i>Tsuga canadensis</i>	Eastern Hemlock	S5							X											
Dicotyledons	Dicots																			
Aceraceae	Maple Family																			
<i>Acer saccharum</i>	Sugar Maple	S5							X							X				
<i>Acer x freemanii</i>	Freeman's Maple	SNA							X											
Anacardiaceae	Sumac or Cashew Family																			
<i>Toxicodendron radicans</i> var. <i>radicans</i>	Eastern Poison Ivy	S5							X	X						X	X		X	
Apiaceae	Carrot or Parsley Family																			
<i>Cicuta maculata</i>	Spotted Water-hemlock	S5							X							X	X			X
<i>Daucus carota</i>	Wild Carrot	SE5							X		X	X						X		
<i>Sium suave</i>	Hemlock Water-parsnip	S5							X										X	X
Apocynaceae	Dogbane Family																			
<i>Apocynum androsaemifolium</i>	Spreading Dogbane	S5							X									X		
<i>Apocynum cannabinum</i>	Hemp Dogbane	S5							X				X							X
<i>Vinca minor</i>	Periwinkle	SE5							X											X
Aquifoliaceae	Holly Family																			
<i>Ilex verticillata</i>	Common Winterberry	S5							X									X		
Araliaceae	Ginseng Family																			
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	S5							X								X		X	X
Asclepiadaceae	Milkweed Family																			
<i>Asclepias syriaca</i>	Common Milkweed	S5							X			X	X	X						
Asteraceae	Composite or Aster Family																			
<i>Achillea borealis</i>	Woolly Yarrow	S5							X			X								
<i>Achillea millefolium</i>	Common Yarrow	SE5?							X			X								
<i>Ageratina altissima</i>	Common White Snakeroot	S5							X				X			X				X
<i>Arctium minus</i>	Common Burdock	SE5							X					X						
<i>Bidens</i> sp.	Beggarticks sp.								X										X	
<i>Bidens cernua</i>	Nodding Beggarticks	S5							X					X		X				
<i>Bidens frondosa</i>	Devil's Beggarticks	S5							X					X		X				X
<i>Cirsium arvense</i>	Creeping Thistle	SE5							X					X				X		
<i>Cirsium vulgare</i>	Bull Thistle	SE5							X		X									
<i>Erigeron annuus</i>	Annual Fleabane	S5							X	X						X				
<i>Erigeron canadensis</i>	Canada Horseweed	S5							X	X										
<i>Eupatorium perfoliatum</i>	Common Boneset	S5							X					X						
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	S5							X		X	X		X				X		
<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	S5							X					X			X	X		X
<i>Lactuca biennis</i>	Tall Blue Lettuce	S5							X							X	X	X		X
<i>Lactuca serriola</i>	Prickly Lettuce	SE5							X									X		
<i>Nabalus albus</i>	White Rattlesnakeroot	S5							X							X				
<i>Solidago altissima</i>	Tall Goldenrod	S5							X		X	X		X				X	X	X
<i>Solidago caesia</i>	Blue-stemmed Goldenrod	S5							X											
<i>Solidago canadensis</i>	Canada Goldenrod	S5							X	X	X	X				X				
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S5							X					X			X	X		
<i>Solidago gigantea</i>	Giant Goldenrod	S5							X					X	X	X	X	X	X	X
<i>Solidago nemoralis</i>	Gray-stemmed Goldenrod	S5							X											
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	S5							X											X
<i>Sonchus oleraceus</i>	Field Sowthistle	SE5							X						X					
<i>Symphyotrichum ericoides</i>	White Heath Aster	S5							X	X										
<i>Symphyotrichum firmum</i>	Glossy-leaved Aster	S4?							X			X			X	X	X	X	X	X
<i>Symphyotrichum lanceolatum</i>	Panicked Aster	S5							X		X	X	X		X		X	X	X	X
<i>Symphyotrichum lateriflorum</i>	Calico Aster	S5							X							X	X	X	X	X
<i>Symphyotrichum novae-angliae</i>	New England Aster	S5							X	X	X	X		X	X		X	X	X	X
<i>Symphyotrichum pilosum</i>	Old Field Aster	S5							X		X	X								

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<i>Symphoricarum puniceum</i>	Swamp Aster	S5							X									X		
<i>Taraxacum officinale</i>	Common Dandelion	SE5							X	X				X	X	X	X	X		X
<i>Tragopogon dubius</i>	Yellow Goat's-beard	SE5							X		X	X								
<i>Tussilago farfara</i>	Cot's-foot	SE5							X			X				X				
Balsaminaceae	Touch-me-not Family																			
<i>Impatiens capensis</i>	Spotted Jewelweed	S5							X				X	X	X	X	X		X	X
Betulaceae	Birch Family																			
<i>Betula alleghaniensis</i>	Yellow Birch	S5							X											X
<i>Betula papyrifera</i>	Paper Birch	S5							X											X
<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	S5							X							X				
Boraginaceae	Borage Family																			
<i>Echium vulgare</i>	Common Viper's Bugloss	SE5							X			X								
<i>Hackelia virginiana</i>	Virginia Stickseed	S5					R*		X							X				
<i>Lithospermum officinale</i>	European Gromwell	SE5							X							X				
Brassicaceae	Mustard Family																			
<i>Alliaria petiolata</i>	Garlic Mustard	SE5							X	X	X		X	X		X	X	X		
<i>Barbarea vulgaris</i>	Bitter Wintercress	SE5							X											
<i>Cardamine diphylla</i>	Two-leaved Toothwort	S5							X										X	
<i>Cardamine pensylvanica</i>	Pennsylvania Bittercress	S5							X											
<i>Hesperis matronalis</i>	Dame's Rocket	SE5							X	X	X			X		X	X			X
Caprifoliaceae	Honeysuckle Family																			
<i>Lonicera x bella</i>	(<i>Lonicera morrowii</i> X <i>Lonicera tatarica</i>)	SNA							X			X		X						
<i>Sambucus canadensis</i>	Common Elderberry	S5							X				X						X	X
<i>Sambucus racemosa</i>	Red Elderberry	S5							X	X						X	X			
Caryophyllaceae	Pink Family																			
<i>Silene latifolia</i>	White Campion	SE5							X								X			
<i>Silene vulgaris</i>	Bladder Campion	SE5							X		X	X								
Celastraceae	Staff-tree Family																			
<i>Euonymus obovatus</i>	Running Strawberry Bush	S4							X	X						X				
Chenopodiaceae	Goosefoot Family																			
<i>Chenopodium album</i>	White Goosefoot	SE5							X			X	X							
Clusiaceae	St. John's-wort Family																			
<i>Hypericum perforatum</i>	Common St. John's-wort	SE5							X							X				
Convolvulaceae	Morning-glory Family																			
<i>Calystegia sepium</i>	Hedge False Bindweed	S5							X			X								
Cornaceae	Dogwood Family																			
<i>Cornus alternifolia</i>	Alternate-leaved Dogwood	S5							X							X				
<i>Cornus obliqua</i>	Pale Dogwood	S5							X									X		
<i>Cornus sericea</i>	Red-osier Dogwood	S5							X					X				X		
Cucurbitaceae	Gourd Family																			
<i>Echinocystis lobata</i>	Wild Mock-cucumber	S5							X							X	X	X		X
Cuscutaceae	Dodder Family																			
<i>Cuscuta gronovii</i>	Swamp Dodder	S5							X				X							
Dipsacaceae	Teasel Family																			
<i>Dipsacus fullorum</i>	Common Teasel	SE5							X		X							X		
Euphorbiaceae	Spurge Family																			
<i>Euphorbia virgata</i>	Russian Leafy Spurge	SE5?							X			X						X		
Fabaceae	Pea Family																			
<i>Melilotus albus</i>	White Sweet-clover	SE5							X	X						X				
<i>Trifolium pratense</i>	Red Clover	SE5							X			X				X				
<i>Quercus macrocarpa</i>	Bur Oak	S5							X							X				
Geraniaceae	Geranium Family																			
<i>Geranium robertianum</i>	Herb-Robert	S5							X	X				X			X			X
Grossulariaceae	Current Family																			
<i>Ribes americanum</i>	Wild Black Currant	S5							X				X		X		X			
<i>Ribes cynosbati</i>	Prickly Gooseberry	S5							X	X					X	X			X	X
<i>Ribes rubrum</i>	Northern Red Currant	SE5							X				X		X	X			X	
Juglandaceae	Walnut Family																			
<i>Juglans nigra</i>	Black Walnut	S4?					R+*		X					X						
Lamiaceae	Mint Family																			
<i>Leonurus cardiaca</i>	Common Motherwort	SE5							X					X		X				
<i>Lycopus europaeus</i>	European Water-horehound	SE5							X				X			X		X		
<i>Mentha canadensis</i>	Canada Mint	S5							X				X			X		X		
Lythraceae	Loosestrife Family																			
<i>Lythrum salicaria</i>	Purple Loosestrife	SE5							X							X		X	X	X
Oleaceae	Olive Family																			
<i>Fraxinus americana</i>	White Ash	S4							X	X						X				
<i>Fraxinus pennsylvanica</i>	Green Ash	S4							X		X								X	X
Onagraceae	Evening-primrose Family																			
<i>Circaea canadensis</i>	Broad-leaved Enchanter's Nightshade	S5							X					X	X	X	X	X	X	X
<i>Purplebaea coloratum</i>	Purple-veined Willowherb	S5							X					X						X
<i>Epilobium parviflorum</i>	Small-flowered Willowherb	SE4							X									X		
<i>Oenothera parviflora</i>	Small-flowered Evening-primrose	S5							X									X		
Oxalidaceae	Wood Sorrel Family																			
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	SE5							X									X		
Papaveraceae	Poppy Family																			
<i>Chelidonium majus</i>	Greater Celandine	SE5							X				X	X			X			
<i>Sanguinaria canadensis</i>	Bloodroot	S5							X							X				
Plantaginaceae	Plantain Family																			
<i>Plantago lanceolata</i>	English Plantain	SE5							X			X								
<i>Plantago rugelii</i>	Rugel's Plantain	S5							X				X	X			X			
Polygalaceae	Milkwort Family																			
<i>Polygaloides paucifolia</i>	Gay-wing Milkwort	S5							X										X	
Polygonaceae	Smartweed Family																			
<i>Fallopia dumetorum</i>	Hedge Bindweed	SEH							X											
<i>Persicaria hydropiperoides</i>	False Waterpepper	S5							X								X			
<i>Rumex crispus</i>	Curly Dock	SE5							X								X	X		

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<i>Rumex obtusifolius</i>	Bitter Dock	SE5							X				X							
Primulaceae	Primrose Family																			
<i>Lysimachia thyrsiflora</i>	Water Loosestrife	S5							X											X
Ranunculaceae	Buttercup Family																			
<i>Actaea rubra</i>	Red Baneberry	S5							X	X						X				X
<i>Anemonastrum canadense</i>	Canada Anemone	S5							X								X	X		
<i>Anemone virginiana</i>	Tall Anemone	S5							X	X	X							X	X	
<i>Caltha palustris</i>	Yellow Marsh Marigold	S5							X									X		
<i>Clematis recta</i>	Ground Virgin's-bower	SE1							X							X		X		X
<i>Clematis virginiana</i>	Virginia Virgin's-bower	S5							X							X		X		X
<i>Coptis trifolia</i>	Goldthread	S5							X							X				
<i>Hepatica acutiloba</i>	Sharp-lobed Hepatica	S5							X							X				
<i>Ranunculus abortivus</i>	Kidney-leaved Buttercup	S5							X							X		X		
<i>Ranunculus acris</i>	Tall Buttercup	SE5							X				X	X			X			
<i>Ranunculus caricetorum</i>	Northern Swamp Buttercup	S5							X				X	X		X	X			
<i>Ranunculus recurvatus</i>	Hooked Buttercup	S5							X						X	X	X		X	X
<i>Thalictrum dioicum</i>	Early Meadow-rue	S5							X							X				
<i>Thalictrum pubescens</i>	Tall Meadow-rue	S5							X							X				
Rhamnaceae	Buckthorn Family																			
<i>Frangula alnus</i>	Glossy Buckthorn	SE5							X	X	X	X			X	X				X
<i>Rhamnus cathartica</i>	Common Buckthorn	SE5							X	X					X				X	X
Rosaceae	Rose Family																			
<i>Agrimonia gryposepala</i>	Hooked Agrimony	S5							X						X					
<i>Agrimonia striata</i>	Woodland Agrimony	S4							X											
<i>Aruncus dioicus</i>	Common Goatsbeard	SE1							X									X		X
<i>Fragaria vesca</i>	Woodland Strawberry	S5							X						X			X	X	
<i>Geum canadense</i>	White Avena	S5							X							X		X	X	
<i>Geum urbanum</i>	Wood Avena	SE3							X								X			X
<i>Potentilla recta</i>	Sulphur Cinquefoil	SE5							X			X						X		
<i>Prunus serotina</i>	Black Cherry	S5							X	X						X				
<i>Prunus virginiana</i>	Choke Cherry	S5							X	X						X				
<i>Rosa multiflora</i>	Multiflora Rose	SE5							X											
<i>Rubus allegheniensis</i>	Allegheny Blackberry	S5							X							X				
<i>Rubus idaeus ssp. strigosus</i>	Wild Red Raspberry	S5							X						X					
<i>Rubus occidentalis</i>	Black Raspberry	S5							X						X					X
<i>Rubus pubescens</i>	Dewberry	S5							X				X	X	X				X	X
<i>Spiraea alba</i>	White Meadowsweet	S5							X					X	X			X	X	
Rubiaceae	Madder Family																			
<i>Galium aparine</i>	Cleavers	S5							X			X			X			X		
<i>Galium asprellum</i>	Rough Bedstraw	S5							X				X		X		X			
<i>Galium mollugo</i>	Smooth Bedstraw	SE5							X		X	X								X
<i>Galium palustre</i>	Marsh Bedstraw	S5							X											
<i>Galium triflorum</i>	Three-flowered Bedstraw	S5							X	X										
Salicaceae	Willow Family																			
<i>Populus balsamifera</i>	Balsam Poplar	S5							X						X					
<i>Populus tremuloides</i>	Trembling Aspen	S5							X						X					
<i>Salix bebbiana</i>	Bebb's Willow	S5							X									X		
<i>Salix eriocephala</i>	Heart-leaved Willow	S5							X				X					X		
<i>Salix petiolaris</i>	Meadow Willow	S5							X									X		
<i>Salix purpurea</i>	Purple Willow	SE4							X			X				X		X		
Saxifragaceae	Saxifrage Family																			
<i>Mitella nuda</i>	Naked Mitrewort	S5							X										X	
<i>Tiarella stolonifera</i>	Heart-leaved Foam-flower	S5							X											X
Scrophulariaceae	Figwort Family																			
<i>Linaria vulgaris</i>	Butter-and-eggs	SE5							X											
<i>Verbascum thapsus</i>	Common Mullen	SE5							X		X					X				
Solanaceae	Nightshade Family																			
<i>Physalis heterophylla</i>	Clammy Ground-cherry	S4							X		X					X				
<i>Solanum dulcamara</i>	Bittersweet Nightshade	SE5							X	X						X	X		X	X
<i>Solanum nigrum</i>	Black Nightshade	SE1							X										X	
Ulmaceae	Elm Family																			
<i>Celtis occidentalis</i>	Common Hackberry	S4					R*		X								X			
<i>Ulmus americana</i>	American Elm	S5							X											X
Urticaceae	Nettle Family																			
<i>Boehmeria cylindrica</i>	False Nettle	S5							X							X				X
<i>Laportea canadensis</i>	Wood Nettle	S5							X						X					X
<i>Pilea pumila</i>	Dwarf Clearweed	S5							X							X		X		X
<i>Urtica dioica</i>	Stinging Nettle	SE2							X									X		X
<i>Urtica gracilis</i>	Slender Stinging Nettle	S5							X	X					X		X			X
Verbenaceae	Vervain Family																			
<i>Verbena urticifolia</i>	White Vervain	S5							X							X				
Violaceae	Violet Family																			
<i>Viola labradorica</i>	Labrador Violet	S5							X							X				
<i>Viola pubescens</i> var. <i>pubescens</i>	Downy Yellow Violet	S5							X							X				X
<i>Viola rostrata</i>	Long-spurred Violet	S5							X							X				
<i>Viola sororia</i>	Woolly Blue Violet	S5							X						X		X	X	X	X
Vitaceae	Grape Family																			
<i>Parthenocissus vitacea</i>	Thicket Creeper	S5							X						X	X	X		X	X
<i>Vitis riparia</i>	Riverbank Grape	S5							X			X	X	X	X	X	X			X
Monocotyledons	Monocots																			
Alismataceae	Water-plantain Family																			
<i>Alisma triviale</i>	Northern Water-plantain	S5							X							X	X			
Araceae	Arum Family																			
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	S5							X	X					X		X		X	X
Cyperaceae	Sedge Family																			
<i>Carex albusina</i>	White Bear Sedge	S5							X							X				
<i>Carex alopecuroides</i>	Foxtail Sedge	S4					R		X											X

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<i>Carex bebbii</i>	Bebb's Sedge	S5							X											X
<i>Carex blanda</i>	Woodland Sedge	S5							X	X						X		X		
<i>Carex bromoides</i>	Brome-like Sedge	S5							X							X				
<i>Carex comosa</i>	Bristly Sedge	S5							X							X				X
<i>Carex deweyana</i>	Dewey's Sedge	S5							X								X			
<i>Carex gracilima</i>	Graceful Sedge	S5							X				X						X	X
<i>Carex intumescens</i>	Bladder Sedge	S5							X						X	X			X	X
<i>Carex leptalea</i>	Bristle-stalked Sedge	S5					R		X									X		
<i>Carex lupulina</i>	Hop Sedge	S5							X									X		X
<i>Carex pedunculata</i>	Long-stalked Sedge	S5							X							X			X	
<i>Carex pensylvanica</i>	Pennsylvania Sedge	S5							X						X	X				
<i>Carex pseudocyperus</i>	Cyperus-like Sedge	S5							X									X		X
<i>Carex radiata</i>	Eastern Star Sedge	S5							X				X	X		X		X		X
<i>Carex rosea</i>	Rosy Sedge	S5							X							X				
<i>Carex tribuloides</i>	Blunt Broom Sedge	S4							X									X		
<i>Carex vulpinoidea</i>	Fox Sedge	S5							X								X	X		
<i>Cyperus esculentus</i>	Perennial Yellow Flatsedge	S5							X				X							
<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush	S5							X									X		
<i>Scirpus atrovirens</i>	Dark-green Bulrush	S5							X									X		
<i>Scirpus cyperinus</i>	Cottongrass Bulrush	S5							X									X		
Juncaceae																				
Rush Family																				
<i>Juncus sp.</i>	Rush sp.								X									X		
<i>Juncus effusus</i>	Soft Rush	S5							X									X		
Lemnaceae																				
Duckweed Family																				
<i>Lemna minor</i>	Lesser Duckweed	S5							X				X			X				
Liliaceae																				
Lily Family																				
<i>Allium tricoccum</i>	Wild Leek	S4							X							X				
<i>Convallaria majalis</i>	European Lily-of-the-valley	SE5							X											X
<i>Erythronium americanum</i>	Yellow Trout-lily	S5							X	X					X				X	X
<i>Lilium philadelphicum</i>	Wood Lily	S5					R		X							X				
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	S5							X						X				X	X
<i>Maianthemum racemosum</i>	Large False Solomon's Seal	S5							X							X			X	X
<i>Maianthemum stellatum</i>	Star-flowered False Solomon's Seal	S5							X		X			X	X					
<i>Trillium erectum</i>	Red Trillium	S5							X							X				
<i>Trillium grandiflorum</i>	White Trillium	S5							X							X				
Orchidaceae																				
Orchid Family																				
<i>Epipactis helleborine</i>	Eastern Helleborine	SE5							X	X						X				X
Poaceae																				
Grass Family																				
<i>Agrostis gigantea</i>	Redtop	SE5							X							X		X		
<i>Agrostis stolonifera</i>	Creeping Bentgrass	SE5							X							X				
<i>Brachyelytrum erectum</i>	Southern Shorthusk	S4							X							X				
<i>Bromus ciliatus</i>	Fringed Brome	S5							X									X		
<i>Bromus inermis</i>	Smooth Brome	SE5							X			X		X						
<i>Dactylis glomerata</i>	Orchard Grass	SE5							X								X			
<i>Danthonia spicata</i>	Poverty Oatgrass	S5							X						X					
<i>Dichanthelium implicatum</i>	Slender-stemmed Panicgrass	S5							X							X				
<i>Elymus hystrix</i>	Bottlebrush Grass	S5							X							X				
<i>Elymus repens</i>	Creeping Wildrye	SE5							X							X				
<i>Elymus virginicus</i>	Virginia Wildrye	S5							X							X				
<i>Glyceria grandis</i>	Tall Mannagrass	S5							X					X		X				X
<i>Glyceria striata</i>	Fowl Mannagrass	S5							X									X		X
<i>Leersia oryzoides</i>	Rice Cutgrass	S5							X			X				X	X			X
<i>Muhlenbergia mexicana</i>	Mexican Muhly	S5							X							X				X
<i>Oryzopsis asperifolia</i>	White-grained Mountain-ricegrass	S5							X							X				
<i>Panicum capillare</i>	Common Panicgrass	S5							X									X		
<i>Phalaris arundinacea</i> var. <i>arundinacea</i>	Reed Canary Grass	S5							X				X				X			
<i>Phleum pratense</i>	Common Timothy	SE5							X			X								
<i>Phragmites australis</i> ssp. <i>australis</i>	European Reed	SE5							X							X	X	X		X
<i>Poa annua</i>	Annual Bluegrass	SE5							X		X							X		
<i>Poa compressa</i>	Canada Bluegrass	SE5							X									X		
<i>Poa palustris</i>	Fowl Bluegrass	S5							X						X			X		
<i>Poa pratensis</i>	Kentucky Bluegrass	S5							X			X				X		X		
<i>Sporobolus vaginiflorus</i>	Sheathed Dropseed	S5					R*		X			X								
Typhaceae																				
Cattail Family																				
<i>Typha angustifolia</i>	Narrow-leaved Cattail	SE5							X									X		
Total								0	250	32	22	33	31	53	23	114	57	78	45	86

*NHIC Atlas Squares: 17NJ4812, 17NJ4912, 17NJ5012, 17NJ5112, 17NJ4910, 17NJ5010, 17NJ5011

References

Ministry of Natural Resources and Forestry (MNRF). 2023a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2023-05-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>

Ministry of the Environment, Conservation, and Parks (MECP). 2023. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-05-23. Available: <https://www.ontario.ca/page/species-risk-ontario>

Government of Canada. 2023. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2023-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

Richardson, W. and V. Martin. 1999. Regional Municipality of Waterloo. Revisions to Waterloo Region's Significant Species List: Native Vascular Plant Component.

Ministry of Natural Resources and Forestry (MNRF). 2023b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-map>

Appendix IV
Bird Species Report from the Study Area

Bird Species Reported from the Study Area - East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (Project #3119)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Region of Waterloo Status	OBBA*	NHIC Data**	NRSI Observed: Highest Level of Breeding Evidence	BMB-001	BMB-002	BMB-003	BMB-004	BMB-005	BMB-006	BMB-010	BMB-011	BMB-012	BMB-013	BMB-014	BMB-015
		MNRF 2023a	MECP 2023	Government of Canada 2023	Government of Canada 2023	Government of Canada 2023	Martin 1996	BSC et al. 2006	MNRF 2023b	NRSI Results from 2023												
Anatidae	Ducks, Geese & Swans																					
<i>Aix sponsa</i>	Wood Duck	S6B,S3N					√*	CO														
<i>Anas platyrhynchos</i>	Mallard	S5						CO		PO			PO									
<i>Anas rubripes</i>	American Black Duck	S4					√	PR														
<i>Branta canadensis</i>	Canada Goose	S5						CO		OB						OB						
<i>Lophodytes cucullatus</i>	Hooded Merganser	S5					√	CO														
<i>Oxyura jamaicensis</i>	Ruddy Duck	S3B,S4N,S5M						PR														
<i>Spatula discors</i>	Blue-winged Teal	S3B,S4M						PR														
Phasianidae	Partridges, Grouse & Turkeys																					
<i>Bonasa umbellus</i>	Ruffed Grouse	S5						PO														
<i>Meleagris gallopavo</i>	Wild Turkey	S5						PR		OB												
<i>Phasianus colchicus</i>	Ring-necked Pheasant	SNA						PO														
Podicipediformes	Grebes																					
<i>Podilymbus podiceps</i>	Pied-billed Grebe	S4B,S2N					√	PR														
Columbidae	Pigeons & Doves																					
<i>Columba livia</i>	Rock Pigeon	SNA						PR														
<i>Zenaida macroura</i>	Mourning Dove	S5						CO		PR	PO			PR		PO						
Cuculiformes	Cuckoos & Anis																					
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	S4B					√	PR		OB												
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	S4S6B					√	PR														
<i>Coccyzus sp.</i>	Black/Yellow-billed Cuckoo	NP						PO														
Apodidae	Swifts																					
<i>Chastura pelagica</i>	Chimney Swift	S3B	THR	T	T	Schedule 1		PR														
Trochilidae	Hummingbirds																					
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	S5B					√	CO		PO											PO	
Rallidae	Rails, Gallinules & Coots																					
<i>Fulica americana</i>	American Coot	S3B,S4N	NAR	NAR	NS	No schedule	√	PO														
<i>Gallinula galeata</i>	Common Gallinule	S3B					√	PO														
<i>Porzana carolina</i>	Sora	S5B					√	PR		OB												
<i>Rallus limicola</i>	Virginia Rail	S4S5B					√	PR														
Charadriidae	Plovers & Lapwings																					
<i>Chareidrus vociferus</i>	Killdeer	S4B						CO		CO					CO	PO						
Scolopacidae	Sandpipers & Allies																					
<i>Actitis macularia</i>	Spotted Sandpiper	S5B						CO		PO												
<i>Bartramia longicauda</i>	Upland Sandpiper	S2B					√	PO														
<i>Gallinago delicata</i>	Wilson's Snipe	S5B					√	PO		PO												
<i>Scolopax minor</i>	American Woodcock	S4B						PO		OB												
Ardeidae	Hérons & Bitterns																					
<i>Ardea herodias</i>	Great Blue Heron	S4					√	PO		OB												
<i>Botaurus lentiginosus</i>	American Bittern	S5B					√	PO														
<i>Butorides virescens</i>	Green Heron	S4B					√	PR														
Cathartidae	Vultures																					
<i>Cathartes aura</i>	Turkey Vulture	S6B,S3N					√	PO		OB												
Pandionidae	Osprey																					
<i>Pandion haliaetus</i>	Osprey	S5B					√	CO														
Accipitridae	Hawks, Kites, Eagles & Allies																					
<i>Accipiter cooperii</i>	Cooper's Hawk	S4	NAR	NAR	NS	No schedule	√	PO														
<i>Accipiter striatus</i>	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule	√	CO														
<i>Buteo jamaicensis</i>	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		CO		PR							PO					
<i>Buteo lineatus</i>	Red-shouldered Hawk	S4B,S2N	NAR	NAR	SC	Schedule 3	√	PO														
<i>Circus hudsonius</i>	Northern Harrier	S6B,S4N	NAR	NAR	NS	No schedule	√	PO														
Strigidae	Typical Owls																					
<i>Asio otus</i>	Long-eared Owl	S4					√	PO														
<i>Bubo virginianus</i>	Great Horned Owl	S4						CO														
<i>Megascops asio</i>	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		CO														
Alcedinidae	Kingfishers																					
<i>Megasceryle alcyon</i>	Belted Kingfisher	S5B,S4N					√	CO														
Picidae	Woodpeckers																					
<i>Colaptes auratus</i>	Northern Flicker	S5						CO		PR	PO	PR	PO			PO	PR	PR				
<i>Dryobates pubescens</i>	Downy Woodpecker	S5						CO		PO												PO
<i>Dryobates villosus</i>	Hairy Woodpecker	S5						CO		PO				PO								PO
<i>Dryocopus pileatus</i>	Pileated Woodpecker	S5					√	PR														
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	S5					√	PO		PR						PR						
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	S6B,S3N					√	PR														
Falconidae	Caracaras & Falcons																					
<i>Falco sparverius</i>	American Kestrel	S4						PR														
Tyrannidae	Tyrant Flycatchers																					
<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		CO	X	PR		PR	PO			PO	PO		PO	PO		PR
<i>Empidonax alnorum</i>	Alder Flycatcher	S5B					√	PO														
<i>Empidonax minimus</i>	Least Flycatcher	S5B					√	PR														
<i>Empidonax traillii</i>	Willow Flycatcher	S4B						PO		PR	PO				PR						PR	
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	S5B						CO		PR		PR	PR				PO		PR			PO
<i>Sayornis phoebe</i>	Eastern Phoebe	S5B						PR														
<i>Tyrannus tyrannus</i>	Eastern Kingbird	S4B						CO		PR						PR						
Vireonidae	Vireos																					
<i>Vireo gilvus</i>	Warbling Vireo	S5B						CO		CO	PR		PR		PO	CO	PR					
<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B						CO		PR		PR	PO			PR		PR	PR			PR
<i>Vireo solitarius</i>	Blue-headed Vireo	S5B						PO														
Corvidae	Crows & Jays																					
<i>Corvus brachyrhynchos</i>	American Crow	S5						CO		PR	PO	PR				PO	PR		PR		PR	
<i>Cyanocitta cristata</i>	Blue Jay	S5						CO		PR		PO	PR			PR		PO	PR		PR	

*OBBA Atlas Squares: 17NJ41, 17NJ5

Ministry of Natural Resources and Forestry (MNR): Canada's Natural Heritage Information Centre (NHIC): Species List on Ontario. Published: 2014-07-17. All Species List Updated: 2023-05-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>
Ministry of the Environment, Conservation, and Parks (MECP): 2023. Species at Risk in Ontario. Published: 2016-07-12. Updated: 2023-05-23. Available: <https://www.ontario.ca/page/species-at-risk-ontario>
Government of Canada: 2023. Species at Risk Public Registry: Species Search. COSEWIC List Assessment Date: 2023-05-05. Available: <https://species-registry.canada.ca/index-en.html?species=7&sortBy=commonNameSort&sortDirection=asc&pageSize=10>
Martin, V. 1996. Reviews to Waterloo Region's Significant Species List: Breeding Birds Component. Report to The Regional Municipality of Waterloo, April 16, 1996.
Bird Studies Canada (BSC): Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas Database, 31 January 2008. <https://www.birdsonario.org/jsr/data summaries.jsp>
Ministry of Natural Resources and Forestry (MNR): 2023. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated: 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-map>

Appendix V
Herpetofauna Species Reported from the Study Area

Reptile and Amphibian Species Reported from the Study Area - East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (Project #3119)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Region of Waterloo Status	ORAA*	NHIC Data**	NRSI Observed	Anuran Call Survey
		MNRF 2023a	MECP 2023	Government of Canada 2023	Government of Canada 2023	Government of Canada 2023	RMOW 1985	Ontario Nature 2019	MNRF 2023b	NRSI Results from 2023	
Turtles											
<i>Chelydra serpentina</i>	Snapping Turtle	S4	SC	SC	SC	Schedule 1	C	X	X		
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	S4		SC	SC	Schedule 1	C	X			
Snakes											
<i>Lampropeltis triangulum</i>	Milksnake	S4	NAR	SC	SC	Schedule 1	√	X			
<i>Opheodrys vernalis</i>	Smooth Greensnake	S4					√	X			
<i>Storeria dekayi</i>	Dekay's Brownsnake	S5	NAR	NAR	NS	No schedule	C*	X			
<i>Storeria occipitomaculata</i>	Red-bellied Snake	S5					C*	X			
<i>Thamnophis sauritus septentrionalis</i>	Northern Ribbonsnake	S4	SC	SC	SC	Schedule 1	√	X			
<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake	S5					C	X		X	
Salamanders											
<i>Ambystoma laterale</i>	Blue-spotted Salamander	S4					C	X			
<i>Ambystoma maculatum</i>	Spotted Salamander	S4					√	X			
<i>Necturus maculosus</i>	Mudpuppy	S4	NAR	NAR	NS	No schedule	√	X			
<i>Notophthalmus viridescens viridescens</i>	Red-spotted Newt	S5					√	X			
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	S5					C	X			
Frogs and Toads											
<i>Anaxyrus americanus</i>	American Toad	S5					C	X		X	X
<i>Dryophytes versicolor</i>	Gray Treefrog	S5					C	X		X	X
<i>Pseudacris triseriata pop. 2</i>	Western Chorus Frog (Great Lakes / St. L	S4	NAR	T	T	Schedule 1		X	X		
<i>Pseudacris crucifer</i>	Spring Peeper	S5					C	X		X	X
<i>Lithobates catesbeianus</i>	American Bullfrog	S4					√	X			
<i>Lithobates clamitans</i>	Green Frog	S5					C	X		X	X
<i>Lithobates palustris</i>	Pickereel Frog	S4	NAR	NAR	NS	No schedule	√	X			
<i>Lithobates pipiens</i>	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	C	X		X	
<i>Lithobates sylvaticus</i>	Wood Frog	S5					C	X			
Total								22	2	6	4

*ORAA Atlas Squares: 17NJ41, 17NJ51

**NHIC Atlas Squares: 17NJ4812, 17NJ4912, 17NJ5012, 17NJ5112, 17NJ4910, 17NJ5010, 17NJ5011

References

Ministry of Natural Resources and Forestry (MNRF). 2023a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2023-05-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>

Ministry of the Environment, Conservation, and Parks (MECP). 2023. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-05-23. Available: <https://www.ontario.ca/page/species-risk-ontario>

Government of Canada. 2023. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2023-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

Regional Municipality of Waterloo (RMOW). 1985. Appendix 3: Reptiles and Amphibians in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

Ontario Nature. 2019. Ontario Reptile and Amphibian Atlas Program: Interactive Range Maps. Accessed October 2019.

Ministry of Natural Resources and Forestry (MNRF). 2023b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-ma>

Appendix VI
Mammal Species Reported from the Study Area

Mammal Species Reported from the Study Area - East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (Project #3119)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Region of Waterloo Status	Ontario Mammal Atlas	NHIC Data**	NRSI Observed
		MNRF 2023a	MECP 2023	Government of Canada 2023	Government of Canada 2023	Government of Canada 2023	RMOW 1985	Dobbyn 1994	MNRF 2023b	NRSI Results from 2023
Didelphimorphia	Opossums									
<i>Didelphis virginiana</i>	Virginia Opossum	S4					R	X		
Eulipotyphla	Shrews, Moles, Hedgehogs, and Allies									
<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	S5						X		
<i>Condylura cristata</i>	Star-nosed Mole	S5						X		
<i>Parascalops breweri</i>	Hairy-tailed Mole	S4					R	X		
<i>Sorex cinereus</i>	Masked Shrew	S5					G	X		
<i>Sorex fumeus</i>	Smoky Shrew	S5					R	X		
<i>Sorex palustris</i>	Water Shrew	S5					R	X		
Chiroptera	Bats									
<i>Eptesicus fuscus</i>	Big Brown Bat	S4						X		
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	S4		E	NS	No schedule		X		
<i>Lasiurus borealis</i>	Eastern Red Bat	S4		E	NS	No schedule		X		
<i>Lasiurus cinereus</i>	Hoary Bat	S4		E	NS	No schedule		X		
<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END					X		
<i>Myotis lucifugus</i>	Little Brown Myotis	S3	END	E	E	Schedule 1		X		
<i>Myotis septentrionalis</i>	Northern Myotis	S3	END	E	E	Schedule 1		X		
<i>Perimyotis subflavus</i>	Tri-colored Bat	S3?	END	E	E	Schedule 1		X		
Lagomorpha	Rabbits and Hares									
<i>Lepus americanus</i>	Snowshoe Hare	S5					S	X		
<i>Lepus europaeus</i>	European Hare	SNA						X		
<i>Sylvilagus floridanus</i>	Eastern Cottontail	S5						X		
Rodentia	Rodents									
<i>Castor canadensis</i>	Beaver	S5					S	X		
<i>Erethizon dorsatum</i>	Porcupine	S5					S	X		
<i>Glaucomys sabrinus</i>	Northern Flying Squirrel	S5					R	X		
<i>Marmota monax</i>	Woodchuck	S5						X		
<i>Microtus pennsylvanicus</i>	Meadow Vole	S5						X		
<i>Microtus pinetorum</i>	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X		
<i>Mus musculus</i>	House Mouse	SNA						X		
<i>Napaeozapus insignis</i>	Woodland Jumping Mouse	S5						X		
<i>Ondatra zibethicus</i>	Muskrat	S5						X		
<i>Peromyscus leucopus</i>	White-footed Mouse	S5						X		
<i>Peromyscus maniculatus</i>	Deer Mouse	S5						X		
<i>Rattus norvegicus</i>	Norway Rat	SNA						X		
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel	S5						X		X
<i>Synaptomys cooperi</i>	Southern Bog Lemming	S4					R	X		
<i>Tamias striatus</i>	Eastern Chipmunk	S5						X		X
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	S5						X		
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	S5						X		
Canidae	Canines									
<i>Canis latrans</i>	Coyote	S5					S	X		
<i>Vulpes vulpes</i>	Red Fox	S5						X		
Felidae	Felines									
<i>Lynx rufus</i>	Bobcat	S4					R	X		
Mephitidae	Skunks and Stink Badgers									
<i>Mephitis mephitis</i>	Striped Skunk	S5						X		
Mustelidae	Weasels and Allies									
<i>Mustela richardsonii</i>	American Ermine	S5						X		
<i>Neogale frenata</i>	Long-tailed Weasel	S4					S	X		
<i>Neogale vison</i>	American Mink	S4					S	X		
<i>Taxidea taxus jacksoni</i>	American Badger (Southwestern Ontario)	S1	END	E	E	Schedule 1		X		
Procyonidae	Raccoons and Allies									
<i>Procyon lotor</i>	Northern Raccoon	S5						X		
Ursidae	Bears									
<i>Ursus americanus</i>	American Black Bear	S5	NAR	NAR	NS	No schedule		X		
Artiodactyla	Deer and Bison									
<i>Odocoileus virginianus</i>	White-tailed Deer	S5						X		X
Total								46	0	3

*Mammal Atlas Square Numbers: NU41, NU51

**NHIC Atlas Squares: 17NJ4812, 17NJ4912, 17NJ5012, 17NJ5112, 17NJ4910, 17NJ5010, 17NJ5011

References

Ministry of Natural Resources and Forestry (MNRF). 2023a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2023-05-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>

Ministry of the Environment, Conservation, and Parks (MECP). 2023. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-05-23. Available: <https://www.ontario.ca/page/species-risk-ontario>

Government of Canada. 2023. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2023-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

Regional Municipality of Waterloo (RMOW). 1985. Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Ministry of Natural Resources and Forestry (MNRF). 2023b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-map>

Appendix VII
Lepidoptera Species Reported from the Study Area

Butterfly Species Reported from the Study Area - East Side Lands: Woolwich Sanitary Servicing Class Environmental Assessment (Project #3119)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Region of Waterloo Status	Ontario Butterfly Atlas*	NHIC Data**	NRSI Observed
		MNRF 2023a	MECP 2023	Government of Canada 2023	Government of Canada 2023	Government of Canada 2023	Linton 2012	Macnaughton et al. 2023	MNRF 2023b	NRSI Results from 2023
Hesperiidae	Skippers									
<i>Amblyscirtes vialis</i>	Common Roadside Skipper	S4						X		
<i>Anatrytone logan</i>	Delaware Skipper	S4					C	X		
<i>Ancyloxypha numitor</i>	Least Skipper	S5					UC	X		
<i>Cartocephalus palaemon</i>	Arctic Skipper	S5					R	X		
<i>Epargyreus clarus</i>	Silver-spotted Skipper	S4					UC	X		
<i>Erynnis baptisiae</i>	Wild Indigo Duskywing	S4					UK	X		
<i>Erynnis brizo</i>	Sleepy Duskywing	S1						X		
<i>Erynnis icelus</i>	Dreamy Duskywing	S5					R	X		
<i>Erynnis juvenalis</i>	Juvenal's Duskywing	S5					R	X		
<i>Erynnis lucilius</i>	Columbine Duskywing	S4					R	X		
<i>Euphyes bimacula</i>	Two-spotted Skipper	S4					R	X		
<i>Euphyes dion</i>	Dion Skipper	S4					R	X		
<i>Euphyes vestris</i>	Dun Skipper	S5					VC	X		
<i>Pholisora catullus</i>	Common Sootywing	S4					R	X		
<i>Poanes hobomok</i>	Hobomok Skipper	S5					C	X		
<i>Poanes viator</i>	Broad-winged Skipper	S4					C	X		
<i>Polites mystic</i>	Long Dash Skipper	S5					UC	X		
<i>Polites peckius</i>	Peck's Skipper	S5					VC	X		
<i>Polites themistocles</i>	Tawny-edged Skipper	S5					C	X		
<i>Pompeius verna</i>	Little Glassywing	S4					UC	X		
<i>Pyrgus communis</i>	Common Checkered Skipper	SNA					R	X		
<i>Thorybes pylades</i>	Northern Cloudywing	S5					R	X		
<i>Thymelicus lineola</i>	European Skipper	SNA					VC	X		
<i>Wallengrenia egeremet</i>	Northern Broken Dash	S5					C	X		
Papilionidae	Swallowtails									
<i>Battus philenor</i>	Pipevine Swallowtail	SNA						X		
<i>Heracles cressphontes</i>	Giant Swallowtail	S4					UC	X		
<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	S5					VC	X		X
<i>Papilio polyxenes</i>	Black Swallowtail	S5					VC	X		
<i>Papilio troilus</i>	Spicebush Swallowtail	S4						X		
Pieridae	Whites and Sulphurs									
<i>Colias eurytheme</i>	Orange Sulphur	S5					VC	X		
<i>Colias interior</i>	Pink-edged Sulphur	S5					R	X		
<i>Colias philodice</i>	Clouded Sulphur	S5						X		
<i>Pieris oleracea</i>	Mustard White	S4					PE	X		
<i>Pieris rapae</i>	Cabbage White	SNA					VC	X		X
<i>Pieris virginianensis</i>	West Virginia White	S3	SC					X		
<i>Pyrisitia lisa</i>	Little Yellow	SNA						X		
Lycaenidae	Harvesters, Coppers, Hairstreaks, Blues									
<i>Celastrina lucia</i>	Northern Spring Azure	S5						X		
<i>Celastrina neglecta</i>	Summer Azure	S5					VC	X		
<i>Celastrina sp.</i>	Azure species	SNA						X		
<i>Cupido comyntas</i>	Eastern Tailed Blue	S5					UC	X		
<i>Glaucopsyche lygdamus</i>	Silvery Blue	S5						X		
<i>Lycaena helloides</i>	Purplish Copper	S3					R	X		
<i>Lycaena hylus</i>	Bronze Copper	S5					VC	X		
<i>Lycaena phlaeas</i>	American Copper	S5						X		
<i>Satyrus acadica</i>	Acadian Hairstreak	S4					UC	X		
<i>Satyrus calanus</i>	Banded Hairstreak	S4					UC	X		
<i>Satyrus liparops</i>	Striped Hairstreak	S5					UC	X		
<i>Satyrus titus</i>	Coral Hairstreak	S5					UC	X		
<i>Strymon melinus</i>	Gray Hairstreak	S4						X		
Nymphalidae	Brush-footed Butterflies									
<i>Aglais milberti</i>	Milbert's Tortoiseshell	S5					UC	X		
<i>Asterocampa clyton</i>	Tawny Emperor	S3					UC	X		
<i>Boloria bellona</i>	Meadow Fritillary	S5					VC	X		
<i>Boloria selene</i>	Silver-bordered Fritillary	S5					R	X		
<i>Cercyonis pegala</i>	Common Wood-Nymph	S5					VC	X		
<i>Chlosyne nycteis</i>	Silvery Checkerspot	S5					R	X		
<i>Coenonympha californica</i>	Common Ringlet	S5					C	X		
<i>Danaus plexippus</i>	Monarch	S2N,S4B	SC	E	SC	Schedule 1	VC	X		X

<i>Euphydryas phaeton</i>	Baltimore Checkerspot	S4					R	X		
<i>Euptoieta claudia</i>	Variegated Fritillary	SNA					R	X		
<i>Junonia coenia</i>	Common Buckeye	SNA					UC	X		
<i>Lethe anthedon</i>	Northern Pearly-Eye	S5					C	X		
<i>Lethe appalachia</i>	Appalachian Brown	S4					UC	X		
<i>Lethe eurydice</i>	Eyed Brown	S5					VC	X		
<i>Libytheana carinenta</i>	American Snout	SNA					R	X		
<i>Limenitis archippus</i>	Viceroy	S5					VC	X		
<i>Limenitis arthemis arthemis</i>	White Admiral	S5					C	X		
<i>Limenitis arthemis astyanax</i>	Red-spotted Purple	S5					C	X		
<i>Megisto cymela</i>	Little Wood-Satyr	S5					VC	X		
<i>Nymphalis antiopa</i>	Mourning Cloak	S5					VC	X		
<i>Nymphalis l-album</i>	Compton Tortoiseshell	S5					UC	X		
<i>Phyciodes cocyta</i>	Northern Crescent	S5					UC	X		
<i>Phyciodes tharos</i>	Pearl Crescent	S4					C	X		
<i>Polygonia comma</i>	Eastern Comma	S5					VC	X		
<i>Polygonia interrogationis</i>	Question Mark	S5					VC	X		
<i>Polygonia progne</i>	Gray Comma	S5					UC	X		
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	S5					R	X		
<i>Speyeria cybele</i>	Great Spangled Fritillary	S5					VC	X		X
<i>Speyeria idalia</i>	Regal Fritillary	SNA						X		
<i>Vanessa atalanta</i>	Red Admiral	S5B					VC	X		X
<i>Vanessa cardui</i>	Painted Lady	S5B					C	X		
<i>Vanessa virginiensis</i>	American Lady	S5					C	X		
Total								81	0	5

*TEA Atlas Square: Square #

**NHIC Atlas Square: Square #

References

Ministry of Natural Resources and Forestry (MNRF). 2023a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2023-05-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>

Ministry of the Environment, Conservation, and Parks (MECP). 2023. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-05-23. Available: <https://www.ontario.ca/page/species-risk-ontario>

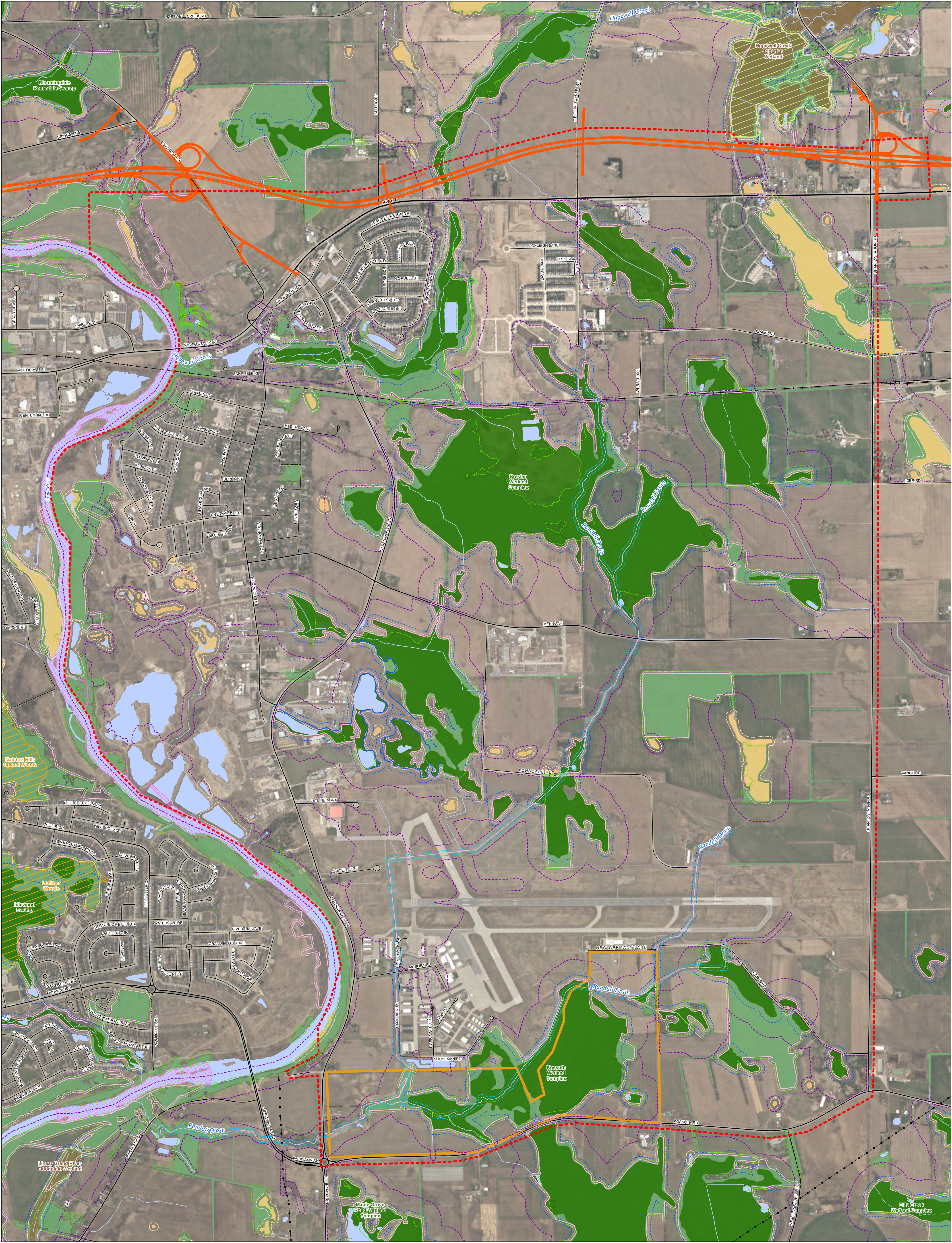
Government of Canada. 2023. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2023-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

Linton, J.E. 2012. The Butterflies of Waterloo Region: An Annotated Checklist, a Species Scarcity Ranking, and a Transect-Based Analysis of Urban vs. Rural Populations. Toronto Entomologists Association. 42p.

Macnaughton A., Layberry R., Cavašin R., Edwards B., and C. Jones. 2023. Ontario Butterfly Atlas. Updated January 2023. Available: <https://www.ontarioinsects.org/atlas/index.html>

Ministry of Natural Resources and Forestry (MNRF). 2023b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2023-03-03. Available: <https://www.ontario.ca/page/make-natural-heritage-area-map>

Maps



EA Study Area

Subject Lands (from original RFP)

Surveyed Dripline

Suveyed Wetland

Permanent Watercourse

Intermittent Watercourse

Recommended 30m Restored Randall Drain Corridor

Water Body

Regulation Limit (GRCA)

Provincially Significant Wetland (PSW)

PSW Buffer (30m)

Other Wetland (Non-PSW)

Unevaluated Wetland

Other Wetland Buffer (15m)

Wooded Area

Woodland Buffer (10m)

Core Environmental Feature (ROP)

Core Feature Buffer (10m)

Waterfowl Winter Concentration Area

White-tailed Deer Wintering Area (Stratum 2)

ANSI, Life Science

Utility Line

Railway

Proposed Highway 7

Highway

Primary Road

Secondary Road

Woolwich Sanitary

Map 1

Servicing Class

Environmental Assessment

Study Area and Natural Features

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Aquatic, Terrestrial and Wetland Biologists

02004006008001,000 Meters

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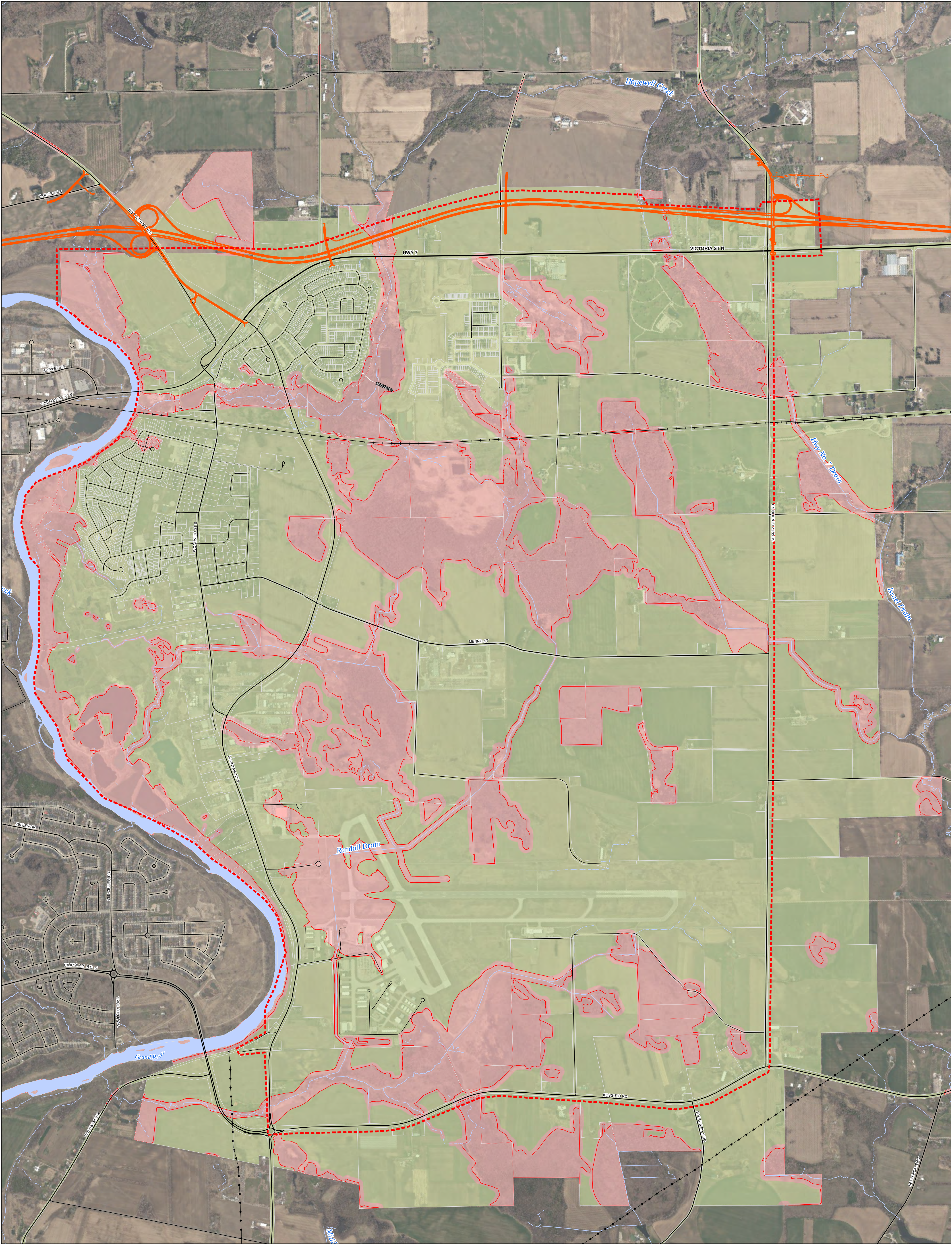
Project: 3119

Date: May 29, 2024

NAD83 - UTM Zone 17N

Scale 1:10,000 (11x17")

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- Legend**
- EA Study Area

Parcel Boundary (Teranet)

Utility Line

Railway

Proposed Highway 7

Highway

Primary Road

Secondary Road

Permanent Watercourse

Intermittent Watercourse

Water Body

Ecological Constraint (without buffer)

Developable

Non-developable

Woolwich Sanitary

Servicing Class

Environmental Assessment

Net-Developable Lands

Map 2

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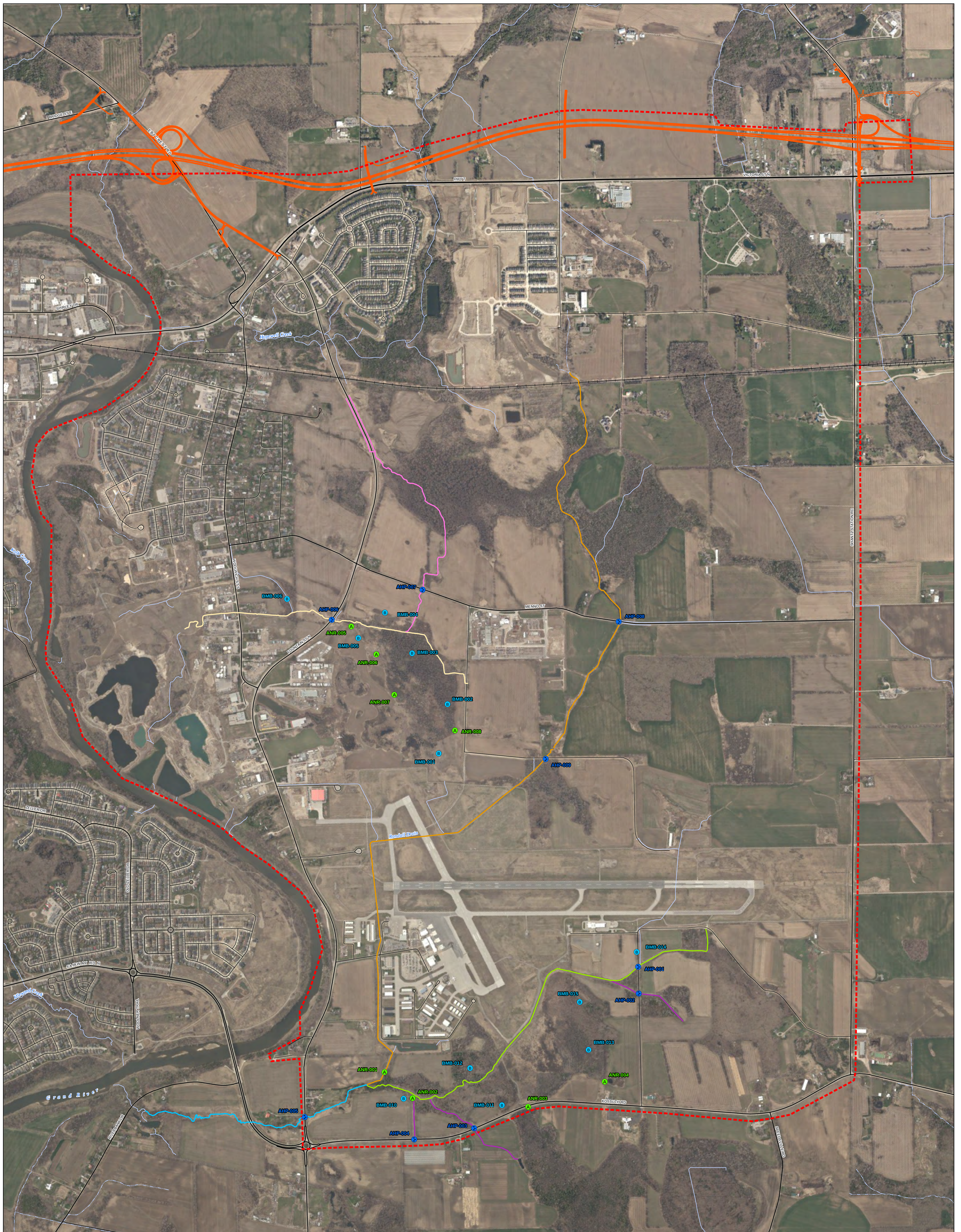
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Legend

- EA Study Area
- Railway
- Proposed Highway 7
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse

Monitoring Stations

- Anuran Call Station (ANR)
- Bird Breeding Monitoring (BMB)
- Aquatic Habitat Point (AHP)

Tributaries

- Breslaw Drain Main Branch
- Breslaw Drain Main Branch Tributary
- Randall Drain East Branch
- Randall Drain East Branch Tributary
- Randall Drain West Branch
- Randal Drain Main Branch

Woolwich Sanitary Map 3b

Servicing Class

Environmental Assessment

Characterization: Monitoring Stations



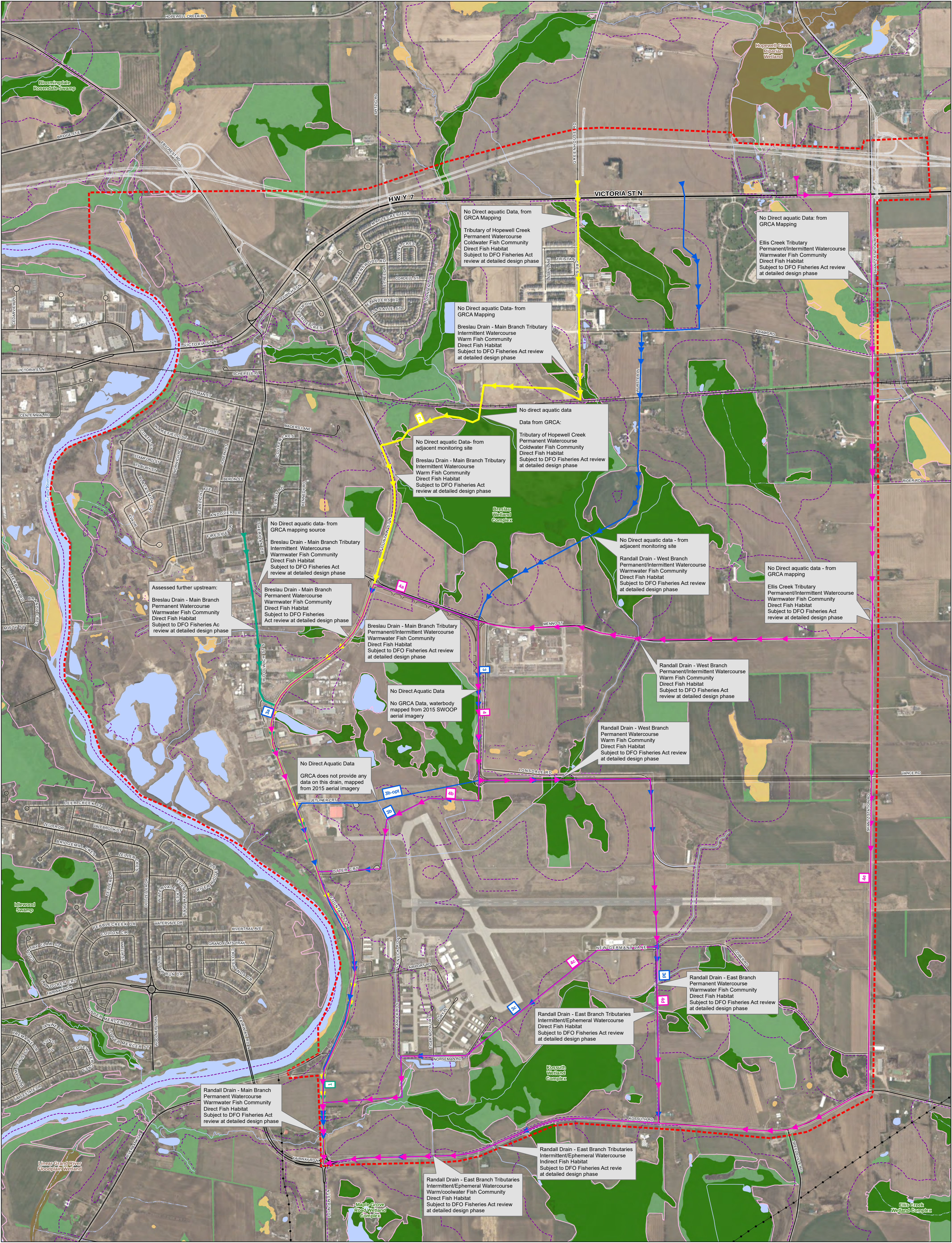
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0 200 400 600 800 1,000 Meters

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Project: 3119
Date: May 29, 2024

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Scale 1:10,000 (11x17")



EA Study Area

Permanent Watercourse

Intermittent Watercourse

Water Body

Regulation Limit (GRCA)

Provincially Significant Wetland (PSW)

Other Wetland (Non-PSW)

Unevaluated Wetland

Wooded Area

Core Environmental Feature (ROP)

Utility Line

Railway

Highway

Primary Road

Secondary Road

Proposed Road ROW

Trunk Alignment 1

Trunk Alignment 2

Trunk Alignment 3

Trunk Alignment 4

Map 4

Woolwich Sanitary

Servicing Class

Environmental Assessment

Trunk Sewer Alignments

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Project: 3119
Date: June 17, 2024
NAD83 - UTM Zone 17N
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