

Natural Environment Report: Proposed Anthony Pit, Puslinch, Ontario

Final Report

March 6, 2026

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Acronyms / Abbreviations

ANSI	Area of Natural and Scientific Interest
ARA	<i>Aggregate Resources Act</i>
ARU	autonomous recording unit
CC	coefficient of conservatism
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CVC	Credit Valley Conservation
DFO	Fisheries and Oceans Canada
EAB	Emerald Ash Borer
ECCC	Environment and Climate Change Canada
EIA	Environmental Impact Assessment
ELC	Ecological Land Classification
EP	Environmental Protection
ESA	<i>Endangered Species Act</i>
FWCA	<i>Fish and Wildlife Conservation Act</i>
GEO	Geospatial Ontario
GPS	Global Positioning System
GRCA	Grand River Conservation Authority
HADD	harmful alteration, disruption or destruction (of fish habitat)
HDF	headwater drainage feature(s)
HiF	high frequency unknown
MBCA	<i>Migratory Birds Convention Act</i>
MBR	Migratory Bird Regulations



MECP	Ministry of Environment, Conservation and Parks
MHBC	MacNaughton Hermesen Britton Clarkson Planning Ltd.
MMAH	Ministry of Municipal Affairs and Housing
MNR	Ministry of Natural Resources
MNRF	Ministry of Natural Resources and Forestry
NE	Natural Environment
NHIC	Natural Heritage Information Centre
NHRM	Natural Heritage Reference Manual
OMNR	Ontario Ministry of Natural Resources
O. Reg.	Ontario Regulation
OP	Official Plan
OWES	Ontario Wetland Evaluation System
PPS	Provincial Planning Statement
PSW	Provincially Significant Wetland(s)
SAR	species at risk
SARA	<i>Species at Risk Act</i>
SARO	Species at Risk in Ontario
SCA	Species Conservation Act
SOCC	species of conservation concern
SWH	significant wildlife habitat
TRCA	Toronto and Region Conservation Authority
UV	ultraviolet

Units of Measure

%	percent
°C	degree(s) Celsius



µM	micron(s)
"	inch(es)
AM	ante meridian
cm	centimetre(s)
DBH	diameter at breast height
ha	hectare(s)
km	kilometre(s)
L	litre(s)
m	metre(s)
masl	metre(s) above sea level
mm	millimetre(s)
PM	post meridian



1 Introduction

CBM Aggregates, a division of St. Marys Cement Inc. (Canada) (CBM) is applying for a Class 'A' Licence under the *Aggregate Resources Act* (ARA), a Township of Puslinch Zoning By-law Amendment and County of Wellington Official Plan Amendment to permit aggregate extraction on lands located at 4454 Victoria Road South, legally described as Part of Lot 22, Concession 8, Township of Puslinch, County of Wellington (Figure 1, Appendix A).

Stantec Consulting Ltd. (Stantec) was retained by CBM to prepare this Natural Environment Report (NER) in support of these applications and fulfill the requirements of the ARA for a new licensed aggregate operation.

1.1 Purpose

This NER was prepared to meet the standards of the Aggregate Resources of Ontario: Technical Reports and Information Standards (MNR 2023) that will accompany the application for a Class 'A' Pit Below Water. In addition to satisfying ARA requirements, this NER will also meet the requirements of an Environmental Impact Assessment (EIA), required by the County of Wellington and Township of Puslinch to undertake amendments to both the County Official Plan (OP) and Township Comprehensive Zoning Bylaw to facilitate aggregate extraction.

For this NER, the following terminology is used for the Project:

- **Site** – the area that is proposed for licensing under the ARA, also referred to as the “proposed licence area”.
- **Extraction Limit** – the total area within the proposed licence boundary where extraction will take place.
- **Proposed Project Footprint** – refers to the lands that will be impacted by the Project, comprised of the Extraction Limit, Acoustic Berms, and Noise Barrier footprints
- **Adjacent Lands** – refers to lands within 120 metres (m) of the proposed licence boundary.
- **Property** – refers to the property currently under private land ownership where site investigations were completed (4454 Victoria Road South). This includes the Site plus a portion of the Adjacent Lands.

These components are shown in Figure 1, Appendix A.



The purpose of this NER is to:

- Identify significant natural heritage features that are present on the Site and/or lands within 120 m; and identify whether natural heritage features are located within a Natural Heritage System as identified by the municipality or a provincial plan.
- Identify potential habitat for Species at Risk (SAR) protected under the *Endangered Species Act, 2007* (ESA) with consideration for the forthcoming *Species Conservation Act* (SCA).
- Identify and assess impacts of the proposed aggregate pit on natural heritage features and/ or the Natural Heritage System and their ecological functions.
- Provide recommendations for preventative, mitigative, or remedial measures related to potential impacts.
- Identify anticipated regulatory approvals under natural heritage legislation.

1.2 Site and Adjacent Lands

1.2.1 Site Description

The Site is located on Victoria Road South, south of Wellington County Road 34, located at municipal address 4454 Victoria Road South in the Township of Puslinch. A large portion of the Site is currently used for agricultural row crops or has succeeded to fallow fields. Hedgerows divide the agricultural fields, and a thicket is present along Victoria Road South. The property owner will remain in residence within the existing dwelling located on the eastern section of the Site.

1.2.2 Adjacent Lands

Natural vegetation communities, including woodlands, wetlands and naturalized plantations occur on Adjacent Lands. Wetlands on Adjacent Lands include unevaluated wetlands and portions of the Mill Creek Puslinch Provincially Significant Wetland (PSW) Complex (Figure 2, Appendix A). Agricultural fields, meadows, residences, and the Mini Lakes Condominium Community also occur on Adjacent Lands.



2 Environmental Policy Context

The Site is in the Township of Puslinch (the Township) in the County of Wellington (the County). The following documents relevant to the Site that describe natural heritage features and regulations were reviewed:

- *Species at Risk Act* (Government of Canada, 2002)
- *Migratory Birds Convention Act* (Government of Canada 1994)
- *Fisheries Act* (Government of Canada 1985)
- ARA (MNR 2020) and Provincial Standards of Ontario – Category 1 – Class A Pit/Quarry Above/Below Water (MNR 1997)
- Provincial Planning Statement (MMAH 2024)
- ESA (Government of Ontario 2007)
- *Fish and Wildlife Conservation Act* (Government of Ontario 1997)
- County of Wellington Official Plan (County 2024)
- Township of Puslinch Zoning By-Law (2018)

An overview of these legislation and policy documents are discussed in Sections 2.1, 2.2, and 2.3.

2.1 Federal Regulations

2.1.1 Species at Risk Act (SARA)

Species included on Schedule 1 of the Species at Risk Act as endangered or threatened are afforded protection of critical habitat on federal lands under this act. On private or public lands, only aquatic species listed as endangered, threatened or extirpated, and migratory birds are protected under SARA, unless otherwise ordered.

2.1.2 Migratory Birds Convention Act (MBCA)

The *Migratory Birds Convention Act*, 1994 (MBCA) prohibits the killing or capturing of migratory birds, as well as the damage, destruction, removal, or disturbance of their nests. The Migratory Birds Regulation, 2022 (MBR), specifies the periods during which the nests of migratory bird species are protected. It includes specific provisions granting year-round protection for the nests of certain species that reuse their nests, such as the Pileated Woodpecker and Great Blue Heron, for designated durations of 36 and 24 months, respectively.



Most bird species in Canada are protected under the MBCA, as defined by Article I, which names the families and subfamilies of birds protected, and provides clarification of which species are included. In southern Ontario, migratory birds generally nest between April 1 and August 31. Environment and Climate Change Canada (ECCC) can issue permits allowing the destruction of nests for scientific, agricultural, or health and safety purposes.

New development and site alterations are not permitted activities under the MBCA, as vegetation removal may contravene the Act.

2.1.3 Fisheries Act

The *Fisheries Act*, 1985 (last amended in 2024) protects fish and fish habitats (s34) within Canadian waters. Under the current fish and fish habitat protection provisions of the *Fisheries Act*, any works, undertaking or activity of a project must avoid causing the death of fish and the harmful alteration, disruption, or destruction (HADD) of fish habitat. To assist proponents with determining if their project will comply with the fish and fish habitat provisions, Fisheries and Oceans Canada (DFO) has outlined measures to protect fish and fish habitat (DFO 2023) as well as several standards and codes of practices (DFO 2024a). If a project cannot completely implement the measures to protect fish and fish habitat and if the standards and codes of practice are not applicable to the project, DFO recommends that the proponent request a review of the project by DFO. If a project cannot avoid and/or mitigate impacts that will cause death of fish or the HADD of fish habitat, an Authorization under the *Fisheries Act* may be required and may be required to develop a habitat offsetting or compensation plan.

2.2 Provincial Regulations

2.2.1 Aggregate Resources Act (ARA)

The ARA, 1990 aims to sustainably manage aggregate resources in Ontario. The Act regulates operations on both Crown and private lands, mandates the rehabilitation of land after aggregate extraction, and minimizes environmental impacts associated with aggregate operations. A Class A license is required to extract more than 20,000 tonnes of aggregate annually from the site [Section 2(a)]. As outlined in Section 3 of the Act, every application for an aggregate license must be prepared in accordance with the regulations and include documents as may be prescribed.

The Aggregate Resources of Ontario: Technical Reports and Information Standards (Standards; MNR 2020) adopted under Ontario Regulation (O. Reg.) 244/97 of the ARA, sets the standards for how technical reports must be prepared. As set out in Section 2.2, this includes the preparation of a NER to identify any of the following natural heritage features and areas that exist on and within 120 m of the Site:

- a) significant wetlands
- b) other coastal wetlands in Ecoregions 5E, 6E and 7E
- c) fish habitat
- d) significant woodlands and significant valleylands



- e) habitat of endangered species and threatened species
- f) significant wildlife habitat
- g) areas of natural and scientific interest (ANSI)
- h) Within the area of one or more provincial plan(s), any key natural heritage features not included in (a) through (g)

Provincial plans include Oak Ridges Moraine Conservation Plan, Greenbelt Plan, A Place to Grow: Growth Plan for the Greater Golden Horseshoe (no longer in effect), Niagara Escarpment Plan, and the Lake Simcoe Protection Plan.

2.2.2 Provincial Planning Statement (PPS)

The *Provincial Planning Statement* (PPS; MMAH 2024) was issued under Section 3 of the *Planning Act* and came into effect on October 20, 2024. The PPS replaces the *Provincial Policy Statement, 2020* and *A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2019*. This report was prepared to be consistent with Policy 4.1 of the PPS with the Natural Heritage Reference Manual (NHRM; MNR 2010).

Natural heritage features relevant to the Site and Adjacent Lands and defined in the PPS are similarly described in the ARA. The Site and Adjacent Lands falls within Ecoregion 6E. Section 4.1.4 of the PPS (2024), states that development and site alteration shall not be permitted in the following features in Ecoregion 6E:

- significant wetlands
- significant coastal wetlands

According to Section 4.1.5 of the PPS, development and site alteration shall not be permitted in the following natural heritage features or areas unless it has been demonstrated that there will be no negative impacts on the features or their ecological functions:

- significant woodlands
- significant valleylands
- significant wildlife habitat (SWH)
- ANSI
- coastal wetlands that are not subject to policy 4.1.4(b)

Further, Sections 4.1.6 and 4.1.7 state that development and site alteration shall not be permitted in the following features, except in accordance with provincial and federal requirements:

- fish habitat
- habitat of endangered or threatened species



Development or site alteration may be permitted on lands adjacent to the natural heritage features listed above if it is demonstrated that there will be no negative impacts on the natural features or the ecological function for which the area was identified. Further the diversity and connectivity of the natural features in an area should be maintained and enhanced, where possible, recognizing linkages between and among natural heritage, surface water and groundwater features (PPS Policy 4.1.2).

2.2.3 Endangered Species Act

The ESA (2007) and associated Regulations that are amended from time to time, identifies wildlife species considered to be at risk in Ontario and designates them as threatened, endangered, extirpated or of special concern. Provincial SAR are identified and assessed by the Committee on the Status of Species at Risk in Ontario (COSSARO), which is a committee of wildlife experts and scientists, as well as those who provide Aboriginal traditional knowledge. COSSARO classifies species according to their degree of risk based on the best available scientific information, community knowledge and Aboriginal traditional knowledge. When COSSARO classifies a SAR, that classification applies throughout Ontario, unless otherwise noted (e.g., black ash).

The ESA protects SAR and their habitats by prohibiting anyone from killing, harming, or possessing protected species (those listed as endangered or threatened), and prohibiting any damage or destruction to the habitat of protected species. All protected species are provided with general habitat protections under the ESA, which protects those areas upon which a species depends to carry out its life processes, such as reproduction, rearing, hibernation, migration or feeding. Recent updates to the ESA have resulted in interim changes and the ESA will be replaced with the *Species Conservation Act* (SCA), which is not yet in effect.

Currently, any activity that could impact a protected species or its habitat must first be authorized through a permit or other authorization from the Ministry of the Environment, Conservation and Parks (MECP). Given the ongoing changes to legislation, the policy that is in place at the time of habitat disturbance (e.g., ESA, SCA) should be reviewed as different permit options may be available.

2.2.4 Fish and Wildlife Conservation Act

The provincial *Fish and Wildlife Conservation Act*, 1997 (FWCA) provides protection of wildlife in Ontario including fish, furbearing mammals, game wildlife and specially protected wildlife through regulations for hunting, trapping, and fishing practices. Game and specially protected mammals, birds, reptiles, amphibians, and invertebrates are listed on Schedules 1-11 of the FWCA. Definitions provided for hunting include capturing or harassing wildlife (Section 5) and would include activities that collect or handle wildlife for inventories or other scientific purposes, or to relocate wildlife out of harm's way (e.g., during construction activities), including individuals and eggs. Sections 7 and 8 also provide protection for nest and eggs of specified bird species including raptors, and dens of bears and furbearing animals, and beaver dams. Under the FWCA, the Minister has the authority to authorize activities that would otherwise be prohibited such as the safe capture of wildlife and removal of nests, dens, and dams, and impose conditions on an authorization.



2.3 Municipal

The County and Township have approval authority for development applications for the Project. The County is the approval authority for OP Amendments for both the County and Township, while the Township is the approval authority for processing zoning applications.

2.3.1 County of Wellington Official Plan

Schedule B7 (Land Use) of the OP identifies the Site and Adjacent Lands as a mix of Rural and Greenlands systems. The Rural System component is comprised of Secondary Agricultural, while the Greenlands System is comprised of Greenlands (primarily woodlands) and Core Greenlands (primarily wetlands).

2.3.2 The Township of Puslinch Comprehensive Zoning By-law

Schedule A of the Township of Puslinch's Comprehensive Zoning By-law (No. 023-18) shows the Site as a mix of Agricultural (A) and Natural Environment (NE) with portions included in an Environmental Protection (EP) Overlay. The EP Overlay is also shown on Schedule B, Map B-1 of the by-law, and represents the natural heritage features included in the Greenlands designation of the County's OP.



3 Project Description

The Site is currently used for rural residential uses and occupied with a detached dwelling, detached garage and a shed. The buildings on the Site are located outside of the proposed Project Footprint.

The area proposed to be licensed is approximately 18.0 hectares (ha) (44.5 acres) with 8.7 ha (21.5 acres) proposed for extraction. The pit is proposed to operate above and below the water table. The proposed maximum annual extraction limit is 1,000,000 tonnes per year.

Above water aggregate extraction is expected to begin in the northeast portion of the Extraction Limit and progress in a general southwesterly direction. The opposite direction is proposed for below water extraction; initiating in the western area of extraction limit and proceed to the northeast. Below water extraction is only proposed for the western part of site. The Site will be extracted to a maximum depth of 304.0 metres above sea level (masl) for below water, and 323.0 masl for above water extraction.

The proposed expansion will not contain any processing, washing, or recycling on the site. There will be no water taking (e.g. dewatering or pumping) on site. Materials will be extracted via excavators and dragline (for below water extraction), stockpiled within the extraction area and then shipped, via highway trucks, for processing to the Aberfoyle Pit (License #5520).

A total of seven acoustic berms and one noise barrier will be located on the Site, some of which will require vegetation removal to facilitate installation.

Access to the Anthony Pit will be via an existing driveway that meets Victoria Road South on the northeast corner of the Site. The first section of the driveway will be shared with the property owner. Afterward, the pit access road will branch from the main residence and extend southwest, passing between two sections of the Mill Creek Puslinch Provincially Significant Wetland (PSW) and entering areas of the property that are currently being used for agricultural row crops and recreation.



4 Methods

4.1 Background Review

Background data were reviewed to identify natural heritage features, including habitat of endangered and threatened species on the Site and Adjacent Lands. The following information sources were reviewed:

- MNR Geospatial Ontario datasets (2025) (Geospatial Ontario Datasets [GEO], 2025)
- Natural Heritage Information Centre (NHIC) online database (MNR 2025a)
- Ontario Amphibian and Reptile Atlas (Ontario Nature 2020)
- Atlas of the Breeding Birds of Ontario (Cadman et al. 2007)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario Butterfly Atlas (MacNaughton et al. 2022)
- Grand River Conservation Authority Regulation Mapping (GRCA 2024)
- County of Wellington Official Plan (Wellington County 2024)
- The Ecosystems of Ontario, Part 2: Ecodistricts (Wester et al. 2018)
- Great Lakes Conservation Blueprint for Terrestrial Biodiversity (Henson et al. 2005)
- Fisheries and Oceans Aquatic SAR Maps – Ontario Southwest Map 17 (DFO 2024)
- Data collected during field investigations

4.2 Species at Risk Screening

For this assessment, habitat of endangered and threatened species includes those listed on SARO under the ESA, 2007 (Government of Ontario 2007). Only species listed as threatened or endangered and their habitats are afforded protection under this Act.

Searches were conducted during field investigations (described in Section 4.3) for suitable habitat and signs of SAR. Habitat suitability was assessed in the field based on known species-specific habitat preferences.

The potential for SAR to occur on the Site and Adjacent Lands was determined based on one of the following criteria:

- a) presence of suitable habitat on the Site and Adjacent Lands
- b) records of the species in the vicinity of the Site and Adjacent Lands from background sources
- c) range overlap with the Site and Adjacent Lands



4.3 Field Investigations

Field investigations were conducted at the Site as well as on the section of Adjacent Lands that are part of the Property. Permission to enter the remaining Adjacent Lands was not obtained and therefore were assessed from the property boundary, through air photo interpretation and from data collected from the background review.

Field surveys were carried out in 2022, 2023, and 2024. Surveys included characterizing and mapping vegetation communities, botanical inventories (three-season) and targeted studies such as: black ash survey, wetland delineation, amphibian call count surveys, salamander surveys (egg mass, eDNA, minnow trap), turtle basking surveys, bird surveys (breeding bird, nocturnal bird acoustic, winter raptor), bat surveys (habitat assessment, acoustic), terrestrial insect surveys and headwater drainage feature assessment.

A summary of field studies is provided in Table 1 and detailed methods are described in the following sections. Incidental wildlife observations were documented during each site visits.

Table 1 Field Surveys Completed for the Project

Survey Type	Survey Date	Surveyor
Vegetation Surveys		
Ecological Land Classification (ELC) Survey and Botanical Inventory	May 19, 2022	J. Ball
	September 9, 2022	B. Miller
	September 29, 2022	B. Miller
	June 2, 2023	B. Miller
	July 17, 2024	J. Ball
Black Ash Survey	June 10, 2024	M. Straus
	July 17, 2024	J. Ball
Wetland Delineation and Soil Assessment	October 24, 2024	J. Ball
	November 8, 2024	J. Ball
Herpetofauna Surveys		
Amphibian Call Count Surveys	April 14, 2022	J. Ball, K. Ellis
	May 10, 2022	J. Ball, L. Marshall
	June 15, 2022	J. Brooks, K. Ellis
Salamander Egg Mass Survey	April 14, 2022	J. Ball, K. Ellis
Salamander eDNA Survey	May 19, 2022	A. Taylor, D. Eusebi
Salamander Minnow Trap Surveys	March 25-27, 2024	J. Ball, M. Straus
	April 1-2, 2024	J. Ball, M. Larson



4 Methods

March 6, 2026

Survey Type	Survey Date	Surveyor
Turtle Basking Surveys	April 22, 2022 April 29, 2022 May 5, 2022 May 19, 2022 May 30, 2022 June 10, 2022	J. Ball M. Straus M. Straus J. Ball L. Marshall L. Marshall
Bird Surveys		
Breeding Bird Surveys	May 30, 2022 June 10, 2022 June 21, 2022	L. Marshall L. Marshall J. Brooks, K. Ellis
Nocturnal Bird Acoustic Surveys	March 18 – April 15, 2022	L. Marshall
Winter Raptor Surveys	March 4, 2022 March 18, 2022	M. Straus L. Marshall
Bat Surveys		
Bat Habitat Assessment	March 4, 2022	M. Straus
Bat Acoustic Surveys	June 3 – June 25, 2022	J. Randall
Insect Surveys		
Terrestrial Insect Surveys	June 2, 2022 July 28, 2022 September 1, 2022	A. Taylor J. Brooks J. Brooks
Aquatic Surveys		
Headwater Drainage Feature Assessment	March 18, 2022 (Visit 1) April 14, 2022 (Visit 1, continued)	L. Marshall J. Ball, K. Ellis

4.3.1 Ecological Land Classification

Ecological Land Classification (ELC) was used to identify and map natural and anthropogenic vegetation communities on the Site and Adjacent Lands. The results were used to inform the presence of rare vegetation communities, including other candidate significant wildlife types and habitat of endangered and threatened species. Identification and mapping of vegetation communities was completed following the ELC System for Southern Ontario (Lee et al. 1998). The ELC codes used follow the updated 2008 ELC naming convention. ELC mapping was completed to vegetation type, where possible.

Before undertaking field surveys, vegetation communities were mapped using aerial imagery, with boundaries delineated in ArcGIS. The field inventories were completed over three seasons (spring, summer, fall) and included verifying and refining the boundaries mapped during the desktop exercise. In the ELC system, community boundaries are delineated according to guidance that designates the outer 10 m as a transitional buffer strip (Government of Ontario, 2017). This method is different from the



Ontario Wetland Evaluation System (OWES) described in Section 4.3.4 and may result in minor boundary inconsistencies when features are overlaid using both systems.

The surveys were completed on the Property, which included the Site and a portion of Adjacent Lands. The remaining Adjacent Lands were assessed from the property boundary and through air photo interpretation. Vegetation field studies were completed on May 19, September 9, and September 29, 2022; June 2, 2023; and July 17, 2024.

4.3.2 Botanical Inventory

A three-season botanical inventory was completed to survey for plant species with different phenology (e.g., spring ephemerals, midsummer wildflowers, fall wildflowers). Botanical inventories on the Property were conducted concurrently with ELC surveys between 2022 and 2024.

All vascular plants observed in each vegetation community were recorded using the common name and scientific nomenclature from the provincial Ontario Species List provided by the NHIC (MNR 2025b). Conservation status of plant species was used to identify species of conservation concern (SOCC) and habitats for endangered and threatened species, based on the following criteria:

- Provincial Status: provincial rankings assigned by the NHIC (MNR 2024b), COSSARO and Species at Risk in Ontario List (SARO) under the ESA.
- Federal Status: Federal rankings were based on the Committee on the Status of Endangered Wildlife in Canada Committee (COSEWIC) and SARA.

Additionally, the Significant Plant List for Wellington County (City of Guelph 2012) was used to identify if plant that are ecologically important, rare, or at risk, to the local Guelph region occur on the Site or on Adjacent lands.

A floristic quality assessment was also completed to determine the level of disturbance and overall quality of the vegetation communities. Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 8, 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

4.3.3 Black Ash Survey

Black ash were recorded during botanical inventories completed between 2022 and 2024. Additional targeted surveys were completed on the Property on June 10 and July 17, 2024 based on new conditional exemptions and assessment guidelines developed by MECP.

Black ash was listed as endangered on the SARO List (O. Reg. 230/08) under the ESA in January 2022. Its protection under the ESA was suspended for two years but reinstated on January 25, 2024. Conditional exemptions were developed and prescribed under a new regulation (O. Reg. 6/24) with



O. Reg. 832/21 amended (through O. Reg. 7/24) to define black ash habitat. Black ash is protected under the ESA if it is a living tree, healthy, ≥ 8 centimetres (cm) in diameter at breast height (DBH) and located in an area identified in Schedule 1 of O. Reg. 6/24. The Project is within the area of the province where black ash is protected.

A health assessment for black ash was completed on the Property in accordance with O. Reg. 6/24, per the “Black Ash Assessment Guidelines: Assessment of Black Ash (*Fraxinus nigra*) for the purposes of the Endangered Species Act, 2007” (MECP 2024). The health assessment followed these requirements:

- **Size:** if the tree is < 8 cm DBH an assessment is not completed.
- **Timing of Assessments:** to be completed during the leaf-on season between June 1 and October 1.
- **Assessing Canopy Condition:** examine signs of thinning, defoliation and dieback and assign a rating using the five-point canopy condition rating system.
- **Assessing Emerald Ash Borer (EAB) Infestation:** assess the presence and severity of EAB infestation based on direct observations of adult or larval life stages, EAB exit holes, and larval galleries. Where past or current infestation is identified, the severity is classified as low, medium or high based on one or more of the listed criteria.
- **Assessing other Possible Health Stressors:** identify and assess other factors that may be contributing to the condition of the tree, such as pathogens or pests, competition, poor habitat quality, low relative crown class, drought conditions, effects of wind exposure, injuries and site degradation (e.g., soil compaction) caused by human activities. The severity of the impact of those factors is classified as low, medium and high based on the criteria listed.
- **Health Determination:** provide a determination as to whether the tree is significantly declining or exhibiting the effects of a significant decline in health using the canopy condition ratings (1 through 5). In general rankings of 1 to 3 are considered healthy, particularly if mortality is not expected within a five-year period. Unhealthy trees include ratings of 3 to 5 if mortality is likely within a five-year period).

Under O. Reg. 832/21, black ash habitat is defined as the area within a radial distance of 30 m around each black ash tree. Damage and destruction are prohibited in black ash habitat to protect and maintain essential habitat conditions (the critical root zone) around each healthy tree.

4.3.4 Wetland Delineation

Provincial mapping (GEO 2025) indicates that the boundaries of the wetlands on the Site were last reviewed in 2009. The boundaries were subsequently re-assessed in the field in 2024.

Where Project components (e.g., access road, Extraction Limit, Acoustic Berms) were located adjacent to wetlands, a detailed wetland field delineation was completed. Delineation methods were based on the protocols outlined in the OWES Southern Manual (MNR 2022). In general, where greater than 50% of the vegetation cover consists of wetland species as described by OWES, the community is considered wetland. The assessment is performed from upper (e.g., canopy and sub-canopy) to lower (e.g.,



herbaceous ground cover) vegetation layers, as larger and longer-lived species are considered better indicators of long-term conditions (MNRF 2022). In situations where plant species do not indicate a clear boundary, additional evidence, such as the nature of the underlying substrate may also be considered (MNRF 2022).

Detailed wetland boundaries were delineated using vegetation characteristics on October 24, 2024, and supplemented by soil augering on November 8, 2024. Wetland delineation was completed outside of spring and summer period when the highest number of vegetation species may be present and identifiable, however the timing of surveys did not affect results for several reasons:

- The majority of wetland habitat on site, and the entire PSW consisted of treed swamp habitats with tree cover that could be assessed during the late site visits.
- Several of the wetlands were confined to clearly defined basins or depressions in the ground. Therefore, the boundary was applied at the top of the depression unless vegetation cover indicated otherwise.
- Soil augering was conducted to support wetland delineation in areas where vegetation and topographic characteristics were inconclusive; locations are shown on Figure 3 (Appendix A).

Detailed wetland boundaries were recorded in the field using a high-accuracy (<60cm) Trimble Catalyst GPS (Global Positioning System) Unit connected to the ArcGIS Field Maps application.

This wetland delineation process differs from ELC boundary delineation (as described in Section 4.3.1) where a transitional boundary is not acknowledged. Wetland boundaries located on Adjacent Lands were delineated using air photo interpretation, observations made from the Property boundary and using the ELC protocol; these boundaries were not surveyed with a high-accuracy GPS.

4.3.5 Amphibian Call Count Surveys

Amphibian call count surveys were completed in 2022, following the Marsh Monitoring Program protocol (Bird Studies Canada 2009). Eight (8) stations were surveyed, as shown on Figure 3, Appendix A.

Surveys were completed from 30 minutes after sunset to midnight on evenings with minimum temperatures of 5 degrees Celsius (°C) in April, 10°C in May, and 17°C in June, and a maximum wind speed of 3 on the Beaufort Scale. Each survey station was a 100 m radius semicircle where surveyors listened for calling frogs and toads for three minutes. The approximate location and direction of calling toads were recorded, and call levels were classified into three categories: 1, 2, or 3. Level 1 indicates that individuals could be counted, and calls were not simultaneous. Level 2 denotes that calls are distinguishable but with some simultaneous calling. Level 3 indicates a full chorus where calls are continuous and overlapping. Toads and frogs calling from outside of the survey stations were also recorded. Survey dates, times, weather conditions, and surveyors are provided in Table 2.



Table 2 Amphibian Call Count Survey Dates, Times, and Weather Conditions

Survey	Date	Time (24 hr)	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	April 14, 2022	20:33 – 21:14	8	2	0	None / none	J. Ball, K. Ellis
2	May 10, 2022	21:03 – 21:54	13	3	5	None / none	J. Ball, L. Marshall
3	June 15, 2022	21:33 – 22:00	25	2	0	None / none	J. Brooks, K. Ellis

4.3.6 Salamander Surveys

4.3.6.1 Salamander Egg Mass Survey

Wetlands on the Property were surveyed on April 14, 2022 for terrestrial mole salamander (*Ambystoma* sp.) egg masses. Based on background records and the presence of suitable habitat, potential mole salamander species present on the Property include Blue-spotted Salamander (*Ambystoma laterale*), Spotted Salamander (*Ambystoma maculatum*), and the endangered Jefferson Salamander (*Ambystoma jeffersonianum*). Mole salamanders lay their eggs in small clumps attached to submerged sticks or plant stems in early spring (March and April).

Ecologists walked around the perimeter of wetlands where pooling water occurred to search for egg masses in suitable habitat on the Site and Adjacent Lands within the following ELC communities (described further in Section 6.1): deciduous swamp communities (SWDM3-3a, SWDM3-3b, SWDM3-3c, SWDM3-3d, SWMO1-1), marsh communities (MAMM1-12) and shallow aquatic communities (SAS, SA). Polarized glasses were used to improve visibility of underwater features. Surveyors limited entry to the wetlands to the extent possible to reduce potential impacts to the egg masses and adult salamanders. Binoculars were used to locate potential egg mass attachment sites that were further from the edge of wetlands. Egg mass size, shape, and conditions were recorded to help with species identification.

4.3.6.2 eDNA Survey

An environmental DNA (eDNA) survey to detect the potential presence of Jefferson Salamander was completed on May 19, 2022, at nine (9) sample locations in four (4) wetlands and ponds on the Property (Figure 3, Appendix A). To optimize capture of eDNA, the survey was scheduled to coincide with larval activity in the pools, prior to larvae metamorphosing and leaving wetland in late summer/early fall. The study design accounted for the possibility that Jefferson Salamander populations, if present, may occur at low densities, resulting in low and patchy eDNA distribution. The design follows guidance from Advice on the Use of Targeted Environmental DNA (eDNA) Analysis for the Management of Aquatic Invasive Species and Species at Risk (DFO 2021).



Three composite samples (A, B, C) were collected from each sample location to further optimize the capture of eDNA. For each composite sample, three sub-samples were collected using a polypropylene sampling container affixed to a telescopic pole. Sub-samples were pooled in a bucket (approximately 4 litres (L) total) before being pumped through a Smith-Root Self-Preserving filter (PES 1.2 microns (μM) mesh size) using a portable peristaltic pump powered by a cordless drill (i.e., one bucket per composite sampling location). Filtration was completed following the filter manufacturer's instructions. Water temperature and pH were measured at each sample site.

For all composite samples, filtration volume was limited to approximately 1 L to avoid concentrating compounds in the water that could inhibit eDNA analysis; Stantec has encountered inhibition during previous eDNA surveys when filtering larger water volumes, and this can result in false negatives. The amount of water pumped through filters was recorded for each composite sample. At some sites, due to suspended particulates in the water, it was not possible to filter 1 L of water through the pump (i.e., the filter became clogged). One negative control sample of filtered distilled water was also collected in the field to test for quality control during collection, handling, and transport to the testing laboratory. Once filtration was complete, the seal of the filter was partially opened, and the pump was run for one minute to air dry the self-preserving filter membrane. After the filter was dried, the filter was sealed in a sterile bag and shipped to the lab for processing within 24 hours of sampling. A multi-species test (metabarcoding) for freshwater vertebrates was completed to detect Jefferson Salamander and/or a Jefferson Salamander dependent unisexual hybrid. Stantec submitted filters to NatureMetrics for eDNA processing as they are a qualified lab specializing in eDNA wildlife metabarcoding analyses in Canada.

Quality Assurance and Quality Control

Standardized sample collection, filtration, handling, and shipment procedures were implemented by experienced field staff to protect the integrity of eDNA collected and avoid degradation. Samples were collected in sterile containers, were filtered on the same day as their collection, and stored in a dark cooler prior to filtration to avoid potential eDNA breakdown due to elevated air temperatures and/or ultraviolet (UV) exposure in intense sunlight. To prevent cross contamination, clean nitrile gloves were used between wetlands and new sampling supplies (i.e., filters and filter tubes, sampling containers, buckets) were used for each sampling site. The sample pole and any other re-used equipment in contact with water (e.g., boots) were sterilized with a 1% bleach solution between wetlands.

4.3.6.3 Salamander Trapping Surveys

Salamander trap surveys were completed in wetlands where eDNA results showed the presence of salamanders. Trapping was completed following methods outlined in the Sampling Protocol for Determining the Presence of Jefferson Salamanders (*Ambystoma jeffersonianum*) in Ontario (Jefferson Salamander Recovery Team 2013). Un-baited minnow traps were placed along the edges of the wetland pools where water was sufficiently deep to submerge the trap to the opening, but with at least 2 cm of space in the trap to allow animals to breathe. Minnow traps with square shaped galvanized 6"x6" (inches) mesh were used to prevent salamanders from getting stuck in the mesh. Sampling sites were chosen near potential egg mass attachment areas, where present. Traps were tethered with a rope and tied to a tree or branch.



Minnow traps were set in the evenings of March 25 and 26, and April 1, 2024 on evenings when salamander movement was expected to be high (i.e. during warm and wet weather). The traps were set just prior to dusk and checked/emptied no more than one hour after sunrise the following morning, and always within 12 hours of deployment. The minnow traps were removed from wetlands on nights when sampling was not taking place. The number of individuals trapped or trapping nights were limited to a maximum of 20 salamanders from each feature. To reduce the likelihood of trampling or disturbing salamanders, staff avoided entering wetlands and exercised caution while walking around and between potential breeding habitats.

Salamander Handling

Salamanders were handled according to Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (MNRF 2013). Salamanders were handled with nitrile gloves that had been moistened with water from the source wetland/pond. Time spent handling each individual salamander was kept as short as possible. Salamanders were placed in a secure container on a paper towel soaked with water from the source wetland/pond until they were sampled.

Tissue Sampling

Salamanders in the traps were identified to species whenever possible. Tissue samples (i.e., tail clippings) were collected from salamanders that were suspected Jefferson Salamanders or their dependent unisexual hybrids. Tissue sampling involved the removal of a small portion of the tip of the salamander's tail (no more than 5 millimetres (mm)), which was placed in 70% ethanol. Tail samples were clipped using surgical scissors, which were sterilized with alcohol between each specimen.

Each tissue sample collected was given a unique identifying code and submitted to Dr. Jim Bogart's laboratory at the University of Guelph for genetic analysis.

4.3.7 Turtle Basking Surveys

Turtle basking surveys were completed at two ponds on the Site: SA and SAS (Figure 3, Appendix A). Basking surveys generally followed the Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario (MNRF 2015). Weather conditions were clear, and temperatures were above 10°C to improve probability of detection at each pond. Surveys were completed on six (6) dates between late April and early June, as turtles are more likely to bask when air temperatures are warmer than water temperature. Each survey consisted of visually scanning the ponds (both with the naked eye and with binoculars) for up to 45 minutes to check for turtle activity and active basking sites. Survey dates, times, weather conditions, and surveyors are provided in Table 3.



Table 3 Turtle Basking Survey Dates, Times and Weather Conditions

Survey	Date	Time (24 hr)	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	April 22, 2022	14:11 – 15:30	10-12	1	5	None/Rain	J. Ball
2	April 29, 2022	10:45 – 11:45	7-10	3	10	None/Rain	M. Straus
3	May 5, 2022	13:39 – 14:30	13-14	2	25	None/Rain	M. Straus
4	May 19, 2022	13:05 – 14:08	16	3	40-80	None/Rain	J. Ball
5	May 30, 2022	10:00 – 10:50	20-23	1	50	None/none	L. Marshall
6	June 10, 2022	10:00 – 10:45	11-13	1	0	None/Rain	L. Marshall

4.3.8 Breeding Bird Surveys

In 2022, breeding bird surveys were completed in all habitats following established protocols such as the Ontario Breeding Bird Atlas (Cadman et al. 2021) and the North American Breeding Bird Survey (ECCC 2018). Surveys were completed by traversing the Property on foot between sunrise and 10:00 a.m. All bird species seen or heard were recorded. A conservative approach to determining breeding status was taken; all birds seen or heard in appropriate habitat during the breeding season were assumed to be breeding. Survey dates, times, weather conditions, and surveyors are provided in Table 4.

Table 4 Breeding Bird Survey Dates, Times and Weather Conditions

Survey	Date	Time (24 hr)	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	May 30, 2022	05:56 – 10:00	17-23	1	50	None / none	L. Marshall
2	June 10, 2022	06:00 – 10:00	11-16	1	0	None / Rain	L. Marshall
3	June 21, 2022	07:02 – 09:56	25	2	0	None / none	J. Brooks, K. Ellis

4.3.9 Nocturnal Bird Surveys

In 2022, six (6) ARUs were deployed in treed habitat, on edges of treed habitat, and within a hedgerow. The ARUs were programmed to record nocturnal birds (specifically Great Horned Owl and Eastern Screech-Owl) and began recording one hour after sunset for six hours each night. Units operated between this timeframe each night between March 18 and April 15, 2022. Locations of ARUS are shown on Figure 3, Appendix A.



Acoustic data were analysed using Audacity software, a multi-track audio editing and processing program. Recordings were loaded into the software and viewed in spectrogram form to assist with the visual detection of vocalizations of target species. The frequency range to detect owls was set from 516 and 1051 Hz and time was set to one second intervals. Window size was set to 1024 and type was set to Hann. Recordings that were made during evenings when heavy rain fell, or when wind speeds that exceeded 3 on the Beaufort scale were excluded from analysis.

Audio recordings were analyzed by visually scanning and “spot-checking” areas of interest (i.e., visual inconsistencies) within an audio file’s spectrogram display. An audio file was loaded into Audacity, the spectrogram settings were applied, and areas of interest were visually identified. Great Horned Owl and Eastern Screech-Owl vocalizations appear prominently on a spectrogram, particularly if the bird is close to the ARU while vocalizing. The vocalizations of each species appear as easily identifiable visual markers and therefore, rapid visual scans and confirmation using Audacity’s playback feature was the method used most frequently in this analysis.

A random subset of ten days was chosen for analysis. If an owl vocalization was detected, the next six nights of recordings were skipped, and analysis resumed with the recording taken seven nights after the initial vocalization. If no owl vocalizations were observed within the subset of ten days, owls were considered absent from the area in which the ARU had been deployed.

4.3.10 Raptor Surveys

Two winter raptor surveys were completed on the Property in 2022. The Property was traversed on foot and raptor behaviour (e.g., perching, hunting, interacting with other birds) was recorded. The surveys were completed during late winter when leaves were not yet present on trees to improve detectability of stick nests in forest communities. During breeding bird surveys, any raptors seen or heard were recorded.

Survey dates, times, weather conditions and surveyors are provided in Table 5.

Table 5 Raptor Survey Dates, Times and Weather Conditions

Survey	Date	Time	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	March 4, 2022	10:00 – 13:00	-3 to -1	4	0	None/None	M. Straus
2	March 18, 2022	09:00 – 12:15	8 to 16	1	100-50	None/None	L. Marshall



4.3.11 Bat Maternity Roost Suitability Survey

Results of the ELC survey was used to identify areas with potential bat maternity roost habitat (for both SAR and SWH) on the Site and Adjacent Lands. Forest, woodland and swamp communities on the Site and Adjacent Lands were considered potential SWH for bat maternity roost colonies (ELC codes: FOD, FOM, FOC, WOD, WOM, WOC, SWD, SWM, SWC). Detailed bat roost suitability surveys were not completed for areas that are not anticipated to be impacted by the Project. Therefore, a snag density calculation was not completed as prescribed in the Ecoregion Criteria (MNRF 2015) for SWH. Instead, SWH for bat maternity roost colonies was assumed present in these ELC communities on the Site and Adjacent Lands.

Candidate bat SAR habitat includes the ELC communities noted for SWH above (e.g., FO, WO, SW) but also may include hedgerows, thickets (THD), and plantations (TAG), if suitable roosting trees are present.

A maternity roost assessment was completed on March 4, 2022 for trees with a DBH >10 cm to identify trees that may be suitable for bat maternity roosts within the proposed vegetation clearing zone, which consisted mainly of hedgerows and some thickets.

The following were recorded for each assessed tree:

- geographic coordinates (UTM)
- tree species
- DBH
- tree height
- presence of cavity, loose bark, crack or knot hole
- cavity height
- tree height and DBH relative to trees in the surrounding landscape
- canopy open/closed
- presence of other candidate roost trees in vicinity
- decay class category (early, category 1-3 or late, category 4 - 6)

Bat roost tree suitability was determined using guidance from MNR's Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-coloured Bat, April 2017 (MNRF 2017). Snag trees suitable for Little Brown Myotis and Northern Myotis were those in an early state of decay with loose bark, or at least one cavity, crack, knot or leaf cluster. Roost trees suitable for Tri-coloured Bat included oak trees over 10 cm DBH, sugar maple trees over 25 cm DBH, and sugar maple trees over 10 cm DBH that also include a dead/dying leaf cluster. According to MNR guidance, an ELC ecosite can qualify as suitable bat SAR maternity habitat regardless of the number of maternity roost trees per hectare. Since the completion of the surveys in 2022, three additional bat species were added to the ESA – Eastern Red Bat, Hoary Bat and Silver-haired Bat (referred to collectively as migratory SAR bats).



It should be noted that MECP provided Stantec with two (2) new draft interim guidance documents for bat treed habitats in the time since this survey was performed:

- Species at Risk Bats Survey Note 2022 (MECP 2022a)
- Maternity Roost Surveys (Forests and Woodlands) (MECP 2022b)

The development of these draft guidance documents was primarily based on Bat and Bat Habitat: Guidelines for Wind Power Projects (MNR 2011). Upon reviewing the new guidance, it was determined that the collected data fulfilled the requirements.

Survey dates, times, weather conditions, and surveyors are provided in Table 6. The results of the suitability surveys were used to determine the locations of bat acoustic monitoring stations.

Table 6 Bat Maternity Roost Suitability Survey Dates, Times and Weather Conditions

Survey	Date	Time	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	March 4, 2022	12:30 – 15:30	-3 to -2	5	0	None/None	M. Straus

4.3.12 Bat Acoustic Surveys

Five (5) autonomous recording units (ARUs) were deployed in treed habitat on the Property from June 3 - 25, 2022. ARUs were moved from their initial locations to new locations on June 14 where they remained until June 25, 2022. Locations of ARUs are shown on Figure 3, Appendix A.

The acoustic data were analysed using Kaleidoscope Pro software by Wildlife Acoustics. The data processing through Kaleidoscope Pro involves running the software's automatic identification, which screens out noise files and provides a suggested species for each bat call file. Where possible, calls were identified to species, or a group of similar species. For calls that were identified as bats that were not SAR (Big Brown Bat), the automatic species identifications (IDs) were used. Calls that were identified as SAR (Northern Myotis, Tri-colored Bat, Eastern Small Footed Bat, Eastern Red Bat, Hoary Bat, and Silver-haired Bat) were reviewed by a qualified biologist to confirm the identification as follows:

- If the identification was given a match ratio (percentage of pulses matching the auto classification result) over 60%, and there were >5 pulses, the manual ID was used.
- For calls with ≤5 pulses, the call was given an identification of 'high frequency unknown' (HiF), as these short calls do not have enough information to provide a reliable identification.
- A subset of the remaining calls identified as bat SARs were manually reviewed.



In some cases, species cannot reliably be identified based on the quality of the call. Where a call was reviewed and determined to be in the *Myotis* genus, but a species ID was not possible, it was categorized as *Myotis* species. In other instances, if a call was manually reviewed and of a high frequency (>35kHz), and thus potentially representative of a SAR bat, it is categorized as HiF. The HiF category includes *Myotis* species, as well as Eastern Red Bat.

4.3.13 Terrestrial Insect Surveys

Three (3) surveys for damselflies, dragonflies and butterflies were completed in 2022, one in each of June, July and September. Surveys were completed under gentle or moderate breeze conditions, on warm days (>15°C), and when the sun was overhead (approximately 10:00 am to 4:00 pm). Species were identified at a distance using binoculars or captured using an aerial net and identified in the hand where required.

Surveys were completed by walking through the Property and recording species encountered. Emphasis was placed on areas where insects were likely to concentrate such as woodland edges, meadows, nectar plants, wetland or open water or habitat containing butterfly larval host plants. Targeted nighttime moth surveys were not conducted.

Survey dates, times, weather conditions, and surveyors are provided in Table 7.

Table 7 Terrestrial Insect Survey Dates, Times and Weather Conditions

Survey	Date	Time (24 hr)	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	June 2, 2022	12:00 – 14:00	18	3	75	None/None	A. Taylor
2	July 28, 2022	13:25 – 15:25	26	4	50	None/Rain	J. Brooks
3	September 1, 2022	12:50 – 14:50	20	3	0	None/None	J. Brooks

4.3.14 Incidental Wildlife and Plant Observations

Incidental wildlife and plant observations were recorded by staff during all field investigations.

4.3.15 Headwater Drainage Feature Assessment

Stantec applied the Evaluation, Classification and Management of Headwater Drainage Features (HDF) Guidelines (TRCA and CVC 2014) to the Site. The HDF Guidelines (TRCA and CVC 2014) are to be applied to any drainage feature that is:

- part of the drainage network (i.e. drainage channels that are identified from aerial photography, and/or drainage lines result from ArchHydro analysis), or
- a groundwater seepage area or spring, or



- a connected headwater wetland (a surface outlet connects to downstream), and
- not a mapped or known perennially flowing stream.

Desktop sources were searched in accordance with the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (TRCA and CVC 2014). No mapped watercourses are present on the Site (GEO 2025, GRCA 2024). No headwater drainage features are visible in aerial photographs (Google 2024) on the Site or portion of the Adjacent Lands on the Property. A field survey was completed during the first window (late March to Mid April) identified in the Guidelines (TRCA and CVC 2014) to confirm the findings of the desktop search. Details of the survey are summarized in Table 8. No HDF were observed during the first visit and therefore no subsequent visits were completed to search for HDF as per the guidelines (TRCA and CVC 2014).

Table 8 Headwater Drainage Feature Assessment Dates, Times, and Weather Conditions

Survey	Date	Time	Temp (°C)	Wind (Beaufort Scale)	Cloud (%)	Precipitation (Current/Last 24 hours)	Surveyors
1	March 18, 2022	09:00 – 12:15	8 to 16	1	50 to 100	None/None	L. Marshall
1 (continued)	April 14, 2022	15:30 - 20:30	8	2	0	None/None	J. Ball K. Ellis

4.4 Analysis of Significance and Impact Assessment

An analysis of significance was conducted to assess whether significant environmental features or SAR are present or have moderate or high potential to be present on the Site and Adjacent lands. This was completed using the results derived from the background review and field investigations and analyzed using the relevant guidance for each feature or habitat type being assessed, as outlined in Section 7.

The potential impacts of the proposed extraction operations on significant features were then identified through analysis of field survey data in conjunction with findings from hydrogeological studies. These results were then used to develop preventive, mitigative and remedial measures aimed at avoiding net effects to the surrounding natural features.



5 Background Review Results

5.1 Local Context

The Site and Adjacent Lands are in Ecoregion 6E (Lake Simcoe-Rideau Ecoregion), and more specifically the Ecodistrict of 6E-1 (Stratford) (Wester et al. 2018). This Ecodistrict consists of smooth clay areas and gently rolling till moraines, known as the Stratford Till Plain and the Oxford Till Plain. The land use in this Ecodistrict is predominately agriculture with cropland constituting a large portion of the land cover (44%). Other land uses include gravel pits, quarries, and settlement areas. Sixteen percent (16%) of the Ecodistrict remains as natural cover, of which 50% is comprised of till moraine and till plain forest complexes, and 34% is comprised of wetland, primarily swamp.

5.2 Topography and Drainage

The Site and Adjacent Lands are within the Horseshoe Moraine physiographic region. The regional topography is dominated by the Paris Moraine, a major depositional feature forming a height of land approximately 3 km northwest of the Site and Adjacent Lands. The Paris moraine, which trends in a southwesterly direction (i.e., along Maltby Road), is generally characterized as hummocky topography with ground surface elevation ranging from 345 to 365 masl.

Local topography is gently rolling. The Site and Adjacent Lands straddle the upland area between two branches of Mill Creek. Total topographic relief across the Property is approximately 7 m, ranging from approximately 329 masl at Victoria to approximately 322 masl at the south limit of the Property.

In the northern portion of the Site, overland drainage flows towards closed depressions (e.g., internally draining) and wetland areas. Infiltrated surface water in this area flows in a southwesterly direction, as groundwater baseflow, towards Aberfoyle Creek. In the southern portion of the Site, overland drainage flows in a southwesterly direction towards Aberfoyle Creek and associated riparian wetlands.

5.3 Designated Natural Features

For this assessment, designated natural features refer to those determined as significant by federal, provincial, or municipal agency mapping. Designated natural features on the Site and Adjacent Lands are shown on Figure 2, Appendix A and include:

- Wetlands that are part of the Mill Creek Puslinch Provincially Significant Wetland Complex on the Site and Adjacent Lands
- Unevaluated wetlands on the Site and Adjacent Lands
- Areas designated Greenlands in the OP and Environmental Protection in the Zoning Bylaw on the Site and Adjacent Lands



- Areas designated as Core Greenlands in the OP and Natural Environment in the Zoning Bylaw on the Site and Adjacent Lands

Refinements to the boundaries of wetlands that were identified in background mapping and on Figure 2 (Appendix A) are discussed in Section 6.5.

5.4 Species at Risk

During the review of wildlife atlas records and background data sources, records of 18 SAR (2 amphibians, 1 reptile, 6 birds, 7 mammals, and 2 plants) were identified that overlap with the Site and Adjacent Lands (Table 9). Range maps provided in the various wildlife atlases are relatively coarse in nature and do not provide precise locations or information on concentrations/densities of records.

SAR identified during the background review were assessed for their potential to occur on the Site and Adjacent Lands based on the following factors:

- records of the species in the region from background sources listed above in the previous 30 years
- range overlap with the Site and Adjacent Lands
- the presence of suitable habitat on the Site and Adjacent Lands

Habitat assessments were conducted in the field to identify suitable habitat for these species. SAR with suitable habitat and at least one recent record and/or an overlapping range on the Site and Adjacent Lands were considered to have a reasonable probability of occurring. Detailed results of the SAR screening for threatened and endangered species are in Appendix B.1 and summarized in Section 7.5.



Table 9 Species at Risk with Potential to Occur on the Site and Adjacent Lands

Species		Status			
		S-Rank	SARO	COSEWIC	SARA
Amphibians					
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	S2	END	END	END
Unisexual Ambystoma (Jefferson Salamander dependent population)	<i>Ambystoma hybrid pop. 1</i>	S2	END	END	END
Birds					
Bank Swallow	<i>Riparia riparia</i>	S4B	THR	THR	THR
Bobolink	<i>Dolichonyx oryzivorus</i>	S4B	THR	SC	THR
Chimney Swift	<i>Chaetura pelagica</i>	S4B, S4N	THR	THR	THR
Eastern Meadowlark	<i>Sturnella magna</i>	S4B	THR	THR	THR
Least Bittern	<i>Ixobrychus exilis</i>	S4B	THR	THR	THR
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S3	END	END	END
Mammals					
Little Brown Myotis	<i>Myotis lucifugus</i>	S4	END	END	END
Northern Myotis	<i>Myotis septentrionalis</i>	S3?	END	END	END
Eastern Small-footed Myotis	<i>Myotis leibii</i>	S2S3	END		
Tri-coloured Bat	<i>Perimyotis subflavus</i>	S3?	END	END	UC
Eastern Red Bat	<i>Lasiurus borealis</i>	S4	END	END	UC
Hoary Bat	<i>Lasiurus cinereus</i>	S4	END	END	UC
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S4	END	END	UC
Plants					
Butternut	<i>Juglans cinerea</i>	S2	END	END	END
Smooth Yellow False Foxglove	<i>Aureolaria flava</i>	S2?	THR	THR	THR
Reptiles					
Blanding's Turtle	<i>Emydoidea blandingii</i>	S3	THR	END	END

END – Endangered

THR – Threatened

UC – Under Consideration for addition to Schedule 1 of SARA



6 Field Survey Results

6.1 Ecological Land Classification

The Site and Adjacent Lands are situated in a semi-rural setting that is typical of southern Ontario, with a mix of residential land uses, farmland and remnants of natural heritage features. The Site and Adjacent Lands include natural features such as forest and swamp communities within the Mill Creek Puslinch PSW Complex, semi-natural features such as thickets, hedgerows, and fallow meadows, and human-made features including agricultural fields and rural residences. None of the ELC vegetation communities identified on the Site and Adjacent Lands are considered provincially rare.

Vegetation communities documented during field surveys are shown on Figure 4, Appendix A, and are described in Table 10.

Table 10 ELC Vegetation Types on the Site and Adjacent Lands

ELC Type	Community Description
Constructed	
CVI Transportation and Utilities	The CVI community represents Victoria Road South.
CVR_4 Rural Property	The CVR_4 communities represent large, rural properties with residential buildings, maintained lawn and planted trees.
CVR_4 / TAGM1 Rural Property / Coniferous Plantation	The CVR_4 / TAGM1 community represents a large, rural property with a coniferous plantation. The property is located on the northeast side of the Site.
CVR_5 Trailer Park	The CVR_5 community represents the Mini Lakes Condominium Community on the Site and Adjacent Lands.
Agriculture	
OAGM1 Annual Row Crops	The OAGM1 communities in the center of the Site are comprised of row crops (e.g., corn).
OAG	The OAG community is on Adjacent Lands where access was not permitted.
Meadow	
ME Meadow	The ME communities represent meadow communities on Adjacent Lands where access was not permitted.



ELC Type	Community Description
MEMM3 Dry – Fresh Mixed Meadow	This dry to fresh open meadow area is dominated by common old field meadow species such as Canada goldenrod, grey-stemmed goldenrod, smooth brome, old field aster and white heath aster. Other common species are wild carrot, orchard grass, grass-leaved goldenrod, common timothy grass, New England aster, Kentucky bluegrass and Canada bluegrass.
MEMM4 Fresh – Moist Mixed Meadow	This small meadow is situated between two sections of SWDM3-3a (WE-1d) and SWDM3-3d (WE-1c) swamp. The ground layer is dominated by Canada goldenrod with occasional North American red raspberry. Immature seedlings and saplings of common buckthorn and green ash occur occasionally.
Hedgerow	
THDM3a Dry - Fresh Deciduous Hedgerow Thicket	This section of hedgerow is dominated by dense common buckthorn and young Manitoba maple.
THDM3b Dry - Fresh Deciduous Hedgerow Thicket	This small hedgerow is next to Victoria Road South and is dominated by common lilac and common buckthorn.
THDM3-1 Buckthorn Deciduous Hedgerow Thicket	This section of hedgerow is dominated by dense common buckthorn.
FODM11 Naturalized Deciduous Hedgerow	These hedgerows along the north and south edge of the Site and Adjacent Lands are occupied by mature sugar maple with occasional bitternut hickory and black cherry. Common buckthorn is abundant in the understory level, along with saplings of common apple, basswood, Manitoba maple, white ash, sugar maple and staghorn sumac.
Thicket	
THCM2-1 Fresh - Moist White Cedar Coniferous Thicket	This area is dominated by dense eastern white cedar in the 5 to 15 m tall range. Common buckthorn shrubs and to a lesser extent white ash saplings are common at the edge of the thicket.
THD Deciduous Thicket	This THD community is a deciduous thicket community in the Adjacent Lands where access was not permitted.
THDM2 Dry - Fresh Deciduous Shrub Thicket	This thicket is next to Victoria Road South. It is sparsely to densely dominated by common buckthorn and common lilac in the understory level. Young white pine is also common in the understory. A few large open-grown sugar maple trees are present.



ELC Type	Community Description
THDM2-6 Buckthorn Deciduous Shrub Thicket	This small thicket is dominated by dense common buckthorn with associates of thicket creeper, common lilac and white elm saplings. A few larger white elm, black cherry and trembling aspen also occur.
THDM3-1 Buckthorn Deciduous Hedgerow Thicket Type	Thicket hedgerow on the southeastern edge of the Site in between the agricultural OAGM1 fields. Sub-canopy species contained common buckthorn.
THDM4 Dry - Fresh Deciduous Regeneration Thicket Ecosite	This THDM4 community is a deciduous thicket community in the Adjacent Lands where access was not permitted.
THDM4a Dry - Fresh Deciduous Regeneration Thicket	This area is dominated by regenerating sugar maple saplings with occasional shrubs of common buckthorn and saplings of white ash, black cherry, and balsam poplar. A few larger sugar maple and eastern cottonwood also occur.
THDM4b Dry - Fresh Deciduous Regeneration Thicket	This small area is dominated by regenerating sugar maple seedlings and common buckthorn shrubs.
Woodland	
FOCM6 Naturalized Coniferous Plantation	This coniferous plantation community is located on the Adjacent Lands where access was not permitted.
FODM5	Upland sugar maple deciduous forest.
FODM5-10 Dry – Fresh Sugar Maple – White Birch – Poplar Deciduous Forest	This section of upland forest surrounds a swamp community. It is dominated by sugar maple, paper birch and trembling aspen in the canopy. The understory is dominated by alternate-leaved dogwood with occasional sugar maple, white ash and trembling aspen. The ground layer contains occasional zigzag goldenrod, thicket creeper, Canada wild-ginger and enchanter's nightshade.
FODM8-1 Fresh – Moist Poplar Deciduous Forest Type	This forest is a mixture of upland and lowland aspen. Trembling and large-toothed aspens are dominant. Paper birch occurs occasionally. Basswood and white ash are common in the sub-canopy and understory layers. The ground layer contains species such as thicket creeper, zigzag goldenrod, poison ivy, false Solomon's seal, graceful sedge and bladder sedge.
TAGM1 Coniferous Plantation	This coniferous plantation is comprised of mid-aged white pine.



ELC Type	Community Description
WOCM1-2 Dry-Fresh White Cedar Coniferous Woodland Type	This community is located on Adjacent Lands where access was not permitted. The community is classified as an upland coniferous woodland because it is outside of the MNR PSW layer, and the white cedar tree cover was noted as relatively sparse on aerial imagery.
WOD Deciduous Woodland	These WOD Codes are deciduous woodland communities in the Adjacent Lands where access was not permitted.
WODM5-3 Fresh – Moist Manitoba Maple Deciduous Woodland	This small woodland is dominated by a semi-open canopy of Manitoba maple and occasional exotic willows. A few larger eastern cottonwood occur here as well. The ground layer is dominated by Canada goldenrod.
Wetland	
SA Shallow Water	This small area of shallow water represents a dug pond that has been stocked with bass. Emergent and submerged vegetation is limited in this feature. This pocket of wetland is dominated by a dense ground layer of variegated scouring-rush. Other ground layer associates include northern water-horehound, yellow sedge, panicled aster and grass-leaved goldenrod. Tall phragmites is also abundant in this community. Greenish sedge, golden sedge and narrow-leaved cattail occur occasionally.
SAS Submerged Shallow Aquatic	This community represents a pond on the residential property on the Site, immediately east of the SWDM3-3b swamp community. The pond contains an abundance of submerged aquatic vegetation and is surrounded by narrow-leaved cattail. Maintained lawn is directly adjacent to the north, east and south edges of the pond.
MAMM1-12 Common Reed Graminoid Mineral Meadow Marsh	This pocket of wetland is dominated by a dense ground layer of variegated scouring-rush. Other ground layer associates include northern water-horehound, yellow sedge, panicled aster and grass-leaved goldenrod. Tall phragmites is also abundant in this community. Greenish sedge, golden sedge and narrow-leaved cattail occur occasionally.
SWCM1-1 White Cedar Mineral Coniferous Swamp	This area is a mixture of upland and lowland eastern white cedar forest/swamp. The community is dominated by white cedar with few other associates. The ground layer is sparse throughout with few species such as woodland/wetland sedges and spinulose wood fern.
SWD Deciduous Swamp	Two different deciduous swamp communities on Adjacent Land where access was not permitted.



ELC Type	Community Description
SWDM3-3a Swamp Maple Mineral Deciduous Swamp	This swamp area is dominated by mature Freeman's (swamp) maple in the canopy, sub-canopy and understory. Standing water was present in the swamp in the spring. Later in the season, the ground layer was dominated by sensitive fern and marsh fern. Small-spike false nettle and northern water-horehound. Wetland sedges such as Tuckerman's sedge and hop sedge are also common throughout the ground layer.
SWDM3-3b Swamp Maple Mineral Deciduous Swamp	This swamp area is dominated by mature Freeman's (swamp) maple in the canopy, sub-canopy and understory. The exotic glossy buckthorn occurs occasionally in the understory. Standing water was present in the swamp in the spring. The ground layer was dominated by small-spike false nettle. Sensitive fern and marsh fern occur abundantly. Northern water-horehound and Tuckerman's sedge occur occasionally. The endangered black ash tree occurs sparsely in this community. Several dead black ash were also observed.
SWDM3-3c Swamp Maple Mineral Deciduous Swamp	This small area of swamp is dominated by mature Freeman's (swamp) maple in the canopy. Peach-leaved willow occurs sparsely in the canopy. The understory contains balsam poplar and blue-beech. The ground layer contains sensitive fern, marsh fern, wild sarsaparilla and dwarf raspberry. The endangered black ash tree occurs sparsely in the understory.
SWDM3-3d Swamp Maple Mineral Deciduous Swamp	This is a swamp community, and it is dominated by Freeman's (swamp) maple in the canopy cover with blue beech and balsam poplar in the understory.
SWDM4-5 Poplar Mineral Deciduous Swamp Type	This swamp community is located on the southwestern edge of the Site south of the agricultural OAGM1 field. This community is dominated by a canopy of trembling aspen with associates of paper birch, and eastern white cedar. The understory is dominated by trembling aspen saplings, chokecherry, alternate-leaved dogwood and a few black ash. The ground layer is dominated by poison ivy, thicket creeper, and graceful sedge.
SWDO2-3 Swamp Maple Organic Deciduous Swamp Type	This swamp community is on the southwestern edge of the Site, south of the agricultural OAGM1 field. This community is dominated by Freeman's swamp maple in the canopy and understory. Eastern white cedar occurs occasionally. Standing water was present in the spring of 2023. The ground layer is dominated by sensitive fern, small-spiked false nettle, marsh fern, and various wetland sedges.
SWMO1 White Cedar Organic Mixed Swamp Ecosite	This community is located on Adjacent Lands where access was not permitted. The community overlaps with the MNR PSW layer, and the community is classified as an organic cedar coniferous swamp based on the dominance of white cedar in the canopy, and the presence of a similar organic cedar swamp community identified on the Adjacent Lands (SWMO1-1).



ELC Type	Community Description
SWMO1-1 White Cedar – Hardwood Organic Mixed Swamp	This dense mixed swamp is dominated by a mixture of eastern white cedar, red maple and mature yellow birch in the canopy and sub-canopy. Tamarack and eastern hemlock occur occasionally in the canopy layers. The understory is dominated by eastern white cedar and endangered black ash (saplings). Highly invasive common and glossy buckthorns occur occasionally. The ground layer contains a diverse assortment of herbaceous species including wild sarsaparilla, bulblet bladder fern, sensitive fern, common oak fern, rough-stemmed goldenrod, common lady fern, drooping woodreed, northern starflower, yellow clintonia, wild lily-of-the-valley, two-seeded sedge, heart-leaved foamflower and bladder fern.

6.2 Botanical Inventory

The following is a floristic summary for the Site and Adjacent Lands based on botanical data collected in 2022, 2023 and 2024. A detailed vascular plant list with the scientific plant names and species' status, is provided in Appendix C.1.

- There were 190 species of vascular plants recorded, which includes taxa identified to species, subspecies (ssp.) and variation (var.) levels.
- 141 of the 190 recorded species are native to Ontario, while 49 are exotic species not native to Ontario.
- 132 of the native species recorded have a provincial rank of S5, which indicates that they are common with a secure population in Ontario.
- There are nine native species with a provincial rank of S4, which indicates they are uncommon, but not rare in the province and populations are apparently secure.
- Four regionally significant plant species (SOCC) in Wellington County were observed on the Site and Adjacent Lands:
 - Clinton's wood fern (SWMO1-1 community)
 - fringed milkwort (SWMO1-1 community)
 - chestnut sedge (SWMO1-1 community)
 - hop sedge (SWDM3-3a, SWDM3-3b and SWMO1-1 communities)
- There was one provincially endangered tree species (black ash) that was observed occasionally in the SWDM3-3b and c communities and was abundant in SWMO1-1. This species was also recorded in SWDM4-5 (see Section 6.3). All black ash are located on Adjacent lands.
- One highly sensitive plant species (coefficient of conservatism 8) was observed in the SWMO1-1 community (two-seeded sedge) on Adjacent Lands.



6.3 Black Ash Survey

Ninety (90) black ash saplings were documented in wetlands on Adjacent Lands during the botanical inventory. A summary of the black ash observations and their associated ELC wetland communities is provided below:

- SWDM3-3b (9 saplings)
- SWDM3-3c (4 saplings)
- SWDMO1-1 (64 saplings)
- SWDM4-5 (13 saplings)

All observed black ash saplings were less than 8 cm DBH; therefore, these trees do not meet the protection criteria outlined in the MECP guidance (MECP 2024) under the ESA. Saplings will receive protection from direct damage and destruction by implementing ecological buffers on wetland communities.

6.4 Woodlands

Wooded areas identified on the Site and Adjacent Lands were primarily swamps, but also included woodlands (coniferous and deciduous), coniferous plantations, and both deciduous and coniferous forests. Eight (8) woodland units (WO-1 – WO-8) were identified based on the results of the background review and field studies and are shown on Figure 5 (Appendix A).

6.5 Wetlands

Ten wetland units were identified on the Site and Adjacent Lands, as shown on Figure 6 (Appendix A). This includes four wetland segments associated with the Mill Creek Puslinch PSW Complex (WE-1a, b, c, d), three associated with unevaluated wetlands identified on background mapping (WE-2 – WE-4) and three additional wetlands identified in the field by Stantec (WE-5 – WE-7).

Wetlands occurred in depressions at the edge of agricultural fields, former aggregate lands and access roads; therefore, the delineation was based on topography in addition to the presence of wetland vegetation and soil characteristics.

The SWDM3-3a (WE-2), SWDM3-3b (WE-1b), SWDM3-3d (WE-1c), and MAMM1-12 (WE-7) communities were located at the base of relatively short and steep slopes. The delineation of these boundaries was determined based on vegetation characteristics and topography.

The wetlands in the northwest corner (SWDM3-3c [WE-1a]) and the southeast corner of the Property (SWMO1-1, SWDM4-5, SWDO2-3; WE-1d) could not be clearly delineated using vegetation characteristics and topography. Therefore, soil samples were collected in each of the communities along the gradual slopes to assess soil characteristics and soil moisture regime. These results were then used to determine wetland boundaries. Soils were comprised of sandy loam, cobble was struck at depths of 40



to 64 cm, and soil moisture regime ranged from 2 (fresh) to 5 (moderately moist). Soil sample locations are shown on Figure 3, Appendix A. The following is a summary of the soil sample characteristics and related wetland boundary determinations:

- Soil Sample 1 (WE-1a): Sandy Loam; hit cobble at 64cm; 44cm to mottles, Moisture Regime=4 (moderately moist); included in wetland boundary
- Soil Sample 2 (WE-1a): Sandy Loam; hit cobble at 40cm; no distinct mottles; Moisture Regime=2 (fresh); human made berms in area; sugar maples present; not included in wetland boundary
- Soil Sample 3 (WE-1d): Sandy Loam; hit cobble at 60cm; slight mottles at 42cm - mottles might be from hitting rocky layer; colour change at 27cm; Moisture Regime=4 (moderately moist); included in wetland boundary (northern edge)
- Soil Sample 4 (WE-1d): Sandy Loam; hit cobble at 40cm; mottles at 29cm - mottles might be based on hitting rocky layer; Moisture Regime=5 (moderately moist); included in wetland boundary
- Soil Sample 5 (WE-1d): Sandy Loam; hit cobble at 42cm; mottles at 35cm - mottles might be based on hitting rocky layer; Moisture Regime=4 (moderately moist); included in wetland boundary

The wetland boundaries delineated by Stantec (Figure 6, Appendix A) differ slightly from those delineated on MNR mapping (MNR 2024b). The methods implemented to delineate the updated wetland boundaries for the Site and Adjacent Lands are described in Section 4.3.4 and included two separate processes. OWES protocols (including soil sampling) were used to delineate wetland boundaries closest to the Site, using a high-accuracy GPS to inform setbacks. This included the two lobes along the southeastern boundary of WE-1a; the northern, western, and southwestern boundaries of WE-1b; the entire boundary of WE-2 and WE-7; the southeastern boundary of WE-1c; and the northeastern boundary of WE-1d, as shown on Figure 4, Appendix A. The remaining wetland boundaries on Adjacent Lands were delineated using ELC, background data, and air photo interpretation.

Two wetland communities (WE-5 and WE-6; Figure 6, Appendix A) are dug ponds that do not meet the OWES definition of wetlands. However, they are included here because of their wetland characteristics and the need to consider hydrologic function and wildlife habitat.

6.6 Amphibian Call Surveys

In 2022, eight amphibian call survey stations were surveyed within the Property as shown on Figure 3, Appendix A. Species and call activity levels are provided in Table 11.



Table 11 Amphibian Call Count Survey Results

Station	Date	Species				
		American Toad	Gray Treefrog	Green Frog	Spring Peeper	Wood Frog
AMP01	April 14 2022	-	-	-	3-50*	1-1
	May 10 2022	1-1	2-8, 1-1*	-	-	-
	June 15 2022	-	2-3*	-	-	-
AMP02	April 14 2022	-	-	-	-	-
	May 10 2022	-	-	-	-	1-1
	June 15 2022	-	-	-	-	-
AMP03	April 14 2022	-	-	-	-	2-8
	May 10 2022	-	-	-	-	-
	June 15 2022	-	-	-	-	-
AMP04	April 14 2022	-	-	-	3-30	1-1
	May 10 2022	1-1	1-1	-	1-5	-
	June 15 2022	-	2-5	-	-	-
AMP05	April 14 2022	-	-	-	-	-
	May 10 2022	2-4	-	-	-	-
	June 15 2022	-	1-4	1-1	-	-
AMP06	April 14 2022	-	-	-	3-20*, 3-30	2-10
	May 10 2022	-	-	-	2-15	-
	June 15 2022	-	-	-	-	-
AMP07	April 14 2022	-	-	-	-	-
	May 10 2022	-	-	-	-	-
	June 15 2022	-	1-2	-	-	-
AMP08	April 14 2022	-	-	-	2-15	-
	May 10 2022	-	1-1, 1-1	-	2-15	-
	June 15 2022	-	2-3*, 2-4	-		-

* Notes: Calling from more than 100 m from the survey station

Call activity levels: 1-1 refers to a call level of 1 with 1 individual calling



Five species of calling amphibians were recorded: American Toad (*Anaxyrus americanus*), Gray Treefrog (*Dryophytes versicolor*), Green Frog (*Lithobates clamitans*), Spring Peeper (*Pseudacris crucifer*) and Wood Frog (*Lithobates sylvaticus*). Calling amphibians were recorded at each station. Spring Peeper was the most abundant, with choruses of approximately 15 individuals within 100 m from station 8, 30 individuals within 100 m of stations 4 and 6, and approximately 50 individuals more than 100 m from station 1 in April.

Stations 1 and 4 had the highest diversity, each recording 4 of the 5 species. At stations 6 and 8, 2 of the 5 species were recorded while only one species was recorded at stations 2, 3 and 7 on a single survey date.

6.7 Salamander Egg Mass Surveys

Salamander egg masses were observed in the SWDM3-3a, SWDM3-3b swamp communities, and the MAMM1-12 marsh community. The observed egg masses most closely resembled those of Blue-spotted Salamander: egg masses laid singly or in small clusters (2-12 eggs), encased in a loose jelly envelope, and typically attached to submerged vegetation or rocks [Toronto Zoo; no date]).

In the SWDM3-3a swamp community, nine salamander eggs masses with 3 to 13 eggs, and three areas with individual eggs were observed. Two of the egg masses were white in colour, which indicates that they were likely not viable. The ponding area in the SWDM3-3a community is approximately 200 m x 100 m with a depth around 20 cm, reaching up to 30 cm. It contains tea coloured water, a leaf-covered bottom and fairy shrimp with woody debris for egg mass attachment sites.

Approximately 42 salamander eggs masses with 2-15 eggs were observed in the SWDM3-3b swamp community. Five egg masses were white in colour, indicating that they were likely not viable. The pool in the SWDM3-3b community is approximately 300 m x 300 m in size with a depth up to 40 cm. It contains tea coloured water, a leaf covered bottom, fairy shrimp and an abundance of woody debris for egg mass attachment sites.

Two egg masses were observed in the MAMM1-12 marsh community. They were white in colour indicating that they were likely not viable. The pool in the MAMM1-12 community is approximately 20 m x 30 m in size. Horsetail provides attachment sites on the east side in shallow water, which reaches a depth of 20 cm. Phragmites is present on the west side of the community where water is up to 40 cm deep.

Results of salamander egg mass surveys are summarized in Table 12.



Table 12 Salamander Egg Mass Survey Results

Wetland Pool ID	Salamander Egg Mass Observations
SWDM3-3a	1 egg mass with 4 eggs 1 egg mass with 3 white eggs 2 egg masses with 8 and 6 eggs; one is white in colour 2 egg masses with 13 and 4 eggs; green algae present 3 eggs on leaves; approx. 20 cm deep 12 eggs on twig in 25 cm of water; green algae present 3 single eggs on twig in 25 cm of water; green algae present 2 egg masses on twigs; 8 eggs in each; approx. 40 cm deep; green algae present 1 egg mass on twigs; 8 eggs; 30 cm of water; green algae present
SWDM3-3b	3 small egg masses attached to leaves; 1 with 2 eggs, 1 with 5 eggs, 1 with 3 eggs; approx. 20cm deep 1 egg mass with approx. 10 eggs; white in colour; approx. 30 cm deep 4 egg masses on small, submerged twigs; 4 to 10 eggs in each; approx. 20cm deep 7 egg mass on a sensitive fern stem; approx. 15cm deep 6 egg masses; 4-5 eggs in each 8 egg masses; 2 with approx. 15 eggs; 2-8 eggs in others; approx. 15cm deep 8 egg masses with 3-5 eggs 3 egg masses with approx. 4 eggs; white in colour; close to edge of pool 4 eggs in each on twig; approx. 25cm deep 6 white eggs
MAMM1-12	2 egg masses with approx. 8 eggs in each; white in colour

No egg masses were observed in the SA and SAS communities. In addition, these communities are anthropogenic in nature with limited vegetation. Therefore, salamander habitat was determined to be absent from these ponds and no additional surveys (i.e., eDNA, trapping) were completed at these locations.

6.8 eDNA Survey

Twenty-two taxa were detected from the nine eDNA samples that were collected from the sample stations shown on Figure 3, Appendix A. Taxa included two unique fish, eight amphibians, eight birds and four mammals. Average taxonomic richness was 6.8 and ranged from 3 to 9. The most frequently detected taxa were Wood Frog (*Lithobates sylvaticus*), Blue-spotted Salamander (*Ambystoma laterale*) and Wood Duck (*Aix sponsa*).

Blue-spotted Salamander (*Ambystoma laterale*) was detected in seven out of the nine samples (not detected in samples 1 and 6). A unisexual salamander (*Ambystoma unisexual*) was detected in samples 3 and 9. To further investigate these findings, salamander trapping and tail clipping surveys were completed in breeding ponds 3 and 9 (see Section 6.9) to assess whether Blue-Spotted Salamander



A. laterale [LLJ], Blue-spotted Salamander dominant (*Ambystoma 2-laterale jeffersonianum* [LLJ] or Jefferson Salamander dominant [LJJ]) populations were present).

Fish were identified at two stations, including an exotic introduced species belonging to the genus *Carassius* (either a goldfish; *Carassius auratus* or Prussian carp; *Carassius gibelio*) in sample 8 and Northern redbelly dace (*Chrosomus eos*) in sample 6.

6.9 Salamander Trapping Survey

Four salamanders were caught during the minnow trap survey at station B1 (eDNA station 9). Tail clip samples were collected from the four salamanders and submitted to the Bogart Laboratory at the University of Guelph for DNA analysis. The samples were identified as blue-spotted salamander dominant polyploids (LLJ and LL). The laboratory results are provided in Appendix D.

No salamanders were captured at stations A1- A10 (eDNA station 3) and no genetic results were obtained.

6.10 Turtle Basking Survey

Midland Painted Turtle was observed in the small, dug pond (ELC community SAS) on June 10, 2022 (one individual), and in the pond directly south of the residence (ELC community SA) on April 22 (one individual), April 29 (one individual), May 5, May 30 (three individuals), and June 10 (one individual), 2022. No turtle SAR were observed on the Site in 2022.

Predated turtle nests were observed in a mixture of sand and gravel on an embankment of a dry, phragmites-dominated wetland on June 14. Evidence of excavation on the embankment was also observed on June 14. The location of the predated nests and excavation are shown on Figure 7, Appendix A.

6.11 Breeding Bird Survey

During 2022 breeding bird surveys, 49 bird species were observed, 44 of which are considered likely to be breeding within the Property and one (Eastern Kingbird) that was confirmed to be breeding on the Site (i.e., Extraction Limit) in the central THDM4b community as adults were observed on a nest on two separate dates. Four species that were observed during surveys are not expected to be breeding on the Property: Canada Goose, Turkey Vulture, Ring-billed Gull, and Great Blue Heron, all of which were observed flying over the Site and Adjacent Lands and/or foraging. All bird species observed are ranked S5 (secure; common and widespread), S4 (apparently secure; uncommon but not rare), or SNA (status not applicable) during the breeding season.



During the 2022 breeding bird surveys, a single SAR, the Eastern Meadowlark, was recorded on Adjacent Lands. This species is provincially and federally designated as threatened and receives habitat protection under the ESA. Eastern Meadowlark was observed singing in a field on Adjacent Lands south of the Site. There is no suitable habitat available on the Site (row crop agriculture, no suitable grassland habitat) so Eastern Meadowlark is not expected to be present.

Two (2) SOCC, Barn Swallow and Eastern Wood-Pewee, were observed on Adjacent Lands. Barn Swallow is listed as special concern under the ESA and threatened under SARA. This species was observed foraging in agricultural communities on the Site and Adjacent Lands. Barn Swallows nest on walls or ledges of barns and on other human-made structures such as bridges, culverts or other buildings (COSEWIC 2021). No structures were found within the proposed Project Footprint, and no Barn Swallow nests were observed on the shed or bunkie. The residence was not checked for bird nests since it will not be affected by the Project.

Eastern Wood-Pewee is listed as special concern under the ESA and SARA. This species was observed singing in the SWMO1-1 and SWDM3-3d swamp communities, and in the FODM5-10, THCM2-1 and MEMM3 communities on each of the three breeding bird surveys in 2022. It is expected that the species is breeding within treed habitats on both the Site and Adjacent Lands. One of these observations was on the edge of the proposed Extraction Limit (MEMM3). Eastern Wood-Pewees do not nest in meadow habitats, so this observation is considered outside of breeding habitat. Observations are shown on Figure 7, Appendix A.

Pileated Woodpecker was observed during the breeding bird survey in the onsite hedgerows and incidentally in 2024 within woodlot edges within the Site. Although the proposed Project Footprint overlaps with the hedgerows, these areas are unlikely to provide suitable nesting habitat for Pileated Woodpecker. Furthermore, these areas were surveyed during bat habitat assessments (see Section 6.14) and there was no evidence of nesting. In 2024, evidence of past Pileated Woodpecker nesting was incidentally observed in SWDM3-3b on Adjacent Lands.

A list of birds observed during the 2022 breeding bird surveys is provided in Appendix C.2.

6.12 Nocturnal Bird Surveys

Of the six (6) ARUs that were deployed between March 18 and April 15, 2022, to record nocturnal birds, only one (1) Eastern Screech-Owl was recorded on a single ARU (NBS4) on April 7, 2022, in the SWDM3-3c swamp community. The owl was only recorded once and is considered a transient, non-breeding visitor to the Site. Owls are considered absent from the Site and Adjacent Lands within the Property. Locations of ARUs are shown on Figure 3, Appendix A.



6.13 Raptor Surveys

No raptors were observed on the Site during winter raptor surveys in 2022, which suggests that the Site and Adjacent Lands do not provide overwintering habitat. In addition, no stick nests were observed during the winter survey. Red-tailed Hawk and Turkey Vulture were observed on the Site and Adjacent Lands during breeding bird surveys conducted from late May to mid-June. However, the absence of stick nests during targeted surveys suggests that these species are likely nesting occurs outside of the Property.

6.14 Bat Maternity Roost Survey

In 2022, suitable bat maternity roost habitat for both SAR and SWH was documented in several areas within the Site and on Adjacent Lands, where access was permitted. One central swamp community and several hedgerow communities collectively contained twenty-three (23) trees with characteristics of potential bat maternity roosts.

MNR guidance states that an ELC ecosite is considered suitable maternity roost habitat for SAR bats regardless of the number of maternity roost trees per hectare. SWH, however (further discussed in Section 7.4.1), excludes hedgerows and plantations and requires >10 wildlife trees > 25 cm DBH per hectare to qualify as significant.

Details of the potential bat maternity roost trees are provided in Table 13 and shown on Figure 3, Appendix A.

Table 13 Bat Maternity Roost Tree Results

Tree Number	Tree Species	Cavities Present (y/n)	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics	ELC Community
1	American Elm	Y	25	10	8	One of the tallest trees in the community Abundance of peeling bark	Dry - Fresh Deciduous Hedgerow Thicket Ecosite (THDM3)
2	Sugar Maple	Y	85	20	7	Large DBH One of the tallest trees in the community Abundance of peeling bark	Dry – Fresh Deciduous Shrub Thicket Ecosite (THDM2)
3	Sugar Maple	Y	120	20	7	Large DBH One of the tallest trees in community	Dry – Fresh Deciduous Shrub Thicket Ecosite (THDM2)



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Tree Number	Tree Species	Cavities Present (y/n)	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics	ELC Community
4	White Ash	N	18	15	N/A	Abundance of peeling bark Tree is dead but still has primary limbs attached Decaying One of the tallest trees in community	Rural Residential Property (CVR_4)
5	Black Cherry	Y	30	10	2	Open canopy	Dry – Fresh Deciduous Regeneration Thicket Ecosite (THDM4)
6	American Elm	N	18	9	N/A	Peeling bark Early stages of decay	Naturalized Deciduous Hedgerow Ecosite (FODM11)
7	American Elm	N	18	10	N/A	Peeling bark Early stages of decay	Naturalized Deciduous Hedgerow Ecosite (FODM11)
8	Sugar Maple	Y	65	19	15	Cavity is high in tree Abundance of peeling bark Large DBH One of the tallest trees in the community Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)
9	American Basswood	Y	62	20	12	Abundance of peeling bark Cavity is high in tree Large DBH One of the tallest trees in the community Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)
10	Sugar Maple	Y	21	15	8	Abundance of peeling bark Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)
11	Manitoba Maple	Y	26	15	4	Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)



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Tree Number	Tree Species	Cavities Present (y/n)	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics	ELC Community
12	American Elm	Y	16	N/A	2	Peeling bark Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)
13	Manitoba Maple	Y	60	17	10	Cavity is high in tree Decaying	Naturalized Deciduous Hedgerow Ecosite (FODM11)
14	Wild Black Cherry	Y	53	20	2	Abundance of peeling bark	Naturalized Deciduous Hedgerow Ecosite (FODM11)
15	Sugar Maple	Y	122	20	15	Cavity is high in tree Decaying Abundance of peeling bark One of the tallest trees in the community Large DBH	Naturalized Deciduous Hedgerow Ecosite (FODM11)
16	Bitternut Hickory	Y	62	20	2	Cavity is high in tree One of the tallest trees in the community Large DBH	Naturalized Deciduous Hedgerow Ecosite (FODM11)
17	Sugar Maple	Y	90	15	2	Abundance of peeling bark Decaying Large DBH	Naturalized Deciduous Hedgerow Ecosite (FODM11)
18	Sugar Maple	Y	105	20	19	Cavity is high in tree Abundance of peeling bark Decaying Large DBH One of the tallest trees in the community	Naturalized Deciduous Hedgerow Ecosite (FODM11)
19	Sugar Maple	Y	88	20	15	Cavity is high in tree Decaying Large DBH One of the tallest trees in the community	Naturalized Deciduous Hedgerow Ecosite (FODM11)



Tree Number	Tree Species	Cavities Present (y/n)	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics	ELC Community
20	Sugar Maple	Y	60	N/A	8	Abundance of peeling bark Large DBH One of the tallest trees in the community	Swamp Maple Mineral Deciduous Swamp Type (SWDM3-3)
21	Sugar Maple	Y	80	20	2	Abundance of peeling bark Large DBH	White Cedar Mineral Mixed Swamp Ecosite (SWMM1)
22	Sugar Maple	Y	70	20	12	Cavity is high in tree Abundance of peeling bark Decaying Large DBH	White Cedar Mineral Mixed Swamp Ecosite (SWMM1)
23	Sugar Maple	Y	62	18	10	Cavity is high in tree Abundance of peeling bark Open Canopy Decaying Large DBH	Naturalized Deciduous Hedgerow Ecosite (FODM11)

With the addition of migratory bats (e.g., Hoary Bat, Eastern Red Bat, Silver-haired bat) to the SARO list in January 2025, it is our understanding that bat SAR habitat may also include shrub habitats.

6.15 Bat Acoustic Surveys

In 2022, six (6) bat species were recorded at nine (9) ARU stations on the Property: Hoary Bat (*Lasiurus cinereus*), Big Brown Bat (*Eptesicus fuscus*), Silver-haired Bat (*Lasionycteris noctivagans*), Eastern Red Bat (*Lasiurus borealis*), Little Brown Myotis (*Myotis lucifugus*) and Tri-coloured Bat (*Perimyotis subflavus*) (Table 14). No data was obtained from a tenth station (Bat 6) due to equipment malfunction, but sufficient data was collected at stations 4 and 2, located to the north and south of Station 6, respectively.

Big Brown Bat is listed as S5 (Secure) in Ontario. Little Brown Myotis, Tri-coloured Bat, Hoary Bat, Eastern Red Bat, and Silver-haired Bat are all listed as endangered on the SARO list. Big Brown Bat, Hoary Bat and Silver-haired Bat were recorded at each of the nine (9) ARU stations.

Eastern Red Bat was recorded at eight (8) of the nine (9) stations while Little Brown Myotis was recorded at all nine (9) survey locations (Figure 3, Appendix A). Tri-coloured Bat was recorded at two (2) of the nine (9) survey locations.

In addition to the calls listed above, 182 could only be identified as “Myotis species,” 486 as “high-frequency unknown (HiF) and 3,222 could not be reliably identified by the software (no ID).



Table 14 Acoustic Bat Survey Results

ARU ID	Date Range	Identification Category									Total
		Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Myotis	Tri-coloured Bat	Myotis Species	HIF	No ID	
Bat1	June 3 – June 14, 2022	161	2	215	161	34		1	43	154	771
Bat2	June 14 – June 25, 2022	489	4	345	162	24		2	16	324	1366
Bat3	June 3 – June 14, 2022	483	11	213	253	144	5	19	33	520	1681
Bat4	June 14 – June 25, 2022	1078	16	239	88	241	3	60	64	726	2515
Bat5	June 3 – June 14, 2022	14		27	26	7		1	17	37	129
Bat6	June 14 – June 25, 2022	Unit malfunctioned – no data retrieved									
Bat7	June 3 – June 14, 2022	416	21	79	149	802		39	186	412	2104
Bat8	June 14 – June 25, 2022	55	4	96	55	17		5	21	341	594
Bat9	June 3 – June 14, 2022	148	6	185	215	73			15	216	858
Bat10	June 14 – June 25, 2022	388	9	144	103	449		55	91	492	1731
Totals		3232	73	1543	1212	1791	8	182	486	3222	11749

6.16 Terrestrial Insect Surveys

During the 2022 surveys, 18 butterfly species, 17 Odonata species (dragonflies and damselflies) and 1 bumblebee species were observed on the Property across three survey dates. Most species observed were ranked S5 (very common and secure in Ontario) or S4 (common and apparently secure in Ontario). One (1) SOCC, (Monarch [*Danaus plexippus*]), is ranked S4B, S2N (imperiled in Ontario) and is listed as special concern provincially and endangered federally. Although this species is not afforded habitat under the ESA, it is still considered further in Section 7.4.3 as SWH.



During the 2022 surveys, eighteen (18) butterfly species, seventeen (17) Odonata species (dragonflies and damselflies), and one (1) bumblebee species were recorded on the Property across three survey dates.

Common Milkweed, the Monarch's larval host plant was found in low abundance in meadow communities on the Site.

A list of insect species observed are included in the wildlife list in Appendix C.2.

6.17 Incidental Wildlife Observations

During field investigations, the following wildlife species (including evidence of presence) were recorded incidentally:

- Bullfrog (*Lithobates catesbeiana*)
- Green Frog (*Lithobates clamitans*)
- Eastern Gartersnake (*Thamnophis sirtalis*)
- American Woodcock (*Scolopax minor*)
- Black-and-white Warbler (*Mniotilta varia*)
- Brown Thrasher (*Toxostoma rufum*)
- Dark-eyed Junco (*Junco hyemalis*)
- Hairy Woodpecker (*Dryobates villosus*)
- Horned Lark (*Eremophila alpestris*)
- Pine Siskin (*Spinus pinus*)
- Tundra Swan (*Cygnus columbianus*)
- Coyote (*Canis latrans*)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Grey Squirrel (*Sciurus carolinensis*)
- Porcupine (*Erethizon dorsatum*)
- Raccoon (*Procyon lotor*)
- Red Fox (*Vulpes vulpes*)
- White-tailed Deer (*Odocoileus virginianus*)
- Largemouth Bass (*Micropterus salmoides*)

Evidence of deer browse, and abundant deer tracks were observed on the Property. All species observed incidentally are ranked S5 (very common and secure in Ontario). Incidental wildlife observations are included in the wildlife list in Appendix C.2.



6.18 Aquatic Features

6.18.1 Headwater Drainage Feature

No HDF are present on the site based on a search of desktop information and a field survey of the Property (completed over two separate dates) completed in accordance with the HDF Guidelines (TRCA and CVC 2014).

6.18.2 Fish Habitat

There are no watercourses on the Site or Adjacent Lands, but the Site contains dugout ponds. Wetlands with pools of water are also present on Adjacent Lands. eDNA surveys for salamanders conducted in the SWD3-2d wetland detected two fish species: Goldfish and Northern Redbelly Dace. It is possible that the dugout ponds are stocked with fish, supported by the observation of a Largemouth Bass in the SAS pond, or that the eDNA records are a result of flooding or spring freshet.

Since there are no watercourses connecting to the dugout ponds and no fish were observed within the wetland, these features are not considered fish habitat under the *Fisheries Act*. Therefore, fish habitat is not present within the Site or Adjacent Lands.

6.19 Summary of Natural Heritage Features

This section compiles natural heritage features identified within proposed Project Footprint (Extraction Limit and berms), Site and Adjacent Lands of during the background data review and field investigations. Protected natural features include features described by the relevant provincial and municipal policy documents described in Section 2. Presence or absence of these features are summarized in Table 15.

Table 15 Summary of Natural Heritage Features

Natural Heritage Feature	Proposed Project Footprint	Site	Adjacent Lands
Significant Areas of Natural and Scientific Interest	No	No	No
Significant Valleylands	No	No	No
Significant Woodlands	Yes	Yes	Yes
Significant Wetlands	No	No (based on Stantec's wetland boundary delineation)	Yes (including unevaluated wetlands)
Other Coastal Wetlands in Ecoregions 5E, 6E and 7E	No	No	No
Fish Habitat	No	No	No



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Natural Heritage Feature	Proposed Project Footprint	Site	Adjacent Lands
Habitat of Endangered and Threatened Species	Yes (bats)	Yes (bats)	Yes (bats, Eastern Meadowlark)
Significant Wildlife Habitat	No (Discussed in Section 7.4)	Yes (Discussed in Section 7.4)	Yes (Discussed in Section 7.4)



7 Analysis of Significance - Natural Heritage Features Assessment

The following documents were used in the analysis of significance:

- Natural Heritage Reference Manual (NHRM; MNR 2010)
- Significant Wildlife Habitat Technical Guide (SWHTG; MNR 2000)
- Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF 2014)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015)
- Wellington County OP

7.1 Significant Woodlands

Wellington County OP Section 5.5.4 outlines the County's criteria for woodland significance. In the Rural System, woodlands over 4 ha and plantations over 10 ha are considered significant and included in the Greenlands System. Additional criteria may be applied to determine woodland significance, such as proximity to watercourses, wetlands, or other woodland, linkage functions, age of the stand or individual trees, presence of endangered or threatened species, or overall species composition (Wellington County 2024).

Significant woodlands on the Site and Adjacent Lands are identified as Greenlands by the OP and have been assessed by Wellington County. Woodlands identified in field studies that are outside the Greenlands System require an analysis of significance based on the criteria specified in the OP. Significant woodlands evaluated by the County, and other un-evaluated woodlands on the Site and Adjacent Lands are described in Table 16 and shown on Figure 5, Appendix A. For each woodland, a determination (or confirmation) of significance is provided, along with the specific criteria that is met. The significance of plantations must be assessed independently based on criteria outlined in the OP (e.g., WO-6 and WO-8), including consideration for size, regardless of whether they are contiguous with other significant woodlands.

The significance of plantations should be evaluated independently based on the criteria specified in the OP (such as WO-6 and WO-8), including considerations of size, regardless of whether they are contiguous with other significant woodlands.

The following woodlands on the Site were evaluated as significant: WO-1, WO-2, WO-3, and WO-4 (Table 16; Figure 5, Appendix A). The proposed Acoustic Berm locations, overlap with approximately 0.02 ha of significant woodland including WO-1 and WO-3.



Table 16 Significant Woodland Evaluation

Unit ID	Location	ELC	Size (ha)	Criteria Met	Evaluation
Significant Woodlands – Evaluated by The County of Wellington					
WO-1	Proposed Project Footprint Site Adjacent Lands	- WE-1a (SWDM3-3c, SWMO1) - THCM2-1 - FODM5-10	13.16	- Size (> 4 ha) - Contains Mill Creek PSW - Proximity to other wetlands, woodlands, linkages - Potential habitat for endangered or threatened species (bats) - Supports SWH: confirmed amphibian breeding habitat (woodland), and confirmed SOCC (Eastern Wood-Pewee)	Significant – as evaluated by the County; meets more than one of the Ops criteria
WO-2	Site Adjacent Lands	- WE-2 (SWDM3-3a) - WE-1c (SWDM3-3d)	4.78	- Size (> 4 ha) - Contains Mill Creek PSW - Proximity to other wetlands, woodlands, linkages - Potential habitat for endangered or threatened species (bats) - Supports SWH: confirmed amphibian breeding habitat (woodland), and confirmed SOCC (Eastern Wood-Pewee and hop sedge)	Significant – as evaluated by the County; meets more than one of the OP criteria



Unit ID	Location	ELC	Size (ha)	Criteria Met	Evaluation
WO-3	Proposed Project Footprint Site Adjacent Lands	- WE-1d (SWCM1-1, SWDO2-3, SWMO1-1, SWD, SWT) - WE-4 (SWD) - FODM5 - WOCM1-2 - FOD and FOM (Adjacent Lands, western limit)	29.54	- Size (> 4 ha) - Contains Mill Creek PSW - Proximity to other wetlands, woodlands, linkages - Potential habitat for endangered or threatened species (bat SAR, black ash) - Supports SWH: confirmed SOCC (Eastern Wood-Pewee, Clinton's wood fern, fringed milkwort, chestnut sedge, and hop sedge)	Significant – as evaluated by the County; meets more than one of the OP criteria
Other Woodlands – Evaluated Using OP Criteria					
WO-4	Site Adjacent Lands	- WE-1b (SWDM3-3b) - WE-3 (SWD) - WOD	3.26	- Contains Mill Creek PSW and unevaluated wetlands - Proximity to other wetlands, woodlands, linkages - Potential habitat for endangered or threatened species (bats, black ash). - Supports SWH: confirmed amphibian breeding habitat (woodland) and confirmed SOCC (hop sedge)	Significant – does not meet the minimum size threshold; however other criteria outlined in the OP are met



Unit ID	Location	ELC	Size (ha)	Criteria Met	Evaluation
WO-5	Proposed Project Footprint Site Adjacent Lands	WODM5-3	0.15	- Proximity to Mill Creek PSW and significant woodland WO-1 - Potential habitat for endangered or threatened species (bats)	Not Significant – does not meet the minimum size threshold. While some criteria are met, this feature is not considered part of the larger contiguous woodland in terms of ecological function. This area consists of a young regenerating treed community featuring an open canopy. It is situated adjacent to a plantation, which is assessed independently pursuant to the OP. See Section 7.5 for further discussion of bat SAR.
WO-6	Adjacent Lands	TAGM1	4.80	Potential habitat for endangered or threatened species (bats)	Not Significant – does not meet the minimum size or other criteria outlined in the OP. See Section 7.5 for further discussion of bat SAR.
WO-7	Adjacent Lands	FOCM6	2.22 (approx.)	Potential habitat for endangered or threatened species (bats)	Not Significant – does not meet the minimum size or other criteria outlined in the OP. See Section 7.5 for further discussion of bat SAR.
WO-8	Adjacent Lands	TAGM1	0.79	- Proximity to other woodlands - Potential habitat for endangered or threatened species (bats)	Not Significant – does not meet the minimum 10 ha size for plantations. See Section 7.5 for further discussion of bat SAR.



7.2 Significant Wetlands

A PSW (Mill Creek Puslinch Wetland Complex) and unevaluated wetlands were identified on the Site and Adjacent Lands during the background review (Figure 2, Appendix A). Field studies were conducted to verify the presence of these wetlands, as well as to identify any additional wetlands that had not been previously recorded. Wetlands were delineated and characterized following OWES or ELC protocols, depending on whether the wetlands were accessibility and/or their proximity to the proposed Project Footprint.

During field studies, the presence of the PSW and other unevaluated wetlands were confirmed. There were four wetland units mapped as PSW: WE-1a, WE-1b, WE-1c, WE-1d and three unevaluated wetlands (WE-2, WE-3, WE-4), all of which were located on Adjacent Lands. The delineation of wetlands in the field using OWES resulted in changes to the boundaries of these communities. During the background review, two additional unevaluated wetland communities (WE-3 and WE-4) were identified on Adjacent Lands. Field verification of these wetlands could not be conducted due to lack of land access. In addition to the wetlands that were verified from the background review, three more wetlands were documented: WE-5, WE-6, and WE-7. WE-6 and WE-7 are dug ponds that do not meet the standard definition of wetlands according to ELC or OWES. However, they are included because they exhibit wetland characteristics, so wildlife habitat and hydrologic impacts need to be considered. A detailed description of these wetland communities is provided in Table 10 and a summary of each of the wetland communities is presented in Table 17. Figure 6 in Appendix A shows a comparison of wetlands on Adjacent Lands to the background mapping.

The PSW and unevaluated wetlands identified from the background review (WE-1, WE-2, WE-3 and WE-4) are within the Core Greenlands designation under the County's OP and zoned as Natural Environment by the Township's Zoning Bylaw. Two of the wetlands identified from ELC (WE-6 and WE-7) are within the Greenlands designation and mapped as Environmental Protection Overlay by the Township.

In general, wetlands smaller than 2 ha (5 acres) are not evaluated under OWES. However, smaller wetlands can be evaluated if there is rationale that they serve important ecological functions. On January 1, 2023, the MNR proceeded with changes to the OWES (ERO 019-6160) in support of the *More Homes Built Faster Act, 2022*. One key change was the removal of wetland "complexing", or the practice of grouping together wetlands that are in close together or hydrologically connected. These and other revisions have made it more challenging for wetlands to qualify as provincially significant.

The unevaluated wetlands listed in Table 17 do not meet the 2 ha minimum size requirement for evaluation. With the removal of complexing, even if there is rationale for ecological importance (e.g., habitat of endangered to threatened species), it is unlikely that they would meet the criteria for provincial significance. Furthermore, these recent changes could prompt a re-evaluation of the Mill Creek Puslinch PSW Complex under the updated OWES. As a result, each wetland unit that is not contiguous with others in the complex would be evaluated individually, which may result in the status being downgraded to non-significant.



Table 17 Summary of Wetland Communities on the Site and Adjacent Lands

Unit ID	Size (ha) ¹	Source	Location	ELC	Species/Features	Overview / Recommendation
Mill Creek Puslinch Provincially Significant Wetland						
WE-1a	13.12	GEO Field Verified where access permitted	Adjacent Lands	SWDM3-3c	SWH - Candidate amphibian movement corridor - Confirmed amphibian breeding habitat (woodland) - Eastern Wood-Pewee (SOCC) SAR Bat SAR	- Within Core Greenlands: PSW, Significant Woodland (WO-1) - Zoned NE - Updates required based on wetland delineation
			Adjacent Lands	SWM01	SAR Bat SAR	- Within Core Greenlands: PSW, Significant Woodland (WO-1) - Zoned NE
WE-1b	2.69	GEO Field Verified where access permitted	Adjacent Lands	SWDM3-3b	SWH - Hop sedge (SOCC) - Salamander egg masses - Blue-spotted salamander (eDNA, samples 4,5,8,9) - Confirmed amphibian breeding habitat (woodland) SAR black ash, bat SAR	- Within Core Greenlands: PSW - Zoned NE - Updates required based on wetland delineation



Unit ID	Size (ha) ¹	Source	Location	ELC	Species/Features	Overview / Recommendation
WE-1c	3.87	GEO Field Verified where access permitted	Adjacent Lands	SWDM3-3d	SAR • Bat SAR	- Within Core Greenlands: PSW, Significant Woodland (WO-2) - Zoned NE - Updates required based on wetland delineation
WE-1d	11.72	GEO Field Verified where access permitted	Adjacent Lands	SWMO1-1	SWH Clinton's wood fern, fringed milkwort, chestnut sedge, and hop sedge (SOCC) SAR Bat SAR	- Within Core Greenlands: PSW, Significant Woodland (WO-3) - Zoned NE - Updates required based on wetland delineation
			Adjacent Lands	SWDO2-3	SAR Bat SAR	Zoned NE
			Adjacent Lands	FOCM2-2 / SWCM1-1	SAR Bat SAR	Zoned NE
			Adjacent Lands	SWD	Unknown	Zoned NE
			Adjacent Lands	SWT	Unknown	Zoned NE



Unit ID	Size (ha) ¹	Source	Location	ELC	Species/Features	Overview / Recommendation
WE-2	0.83	GEO Field Verified	Adjacent Lands	SWDM3-3a	SWH - Hop sedge (SOCC) - Salamander egg masses - Blue-spotted salamander (eDNA, samples 2, 3) - Confirmed amphibian breeding habitat (woodland) SAR Bat SAR	- Within Core Greenlands: Significant Woodland (WO-2) - Zoned NE - Too small under OWES
WE-3	0.80	GEO	Adjacent Lands	SWD	SAR Bat SAR	- Within Core Greenlands - Zoned NE
WE-4	0.05	GEO	Adjacent Lands	SWD	SAR Bat SAR	- Within Core Greenlands: Significant Woodlands (WO-3) - Zoned NE
Other Wetlands						
WE-5	0.09	Field Verified	Site	SAS (dug pond)	SWH Midland Painted Turtle (SOCC)	- Zoned Agricultural - Too small under OWES to be delineated as a wetland
WE-6	0.06	Field Verified	Site	SA (dug pond)	SWH Midland Painted Turtle (SOCC)	- Within Greenlands - Zoned EP Overlay - Too small under OWES to be delineated as a wetland



Unit ID	Size (ha) ¹	Source	Location	ELC	Species/Features	Overview / Recommendation
WE-7	0.08	Field Verified	Site	MAMM1-12	SWH - Salamander egg masses - Blue-spotted salamander (eDNA, sample 7) - Candidate turtle nest (predated nests) - Confirmed amphibian breeding habitat (woodland)	- Within Greenlands - Zoned EP Overlay - Too small under OWES to be delineated as a wetland

¹Size calculation reflects the total size of the contiguous wetland unit, including the area that extends beyond the Site and Adjacent Lands. Sizes for each individual community within a wetland unit is provided in the effects assessment where there is encroachment.



7.3 Greenlands

As defined by the County of Wellington Official Plan, Core Greenlands includes:

- provincially significant wetlands
- all other wetlands
- habitat of endangered or threatened species and fish habitat
- hazardous lands.

Core Greenlands on the Site per Figure 2 (Appendix A) include wetlands; however, Stantec refined the wetland boundaries as detailed in Section 4.3.4. Habitat for threatened or endangered species are discussed in Section 7.5.

Greenlands, per the County OP, include:

- Fish and wildlife habitat
- Areas of Natural and Scientific Interest (ANSI's)
- Streams and Valleylands
- Significant Woodlands
- Environmentally Sensitive Areas

Greenlands per Figure 2 (Appendix A) on the site includes:

- agricultural lands
- woodland: WODM5-3
- thicket: THDM4a
- marsh: MAMM1-12
- dug pond: SA
- meadow: MEMM3

Based on the definition, the reason for designating these communities on the Site as Greenlands is unclear. Woodland WO-5 (WODM5-3), discussed in Section 7.1 was assessed as not significant primarily based on size; however, it provides candidate SWH. Similarly, MAMM1-12 provides salamander breeding habitat and a portion of MEMM3 candidate turtle nesting areas, although both are anthropogenically created.



7.4 Significant Wildlife Habitat

A SWH assessment was completed in accordance with the SWH Criteria Schedule for Ecoregion 6E (MNRF 2015b). A full evaluation of each of the SWH types is provided in Appendix B.1, with a summary provided in the sections below. The assessment identified several candidate and confirmed SWH types on the Site and Adjacent Lands. Based on background information and field investigations, there is potential for seasonal concentration of animals, specialized habitat for wildlife, and habitat for SOCC. No rare vegetation communities were noted onsite or on Adjacent Lands. Locations of confirmed and candidate SWH is shown on Figure 7, Appendix A.

7.4.1 Seasonal Concentration Areas of Animals

One type of seasonal concentration area was confirmed on the Site and Adjacent Lands:

Candidate SWH:

- Bat Maternity Colonies – High numbers of bat species were recorded on ARUs during acoustic surveys and suitable bat maternity roost trees were observed during field studies. Since no detailed assessments were done beyond the Extraction Limit, the required habitat density could not be confirmed but is assumed present. Confirmed habitat for bat maternity colonies is present in the following woodland communities on the Site and Adjacent Lands: FOC, FOD, FOM, WOC, WOD, SWD.

7.4.2 Specialized Habitat for Wildlife

The following confirmed and candidate SWH types of specialized habitat for wildlife are present on the Site and on Adjacent Lands:

Confirmed SWH:

- Amphibian Breeding Habitat (Woodland) –WE-1b, WE-2, WE-7 was confirmed SWH for amphibian breeding due to the presence of Blue-spotted Salamander as well as high numbers of Spring Peepers and the presence of Wood Frog in WE-2. This habitat is located on the Site and Adjacent Lands.

Candidate SWH:

- Turtle Nesting Areas – Depredated turtle nests were present north of MAMM1-12 in an area of exposed gravel/sand. The number and type of turtle nests is not known to confirm SWH. However, Midland Painted Turtle presence and evidence of turtle nesting is confirmed on the Site.



7.4.3 Habitat for Species of Conservation Concern

A full assessment for habitat for SOCC on the Site and Adjacent Lands is in Appendix B.2. Based on species identified in the background review, SOCC are characterized as being either confirmed present or with low, moderate, or high potential to occur based on habitat assessments conducted during field studies.

The following SOCC were confirmed on the Site and Adjacent Lands:

- Midland Painted Turtle was observed in the two constructed ponds on the Site
- Barn Swallow was recorded during breeding bird surveys. No nests or nest building was observed; however, suitable nesting features (i.e., sheds, eaves) were present on the Site
- Eastern Wood-Pewee was recorded in the Adjacent Lands during breeding bird surveys and suitable breeding habitat is present in the proposed Project Footprint, Site and Adjacent Lands. There was also one meadow observation of Eastern Wood-Pewee (MEMM3), but this is outside of suitable breeding habitat.
- Monarch was observed on the Property during the insect survey. Common milkweed, Monarch's larval host plant, was also present and habitat was identified within the proposed Project Footprint, Site and Adjacent Lands.

Field studies did not target these species; however, given the presence of suitable habitat, the following SOCC are considered to have a moderate potential to occur on the Site and Adjacent Lands:

- Eastern Milksnake – potential habitat throughout the open habitat on the Site and Adjacent Lands for this habitat generalist.
- Eastern Ribbonsnake – potential habitat adjacent to wetlands on the Site and Adjacent Lands
- Betrothed Underwing Moth – associated with its larval host plants, honey locust or black walnut
- Chestnut Schizura Moth – associated with its larval host plant, Viburnum species which occurs on the Site and Adjacent Lands
- Giant Leopard Moth – potential to occur as its larvae feed on a diversity of plant species
- Penitent Underwing Moth – associated with its larval host plant; ash, butternut, hickory, pecan and walnut trees which occur on the Site and Adjacent Lands
- Walnut Caterpillar Moth – associated with its larval host plant, black walnut, which occurs on Adjacent Lands

7.4.4 Animal Movement Corridors

There were no animal movement corridors present. Amphibian movement corridors are absent due to the lack of wetland amphibian breeding habitat and there were no deer yards identified on the Site and Adjacent Lands.



7.5 Species at Risk (Endangered and Threatened Species)

A full assessment of candidate habitat for SAR on the Site and Adjacent Lands is in Appendix B.3. Species identified in the background review were classified as confirmed present or as having low, moderate, or high likelihood of occurrence based on habitat assessments completed during field studies.

For bats, updates to habitat definitions under the ESA came into effect on June 5, 2025. It is our understanding based on recent correspondence with MECP that the following definitions apply to bat SAR maternity roosts:

For all bat SAR:

- The natural roost feature (e.g., tree, snag, rock) or entire anthropogenic structure (entire bridge, barn, or rock pile) occupied for breeding (gestation, birth) and rearing pups
- The contiguous ELC ecosite up to a radius of 1000m from the confirmed maternity roost which is essential for breeding and rearing pups

For migratory bat SAR:

- Migratory stopover areas (migratory bats)
- The forested area habitually occupied for staging during migration
- Habitat-use by migratory bat SAR should be considered, which includes live or dead trees >10 cm in DBH, and trees with exfoliating bark, cracks, knots, holes, and cavities
- Shrubs >1 m in height, as these may provide roosting habitat for bat SAR
- Active window for Eastern Red Bat, Hoary Bat, and Silver-haired Bat is April 1 – November 30

Based on this, confirmation of a maternity feature is needed to confirm SAR habitat. Bat SAR were recorded on the Site and Adjacent Lands, but presence of maternity colonies was not confirmed.

The following SAR were confirmed on the Site and Adjacent Lands, and potential SAR Habitat is shown on Figure 8 (Appendix A):

- Eastern Red Bat was detected during bat acoustic surveys at 8 out of 9 stations. Potential habitat is present in the woodland, swamp, hedgerow and thicket communities on the Site (including the proposed Project Footprint) and Adjacent Lands.
- Hoary Bat was detected during bat acoustic surveys at all 9 stations. Potential habitat is present in the woodland, swamp, hedgerow and thicket communities on the Site (including the proposed Project Footprint) and Adjacent Lands.
- Little Brown Myotis was detected during bat acoustic surveys at all 9 stations. Potential habitat is present in woodland, swamp, hedgerow and thicket communities on the Site (including the proposed Project Footprint) and Adjacent Lands.



- Tri-coloured Bat was detected during bat acoustic surveys at 2 of 9 stations. Potential habitat is present in the woodland, swamp, hedgerow and thicket communities on the Site (including the proposed Project Footprint) and Adjacent Lands.
- Silver-haired Bat was detected during bat acoustic surveys at all 9 stations. Potential habitat is present in the woodland, swamp, hedgerow and thicket communities on the Site (including the proposed Project Footprint) and Adjacent Lands.
- During the botanical inventory, Black ash was observed in the FODM5-10, SWDM3-3 and SWMO1-1 communities on Adjacent Lands. However, these saplings are not protected (or mapped) as none exceeded the 8 cm DBH required for protection.
- Eastern Meadowlark was observed singing in a field on Adjacent Lands. Eastern Meadowlark was not observed on the Site (including the proposed Project Footprint) and there is no suitable habitat present for this species (i.e., only row crops). Therefore, this species is present on Adjacent Lands but absent from the Site.



8 Assessment of Impacts

The potential impacts to natural features that may occur from the proposed aggregate operation are identified and discussed in this section. Where direct impacts to SAR are anticipated, an approach to authorization under the provincial *Endangered Species Act* is outlined.

This section should be read in conjunction with the Site Plan (MHBC 2025) and the Level I and II Water Report (Stantec 2026) as part of the aggregate extraction application. The Site Plan provides specific details on existing conditions, Extraction Limits and phasing, and a progressive rehabilitation plan.

Vegetation communities within the Extraction Limit and acoustic berm creation (i.e. proposed Project Footprint) will be impacted, as shown in Table 18.

Table 18 Vegetation Communities within the Proposed Project Footprint

Community Type	Description	Quantities (ha)
Constructed (0.02 ha)		
CVR_4	Rural Property	0.02
Agricultural (6.87 ha)		
OAGM1	Annual Row Crops	6.87
Meadow (1.96 ha)		
MEMM3	Dry – Fresh Mixed Meadow	1.96
MEMM4	Fresh – Moist Mixed Meadow	0.004
Hedgerow (1.25 ha)		
FODM11	Naturalized Deciduous Hedgerow Ecosite	0.90
THDM3a	Dry - Fresh Deciduous Hedgerow Thicket Ecosite	0.14
THDM3b	Dry - Fresh Deciduous Hedgerow Thicket Ecosite	0.01
THDM3-1	Buckthorn Deciduous Hedgerow Thicket Type	0.20
Thicket (0.30 ha)		
THCM2-1	Fresh - Moist White Cedar Coniferous Thicket	0.03
THDM2-6	Buckthorn Deciduous Shrub Thicket	0.06
THDM4a	Dry - Fresh Deciduous Regeneration Thicket	0.07



Community Type	Description	Quantities (ha)
THDM4b	Dry - Fresh Deciduous Regeneration Thicket	0.14
Woodlands (0.08 ha)		
FODM5	Dry-Fresh Sugar Maple Deciduous Forest Ecosite	0.01
FODM5-10	Dry – Fresh Sugar Maple – White Birch – Poplar Deciduous Forest	0.01
WODM5-3	Fresh – Moist Manitoba Maple Deciduous Woodland	0.06

8.1 Significant Woodlands and Wetlands

As discussed in Section 7.1, seven woodlands are present on the Site and Adjacent Lands (Figure 7, Appendix A). Four of these woodlands were evaluated as significant (WO-1, WO-2, WO-3, WO-4) and were carried forward to the assessment of impacts.

As described in Section 7.2, there were six wetland units (WE1a-d, WE-2, WE-5) identified on Adjacent Lands. There are two wetlands (WE-6 and WE-7) present on the Site. WE-5 does not qualify as significant and is therefore not discussed in this section.

Impacts to woodlands and wetlands are discussed below; details on mitigation are covered in Section 9 and rehabilitation in Section 10.

8.1.1 Setbacks

A vegetation protection zone from the Extraction Limit is proposed 10 m from Significant Woodlands (with minor exceptions, e.g., FODM5) and 30 m from the wetlands, as shown on Figures 5 and 6 (Appendix A). This setback is considered sufficient to protect the form and function of the wetlands and woodlands from potential impacts, including encroachment, edge effects, and screening from noise and light disturbances. Although the County of Wellington does not prescribe a minimum woodland and wetland setback, the 10 and 30 m setbacks is consistent with other surrounding municipalities (e.g., City of Guelph).

The access road will follow the current gravel driveway and a secondary laneway between two areas of the Mill Creek PSW (WE-1a/WO-1 and WE-1b/WO-4), as shown on Figure 6 and Figure 7 (Appendix A). The access road is within 2 m of WE-1a and WE-1b and within 2 m of WO-1 and WO-4.



8.1.2 Acoustic Berms

Acoustic berms are proposed within both the 10 m and 30 m setback areas (Figure 5 and 6, Appendix A). In some areas, the grading required to accommodate the specified heights of the acoustic berms will require grading within significant woodlands, including removal of approximately 0.02 ha of significant woodland (FODM5, FODM5-1). The limited area proposed for removal along existing vegetation edges will not impact the form or function of the significant woodland. Furthermore, upon completion of the aggregate operation, setback areas will be replanted as part of the Rehabilitation Plan (MHBC 2026), which is further detailed in Section 10.

Where possible, berms will be located outside of the critical root zone to avoid impacts on tree survival to the woodland edge. This will require an assessment by a qualified arborist and should follow standard arborist guidelines (e.g., PNWISA 2021).

8.1.3 Wetland Water Balance and Thermal Impacts

The key potential impact of the proposed extraction on the surrounding natural environment relates to water impacts (surface water and groundwater) to fish habitat, wetlands (including PSW, amphibian habitat) and ponds. Fish habitat is absent from the Site and Adjacent Lands but is discussed in Section 8.3 relative to offsite impacts. Overland drainage and water table levels will change during and after extraction, which may impact wetlands on Adjacent Lands. Impacts and the water balance budget were assessed using data from the Level I and II Water Report (Stantec 2026) and are summarized below.

In areas where dredging of aggregate will be undertaken, the local water table will be affected in two ways:

1. Over the short term (i.e., anticipated 2-to-5-year extraction period), the volume of the aggregate removed will be replaced by groundwater. This displacement, equivalent to approximately 1,050 m³/day during normal operations, will temporarily draw down the water table within the aggregate ponds area by up to 0.3 m. This water table drawdown will decrease with radial distance from the aggregate ponds, interpreted to be approximately 0.13 m at the boundary of neighboring wetlands. These small water table adjustments are minor relative to the 1 m variations observed seasonally. This drawdown will not occur post rehabilitation of the pit.
2. The water table gradient will flatten within the area of the proposed pit ponds. The projected effects of this hydraulic gradient change, as shown on Figure 15 of Stantec's Water Report (2026), as summarized as follows:
 - water table rise (up to 0.3 m) in the southwestern portion of the licensed area
 - water table decline (up to 0.6 m) in the northeastern portion of the of the licensed area
 - no significant water table change (0.3 m or less) in local wetland areas.



Other key findings of the Water Report (Stantec 2026), related to water resources, include:

- Water ponding in the local PSWs is directly related to seasonally high-water table levels. Due to the limited catchment areas of the PSWs, ponding is not observed during the late-summer and fall months (i.e., low water table season), even during substantial precipitation events. It is therefore concluded that partial removal of the surface catchment areas adjacent to PSWs should not interfere with the current hydroperiods observed seasonally.
- The average annual volume of infiltration under pre-development conditions is estimated at approximately 22,345 m³/year or unit rate of approximately 255 mm/year. Under post-development conditions, increased evaporation (i.e., due to the open pit ponds) is expected to decrease the average annual infiltration to approximately 10,747 m³/year or unit rate of approximately 123 mm/year. The presence of the pit ponds is therefore expected to reduce the onsite infiltration rate by 11,598 m³/year (equivalent to 65 m³/day or 0.4 L/s). This reduction is small, equivalent to less than 1% of the interpreted base flow rate in Aberfoyle Creek (down stream of the Site). This adjustment should not affect normal groundwater or surface water flow conditions locally.
- Permanent adjustment of the local water table gradient at PSW locations, in response to creation of the pit ponds, are projected to be less than 0.3 m. These small water table adjustments are minor relative to the 1 m variations observed seasonally. The zone of influence of these changes are interpreted to be approximately 400 m from the edge of the pit ponds.
- Local groundwater temperatures range from 8°C to 12°C. The average annual water temperature within the aggregate pit ponds is interpreted to increase approximately 6°C, reflecting a range of 14°C to 18°C. This pond water will flow in a southwesterly direction, cooling along its flowpath and eventually outflowing into Aberfoyle Creek. At Aberfoyle Creek (along a 200 m section on the east side) the temperature of this groundwater could be 2°C above the local ambient (e.g., reflecting a range of 10°C to 14°C. It is noted that once the groundwater base flow in this 200 m section mixes with the creek flow, no temperature difference is likely to be realized from normal creek flow conditions.

Following on the conclusions provided above and water effects delineated on Figure 15 of the Water Report (Stantec 2026), the interpreted effects on the natural environment are outlined below.

- Seasonal groundwater changes under the adjacent wetlands (e.g., WE-2) are not expected to impact wetland flora and fauna as these changes are relatively minor and occur within a normal range of groundwater fluctuations realized year to year.
- Onsite groundwater only supports the adjacent wetland hydroperiod for a limited portion of the year, as surplus water conditions occur for the remainder of the year (i.e., fall-spring). As a result, minor changes in groundwater conditions are inconsequential to the wetland as they will continue to have a viable hydroperiod. The hydroperiod of the wetlands is also supported by surface water flow and near surface interflow within the retained catchment of each feature.
- A shortened hydroperiod is not anticipated as this could have negative impacts on amphibian breeding if water depths are insufficient to support amphibian egg maturation.



- An increased water level post-operation may occur due to a flattening of the water tables.
- Projected temperature changes in groundwater baseflow towards Aberfoyle Creek should have no effect on the local aquatic habitat.

Overall, the collective inputs to the features allow the wetlands to maintain hydric conditions. Small changes to any of these inputs are not expected to negatively impact the form or function of the wetlands on Adjacent Lands.

8.2 Greenlands

A portion of the agricultural lands designated as Greenlands are located within the Extraction Limit (1.16 ha) and within the proposed footprint for acoustic berms (0.64 ha). Of the 1.16 ha that is proposed for removal, most is active agriculture (OAGM1) with a small portion of MEMM1. These communities do not qualify as Greenlands and therefore impacts to the form and function of greenlands are not anticipated.

The proposed acoustic berms impact small portions of WODM5-3, THDM4a, and MEMM3. Impacts to candidate bat SAR habitat and turtle nesting habitat are addressed in Sections 8.3.5 and 8.3.2, respectively. With the implementation of mitigation and restoration proposed for the functions provided by these small, marginal features within the designated Greenlands, no loss of Greenland function is anticipated.

8.3 Wildlife and Wildlife Habitat

8.3.1 Amphibians

Direct impacts to amphibian habitat are not anticipated.

Although SWH for amphibian movement is not present on the Site, due to the proximity of the Site to SWH for amphibian breeding (woodland), potential impacts to amphibians associated with road mortality along the access road were assessed. Amphibian movement includes the spring migration period when amphibians travel overland to breeding ponds, the timing of which is dependent upon ice melt, nighttime temperatures, and often rain (e.g., COSEWIC 2010), but generally occurs in evenings from late March to mid-April. Restricting operation to daylight hours during this time would mitigate road mortalities during the highly sensitive period.

The sensitive breeding/larval development period within amphibian ponds last from egg-laying in the spring until early August when the juveniles leave to search for overwintering sites. Timing of this movement is less time-specific and concentrated, which makes it difficult to implement targeted mitigation for road mortality. However, the implementation of timing windows and speed limits, as described in Section 9, as well as habitat creation (Section 10.2.1), overall impacts to amphibians are not anticipated.



8.3.2 Turtles

To facilitate the construction of one of the acoustic berms, grading will result in a direct impact to one candidate SWH feature (Turtle Nesting Area), as identified on Figure 7 (Appendix A). Although this SWH type was not confirmed, depredated turtle nests were observed north of a small wetland (MAMM1-12) in an area of exposed gravel/sand. The confirmed presence of Midland Painted Turtles indicates that the Site supports turtle nesting.

With implementation of proposal mitigation measures and habitat creation (Section 10.2.2), no negative impacts to turtles are anticipated from the proposed pit.

8.3.3 Eastern Wood-Pewee

There will be a loss of approximately 0.01 ha of FODM5-3 that is mapped as Eastern Wood-pewee habitat. The Eastern Wood-pewee observed within this woodland feature was not present within the portion of the woodlot proposed for removal; however, as SWH includes the entire ELC community. Therefore, this community qualifies as habitat for SOCC. The proposed removal of the edge of this feature outside of where the bird was observed to result in direct impacts to Eastern Wood-pewee. Impacts can be managed by vegetation removal timing windows.

8.3.4 Monarch

There will be a loss of 0.57 ha of candidate habitat for Monarch. Monarch was observed during field investigations and suitable habitat for egg-laying and larval development (common milkweed and swamp milkweed) is present on the Site. Monarch is typically found where milkweed and wildflowers (including goldenrods and asters) are present (COSEWIC 2010). Caterpillars are dependent on milkweed, whereas adults exhibit broader habitat preferences and will feed on a variety of wildflowers. With compensation and mitigation measures for Monarch provided in Section 9 and 10.2.3, overall impacts are not anticipated to Monarch.

8.3.5 Bat Species at Risk

There will be a loss of 1.56 ha of potential Bat SAR Habitat and eighteen candidate bat roost trees. Eastern Red Bat, Hoary Bat, Little Brown Myotis, Silver-haired Bat and Tri-colored Bat were confirmed on the Site and Adjacent Lands based on the bat acoustic survey results, but it was not possible to confirm the presence of maternity roost sites. Three woodlands (WODM5-3, FODM5, FODM5-10), and five hedgerow/thicket communities (FODM11, THDM3a, THDM3-1, THDM4b and THCM2-1), which contain suitable bat habitat will be impacted by the Project. With compensation and mitigation measures for bat SAR provided in Section 9 and 10.3, no impacts are anticipated to bat SAR, pending confirmation from MECP.

Indirect impacts such as onsite light use, will be limited as work is proposed during daylight hours during the bat active period.



8.4 Fish Habitat

There is no Fish Habitat within the Site or Adjacent Lands. Aberfoyle Creek is located approximate 300 m southwest of the Site and Adjacent Lands.

Aberfoyle Creek is a Brook Trout creek with a coldwater thermal regime. The temperature range for optimal growth and survival of adult Brook Trout used in the Brook Trout Habitat Suitability Index (HSI) is 11-16°C (Raleigh 1982).

Brook Trout normally require high oxygen concentrations with optimum conditions at dissolved oxygen concentrations near saturation and temperatures above 15°C (Raleigh 1982). The dissolved oxygen concentration should not fall below 5 mg/L (Raleigh 1982), which is the same as the Provincial Water Quality Objective (PWQO; MOEE 1994) for coldwater biota at 20°C.

As discussed in Section 8.1.3, local groundwater temperature ranges from 8°C to 12°C. The average annual water temperature within the aggregate pit ponds is interpreted to increase approximately 6°C, reflecting a range of 14°C to 18°C. This pond water will flow in a southwesterly direction, cooling along its flowpath and eventually outflowing into Aberfoyle Creek. At Aberfoyle Creek (along a 200 m section on the east side) the temperature of this groundwater could be 2°C above the local ambient (e.g., reflecting a range of 10°C to 14°C). It is noted that once the groundwater base flow in this 200 m section mixes with the creek flow, no temperature difference is likely to be realized from normal creek flow conditions.

This is well within the Provincial Water Quality Objectives (PWQO) that states that the water temperature *'at the edge of a mixing zone shall not exceed the natural ambient water temperature at a representative control location by more than 10 Celsius degrees'* (MOEE 1994). Additionally, this will not impact the habitat suitability of Aberfoyle Creek for Brook Trout as it will remain within the optimal temperature regime.



9 Mitigation

Standard Best Management Practices to reduce the likelihood of impacts to the adjacent natural features include:

- Migratory birds and their nests, when active (i.e., contain a viable egg, or young) are protected under the MBCA (Government of Canada 1994). Avoid vegetation removal during the active period, generally April 1 – August 31, to reduce the risk of harm to protected nests. Nest surveys by a qualified biologist may be conducted if the area to be search is relatively simple (e.g., hedgerows) and the primary mitigation measures (i.e., timing windows) cannot be applied. Active nests will be protected with an appropriate buffer until young have fledged.
- Vegetation clearing where milkweed plants are present is recommended to proceed when Monarch larvae are absent (i.e. not April 1 to September 30), if possible.
- Restrict operations to daylight hours - 07:00 to 19:00 on weekdays and 08:00 to 16:00 on weekends – which should avoid key amphibian movement periods in the spring evenings (late March to mid-April).
- Implement speed limits on the access road of 20 km/hour
- Consultation with MECP on permitting requirements or consideration under the forthcoming SCA for the removal of approximately 1.56 ha of bat SAR habitat and eighteen candidate roost trees, as shown on Figure 7, Appendix A. Avoid vegetation removal outside the active period (i.e., do not remove forest, hedgerows, and thickets from April 1 – November 30).
- Implement enhancement, restoration, and mitigation measures outlined on the Rehabilitation Plan (MHBC 2026), detailed in Section 10.

9.1 Vegetation

The following mitigation measures are recommended to reduce the likelihood of impacts to vegetation and vegetation communities (e.g., wetlands, woodlands, thickets, meadows), with rehabilitation discussed in Section 10.1:

- The boundaries of the project limits, vegetation clearing and retention zones within the project limits, and natural areas adjacent to the project limits, shall be clearly delineated in plans/drawings and in the field.
- In the case of unexpected vegetation removal or accidental damage to trees, vegetation shall be replaced and/or restored.
- Access road upgrades, if required, will consider overhanging trees and avoid compression of critical root zones of adjacent features (i.e., woodlands and wetlands). The footprint of the road will be reduced to the greatest extent possible to avoid further encroachment to the adjacent natural features.



- Vegetation removals shall adhere to applicable timing windows, December 1 to March 30 to accommodate most species.
- Strict mitigation for dust suppression will be implemented as detailed in the *Best Management Plan for Fugitive Dust: Anthony Pit Project* (Stantec 2026).

9.2 Invasive Species Management

- Clean vehicles and equipment in an area that is free of mud, with a gravel surface, a hard surface, or a regularly mowed grassy area at least 30 m away from nearby watercourses and areas of natural vegetation in accordance with Clean Equipment Protocol for Industry (Halloran et al. 2013)
- European Buckthorn will be removed and stored in a manner that does not spread seeds. Buckthorn can be brushpiled and left as wildlife habitat in the area where it was removed, chipped and buried, or disposed of off-site at an appropriate facility.
- Seeds being used for hydro seeding or revegetation should be certified free of weeds or invasive species. Mulch should be weed free.

9.3 Erosion and Sediment Control

- Develop and implement an Erosion and Sediment Control Plan prior to construction to protect sensitive natural heritage features.
- ESC measures shall be installed prior to vegetation removal and remain in place until vegetation has become established and soils re-stabilized.
- Selection of ESC measures shall be appropriate for the site and extent of disturbance, and potential impacts to wildlife, such as entanglement and movement barriers.
- Stockpiled materials shall be stored in areas where stormwater run-off will not drain directly into wetland and the woodlot areas being maintained at the Site.
- Berms constructed at the Site shall be vegetated as soon as possible after placement, to help stabilize the berm side slopes.
- ESC measures shall be inspected to confirm as part of construction monitoring activities (Section 9.5).

9.4 Spill Prevention

- Develop and implement a Spill Prevention and Response Contingency Plan that includes measures for preventing, addressing, and reporting potential spills, in accordance with all applicable regulations, permits, and guidelines.
- On-site hazardous materials, vehicle maintenance and refueling activities shall be properly stored and located at least 30 m away from wetlands, and other sensitive natural features.
- Spill kits shall always be kept on-site and accessible at all times.



- Control onsite activities, including equipment maintenance and re-fueling, to prevent entry of petroleum products or other deleterious substances, including any debris, waste, rubble, etc., into the natural environment.

9.5 Environmental Monitoring

- Environmental monitoring during operation should be documented and include, but not be limited to:
 - Regular inspections of sensitive features so that setbacks are adhered to and that damage/alteration to the demarcations or protective measures of these features is addressed.
 - Regular monitoring of erosion and sediment control, equipment refuelling activities, so that spills and sediment releases are prevented or addressed quickly and effectively.
 - Monitoring for dust as detailed in *Best Management Plan for Fugitive Dust: Anthony Pit Project* (Stantec 2026).
- Specialized environmental monitoring programs shall be developed and implemented as it relates to:
 - Rehabilitation and enhancement (Section 10.1)
 - Permit and approval requirements, which will be confirmed as part of the permitting processes (Section 10.3).



10 Rehabilitation and Enhancement

A Rehabilitation Plan for the Anthony Pit has been developed by MHBC. This plan has been developed to restore, enhance and offset potential impacts of the development as described in the following sections.

10.1 Woodlands and Wetlands

Vegetation will be planted along the boundary of the natural features, which will increase the woodland area of WO-2, WO-3, and setbacks to WE-1c-d and WE-2. The approximately 0.02 ha of significant woodland proposed for removal will be replaced by a proposed 1.8 ha of future woodlands, which will increase the amount of woodland compared to existing conditions.

Native species plantings will result in an improvement in both size and quality of woodlands. Nodal planting details are provided in Appendix D and will include a standard survival guarantee of two years for vegetation planting.

A small 0.9 ha wetland will be created as part of the rehabilitation works. This wetland area will be approximately $\pm 0.15 - 1.0$ m deep, comprised of placed organic material, topsoil, substrates and cover materials with emergent herbaceous vegetation and structures within the littoral zone. A schematic is provided in the Wetland Area Detail inset portion of the plan, found in the Rehabilitation Plan (MHBC 2026).

10.2 Significant Wildlife Habitat

10.2.1 Amphibians Breeding Habitat (Woodland)

In addition to the creation of the wetland area described in Section 10.1, the post-extraction ponds will also be modified by providing organic material, topsoil, substrates and cover maternity to promote shoreline aquatic vegetation. The placement of large woody debris and rubble/boulder material along the pond edge is also proposed in the Shoreline Area Detail (Rehabilitation Plan (MHBC 2026)).

These created features may provide suitable salamander and amphibian breeding habitat, which will increase habitat availability on Site. The post-extraction ponds will also provide frog and toad breeding habitat, based on the addition of specific shoreline features as outlined in the Rehabilitation Plan (Rehabilitation Plan (MHBC 2026)). The larger ponds are not expected to provide appropriate conditions (e.g., size, potential for predators due to fish stocking) to support salamander breeding but the protection of existing breeding ponds and the creation of 0.9 ha of new habitat will result in a net gain of this habitat type.



10.2.2 Turtles and Turtle Habitat

To supplement the proposed removal of existing turtle nesting habitat onsite to facilitate berm construction, the creation of a turtle nesting mound is recommended in the vicinity of removal (i.e., in proximity to MAMM1-12) in accordance with guidance provided by the Canadian Wildlife Federation (CWF) and Paterson et al. 2015, including:

- Locate above the high-water mark
- Locate in open areas to receive sun most of the day
- Place geotextile cloth under the nesting area to prevent vegetation growth
- Soil should be a mixture of fine gravel, sand, and existing soil
- Site each mound facing south or south-west
- Slope of no more than 30%

To avoid impacts to turtles nesting onsite, construction of the proposed nesting mound is recommended to occur prior to removal of the existing nesting site so there is a continuous availability of nesting areas. Specific timing windows and exclusionary measures will (or concurrently) be required so that removal of the existing feature will not directly impact turtle eggs that could be in the feature to be removed. The following are recommended to reduce the likelihood of impacts to turtles during operation:

- if there are repeat observations of turtles in the active pit (including nesting), barrier fencing may be used to direct wildlife away from the active work area(s) and toward natural wetland areas outside the Extraction Limit
- all fencing materials should be wildlife-friendly to prevent accidental entanglement
- If a turtle nest site or evidence of a turtle nest (i.e., areas of fresh digging in loose gravel or sandy material) is found within the work areas, all work in that area shall cease. The nests shall be left undisturbed, flagged and a setback applied to protect against construction activities. If avoidance is not possible, egg salvage may be completed by a Qualified Biologist.

10.2.3 Habitat for Species of Conservation Concern

Three SOCC were present in the Site and are shown on Figure 7 (Appendix A) – Eastern Wood-Pewee, Monarch and Midland Painted Turtle. Compensation for Midland Painted Turtle nesting habitat is discussed in Section 10.2.2 and the rehabilitation planting plan will offset the loss of the edge of Eastern Wood-pewee habitat that is proposed for removal.

Monarch is typically found where milkweed and wildflowers (including goldenrods and asters) are present (COSEWIC 2010). Caterpillars are dependent on milkweed, whereas adults exhibit broader habitat preferences and will feed on a variety of wildflowers. Common milkweed and nectar producing plants (e.g., serviceberry, dogwood, asters, goldenrods, blackeyed Susan, Joe Pye weed) will be incorporated into the rehabilitation seed mix described in the Rehabilitation Plan.



10.3 Species at Risk

Since bats were identified during acoustic surveys, and suitable habitat is present in the proposed Project Footprint, consultation with MECP is recommended to develop appropriate mitigation and compensation for bat SAR under the ESA or forthcoming SCA. The following are recommended compensation and mitigation measures (subject to appropriate regulatory consideration or approvals) for bat SAR:

- Installation of artificial roosting structures (i.e. bat boxes) and woodland restoration.
 - The two-chamber Rocket Boxes that can accommodate an average of 250 bats (specifications available at the following website <http://www.batcon.org/files/RocketBoxPlans.pdf>) and is recommended for inclusion in the Rehabilitation Plan.
 - BrandenBark™ features may also be used to supplement the Rocket Boxes
- Include oak and maple in the replanting plan to support tree-roosting bats
- To reduce the effects of light pollution on bats, it is recommended that permanent light fixtures installed near bat habitat be avoided, where feasible. If not feasible, reduce illumination and light spill through design (e.g. height of light, light shields, lighting intensity, direction and spectral composition).



11 Summary and Closing

The results of the extensive field program undertaken for this NER/EIS identified the following significant natural features located within the Proposed Project Footprint (Extraction Limit and acoustic berm/barrier footprints), on the Site and Adjacent Lands as detailed in Table 19.

Table 19 Summary of Natural Heritage Features for the Project

Natural Heritage Feature	Proposed Project Footprint	Site	Adjacent Lands
Significant Areas of Natural and Scientific Interest	No	No	No
Significant Valleylands	No	No	No
Significant Woodlands	Yes	Yes	Yes
Significant Wetlands	No	No (based on Stantec's wetland boundary delineation)	Yes (including unevaluated wetlands)
Other Coastal Wetlands in Ecoregions 5E, 6E and 7E	No	No	No
Fish Habitat	No	No	No
Habitat of Endangered and Threatened Species	Yes (bats)	Yes (bats)	Yes (bats, Eastern Meadowlark)
Confirmed Significant Wildlife Habitat	Habitat of SOCC (Monarch, Eastern Wood-pewee)	- Amphibian Breeding Habitat (woodland) - Habitat of SOCC (Midland Painted Turtle, Barn Swallow, Eastern Wood-pewee, Monarch)	- Amphibian Breeding Habitat (woodland) - Habitat of SOCC (Midland Painted Turtle, Barn Swallow, Eastern Wood-pewee, Monarch)
Candidate Significant Wildlife Habitat	- Bat Maternity Roost Habitat - Habitat of SOCC (Eastern Milksnake, Eastern Ribbonsnake, Betrothed Underwing Moth, Giant Leopard Moth)	Habitat of SOCC (Eastern Milksnake, Eastern Ribbonsnake, Betrothed Underwing Moth, Chestnut Schizura Moth, Giant Leopard Moth, Penitent Underwing Moth, Walnut Caterpillar Moth)	Habitat of SOCC (Eastern Milksnake, Eastern Ribbonsnake, Betrothed Underwing Moth, Chestnut Schizura Moth, Giant Leopard Moth, Penitent Underwing Moth, Walnut Caterpillar Moth)



Permitting under the Endangered Species Act may be required to address potential impacts to bat SAR habitat, although consideration should be given to the policy in place at the time of removal (e.g., the forthcoming *Species Conservation Act*).

The proposed licensed area is approximately 18.0 hectares (ha) (44.5 acres) with 8.7 ha (21.5 acres) proposed for extraction. The pit is proposed to operate above and below the water table, which will create two large ponds post-extraction. Access will occur via an existing driveway that meets Victoria Road South on the northeast corner of the Site, a portion of which will be shared with the property owner. The remaining portion of the access road will pass between two sections of the Mill Creek Puslinch PSW and extraction is focused on areas being used for agricultural row crops and recreation.

Impacts discussed in this report focus on significant features detailed in Table 19, looking at both potential direct (e.g., removal) and indirect (i.e., water balance) impacts.

A series of recommendations are included in Sections 9 (mitigation) and 10 (rehabilitation and enhancement) to offset potential impacts of the pit to natural features and wildlife habitat identified within the impact area, Site, and on Adjacent Lands. This includes:

- Timing restrictions for vegetation removal to occur outside the active seasons for migratory birds (April 1 – August 31), bat SAR (April 1 – November 30), and Monarch (milkweed plants, April 1 – September 30; where feasible)
- Specific measures are included for vegetation protection, invasive species management, erosion and sediment controls, spill prevention measures and environmental monitoring.
- Operational considerations, including restricting work to daylight hours (07:00 to 19:00 on weekdays and 08:00 to 16:00 on weekends) to avoid key amphibian movement periods in the spring evenings (approximately late March to mid-April), lighting considerations for indirect impacts to bats, the implementation of speed limits on the access road (20 km/hour), and mitigation for dust suppression as detailed in the *Best Management Plan for Fugitive Dust: Anthony Pit Project* (Stantec, 2026).
- Post-operation, the Site will be rehabilitated/enhanced to provide a new constructed wetland, two large ponds structured to support fish, amphibian, and turtles (including a new nesting area), seeding and tree planting to support future habitat for Monarch, bats, amphibians, SOCC insects, as well as provisioning of bat boxes to offset woodland/hedgerow/thicket removal.
- With the implementation of the mitigation and rehabilitation measures outlined in this report

This NER/EIS was prepared to meet the assessment requirements of the ARA, the PPS, and the County of Wellington OP.



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Appendices



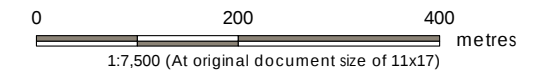
Appendix A Figures





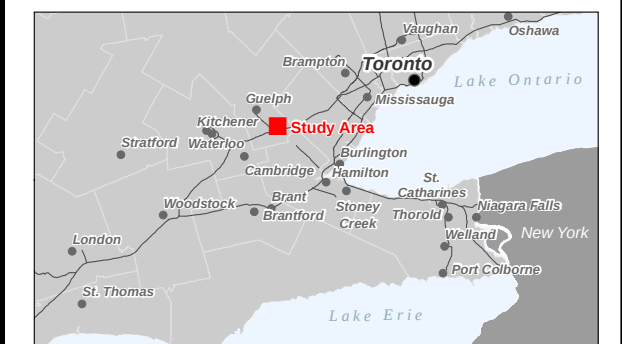
Legend

- Site
- Adjacent Lands (120 m)
- Road
- Watercourse
- Waterbody



Notes

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Project Location
Township of
Puslinch

160961457 REVA
Prepared by PRM on 2025-09-22
Technical Review by MS on 2025-09-16

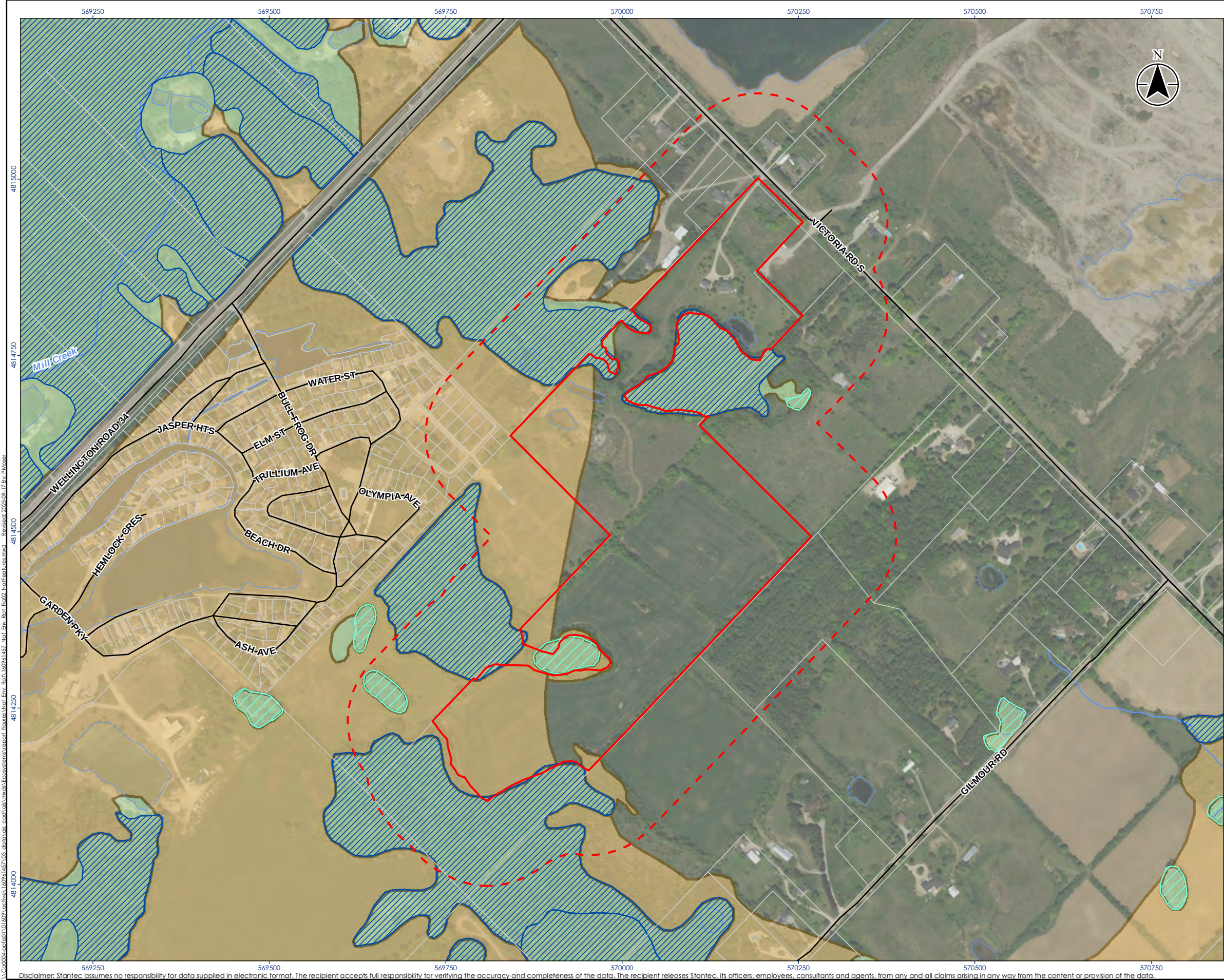
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Figure No.

1

Title

Site and Adjacent Lands

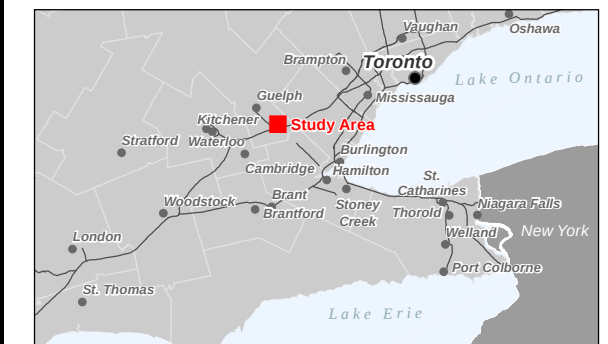


Legend

- Site
- Adjacent Lands (120 m)
- Road
- Watercourse
- Waterbody
- Mill Creek Provincial Significant Wetland (GEO)
- Unevaluated Wetland (GEO)
- Parcel Boundary
- The Greenland System**
 - Core Greenlands
 - Greenlands

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- Notes
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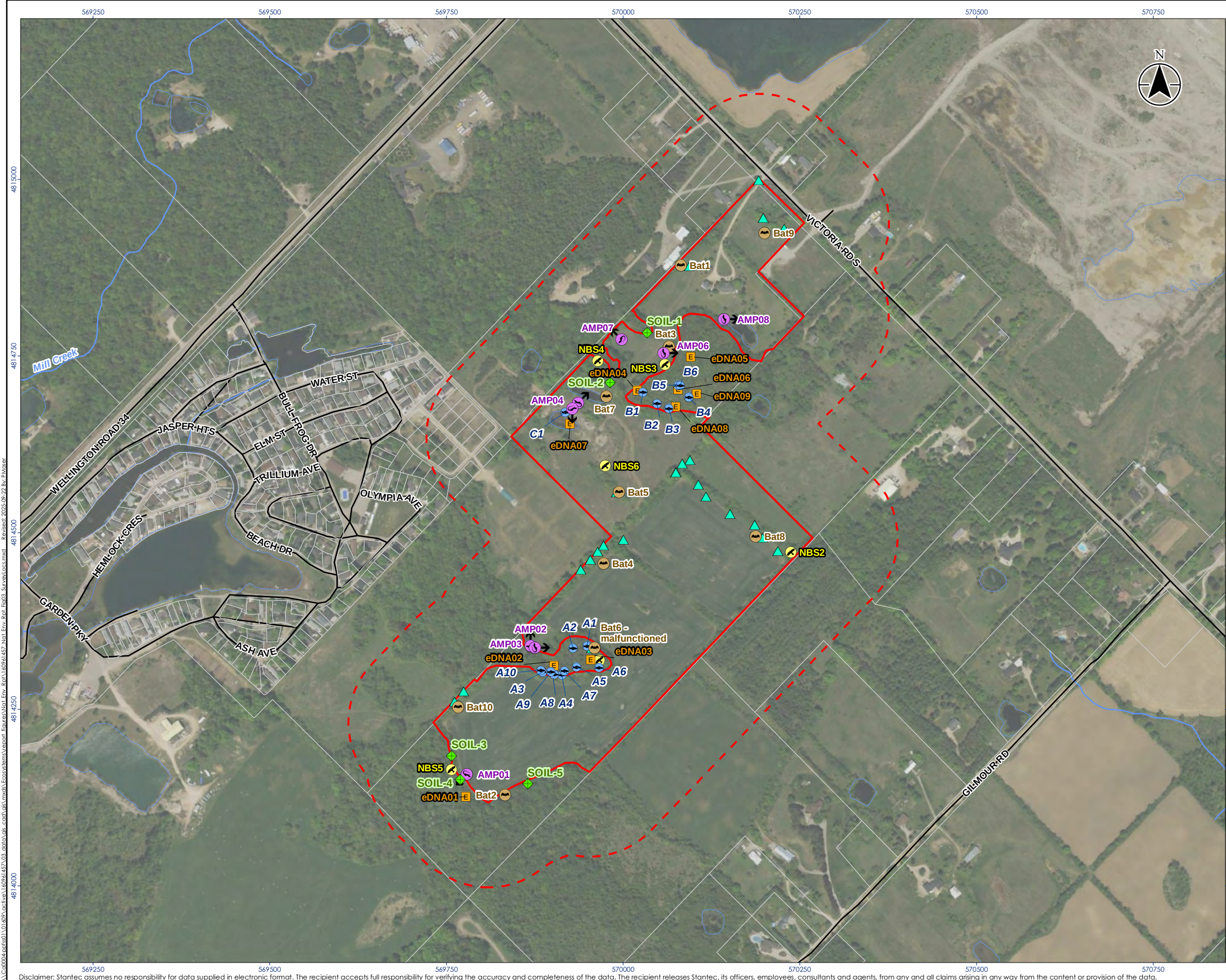


Project Location
Township of
Puslinch
160961457 REVA
Prepared by PRM on 2025-09-17
Technical Review by MS on 2025-09-16

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NATURAL ENVIRONMENT REPORT

Figure No.
2

Title
Natural Features



Legend

- Site
- Adjacent Lands (120 m)

Survey Location

- Amphibian Survey Location
- Potential Bat Roost Tree
- Bat Acoustic Survey Location
- Salamander Minnow Trap Location
- Nocturnal Bird Survey Station
- eDNA Sample Locations
- Soil Sample Location

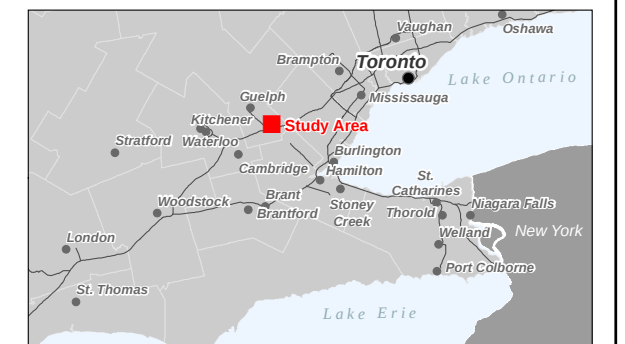
Base Features

- Road
- Watercourse
- Waterbody
- Parcel Boundary

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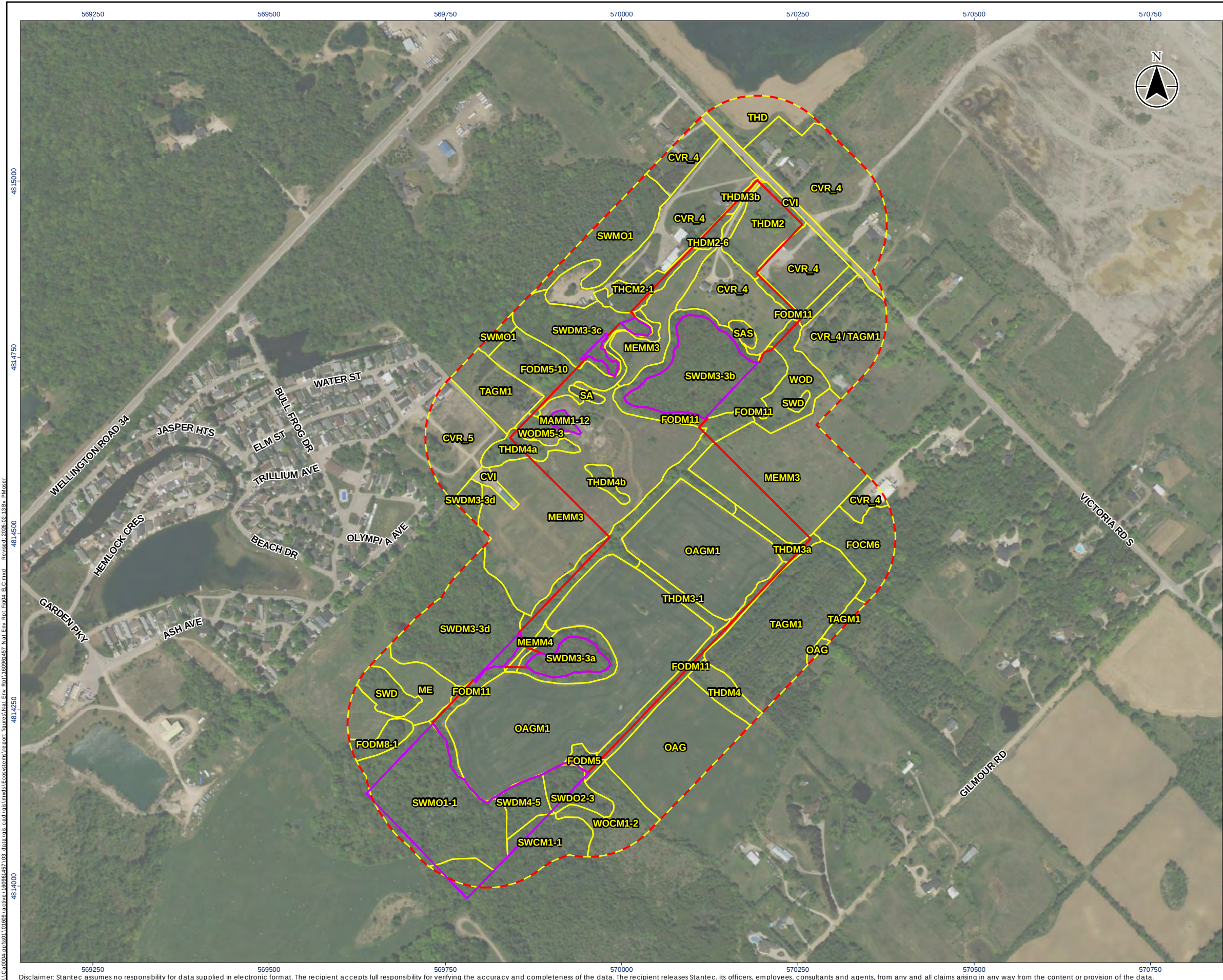
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Figure No.

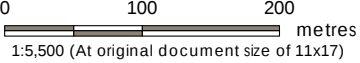
3

Title

Survey Location



- Legend
- Site
 - Adjacent Lands (120 m)
 - Wetland (Stantec 2024)
 - ELC Boundary
- CVI - Transportation and Utilities
CVR_4 - Rural Property
CVR_5 - Trailer Park
FOCM6 - Naturalized Coniferous Plantation
FODM11 - Naturalized Deciduous Hedge-row Ecosite
FODM5-10 - Dry – Fresh Sugar Maple – White Birch – Poplar Deciduous Forest Type
FODM5 - Dry-Fresh Sugar Maple Deciduous Forest Ecosite
FODM8-1 - Fresh – Moist Poplar Deciduous Forest Type
MAMM1-12 - Common Reed Graminoid Mineral Meadow Marsh Type
ME - Meadow
MEMM3 - Dry - Fresh Mixed Meadow Ecosite
MEMM4 - Fresh - Moist Mixed Meadow Ecosite
OAG - Open Agriculture
OAGM1 - Annual Row Crops
SA - Shallow Water
SAS - Shallow Marsh
SWCM1-1 - White Cedar Mineral Coniferous Swamp Type
SWD - Deciduous Swamp
SWDM3-3 - Swamp Maple Mineral Deciduous Swamp Type
SWDM4-5 - Poplar Mineral Deciduous Swamp Type
SWDO2-3 - Swamp Maple Organic Deciduous Swamp Type
SWMO1-1 - White Cedar - Hardwood Organic Mixed Swamp
SWMO1 - White Cedar Organic Mixed Swamp Ecosite
TAGM1 - Coniferous Plantation
THCM2-1 - Fresh - Moist White Cedar Coniferous Thicket Type
THD - Deciduous Thicket
THDM2-6 - Buckthorn Deciduous Shrub Thicket Type
THDM2 - Dry - Fresh Deciduous Shrub Thicket Ecosite
THDM3-1 - Buckthorn Deciduous Hedgerow Thicket Type
THDM3 - Dry - Fresh Deciduous Hedgerow Thicket Ecosite
THDM4 - Dry - Fresh Deciduous Regeneration Thicket Ecosite
WOCM1-2 - Dry-Fresh White Cedar Coniferous Woodland
WOD - Deciduous Woodland
WODM5-3 - Fresh - Moist Manitoba Maple Deciduous Woodland Type



Notes

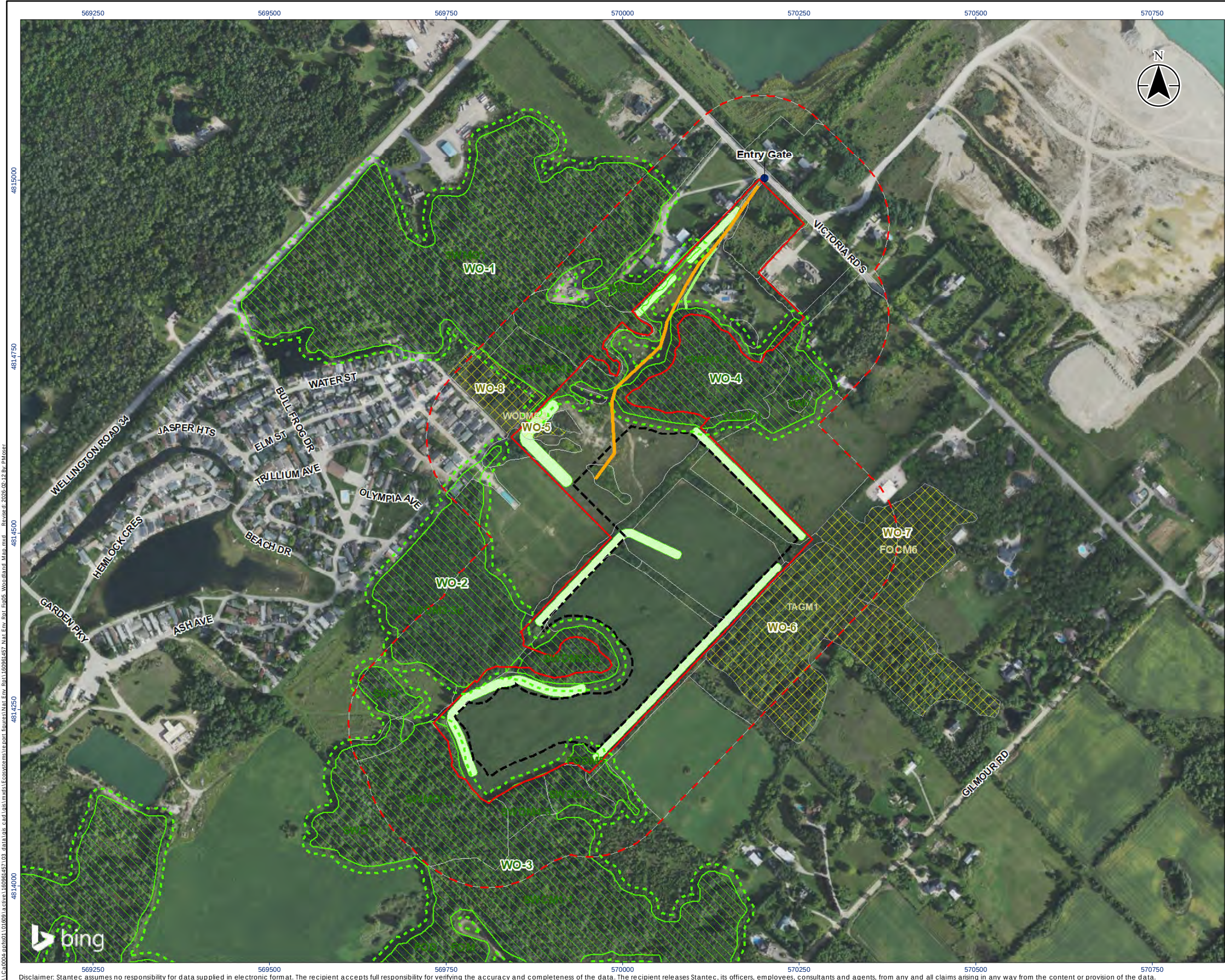
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Project Location: 160961457 REVA
Township of: Prepared by PRM on 2026-02-13
Puslinch: Technical Review by MS on 2026-02-12

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NATURAL ENVIRONMENT REPORT

Figure No.
4

Title
Ecological Land Classification



Legend

- Site
- Adjacent Lands (120 m)
- Significant Woodland
- Other Woodland
- Significant Woodland Setback (10m)
- FOCM6 - Naturalized Coniferous Plantation
- FOD - Deciduous Forest
- FODM5-10 - Dry - Fresh Sugar Maple - White Birch - Poplar Deciduous Forest Type
- FODM5 - Dry-Fresh Sugar Maple Deciduous Forest Ecosite
- FOM - Mixed Forest
- SWCM1-1 - White Cedar Mineral Coniferous Swamp Type
- SWD - Deciduous Swamp
- SWDM3-3 - Swamp Maple Mineral Deciduous Swamp Type
- SWDM4-5 - Poplar Mineral Deciduous Swamp Type
- SWDO2-3 - Swamp Maple Organic Deciduous Swamp Type
- SWMO1-1 - White Cedar - Hardwood Organic Mixed Swamp
- SWMO1 - White Cedar Organic Mixed Swamp Ecosite
- THCM2-1 - Fresh - Moist White Cedar Coniferous Thicktke Type

Project Component

- Proposed Acoustic Discretionary Noise Barrier
- Proposed Acoustic Berm Location
- Acces Route
- Extraction Site Footprint

0 100 200 metres
1:5,500 (At original document size of 11x17)

- Notes
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Project Location 160961457 REVA
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Puslinch Technical Review by MS on 2025-03-03

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Figure No.
5

Title
Woodland Map



Legend

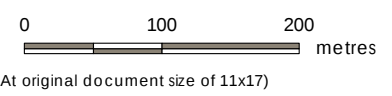
- Site
- Adjacent Lands (120 m)
- Wetland (Stantec 2022-2024)
- Mill Creek Provincially Significant Wetland (GEO)
- Unevaluated Wetland (GEO)
- Wetland Buffer (30m)

Project Component

- Proposed Acoustic Discretionary Noise Barrier
- Proposed Acoustic Berm
- Acces Route
- Extraction Site Footprint
- Below Water Table Extraction Footprint

ELC Description

- MAMM1-12** - Common Reed Graminoid Mineral Meadow Marsh Type
- SA** - Shallow Water
- SAS** - Shallow Marsh
- SWCM1-1** - White Cedar Mineral Coniferous Swamp Type
- SWD** - Deciduous Swamp
- SWDM3-3** - Swamp Maple Mineral Deciduous Swamp Type
- SWDM4-5** - Poplar Mineral Deciduous Swamp
- SWDO2-3** - Swamp Maple Organic Deciduous Swamp Type
- SWMO1-1** - White Cedar - Hardwood Organic Mixed Swamp
- SWMO1** - White Cedar Organic Mixed Swamp Ecosite
- SWT** - Thicket Swamp



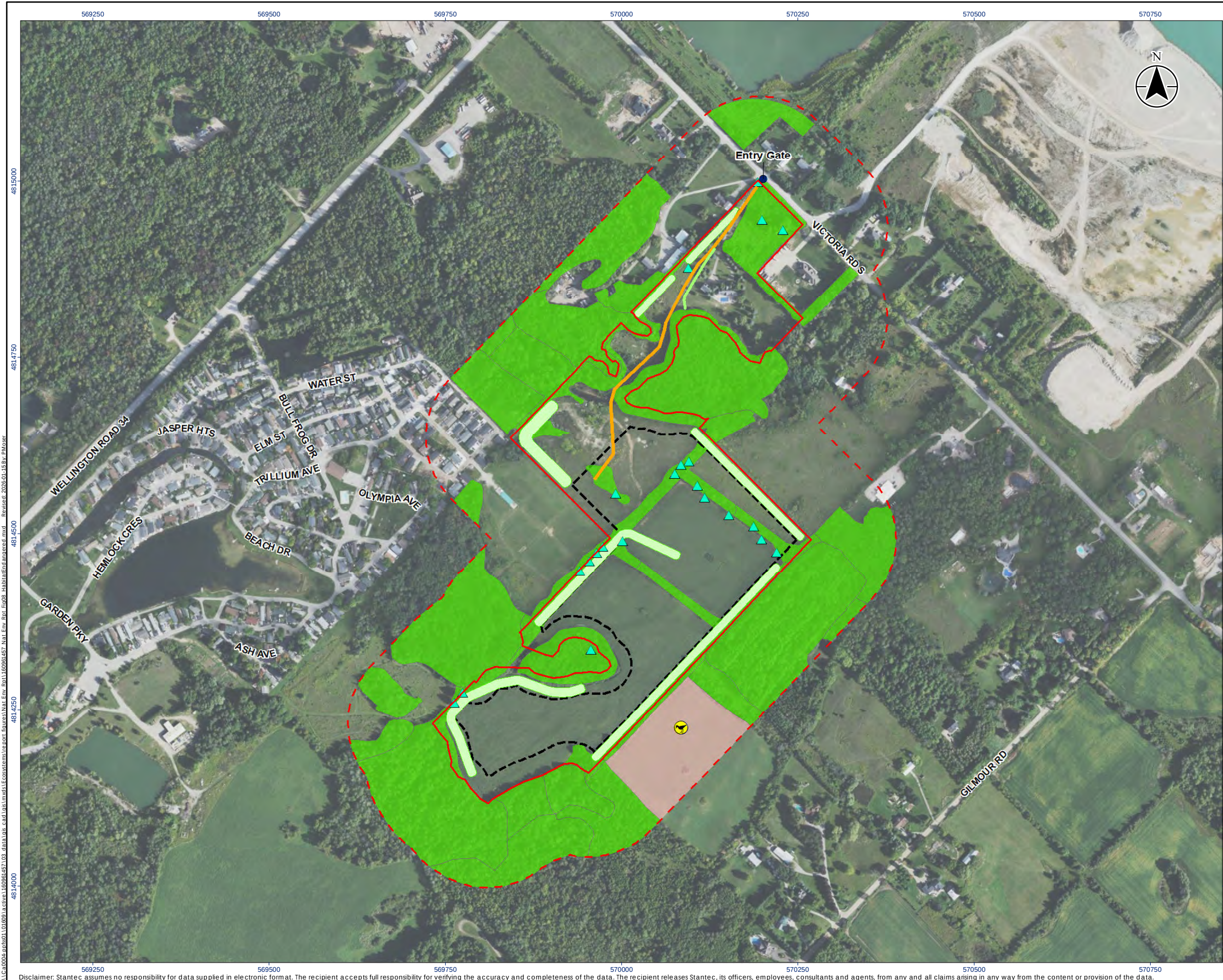
- Notes
- Coordinate System: NAD 1983 UTM Zone 17N
 - Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
 - Orthoimagery © First Base Solutions, 2021.
 - Greenland System Data from the Puslinch Land Use Map. Retrieved on December 20, 2024.

Project Location: 160961457 REVA
Township of Puslinch Prepared by PRM on 2026-02-13
Technical Review by MS on 2026-02-13

Client/Project
CBM AGGREGATES
ANTHONY PIT
NATURAL ENVIRONMENT REPORT

Figure No.
6

Title
Wetlands

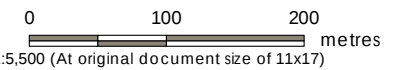


Legend

- Site
- Adjacent Lands (120 m)
- Potential Bat Roost Tree
- Eastern Meadowlark Observation
- Potential SAR Bat Habitat
- Eastern Meadowlark Habitat

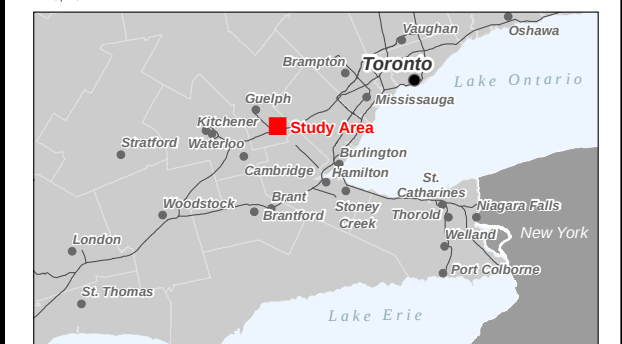
Project Components

- Proposed Acoustic Discretionary Noise Barrier
- Proposed Acoustic Berm Location
- Access Road
- Extraction Area Footprint



Notes

- Coordinate System: NAD 1983 UTM Zone 17N
- Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
- Orthoimagery © First Base Solutions, 2021.
- Greenland System Data from the Puslinch Land Use Map. Retrieved on December 20, 2024.



Project Location
Township of
Puslinch

160961457 REVA
Prepared by PRM on 2026-01-15
Technical Review by JB on 2025-09-16

Client/Project
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Figure No.
8

Title
Habitat of Endangered or Threatened
Species

Appendix B Additional Tables



B.1 Significant Wildlife Habitat Assessment



Table B.1 Significant Wildlife Habitat Assessment

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water during spring (mid-March to May), or annual spring melt water flooding found in any of the following Community Types: Meadow (CUM1), Thicket (CUT1). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless they have spring sheet water available.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Waterfowl Stopover and Staging Areas (Terrestrial).	There were no flooded meadows or fields on the Site or Adjacent Lands. Candidate habitat for waterfowl stopover or staging areas (terrestrial) is absent from the Site and Adjacent Lands.
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. The combined area of the ELC ecosites and a 100 m radius area is the SWH. 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.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Waterfowl Stopover and Staging Areas (Aquatic).	There were no waterfowl species observed using the deciduous swamp (SWDM3-3) communities during spring field investigations when vernal pooling was present in the features. Candidate habitat for waterfowl stopover or staging areas (aquatic) is absent from the Site and Adjacent Lands.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers, and wetlands, including beach areas, bars, and seasonally flooded, muddy, and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), Beach/Bar (BB), or Sand Dune (SD)	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Shorebird Migratory Stopover Areas.	Shoreline habitats and meadow marsh (MAM) are absent from the Site and Adjacent Lands. Therefore, candidate habitat for shorebird migratory stopover areas are considered absent from the Site and Adjacent Lands.
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (CUM), Thicket (CUT), Savannah (CUS), Woodland (CUW) (<60% cover) that are >20 ha and provide roosting,	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Raptor Wintering Areas.	Upland meadow habitat (CUM) on the Site and Adjacent Lands is not large enough to meet the size criteria for raptor wintering areas. Therefore, candidate habitat for raptor wintering areas is considered absent from the Site and Adjacent Lands.



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Appendix B Additional Tables

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Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
	foraging and resting habitats for wintering raptors. Upland habitat (CUM, CUT, CUS, CUW), must represent at least 15 ha of the 20-ha minimum size.		
Seasonal Concentration Areas			
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations, and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC surveys and background review were used to determine the presence of candidate Bat Hibernacula.	No candidate hibernaculum features were identified on the Site and Adjacent Lands.
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Community Types FOD, FOM, SWD, SWM that have >10/ha wildlife trees >25cm diameter at breast height (dbh). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Maternity Colonies are confirmed where they are in use by 10 Big Brown Bats.	ELC surveys and targeted bat maternity roost tree assessments were used to determine the presence of candidate Bat Maternity Colonies.	Targeted acoustic monitoring surveys detected high numbers of Big Brown Bats (i.e., 3,232 calls between June 3 and June 25, 2022); however, maternity roost confirmation was not possible. Detailed roost tree assessments were not completed outside of the Extraction Limit and as such a determination if the density criteria of 10 trees/ha were met is not possible. However, due to the presence of wooded habitat (e.g., FOD, SWD, SWM) as well as FOC and WOD, these areas are assumed to be candidate habitat for bat maternity colonies on the Site (WOD) and Adjacent Lands.
Turtle Wintering Areas	Snapping and Midland Painted Turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO). Northern Map turtle- open water areas such as deeper rivers or streams and lakes can also be used as over-wintering habitat. Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen. Significant when 5 over-wintering Midland Painted Turtles or one or more Northern Map Turtle or Snapping Turtle.	ELC surveys and aquatic habitat assessments were used to assess features within the Site and Adjacent Lands that may support areas of permanent standing water but not deep enough to freeze.	Midland Painted Turtles were observed basking in both constructed ponds on the Site; however, a maximum of 3 turtles were noted at any one time (May 5, 30, 2022) and as such is not considered significant.



Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Seasonal Concentration Areas			
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. 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. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Snake Hibernacula.	No candidate hibernacula features were identified on the Site and Adjacent Lands.
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (CUM), Thicket (CUT), Bluff (BL), Cliff (CL). 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.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Colonial-Nesting Bird Breeding Habitat (Bank and Cliff).	No candidate habitat to support colonial bank/cliff nesting breeding birds was identified on the Site and Adjacent Lands.
Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM), Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs).	No candidate habitat to support colonial tree/shrub nesting breeding birds was identified on the Site and Adjacent Lands.
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM), Thicket (CUT), Savannah (CUS).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Colonial-Nesting Bird Breeding Habitat (Ground).	No habitat to support colonial ground nesting breeding birds was identified on the Site and Adjacent Lands.



Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Seasonal Concentration Areas			
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Ontario A combination of ELC communities, one from each land class is required: Field (CUM, CUT, CUS) and Forest (FOC, FOM, FOD, CUP) Minimum of 10 ha in size with a combination of field and forest habitat present	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Migratory Butterfly Stopover Areas.	The Site and Adjacent Lands are not located within 5 km of Lake Ontario.
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD) Woodlots must be >10 ha in size and within 5 km of Lake Ontario – woodlands within 2 km of Lake Ontario are more significant	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Landbird Migratory Stopover Areas.	The Site and Adjacent Lands are not located within 5 km of Lake Ontario.
Deer Yarding/Winter Congregation Areas	Woodlots typically > 100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50ha) All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used	No studies required as the MNR determines this habitat.	There were no designated deer wintering areas identified on MNR mapping on the Site or Adjacent Lands.
Rare Vegetation Communities			
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT Most cliff and talus slopes occur along the Niagara Escarpment	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered cliffs or talus slopes.	Cliffs and talus slopes were not present on the Site and Adjacent Lands.
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires, and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be sand barrens.	Sand barrens were not present on the Site and Adjacent Lands.



Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Rare Vegetation Communities			
Alvars	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. 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 zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. Any of the following Community Types: ALO1 (Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland) An Alvar site > 0.5 ha in size	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be alvar communities.	Alvars were not present on the Site and Adjacent Lands.
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. No minimum size criteria t in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest) Forests greater than 120 years old and with no historical forestry management was the main criteria when surveying for old-growth forests.	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be old-growth forest communities.	Old-growth Forest was not present on the Site and Adjacent Lands.



Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Rare Vegetation Communities			
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be savannah communities.	Savannahs were not present on the Site and Adjacent Lands.
Tall-grass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite).	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be tall-grass communities.	Tall-grass prairies were not present on the Site and Adjacent Lands.
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG	ELC surveys and botanical inventories were used to assess features within the Site and Adjacent Lands that would be considered to be other rare vegetation communities.	The vegetation communities present on the Site and Adjacent Lands are common and widespread throughout the region and are not ranked S1-S3.



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Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	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	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Waterfowl Nesting Areas.	There were no congregations of nesting waterfowl observed in or adjacent to the deciduous swamp and marsh communities on the Site and Adjacent Lands during field investigations.
Specialized Habitat for Wildlife			
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat.	No large stick nests were observed on the Property during field investigations.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small offshore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Woodland Raptor Nesting Habitat.	The large forest and swamp communities on the Site and Adjacent Lands do not meet the minimum interior habitat criteria for woodland raptor nesting.
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, BOO1, FEO1 Best nesting habitat for turtles is close to water, 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	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Turtle Nesting Areas.	Predated turtle nests were observed north of the MAMM1-12 wetland in an exposed area with gravel and sand. This area is adjacent to a constructed pond where basking turtles were observed. However, the number and type of turtle nests is not known to confirm SWH but candidate habitat has been identified.



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Appendix B Additional Tables

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Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
	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. To be significant, 5 or more nesting Midland Painted Turtle nests, or one or more Northern Map or Snapping Turtle nests are required.		
Seeps and Springs	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	ELC surveys and wildlife habitat assessments were used to determine the presence of Seeps and Springs.	The entirety of the Property was visually assessed during field assessments. No seeps or springs were identified.
Specialized Habitat for Wildlife			
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. Species listed: Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Wood Frog Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3 is required to meet criteria.	ELC surveys and amphibian call surveys were used to determine the presence of candidate Amphibian Breeding Habitat (Woodland).	The SWDM3-3a and SWDM3-3b communities met the significance criteria to qualify as confirmed amphibian breeding habitat (woodland) due to the presence of blue-spotted salamander. The SWDM3-3b community also had Spring Peeper with a Call Level Code of 3 and the presence of Wood Frog. Although Spring Peeper was recorded with a Call Level Code of 3 at the station adjacent to the SWTO1-1 community, the chorus was recorded beyond the 100m survey area, likely from a large pond west of the swamp. The SWTO1-1 community is therefore not considered as habitat for amphibian breeding habitat (woodland). MAMM1-12 qualifies as amphibian breeding habitat due to the presence of Blue-spotted Salamander and due to the proximity to nearby woodlands (i.e., <120 m) is considered woodland habitat.



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Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA, and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m² (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3 is required to meet criteria.	ELC surveys and amphibian call surveys were used to determine the presence of candidate Amphibian Breeding Habitat (Wetland).	Wetlands >120 m from woodlands did not occur on the Site or Adjacent Lands. No amphibian breeding habitat (wetlands) is present.
Habitat for Species of Conservation Concern			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM) Community Types.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Marsh Bird Breeding Habitat.	Marsh habitat on the Site and Adjacent Lands was either too small (MAS, MAMM1-12, SA) or did not provide adequate emergent vegetation to support marsh bird breeding habitat (SWD).
Woodland Area-sensitive Bird Breeding Habitat	Habitats >30ha where interior forest is present (at least 200 m from the forest edge); typically >60 years old. These include any of the following Community Types: Forest (FO), Treed Swamp (SW)	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Woodland Area-sensitive Bird Breeding Habitat.	The forest and swamp communities on the Site and Adjacent Lands do not meet the minimum interior habitat criteria for woodland area-sensitive birds.
Habitat for Species of Conservation Concern			
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (CUM).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Open Country Bird Breeding Habitat	Meadow habitat on the Site and Adjacent Lands did not meet the size criteria for open country breeding birds.
Habitat for Other Species of Conservation Concern (Excluding	Habitats used by Species of Conservation Concern for all or part of their lifecycle.	ELC surveys, targeted surveys, and wildlife habitat assessments were used to determine the presence of	Confirmed: - Midland Painted Turtle were observed in the two constructed ponds on the Site - Barn Swallow was recorded on the Site and



Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Species Listed as Endangered or Threatened)		candidate Habitat for Other Species of Conservation Concern.	Adjacent Lands during breeding bird surveys. No nests or nest building was observed; however, suitable nesting features (i.e., sheds, eaves) were identified onsite. • Eastern Wood-Pewee was identified in woodlands during breeding bird surveys and suitable breeding habitat is present. • Monarch was observed on the Site and Adjacent Lands during the insect survey. Common milkweed, Monarch's larval host plant, was also present on the Site, Adjacent Lands and extraction footprint. Candidate (Moderate Potential to Occur on the Site and Adjacent Lands): • Eastern Milksnake – potential habitat throughout the open habitat on the Site and Adjacent Lands for this habitat generalist. • Eastern Ribbonsnake – potential habitat adjacent to wetlands on the Site and Adjacent Lands • Betrothed Underwing Moth – associated with its larval host plants, honey locust or black walnut • Chestnut Schizura Moth – associated with its larval host plant, Viburnum species • Giant Leopard Moth – potential to occur throughout the Site and Adjacent Lands as its larvae feed on a diversity of plant species • Penitent Underwing Moth – associated with its larval host plant; ash, butternut, hickory, pecan and walnut trees • Walnut Caterpillar Moth – associated with its larval host plant, black walnut

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment
Shrub/Early Successional Bird Breeding Habitat	Oldfield areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (CUT), Savannahs (CUS), or Woodlands (CUW).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Shrub/Early Successional Bird Breeding Habitat.	There were no early successional shrub communities large enough to support shrub/early successional bird breeding habitat on the Site and Adjacent Lands.
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3. Construct burrows in marshes, mudflats, meadows Can be found far from water.	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Terrestrial Crayfish habitat.	Burrowing crayfish chimneys were not observed during field investigations.
Animal Movement Corridors			
Amphibian Movement Corridor	Corridors may be found in all ecosites associated with water. Determined based on identifying significant amphibian breeding habitat (wetland).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Amphibian Movement Corridors.	Amphibian movement corridors are absent due to the lack of wetland breeding amphibian habitat.
Deer Movement Corridors	Corridors may be found in all forested ecosites. Determined based on identifying significant deer wintering habitat (MNR).	ELC surveys and wildlife habitat assessments were used to determine the presence of candidate Deer Movement Corridors.	There were no designated deer wintering areas identified on MNR mapping; therefore, deer movement corridors are absent from the Site and Adjacent Lands.

B.2 Species of Conservation Concern



Table B.2 Species of Conservation Concern

Group	Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Suitability Assessment	Potential to Occur on the Site and Adjacent Lands
Reptiles	Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S4		SC	Ontario Nature 2020	Found in shallow, slow-moving water with abundant aquatic vegetation and basking sites. Occur in swamps, ponds, marshes, bogs, creeks, rivers.	Suitable habitat present in the dug ponds (SA, SAS) on the Site. Midland Painted Turtle observed during field surveys in 2022.	Confirmed (Site)
Reptiles	Snapping Turtle	<i>Chelydra serpentina</i>	S3	SC	SC	Ontario Nature 2020	Inhabits ponds, sloughs, streams, rivers, and shallow bays that are characterized by slow moving water, aquatic vegetation, and soft bottoms (COSEWIC 2008). It prefers to stay in shallow water, where it buries itself into mud and leaf litter and has easy access to the surface for air (MNR 2016). Females nest in sand or gravel, frequently using manmade surfaces such as road shoulders and aggregate pits, in May and early June (MNR 2016; COSEWIC 2008).	Suitable habitat present in the dug pond (SA) and shallow marsh (MAS) on the Property. Snapping Turtle not observed during turtle surveys in 2022.	Low
Reptiles	Eastern Milksnake	<i>Lampropeltis triangulum</i>	S4	NAR	SC	Ontario Nature 2020	Utilizes open habitats such as meadows, fields, rocky outcrops and forest edges. Overwintering sites include rock crevices, mammal burrows and the foundations of old buildings.	Suitable habitat present throughout the Property.	Moderate
Reptiles	Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	S3	SC	SC	Ontario Nature 2020	Usually found close to water and is particularly characteristic of wetlands that have an abundance of small fish and frogs (MNR 2016). It hibernates in communal underground burrows over winter (MNR 2016).	Suitable Habitat present adjacent to wetlands on the Property.	Moderate
Birds	Barn Swallow	<i>Hirundo rustica</i>	S4B	SC	THR	Cadman et al. 2007	Barn Swallow commonly nests on walls or ledges of barns, bridges, culverts or other man-made structures (Cadman et al. 2007). Where suitable nesting structures occur, Barn Swallow often form small colonies, sometimes mixed with other swallow species (COSEWIC 2011). The Barn Swallow feeds on aerial insects while foraging over a variety of open habitats such as pastures, lawns, meadows and fields (COSEWIC 2011). It will also frequently forage in woodland clearings, over wetland habitats or open water where insect prey are abundant (Cadman et al. 2007).	Confirmed during field surveys, but no breeding evidence documented on the Property. Breeding habitat available on the Property (i.e., buildings).	Confirmed (Site, Adjacent Lands)
Birds	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	S3B, S2N, S4M			Cadman et al. 2007	Breeds in low shrubs around wetlands.	No suitable habitat on the Property (i.e., shrubs for breeding around wetlands).	Low
Birds	Black Tern	<i>Chlidonias niger</i>	S3B, S4M	SC	NAR	Cadman et al. 2007	Black Terns build nests on mats of floating vegetation in loose colonies in shallow marshes.	No suitable habitat on the Property (i.e., marshes, bays or ponds with emergent vegetation).	Low
Birds	Blue-winged Teal	<i>Spatula discors</i>	S3B, S4M	Not Listed	Not Listed	Cadman et al. 2007	Found in marshes, sloughs and river margins. Breeds in open areas with well-developed grassy cover, usually within 150m of a wetland.	No suitable habitat on the Property.	Low
Birds	Caspian Tern	<i>Hydroprogne caspia</i>	S3B, S5M	NAR	NAR	Cadman et al. 2007	Typically nests on more elevated areas of islands.	No suitable habitat on the Property (i.e., islands).	Low
Birds	Common Gallinule	<i>Gallinula galeata</i>	S3B			Cadman et al. 2007	Common Gallinule uses freshwater and brackish marshes, lakes or ponds that have a mixture of vegetation types (e.g., submerged,	No suitable habitat in the Property (i.e., marshes with	Low



Group	Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Suitability Assessment	Potential to Occur on the Site and Adjacent Lands
							emergent, floating). Nesting occurs on top of mats of aquatic plants.	mats of aquatic plants for nesting).	
Birds	Common Nighthawk	<i>Chordeiles minor</i>	S4B	SC	SC-SC	Cadman et al. 2007	Common Nighthawk is found in open and partially-open habitats such as sand dunes and beaches, logged and recently burned forests, woodland clearings, prairies, plains, sagebrush, grasslands, bogs and rock outcrops. Gravel rooftops are also used as nesting sites in urban areas (Cornell Lab of Ornithology 2019; COSEWIC 2018).	Suitable habitat present in the open meadow communities on the Property. Species was not observed during field investigations.	Low
Birds	Eastern Wood-Pewee	<i>Contopus virens</i>	S4B	SC	SC-NS	Cadman et al. 2007	Eastern Wood-Pewee is found in the mid-canopy layer of deciduous and mixedwood forests with open understories, and is commonly associated with edges and clearings (MNR 2016).	Suitable habitat present in the swamp and woodland communities on the Property. Breeding evidence confirmed during field investigations.	Confirmed (Site and Adjacent Lands)
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	S4B	SC	SC-SC	Cadman et al. 2007	Grasshopper Sparrow is found in grasslands, prairies, hayfields, and open pastures with little to no scrub cover on well-drained (often poor) dry soil (Cornell Lab of Ornithology 2019; COSEWIC 2013).	Marginally suitable habitat present in the meadow communities on the Property and Adjacent Lands. Species was not observed during field investigations.	Low
Birds	Horned Grebe	<i>Podiceps auritus</i>	S1B, S3N, S4M	SC	SC	Cadman et al. 2007	Horned Grebe typically utilizes small ponds, shallow bays and marshes with emergent vegetation for nesting. The species occupies both natural habitat and man-made reservoirs.	No suitable habitat on the Property (i.e., marshes, bays or ponds with emergent vegetation).	Low
Birds	Purple Martin	<i>Progne subis</i>	S3B			Cadman et al. 2007	Breeds in colonies almost exclusively in nest boxes or artificial structures near lakes or waterbodies that provide suitable foraging habitat.	No suitable habitat on the Property (i.e. lakes).	Low
Birds	Redhead	<i>Aythya americana</i>	S2B, S4N			Cadman et al. 2007	The Redhead is a semi-parasitic species. Females often lay eggs in the nests of other waterfowl species. Nests in extensive marshes	No suitable habitat in the Property (i.e., extensive marshes).	Low
Birds	Red-shouldered Hawk	<i>Buteo lineatus</i>	S4B, S2N	NAR	NAR	Cadman et al. 2007	Breeds in a variety of forest types but prefers dense, mature hardwood forest near wetlands or lakes.	Large stick nests were not observed during field investigations. No suitable habitat on the Property.	Low
Birds	Wood Thrush	<i>Hylocichla mustelina</i>	S4B	SC	THR	Cadman et al. 2007	The Wood Thrush is found in deciduous and mixed forests with a developed understory and tall trees (MNR 2016). While it prefers large forest tracts, it will utilize smaller forest fragments (MNR 2016). Nests are constructed in shrubs or saplings, typically Sugar Maple or American Beech (MNR 2016).	Marginally suitable habitat present in the swamp communities, but they are not likely to be preferred. Species was not observed during field investigations.	Low
Mammals	Woodland Vole	<i>Microtus pinetorum</i>	S3?	SC	SC-SC	Dobbyn 1994	The Woodland Vole is primarily found in mature Carolinian forest with a dense leaf litter layer (MNR 2016), however it may also be found in sand dunes, swamps and orchards (COSEWIC 2010). The most important factor in habitat selection is a dense herbaceous layer and friable soils with low saturation (COSEWIC 2010).	No suitable habitat on the Property. Swamp communities have saturated soils and lack dense leaf litter layer. No nearby	Low



Group	Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Suitability Assessment	Potential to Occur on the Site and Adjacent Lands
								recent records.	
Insects	Betrothed Underwing Moth	<i>Catocala innubens</i>	S3			Ontario Moth Atlas	Larvae feeds on honey locust or black walnut.	Black walnut is present on the Property.	Moderate
Insects	Chestnut Schizura Moth	<i>Schizura badia</i>	S3			Ontario Moth Atlas	Feeds on viburnum species.	Host plants are present on the Property.	Moderate
Insects	Giant Leopard Moth	<i>Hypercompe scribonia</i>	S3S4			Ontario Moth Atlas	Found along woodland edges, fields or meadows. The larvae of this species has a varied diet.	Suitable habitat present in the meadows and woodland edges on the Property.	Moderate
Insects	Little Underwing Moth	<i>Catocala minuta</i>	S3			Ontario Moth Atlas	Feeds on water locust or swamp locust (Gleditsia).	Host plants are absent from the Property.	Low
Insects	Monarch	<i>Danaus plexippus</i>	S4B, S2N	SC	SC-END	Ontario Butterfly Atlas; iNaturalist	Monarch is found in areas where Milkweed (Asclepias species) grows. Milkweed is the sole food source (host plant) for Monarch caterpillars, and grows in open and disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests (COSEWIC 2016).	Common Milkweed is present on the Property. Monarch confirmed during insect survey in 2022.	Confirmed (Extraction Limit, Site, Adjacent Lands)
Insects	Pawpaw Sphinx	<i>Dolba hyloeus</i>	S3S4			Ontario Moth Atlas	Found in areas where host plants (pawpaw, littleleaf sweetfern, possum haw) are found.	Host plants are absent from Property.	Low
Insects	Penitent Underwing Moth	<i>Catocala piatrix</i>	S3			Ontario Moth Atlas	Larvae are found on ash, butternut, hickory, pecan and walnut trees.	Ash, bitternut hickory and black walnut are present on the Property.	Moderate
Insects	Walnut Caterpillar Moth	<i>Datana integerrima</i>	S3S4			Ontario Moth Atlas	Larvae are found on walnut and butternut trees.	Black Walnut is present on the Property.	Moderate
Insects	Yellow-banded Bumble Bee	<i>Bombus terricola</i>	S3S5	SC	SC	NHIC (MNR 2024)	Feeds on wild blueberry and agricultural crops such as apple trees. The species is a forage and habitat generalist. (COSSARO 2016).	Species was not observed during insect surveys.	Low
Plants	Western Stiff Gentian	<i>Gentianella quinquefolia</i> ssp. <i>occidentalis</i>	S1S2			iNaturalist 2024	Stream and river banks, marshy meadows; bluffs and forested hillsides; usually in calcareous sites.	Species was not observed during the botanical inventory.	Low

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Species Schizura badia - Chestnut Schizura - Hodges#8006 - BugGuide.Net Penitent Underwing (*Catocala piatrix*) iNaturalist



Giant Leopard Moth Caterpillar Guide: Diet, Sting, and More (butterflyrealm.com) Walnut Caterpillar Moth (insectidentification.org)
Accessible_COSSARO-evaluation-Yellow-banded-Bumble-Bee.pdf (cossaroagency.ca) Ontario Reptile and Amphibian Atlas Publication - Page 192-193 (publitas.com)



B.3 Species at Risk Habitat Assessment



Group	Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Assessment	Potential to Occur on the Site and Adjacent Lands
Amphibians	Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	S2	END	END	Ontario Reptile and Amphibian Atlas 2020	Inhabits deciduous and mixed forests, typically within a few hundred meters of a pond.	Suitable habitat present (i.e., SWDM3-3 communities); however, Jefferson Salamander was not recorded during eDNA surveys.	Low
Amphibians	Unisexual Ambystoma (Jefferson Salamander dependent population)	<i>Ambystoma hybrid pop. 1</i>	S2	END	END	Ontario Reptile and Amphibian Atlas 2020	Inhabits deciduous and mixed forests, typically within a few hundred meters of a pond.	Suitable habitat present (i.e., SWDM3-3 communities); however, Jefferson Salamander was not recorded during eDNA surveys.	Low
Reptiles	Blanding's Turtle	<i>Emydoidea blandingi</i>	S3	THR	THR	Ontario Reptile and Amphibian Atlas 2020	Blanding's Turtle prefers shallow water in heavily vegetated, large wetlands and lakes (MNR 2016). However, in Ontario it also commonly uses clear watered habitats such as streams, rivers and ponds (COSEWIC 2005a). Nests occur in a variety of loose substrates such as sand, gravel and cobblestone (COSEWIC 2005a). Blanding's Turtles can often be found hundreds of metres from the nearest aquatic habitat during the active season, as they search for mates or nest sites (MNR 2016). Overwintering sites are permanent pools approximately 1 m in depth (COSEWIC 2005a).	Blanding's Turtle was not observed during the turtle basing surveys on the Property. There is a low potential for Blanding's Turtle to enter the Site from adjacent wetlands.	Low
Birds	Bank Swallow	<i>Riparia riparia</i>	S4B	THR	THR	Cadman et al. 2007	Bank Swallow breeds on a variety of sites with vertical banks, including riverbanks, bluffs, aggregate pits and stock piles of sand and soil (COSEWIC 2013). Sand-silt substrates are preferred (COSEWIC 2013). Nesting sites are often near open habitats used for aerial foraging (COSEWIC 2013). Large wetlands are used as communal roosts during post-breeding, migration, and wintering periods (COSEWIC 2013).	No suitable nesting sites for Bank Swallow were identified on the Site or Adjacent Lands.	Low
Birds	Bobolink	<i>Dolichonyx oryzivorus</i>	S4B	THR	THR	Cadman et al. 2007; MNR 2024	The Bobolink is generally referred to as a “grassland species”. It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010b). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010b).	Marginally suitable habitat present in the meadow communities on Adjacent Lands; however, Bobolink was not recorded during breeding bird surveys.	Low
Birds	Chimney Swift	<i>Chaetura pelagica</i>	S4B, S4N	THR	THR	Cadman et al. 2007	Chimney Swift uses chimneys for roosting and breeding, and less commonly, nest in large hollow trees (Cadman et al. 2007a). Nesting sites typically have a constant ambient temperature (COSEWIC 2007a). It is an aerial insectivore, and often forages near water (COSEWIC 2007a).	Suitable chimneys are not present on the Site. There is low potential for Chimney Swift to use hollow trees to nest on Adjacent Lands.	Low
Birds	Eastern Meadowlark	<i>Sturnella magna</i>	S4B	THR	THR	Cadman et al. 2007; MNR 2024	The Eastern Meadowlark is typically found in fields, meadows, golf courses, pastures, alfalfa fields, roadsides and other open areas (MNR 2016). Older sites with moderately tall grass, a substantial litter layer, low forb and shrub cover and dense grass are preferred (COSEWIC 2011a). Larger patch sizes (>5 ha) are also generally preferred (COSEWIC 2011a).	Species observed singing in during each breeding bird survey date in 2022.	Confirmed (Adjacent Lands)



Group	Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Assessment	Potential to Occur on the Site and Adjacent Lands
Birds	Least Bittern	<i>Ixobrychus exilis</i>	S4B	THR	THR	Cadman et al. 2007	The Least Bittern prefers cattail marshes, but may be found in a variety of wetland habitats with stable water levels and dense vegetation interspersed with open water areas (MNR 2016; COSEWIC 2009b). Nests are built in dense vegetation near open water for foraging (MNR 2016).	No suitable habitat on the Site or Adjacent Lands (i.e., large cattail marsh).	Low
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S3	END	END	Cadman et al. 2007	Red-headed Woodpecker is found in deciduous woodlands, groves of dead or dying trees, river bottoms, burned areas, recent clearings, beaver swamps, orchards, parks, farmlands, grasslands with scattered trees, cemeteries, golf courses, forest edges and roadsides (Cornell Lab of Ornithology 2019; COSEWIC 2018). Nests are constructed in cavities of dead (or almost dead) trees, and open canopy is preferred (Cornell Lab of Ornithology 2019; COSEWIC 2018).	Suitable habitat in the woodland communities on the Site and Adjacent Lands. Species was not detected during breeding bird surveys.	Low
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	S4	END	END	Dobbyn 1994	The Little Brown Myotis roosts in tree cavities and abandoned buildings, and often forms roosting colonies in barns, attics and abandoned buildings (MNR 2016; COSEWIC 2013). They have been found in a wide variety of deciduous and coniferous tree stands (COSEWIC 2013). Hibernation typically occurs in caves and mines (MNR 2016).	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands. Species detected during the bat acoustic survey at all 9 stations.	Species presence confirmed but roosting habitat unconfirmed (Extraction Limit, Site and Adjacent Lands)
Mammals	Northern Myotis	<i>Myotis septentrionalis</i>	S3?	END	END	Dobbyn 1994	The Northern Myotis roosts in colonies in tree cavities (COSEWIC 2013) in a wide variety of deciduous and coniferous forest stands. Little is known about the effect of tree density on maternity roost selection for this species, but bats tend to avoid large open areas (COSEWIC 2013). Small forest gaps, such as over streams or ponds, are used for foraging (COSEWIC 2013).	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands; however, species was not detected during the bat acoustic survey.	Low
Mammals	Eastern Small-footed Myotis	<i>Myotis leibii</i>	S2S3	END		Dobbyn 1994	The Eastern Small-footed Myotis roosts in a variety of habitats, including hollow trees, under rocks or in rock outcrops, in buildings, caves, mines and under bridges (MNR 2016). Different roosting sites may be selected each day (MNR 2016). Hibernation occurs in abandoned mines and caves (MNR 2016).	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands; however, species was not detected during the bat acoustic survey.	Low
Mammals	Tri-coloured Bat	<i>Perimyotis subflavus</i>	S3?	END	END	Dobbyn 1994	Foraging habitat occurs over water, along road corridors and forest edges. Hibernation occurs in caves.	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands. Species detected during the bat acoustic survey at 2 out of 9 stations.	Species presence confirmed but roosting habitat unconfirmed (Extraction Limit, Site and Adjacent Lands)
Mammals	Eastern Red Bat	<i>Lasiurus borealis</i>	S4	END		Dobbyn 1994	Eastern Red Bat is a solitary, tree dwelling species that roosts exclusively in the terminal foliage of deciduous trees (MNR 1984; Dobbyn 1994). Eastern Red Bats typically forage near or above tree tops and water bodies such as streams, lakes, rivers, and riparian	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on	Species presence confirmed but roosting habitat unconfirmed (Extraction Limit, Site



Group	Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	Record Source(s)	Habitat Description	Habitat Assessment	Potential to Occur on the Site and Adjacent Lands
							flood plains (MNR 1984).	the Site and Adjacent Lands. Species detected during the bat acoustic survey at 8 out of 9 stations.	and Adjacent Lands)
Mammals	Hoary Bat	<i>Lasiurus cinereus</i>	S4	END		Dobbyn 1994	Hoary Bat is a solitary, tree dwelling species that roosts in the terminal foliage of coniferous or deciduous trees (MNR 1984; Dobbyn 1994). Hoary Bats typically forage over glades or lakes in forested areas (MNR 1984).	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands. Species detected during the bat acoustic survey at all 9 stations.	Species presence confirmed but roosting habitat unconfirmed (Extraction Limit, Site and Adjacent Lands)
Mammals	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S4	END		Dobbyn 1994	Silver-haired Bat is a solitary, tree dwelling species that forms maternity colonies in hollow trees, woodpecker holes and birds' nests, and typically does not utilize anthropogenic structures, but has been found in sheds/garages (MNR 1984; Dobbyn 1994). Silver-haired Bats typically forage over woodland lakes and streams (MNR 1984).	Suitable habitat in the woodland, swamp, plantation, thicket, and hedgerow communities on the Site and Adjacent Lands. Species detected during the bat acoustic survey at all 9 stations.	Species presence confirmed but roosting habitat unconfirmed (Extraction Limit, Site and Adjacent Lands)
Plants	Black Ash	<i>Fraxinus nigra</i>	S4	END		Field Observation	Typically occurs in wetland areas, particularly along the edges of streams, rivers, and ponds. These habitats are often characterized by saturated soils and are frequently found in areas with moderate to high moisture levels. Black ash is a dominant species in specific forest types, including bottomland hardwood forests and floodplain forests.	This species was confirmed in the FODM5-10, SWDM4-5, SWDM3-3 and SWMO1-1 communities on Adjacent Lands during the botanical inventory.	Confirmed (Adjacent Lands, not protected)
Plants	Butternut	<i>Juglans cinerea</i>	S3?	END	END	MECP 2024	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	Species was not identified on the Property during the botanical inventory.	Low
Plants	Smooth Yellow False Foxglove	<i>Aureolaria flava</i>	S2?	THR	THR	MNR 2024	Found in dry, open to semi-open upland oak forests. Also found in well-drained soils including sand dunes. The species is shade-intolerant.	Species and species habitat was not identified on the Property during the botanical inventory.	Low

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Draft Natural Environment Report
Appendix B Additional Tables

September 23, 2025

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Appendix C Species Lists



C.1 Vascular Plant Species List



Appendix C.1: Vascular Plant Species List

MEADOW (MEMM3)	THICKETS (THD) & HEDGEROWS	HEDGEROWS	POPLAR FOREST (FODM5-10, FODM8-1)	MARSH (MAM / MAS)	DECIDUOUS SWAMPS (SWDM3-3)	MIXED SWAMP (SWMO1-1)	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	SARA STATUS	RARE IN WELLINGTON COUNTY	COEFFICIENT OF CONSERVATISM	COEFFICIENT OF WETNESS
							PTERIDOPHYTES (FERNS & FERN ALLIES)							
						x	<i>Athyrium filix-femina</i>	Common Lady Fern	S5				4	0
					x	x	<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern	S5				5	-3
			x		x		<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	S5				5	-3
						x	<i>Dryopteris clintoniana</i>	Clinton's Wood Fern	S4			X	7	-3
x				x	x	x	<i>Equisetum arvense</i>	Field Horsetail	S5				0	0
x							<i>Equisetum hyemale</i> ssp. <i>affine</i>	Common Scouring-rush	S5				2	0
x				x			<i>Equisetum variegatum</i>	Variiegated Scouring-rush	S5				5	-3
						x	<i>Gymnocarpium dryopteris</i>	Common Oak Fern	S5				7	3
	x	x					<i>Matteuccia struthiopteris</i>	Ostrich Fern	S5				5	0
					x	x	<i>Onoclea sensibilis</i>	Sensitive Fern	S5				4	-3
					x		<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal Fern	S5				7	-5
						x	<i>Osmundastrum cinnamomeum</i>	Cinnamon Fern	S5				7	-3
					x		<i>Parathelypteris noveboracensis</i>	New York Fern	S4/S5				7	0
					x		<i>Thelypteris palustris</i>	Marsh Fern	S5				5	-3
							GYMNOSPERMS (CONIFERS)							
						x	<i>Abies balsamea</i>	Balsam Fir	S5				5	-3
x							<i>Juniperus communis</i>	Common Juniper	S5				4	3
x							<i>Juniperus virginiana</i>	Eastern Red Cedar	S5				4	3
						x	<i>Larix laricina</i>	Tamarack	S5				7	-3
	x					x	<i>Pinus strobus</i>	Eastern White Pine	S5				4	3
x							<i>Pinus sylvestris</i>	Scots Pine	SE5					3
x	x	x	x		x	x	<i>Thuja occidentalis</i>	Eastern White Cedar	S5				4	-3
						x	<i>Tsuga canadensis</i>	Eastern Hemlock	S5				7	3
							ANGIOSPERMS (DICOTS)							
	x	x					<i>Acer negundo</i>	Manitoba Maple	S5				0	0
						x	<i>Acer rubrum</i>	Red Maple	S5				4	0
x	x	x	x		x		<i>Acer saccharum</i>	Sugar Maple	S5				4	3
						x	<i>Acer spicatum</i>	Mountain Maple	S5				6	3
				x	x		<i>Acer x freemanii</i>	Freeman's (swamp) maple	S5				6	-5
x							<i>Achillea millefolium</i>	Common Yarrow	SE5?					3
						x	<i>Actaea pachypoda</i>	White Baneberry	S5				6	5
x							<i>Ambrosia artemisiifolia</i>	Common Ragweed	S5				0	3
					x		<i>Anemonastrum canadense</i>	Canada Anemone	S5				3	-3
			x			x	<i>Anemone virginiana</i>	Tall Anemone	S5				4	3
x							<i>Antennaria</i> sp.	Pussytoes Species						
x							<i>Apocynum androsaemifolium</i>	Spreading Dogbane	S5				3	5
x							<i>Apocynum cannabinum</i>	Hemp Dogbane	S5				3	0
			x			x	<i>Aralia nudicaulis</i>	Wild Sarsaparilla	S5				4	3
x							<i>Arctium minus</i>	Common Burdock	SE5					3
			x		x		<i>Asarum canadense</i>	Canada Wild-ginger	S5				6	5
x							<i>Asclepias syriaca</i>	Common Milkweed	S5				0	5
						x	<i>Betula alleghaniensis</i>	Yellow Birch	S5				6	0
x			x		x	x	<i>Betula papyrifera</i>	Paper Birch	S5				2	3

MEADOW (MEMM3)	THICKETS (THD) & HEDGEROWS	HEDGEROWS	POPLAR FOREST (FODM5-10, FODM8-1)	MARSH (MAM / MAS)	DECIDUOUS SWAMPS (SWDM3-3)	MIXED SWAMP (SWMO1-1)	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	SARA STATUS	RARE IN WELLINGTON COUNTY	COEFFICIENT OF CONSERVATISM	COEFFICIENT OF WETNESS
					x		<i>Bidens frondosa</i>	Devil's Beggarticks	S5				3	-3
					x	x	<i>Boehmeria cylindrica</i>	Small-spike False Nettle	S5				4	-5
			x		x		<i>Carpinus caroliniana</i>	Blue-beech	S5				6	0
	x	x					<i>Carya cordiformis</i>	Bitternut Hickory	S5				6	0
x							<i>Centaurea sp.</i>	Knapweed Species						
x							<i>Cichorium intybus</i>	Wild Chicory	SE5					5
			x		x		<i>Circaea canadensis</i>	Enchanter's Nightshade	S5				2	3
	x						<i>Cirsium arvense</i>	Canada Thistle	SE5					3
x	x	x			x	x	<i>Clematis virginiana</i>	Virginia Clematis	S5				3	0
						x	<i>Coptis trifolia</i>	Goldthread	S5				7	-3
x	x	x	x		x	x	<i>Cornus alternifolia</i>	Alternate-leaved Dogwood	S5				6	3
x				x	x		<i>Cornus sericea</i>	Red-osier Dogwood	S5				2	-3
x	x						<i>Daucus carota</i>	Wild Carrot	SE5					5
x							<i>Echium vulgare</i>	Common Viper's Bugloss	SE5					5
x							<i>Elaeagnus umbellata</i>	Autumn Olive	SE3					3
						x	<i>Endotropis alnifolia</i>	Alder-leaved Buckthorn	S5				7	-5
x							<i>Erigeron annuus</i>	Annual Fleabane	S5				0	3
x							<i>Erigeron pulchellus</i>	Robin's-plantain Fleabane	S5				7	3
				x			<i>Eupatorium perfoliatum</i>	Common Boneset	S5				2	-3
x				x			<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	S5				2	0
				x			<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	S5				3	-5
x	x						<i>Fragaria virginiana</i>	Wild Strawberry	S5				2	3
x				x	x	x	<i>Frangula alnus</i>	Glossy Buckthorn	SE5					0
	x	x	x				<i>Fraxinus americana</i>	White Ash	S4				4	3
			x		x	x	<i>Fraxinus nigra</i>	Black Ash	S4	END	THR		7	-3
						x	<i>Galium triflorum</i>	Three-flowered Bedstraw	S5				4	3
					x		<i>Geranium robertianum</i>	Herb-Robert	S5				2	3
					x		<i>Hedera helix</i>	English Ivy	SE1					3
x							<i>Hypericum perforatum</i>	Common St. John's-wort	SE5					5
					x	x	<i>Ilex verticillata</i>	Common Winterberry	S5				5	-3
						x	<i>Impatiens capensis</i>	Spotted Jewelweed	S5				4	-3
	x		x				<i>Juglans nigra</i>	Black Walnut	S4?				5	3
x							<i>Leucanthemum vulgare</i>	Oxeye Daisy	SE5					5
	x	x					<i>Linaria vulgaris</i>	Butter-and-eggs	SE5					5
x							<i>Lotus corniculatus</i>	Garden Bird's-foot Trefoil	SE5					3
				x	x	x	<i>Lycopus uniflorus</i>	Northern Water-horehound	S5				5	-5
						x	<i>Lysimachia borealis</i>	Northern Starflower	S5				6	0
					x		<i>Lysimachia thyrsiflora</i>	Tufted Yellow Loosestrife	S5				7	-5
				x			<i>Lythrum salicaria</i>	Purple Loosestrife	SE5					-5
	x	x					<i>Malus pumila</i>	Common Apple	SE4					5
x	x						<i>Malus sp.</i>	Crabapple Species	SE					
x							<i>Medicago sativa</i>	Alfalfa	SE5					5
x							<i>Melilotus albus</i>	White Sweet-clover	SE5					3
					x		<i>Mentha canadensis</i>	Canada Mint	S5				3	-3
x							<i>Oenothera sp.</i>	Evening-primrose Species						

MEADOW (MEMM3)	THICKETS (THD) & HEDGEROWS	HEDGEROWS	POPLAR FOREST (FODM5-10, FODM8-1)	MARSH (MAM / MAS)	DECIDUOUS SWAMPS (SWDM3-3)	MIXED SWAMP (SWMO1-1)	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	SARA STATUS	RARE IN WELLINGTON COUNTY	COEFFICIENT OF CONSERVATISM	COEFFICIENT OF WETNESS
	x	x					<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	S5				4	3
x	x	x	x		x	x	<i>Parthenocissus vitacea</i>	Thicket Creeper	S5				4	3
x							<i>Physalis heterophylla</i>	Clammy Ground-cherry	S4				3	5
	x	x					<i>Physalis longifolia</i>	Long-leaved Ground-cherry	S4				1	5
x							<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	SE5					5
x	x						<i>Plantago lanceolata</i>	English Plantain	SE5					3
x							<i>Plantago major</i>	Common Plantain	SE5					3
x							<i>Plantago rugelii</i>	Rugel's Plantain	S5				1	0
						x	<i>Polygaloides paucifolia</i>	Fringed Milkwort	S5			X	6	3
x	x	x	x				<i>Populus balsamifera</i>	Balsam Poplar	S5				4	-3
x	x						<i>Populus deltoides ssp. deltoides</i>	Eastern Cottonwood	S5				4	0
x			x			x	<i>Populus grandidentata</i>	Large-toothed Aspen	S5				5	5
x	x		x			x	<i>Populus tremuloides</i>	Trembling Aspen	S5				2	0
x	x						<i>Potentilla recta</i>	Sulphur Cinquefoil	SE5					5
x							<i>Poterium sanguisorba</i>	Small Burnet	SE4					0
x							<i>Prunella vulgaris</i>	Common Self-heal	S5				0	0
	x	x	x		x	x	<i>Prunus serotina</i>	Black Cherry	S5				3	3
			x			x	<i>Prunus virginiana</i>	Chokecherry	S5				2	3
x							<i>Ranunculus acris</i>	Common Buttercup	SE5					0
						x	<i>Ranunculus recurvatus</i>	Hooked Buttercup	S5				4	-3
x	x	x	x		x	x	<i>Rhamnus cathartica</i>	European Buckthorn	SE5					0
x	x	x					<i>Rhus typhina</i>	Staghorn Sumac	S5				1	3
					x		<i>Ribes cynosbati</i>	Eastern Prickly Gooseberry	S5				4	3
						x	<i>Ribes triste</i>	Swamp Red Currant	S5				6	-5
x							<i>Robinia pseudoacacia</i>	Black Locust	SE5					3
x	x				x		<i>Rubus idaeus ssp. strigosus</i>	N. American Red Raspberry	S5				2	3
					x		<i>Rubus occidentalis</i>	Black Raspberry	S5				2	5
			x		x	x	<i>Rubus pubescens</i>	Dwarf Raspberry	S5				4	-3
x							<i>Rudbeckia hirta</i>	Black-eyed Susan	S5				0	3
				x			<i>Salix amygdaloides</i>	Peach-leaved Willow	S5				6	-3
x							<i>Salix discolor</i>	Pussy Willow	S5				3	-3
x							<i>Salix eriocephala</i>	Cottony Willow	S5				4	-3
x							<i>Salix interior</i>	Sandbar Willow	S5				1	-3
				x			<i>Salix lucida</i>	Shining Willow	S5				5	-3
	x			x			<i>Salix sp.</i>	Exotic Willow Species	SE					
						x	<i>Sambucus cf. canadensis</i>	Common Elderberry	S5				5	-3
					x		<i>Sanguinaria canadensis</i>	Bloodroot	S5				5	3
x							<i>Silene vulgaris</i>	Bladder Campion	SE5					5
					x		<i>Sium suave</i>	Common Water-parsnip	S5				4	-5
					x	x	<i>Solanum dulcamara</i>	Bittersweet Nightshade	SE5					0
x	x	x					<i>Solidago canadensis</i>	Canada Goldenrod	S5				1	3
			x		x	x	<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S5				6	3
x							<i>Solidago nemoralis</i>	Grey-stemmed Goldenrod	S5				2	5
						x	<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	S5				4	0
x							<i>Symphyotrichum ericoides</i>	White Heath Aster	S5				4	3

MEADOW (MEMM3)	THICKETS (THD) & HEDGEROWS	HEDGEROWS	POPLAR FOREST (FODM5-10, FODM8-1)	MARSH (MAM / MAS)	DECIDUOUS SWAMPS (SWDM3-3)	MIXED SWAMP (SWMO1-1)	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	SARA STATUS	RARE IN WELLINGTON COUNTY	COEFFICIENT OF CONSERVATISM	COEFFICIENT OF WETNESS
x	x			x	x		<i>Symphytotrichum lanceolatum</i>	Panicled Aster	S5				3	-3
						x	<i>Symphytotrichum lateriflorum</i>	Calico Aster	S5				3	0
x	x	x					<i>Symphytotrichum novae-angliae</i>	New England Aster	S5				2	-3
x	x						<i>Symphytotrichum pilosum</i> var. <i>pilosum</i>	Old Field Aster	S5				1	3
x	x						<i>Symphytotrichum urophyllum</i>	Arrow-leaved Aster	S4				6	5
	x						<i>Syringa vulgaris</i>	Common Lilac	SE5					5
	x	x					<i>Tanacetum vulgare</i>	Common Tansy	SE5					5
x							<i>Taraxacum officinale</i>	Common Dandelion	SE5					3
						x	<i>Tiarella stolonifera</i>	Heart-leaved Foamflower	S5				6	3
	x	x	x			x	<i>Tilia americana</i>	Basswood	S5				4	3
	x	x					<i>Toxicodendron radicans</i>	Poison Ivy	S5				2	0
x							<i>Tragopogon dubius</i>	Yellow Goatsbeard	SE5					5
x							<i>Trifolium pratense</i>	Red Clover	SE5					3
x							<i>Trifolium repens</i>	White Clover	SE5					3
x					x		<i>Tussilago farfara</i>	Coltsfoot	SE5					3
x	x	x			x	x	<i>Ulmus americana</i>	White Elm	S5				3	-3
	x	x					<i>Ulmus rubra</i>	Slippery Elm	S5				6	0
x							<i>Veronica officinalis</i>	Common Speedwell	SE5					5
	x						<i>Viburnum opulus</i> var. <i>opulus</i>	Cranberry Viburnum	SE4?					-3
x	x	x	x		x		<i>Vitis riparia</i>	Riverbank Grape	S5				0	0
							ANGIOSPERMS (MONOCOTS)							
x							<i>Agrostis gigantea</i>	Redtop	SE5					-3
					x	x	<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	S5				5	-3
x							<i>Asparagus officinalis</i>	Garden Asparagus	SE					3
x	x	x					<i>Bromus inermis</i>	Smooth Brome	SE5					5
x				x			<i>Carex aurea</i>	Golden Sedge	S5				4	-3
					x		<i>Carex castanea</i>	Chestnut Sedge	S5			X	7	-3
					x		<i>Carex disperma</i>	Two-seeded Sedge	S5				8	-5
				x			<i>Carex flava</i>	Yellow Sedge	S5				5	-5
					x		<i>Carex gracillima</i>	Graceful Sedge	S5				4	3
x							<i>Carex granularis</i>	Limestone Meadow Sedge	S5				3	-3
					x		<i>Carex intumescens</i>	Bladder Sedge	S5				6	-3
					x		<i>Carex lupulina</i>	Hop Sedge	S5			X	6	-5
					x		<i>Carex pedunculata</i>	Long-stalked Sedge	S5				5	3
					x		<i>Carex retrorsa</i>	Retorse Sedge	S5				5	-5
					x		<i>Carex tuckermanii</i>	Tuckerman's Sedge	S5				7	-5
				x			<i>Carex viridula</i>	Greenish Sedge	S5				5	-5
					x		<i>Cinna latifolia</i>	Drooping Woodreed	S5				7	-3
					x		<i>Clintonia borealis</i>	Yellow Clintonia	S5				7	0
					x		<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Northern Yellow Lady's-slipper	S4S5				5	0
x	x						<i>Dactylis glomerata</i>	Orchard Grass	SE5					3
x							<i>Danthonia spicata</i>	Poverty Oatgrass	S5				5	5
				x			<i>Dichanthelium</i> cf. <i>implicatum</i>	Slender-stemmed Panicgrass	S5				3	0
					x		<i>Epipactis helleborine</i>	Broad-leaved Helleborine	SE5					3

MEADOW (MEMM3)	THICKETS (THD) & HEDGEROWS	HEDGEROWS	POPLAR FOREST (FODM5-10, FODM8-1)	MARSH (MAM / MAS)	DECIDUOUS SWAMPS (SWDM3-3)	MIXED SWAMP (SWMO1-1)	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	SARA STATUS	RARE IN WELLINGTON COUNTY	COEFFICIENT OF CONSERVATISM	COEFFICIENT OF WETNESS
					x		<i>Erythronium americanum</i>	Yellow Trout-lily	S5				5	5
						x	<i>Glyceria striata</i>	Fowl Mannagrass	S5				3	-5
					x		<i>Iris versicolor</i>	Harlequin Blue Flag	S5				5	-5
				x			<i>Juncus articulatus</i>	Jointed Rush	S5				5	-5
					x		<i>Leersia oryzoides</i>	Rice Cutgrass	S5				3	-5
					x	x	<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	S5				5	3
						x	<i>Maianthemum racemosum</i>	False Solomon's Seal	S5				4	3
	x	x					<i>Panicum capillare</i>	Common Panicgrass	S5				0	0
					x		<i>Phalaris arundinacea</i>	Reed Canarygrass	S5				0	-3
x							<i>Phleum pratense</i>	Common Timothy	SE5					3
				x	x		<i>Phragmites australis</i> <i>ssp. australis</i>	European Reed	SE5					-3
x				x			<i>Poa compressa</i>	Canada Bluegrass	SE5					3
x	x						<i>Poa pratensis</i>	Kentucky Bluegrass	S5				0	3
						x	<i>Polygonatum pubescens</i>	Hairy Solomon's Seal	S5				5	5
x							<i>Setaria pumila</i>	Yellow Foxtail	SE5					0
x							<i>Sisyrinchium montanum</i>	Strict Blue-eyed-grass	S5				4	0
						x	<i>Streptopus lanceolatus</i>	Rose Twisted-stalk	S5				7	3
			x			x	<i>Trillium erectum</i>	Red Trillium	S5				6	3
			x				<i>Typha angustifolia</i>	Narrow-leaved Cattail	SE5					-5

FLORISTIC SUMMARY	TOTAL
Total Species	190
Native Species	141
Introduced (exotic) species	49
Species at Risk in Ontario (END, THR or SC)	1
Species at Risk in Canada (END, THR or SC)	1
Rare in Ontario (S1, S2 or S3)	0
Uncommon to common in Ontario (S4)	9
Common to very common in Ontario (S5)	132
Rare in Wellington County	4
Highly sensitive plant species with C value of 8, 9 or 10	1
Wetland Plant Species (-5, -4 or -3)	62

C.2 Wildlife Species List



Wildlife Recorded from 4454 Victoria Road South, Township of Puslinch

		ONTARIO GLOBAL					
COMMON NAME	SCIENTIFIC NAME	STATUS	STATUS	SARO	SARA	Stantec Survey	
ODONATA							
Emerald Spreadwing	<i>Lestes dryas</i>	S5	G5			Insect Survey	
Sweetflag Spreadwing	<i>Lestes forcipatus</i>	S4	G5			Insect Survey	
Slender Spreadwing	<i>Lestes rectangularis</i>	S5	G5			Insect Survey	
Violet Dancer	<i>Argia fumipennis violacea</i>	S5	G5T5			Insect Survey	
Familiar Bluet	<i>Enallagma civile</i>	S5	G5			Insect Survey	
Eastern Forktail	<i>Ischnura verticalis</i>	S5	G5			Insect Survey	
Lance-Tipped Darner	<i>Aeshna constricta</i>	S5	G5			Insect Survey	
Common Green Darner	<i>Anax junius</i>	S5	G5			Insect Survey	
Lancet Clubtail	<i>Gomphus exilis</i>	S5	G5			Insect Survey	
Common Baskettail	<i>Epithea cynosura</i>	S5	G5			Insect Survey	
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	S5	G5			Insect Survey	
Dot-tailed Whiteface	<i>Leucorrhinia intacta</i>	S5	G5			Insect Survey	
Widow Skimmer	<i>Libellula luctuosa</i>	S5	G5			Insect Survey	
Twelve-Spotted Skimmer	<i>Libellula pulchella</i>	S5	G5			Insect Survey	
Common Whitetail	<i>Plathemis lydia</i>	S5	G5			Insect Survey	
Saffron-bordered Meadowhawk	<i>Sympetrum costiferum</i>	S4	G5			Insect Survey	
Black Saddlebags	<i>Tramea lacerata</i>	S4	G5			Insect Survey	
BUTTERFLIES							
Juvenal's Duskywing	<i>Erynnis juvenalis</i>	S5	G5			Insect Survey	
Columbine Duskywing	<i>Erynnis lucilius</i>	S4	G5			Insect Survey	
Common Sootywing	<i>Pholisora catullus</i>	S4	G5			Insect Survey	
Leonard's Skipper	<i>Hesperia leonardus</i>	S4	G5			Insect Survey	
Fiery Skipper	<i>Hylephila phyleus</i>	SNA	G5			Insect Survey	
Black Swallowtail	<i>Papilio polyxenes</i>	S5	G5			Insect Survey	
Cabbage White	<i>Pieris rapae</i>	SNA	G5			Insect Survey	
Clouded Sulphur	<i>Colias philodice</i>	S5	G5			Insect Survey	
Orange Sulphur	<i>Colias eurytheme</i>	S5	G5			Insect Survey	
Eastern Tailed Blue	<i>Everes comyntas</i>	S5	G5			Insect Survey	
Summar Azure	<i>Celastrina neglecta</i>	S5	G5			Insect Survey	
Silvery Blue	<i>Glaucopsyche lygdamus</i>	S5	G5			Insect Survey	
Meadow Fritillary	<i>Boloria bellona</i>	S5	G5			Insect Survey	
Viceroy	<i>Limenitis archippus</i>	S5	G5			Insect Survey	
Eyed Brown	<i>Satyrodes eurydice</i>	S5	G4			Insect Survey	
Common Ringlet	<i>Coenonympha tullia</i>	S5	G5			Insect Survey	
Common Wood-Nymph	<i>Cercyonis pegala</i>	S5	G5			Insect Survey	

Wildlife Recorded from 4454 Victoria Road South, Township of Puslinch

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	SARO	SARA	Stantec Survey	
Monarch	<i>Danaus plexippus</i>	S4B, S2N	G4	SC	END	Insect Survey	
BUMBLE BEES							
Common Eastern Bumble Bee	<i>Bombus impatiens</i>	S5	G5			Insect Survey	
AMPHIBIANS							
Blue-spotted Salamander	<i>Ambystoma laterale</i>	S4	G5	NAR		eDNA Survey, Salamander Survey	
Unisexual Ambystoma Blue-spotted Dependent	<i>Ambystoma (2) laterale - jeffersonianum</i>	S4	G5	NAR	NAR	eDNA Survey	
American Toad	<i>Anaxyrus americanus</i>	S5	G5			Amphibian Survey, eDNA Survey	
Tetraploid Gray Treefrog	<i>Dryophytes versicolor</i>	S5	G5			Amphibian Survey, eDNA Survey	
Spring Peeper	<i>Pseudacris crucifer</i>	S5	G5			Amphibian Survey, eDNA Survey	
Bullfrog	<i>Lithobates catesbeiana</i>	S4	G5			eDNA Survey, Incidental Observation	
Northern Green Frog	<i>Lithobates clamitans</i>	S5	G5			eDNA Survey, Incidental Observation	
Wood Frog	<i>Lithobates sylvatica</i>	S5	G5			Amphibian Survey, eDNA Survey	
Northern Leopard Frog	<i>Lithobates pipiens</i>	S5	G5	NAR	NAR	eDNA Survey	
REPTILES							
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S5	G5T5	NAR	SC		
Eastern Gartersnake	<i>Thamnophis sirtalis</i>	S5	G5			Incidental Observation	
BIRDS							
Canada Goose	<i>Branta canadensis</i>	S5	G5			Breeding Bird Survey	
Tundra Swan	<i>Cygnus colymbianus</i>	S2B, S4N,	G5			Incidental Observation	
Wood Duck	<i>Aix sponsa</i>	S5B, S3N	G5			eDNA Survey	
Mallard	<i>Anas platyrhynchos</i>	S5	G5			Breeding Bird Survey	
Hooded Merganser	<i>Lophodytes cucullatus</i>	S5	G5			eDNA Survey	
Wild Turkey	<i>Meleagris gallopava</i>	S5	G5			Breeding Bird Survey	
Ruffed Grouse	<i>Bonasa umbellus</i>	S5	G5			Incidental Observation	
Mourning Dove	<i>Zenaida macroura</i>	S5	G5			Breeding Bird Survey	
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	S5B	G5			Breeding Bird Survey	
Killdeer	<i>Charadrius vociferus</i>	S5B, S5N	G5			Breeding Bird Survey	
American Woodcock	<i>Scolopax minor</i>	S4B	G5			Incidental Observation	
Ring-billed Gull	<i>Larus delawarensis</i>	S5B, S4N	G5			Breeding Bird Survey	
Great Blue Heron	<i>Ardea herodias</i>	S5	G5			Breeding Bird Survey	
Green Heron	<i>Butorides virescens</i>	S4B	G5			eDNA Survey	
Turkey Vulture	<i>Cathartes aura</i>	S5B	G5			Breeding Bird Survey	
Cooper's Hawk	<i>Accipiter cooperii</i>	S4	G5	NAR	NAR	Incidental Observation	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	S5	G5	NAR	NAR	Breeding Bird Survey	
Eastern Screech-Owl	<i>Megascops asio</i>	S5	G5	NAR	NAR	Nocturnal Bird Survey	
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	S4	G5			Breeding Bird Survey	

Wildlife Recorded from 4454 Victoria Road South, Township of Puslinch

COMMON NAME	SCIENTIFIC NAME	ONTARIO GLOBAL		SARO	SARA	Stantec Survey	
		STATUS	STATUS				
Downy Woodpecker	<i>Dryobates pubescens</i>	S5	G5			Breeding Bird Survey	
Hairy Woodpecker	<i>Dryobates villosus</i>	S5	G5			eDNA Survey, Incidental Observation	
Northern Flicker	<i>Colaptes auratus</i>	S4B	G5			Breeding Bird Survey	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	S5	G5			Breeding Bird Survey	
Eastern Wood-Pewee	<i>Contopus virens</i>	S4B	G5	SC	SC	Breeding Bird Survey	
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S4B	G5			Breeding Bird Survey	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S4B	G5			Breeding Bird Survey	
Warbling Vireo	<i>Vireo gilvus</i>	S5B	G5			Breeding Bird Survey	
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5B	G5			Breeding Bird Survey	
Blue Jay	<i>Cyanocitta cristata</i>	S5	G5			Breeding Bird Survey	
American Crow	<i>Corvus brachyrhynchos</i>	S5B	G5			Breeding Bird Survey	
Horned Lark	<i>Eremophila alpestris</i>	S5B	G5			Incidental Observation	
Tree Swallow	<i>Tachycineta bicolor</i>	S4B	G5			Breeding Bird Survey	
Barn Swallow	<i>Hirundo rustica</i>	S4B	G5	SC	THR	Breeding Bird Survey	
Black-capped Chickadee	<i>Poecile atricapillus</i>	S5	G5			Breeding Bird Survey, eDNA Survey	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	S5	G5			Breeding Bird Survey	
White-breasted Nuthatch	<i>Sitta carolinensis</i>	S5	G5			Breeding Bird Survey	
House Wren	<i>Troglodytes aedon</i>	S5B	G5			Breeding Bird Survey	
Carolina Wren	<i>Thryothorus ludovicianus</i>	S4	G5			Breeding Bird Survey	
American Robin	<i>Turdus migratorius</i>	S5B	G5			Breeding Bird Survey	
Gray Catbird	<i>Dumetella carolinensis</i>	S4B	G5			Breeding Bird Survey	
Brown Thrasher	<i>Toxostoma rufum</i>	S4B	G5			Incidental Observation	
European Starling	<i>Sturnus vulgaris</i>	SNA	G5			Breeding Bird Survey	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5B	G5			Breeding Bird Survey	
Pine Siskin	<i>Spinus pinus</i>	S5	G5			Incidental Observation	
American Goldfinch	<i>Spinus tristis</i>	S5B	G5			Breeding Bird Survey	
Chipping Sparrow	<i>Spizella passerina</i>	S5B	G5			Breeding Bird Survey	
Field Sparrow	<i>Spizella pusilla</i>	S4B	G5			Breeding Bird Survey	
Dark-eyed Junco	<i>Junco hyemalis</i>	S5B	G5			Incidental Observation	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	S4B	G5			Breeding Bird Survey	
Song Sparrow	<i>Melospiza melodia</i>	S5B	G5			Breeding Bird Survey	
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	S4B	G5			Breeding Bird Survey	
Eastern Meadowlark	<i>Sturnella magna</i>	S4B	G5	THR	THR	Breeding Bird Survey	
Baltimore Oriole	<i>Icterus galbula</i>	S4B	G5			Breeding Bird Survey	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S4	G5			Breeding Bird Survey	
Brown-headed Cowbird	<i>Molothrus ater</i>	S4B	G5			Breeding Bird Survey	

Wildlife Recorded from 4454 Victoria Road South, Township of Puslinch

COMMON NAME	SCIENTIFIC NAME	ONTARIO GLOBAL				Stantec Survey	
		STATUS	STATUS	SARO	SARA		
Common Grackle	<i>Quiscalus quiscula</i>	S5B	G5			Breeding Bird Survey	
Ovenbird	<i>Seiurus aurocapilla</i>	S4B	G5			Breeding Bird Survey	
Northern Waterthrush	<i>Parkesia noveboracensis</i>	S5B	G5			Breeding Bird Survey	
Black-and-white Warbler	<i>Mniotilta varia</i>	S5B	G5			Incidental Observation	
Yellow Warbler	<i>Setophaga petechia</i>	S5B	G5			Breeding Bird Survey	
Northern Cardinal	<i>Cardinalis cardinalis</i>	S5	G5			Breeding Bird Survey	
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	S4B	G5			Breeding Bird Survey	
Indigo Bunting	<i>Passerina cyanea</i>	S4B	G5			Breeding Bird Survey	
Duck species	<i>Anatidae sp.</i>					eDNA Survey	
Sparrow species	<i>Passeriformes sp.</i>					eDNA Survey	
Thrush species	<i>Turdus sp.</i>					eDNA Survey	
MAMMALS							
Little Brown Myotis	<i>Myotis lucifugus</i>	S3	G3G4	END	END	Bat Acoustic Survey	
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S3	G3G4	END		Bat Acoustic Survey	
Tri-colored Bat	<i>Perimyotis subflavus</i>	S3?	G3G4	END	END	Bat Acoustic Survey	
Eastern Red Bat	<i>Lasiurus borealis</i>	S3	G3G4	END		Bat Acoustic Survey	
Big Brown Bat	<i>Eptesicus fuscus</i>	S4	G5			Bat Acoustic Survey	
Hoary Bat	<i>Lasiurus cinereus</i>	S3	G3G4	END		Bat Acoustic Survey	
Eastern Cottontail	<i>Sylvilagus floridanus</i>	S5	G5			eDNA Survey, Incidental Observation	
Grey Squirrel	<i>Sciurus carolinensis</i>	S5	G5			eDNA Survey, Incidental Observation	
Porcupine	<i>Erethizon dorsatum</i>	S5	G5			eDNA Survey, Incidental Observation	
Coyote	<i>Canis latrans</i>	S5	G5			Incidental Observation	
Red Fox	<i>Vulpes vulpes</i>	S5	G5			Incidental Observation	
Raccoon	<i>Procyon lotor</i>	S5	G5			eDNA Survey	
White-tailed Deer	<i>Odocoileus virginianus</i>	S5	G5			Incidental Observation	
FISHES							
Goldfish	<i>Carassius auratus</i>	SNA	G5			eDNA Survey	
Largemouth Bass	<i>Micropterus salmoides</i>	S5	G5			Incidental Observation	
Northern Redbelly Dace	<i>Chrosomus eos</i>	S5	G5			eDNA Survey	
Explanation of Status and Acronymns							
COSSARO: Committee on the Status of Species at Risk in Ontario							
COSEWIC: Committee on the Status of Endangered Wildlife in Canada							
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)							

Wildlife Recorded from 4454 Victoria Road South, Township of Puslinch

COMMON NAME	SCIENTIFIC NAME	ONTARIO GLOBAL				Stantec Survey	
		STATUS	STATUS	SARO	SARA		
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),							
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)							
S4: Apparently Secure—Uncommon but not rare							
S5: Secure—Common, widespread, and abundant in the province							
SX: Presumed extirpated							
SH: Possibly Extirpated (Historical)							
SNR: Unranked							
SU: Unrankable—Currently unrankable due to lack of information							
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.							
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species							
S#B- Breeding status rank							
S#N- Non Breeding status rank							
?: Indicates uncertainty in the assigned rank							
G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range							
G1G2: Extremely rare to very rare globally							
G2: Very rare globally; usually between 5-10 occurrences in the overall range							
G2G3: Very rare to uncommon globally							
G3: Rare to uncommon globally; usually between 20-100 occurrences							
G3G4: Rare to common globally							
G4: Common globally; usually more than 100 occurrences in the overall range							
G4G5: Common to very common globally							
G5: Very common globally; demonstrably secure							
GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.							
GNR: Unranked—Global rank not yet assessed.							
T: Denotes that the rank applies to a subspecies or variety							
Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable .							
END: Endangered							
THR: Threatened							
SC: Special Concern							
2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Species At Risk Act (SARA)							
NAR: Not At Risk							
IND: Indeterminant, insufficient information to assign status							
DD: Data Deficient							
All rankings for birds refer to breeding birds unless the ranking is followed by N							

Appendix D eDNA Results



D.1 Salamander eDNA Results (Nature Metrics, August 8, 2022)



VERTEBRATE METABARCODING RESULTS

Order number: NA-SO00022
Report number: NM-CAM746
Company: Stantec
Contact: Andrew Taylor
Project: Jefferson Salamander Survey
Sample type: Smith-Root self-preserving filter
Date of report: 08-Aug-2022
Number of samples: 10

Thank you for sending your samples for analysis by NatureMetrics. Your samples have been **metabarcoded** following our **eDNA** survey - Vertebrates pipeline. A **taxon-by-sample table of your samples and a frequency of occurrence table are attached to this report (NM-CAM746.NA-SO00022.Vertebrate.xlsx)**. Each row in the table represents one taxon (**OTU**), shown with the lowest possible taxonomic assignment based on currently available reference data. Each column represents a sample, showing the proportion of sequence reads per detected OTU. Care should be taken in interpreting the numbers in terms of relative species abundance, but a high sequence proportion can be interpreted as lending greater confidence to a detection. This report contains biodiversity information that may be sensitive, particularly with respect to endangered or protected species. It is the responsibility of the client to ensure that due consideration is given to the data and that the information is shared in a responsible way.

Here we present an overview of the key results, followed by a more detailed report that starts with the taxonomic composition of the samples followed by a more detailed look at the steps taken to extract, amplify, sequence, and analyse your DNA. A glossary for terms in **bold** is provided at the end of the report to define key terms used within the report.

OVERVIEW OF YOUR RESULTS

- A total of 22 **taxa** were detected.
- Average taxonomic **richness** was 6.8 and ranged from 3 to 9.
- Most abundant **sequences**: wood frog (*Lithobates sylvaticus*).
- Most commonly detected taxa: wood frog (*Lithobates sylvaticus*), blue-spotted salamander (*Ambystoma laterale*) and wood duck (*Aix sponsa*).
- Blue-spotted salamander (*Ambystoma laterale*) and unisexual salamander (*Ambystoma unisexual*) were detected.

FULL REPORT

Sample composition

A total of 22 taxa were detected (**Table 1**). 63.6% (14 taxa) were at least 99% similar to a species in the global [reference databases](#), and [species](#) names are suggested. The remaining taxa were identified to the lowest possible taxonomic level: 27.3% to [genus](#) (6 taxa), 4.5% to [family](#) (1 taxon), and the remaining taxon to [order](#). A total of 2 unique fish, 8 amphibians, 8 birds and 4 mammals were detected. The taxa belong to 10 orders, 14 families, and 17 genera.

Blue-spotted salamander (*Ambystoma laterale*) and unisexual salamander (*Ambystoma unisexual*) were detected.

The average taxon richness was 6.8 and ranged from 3 ('stantec-160961457-05192022-01meta') to 9 ('stantec-160961457-05192022-03meta' and 'stantec-160961457-05192022-10meta'). The relative proportion of the sequences found in each of the samples is shown in **Figure 1** and **Table 1** and the diversity is summarised in **Table 2** and **Table 3**.

Wood frog (*Lithobates sylvaticus*) which accounted for 57.5% of the total sequence reads, was among the most abundant in terms of sequences. Among the most commonly detected species were wood frog (*Lithobates sylvaticus*), blue-spotted salamander (*Ambystoma laterale*) and wood duck (*Aix sponsa*) which were detected in 10, 7 and 6 samples, respectively.

High-quality vertebrate sequence data were obtained for 9 of the 10 eDNA samples. Sample 'stantec-160961457-05192022-07meta' produced fewer than expected target reads; results for this sample are therefore considered tentative. All laboratory controls behaved as expected.

Table 1 (attached separately). Taxon-by-sample table.



Figure 1. The proportion of the sequencing output allocated to the different taxa (rows) within each sample (columns). Each bubble per sample represents the proportion of DNA for each taxon for that sample. The size of the bubble is relative to the number of sequences from all taxa detected in that sample.

Table 2. Taxon richness among the samples.

Sample ID	Class	Order	Family	Genus	Taxa (Species)
stantec-160961457-05192022-01meta	2	2	1	1	3 (1)
stantec-160961457-05192022-02meta	2	5	6	7	8 (5)
stantec-160961457-05192022-03meta	3	5	6	7	9 (6)
stantec-160961457-05192022-04meta	3	5	5	4	5 (3)
stantec-160961457-05192022-05meta	3	6	5	6	8 (4)
stantec-160961457-05192022-06meta	4	5	5	6	7 (4)
stantec-160961457-05192022-07meta	2	3	5	5	8 (5)
stantec-160961457-05192022-08meta	3	5	5	5	5 (2)
stantec-160961457-05192022-09meta	3	4	4	4	6 (3)
stantec-160961457-05192022-10meta	3	6	7	7	9 (6)

Table 3 (attached separately). The frequency of occurrence of all detected families. Numbers correspond to the number of taxa belonging to those families in those samples.

METHODS

DNA from each filter was extracted using a commercial DNA extraction kit with a protocol modified to increase DNA yields. An extraction blank was also processed for the extraction batch. DNA was purified to remove PCR **inhibitors** using a commercial purification kit.

Comment: DNA yields were as expected.

Purified DNAs were amplified with **PCR** for a hypervariable region of the 12S rRNA gene to target vertebrates as part of the eDNA survey Vertebrate pipeline. Our standard analysis includes 12 replicate PCRs per sample.

All PCRs were performed in the presence of both a **negative control** and a **positive control** sample (a mock community with a known composition). Amplification success was determined by **gel electrophoresis**.

Comment: PCR reactions were successful for all 10 samples. Electrophoresis bands were strong and of the expected size. Overall, 11-12 successful PCR replicates were obtained for each of the 10 samples submitted for sequencing. No bands were observed on electrophoresis gels for the extraction blank or negative controls.

PCR replicates were pooled and purified, and sequencing adapters were added. Success was determined by gel electrophoresis.

Comment: All samples were successfully indexed, electrophoresis bands were strong and of the expected size. No repeat reactions were necessary.

Amplicons were purified and checked by gel electrophoresis, these were then quantified using a Qubit high sensitivity kit according to the manufacturer's protocol.

Comment: All amplicons were successfully purified.

All purified index PCRs were pooled into a final library with equal concentrations. The final library was sequenced using an Illumina MiSeq V3 kit at 10.5 pM with a 20% PhiX spike in.

Sequence data were processed using a custom **bioinformatics** pipeline for quality filtering, **OTU** clustering, and taxonomic assignment.

Comment: Very few sequences were discarded prior to dereplication, which is indicative of high-quality data with minimal PCR and sequencing errors. A total of 548,181 high-quality sequences were included in the final dataset.

Consensus taxonomic assignments were made for each OTU using sequence similarity searches against the NCBI nt (GenBank) reference database. Assignments were made to the lowest possible taxonomic level where there was consistency in the matches. Conflicts were flagged and resolved manually. Minimum similarity thresholds of 99%, 97%, and 95% were used for species-, genus- and higher-level assignments respectively. In cases where there were equally good matches to multiple species, public records from GBIF were used to assess which were most likely to be present in Canada. Higher-level taxonomic identifications or multiple potential identifications were reported in cases that could not be resolved in this way.

The OTU table was then filtered to remove low abundance OTUs from each sample (<0.025% or <10 reads, whichever is the greater threshold for the sample). Unidentified, non-target, and common contaminant sequences such as human and livestock were then removed.

Note that unidentified or misidentified taxa can result from incomplete or incorrect reference databases, and taxa may be missed due to low quality DNA, environmental contaminants, or the dominance of other species in the sample.

Please note that the abundance of taxa cannot be directly inferred from the proportion of total sequence reads. While the proportion of sequence reads is a consequence of abundance, it is also impacted by biomass, activity, surface area, condition, distance from the physical sample, primer bias, and species-specific variation in the genome.

Table 4. Sample information table.

Kit ID	Label	Volume filtered	Date received
NAS-01-00297	stantec-160961457-05192022-01meta	750ml	27-May-22
NAS-01-00298	stantec-160961457-05192022-02meta	500ml	27-May-22
NAS-01-00299	stantec-160961457-05192022-03meta	500ml	27-May-22
NAS-01-00300	stantec-160961457-05192022-04meta	500ml	27-May-22
NAS-01-00301	stantec-160961457-05192022-05meta	500ml	27-May-22
NAS-01-00302	stantec-160961457-05192022-06meta	500ml	27-May-22
NAS-01-00303	stantec-160961457-05192022-07meta	400ml	27-May-22
NAS-01-00304	stantec-160961457-05192022-08meta	500ml	27-May-22
NAS-01-00305	stantec-160961457-05192022-09meta	500ml	27-May-22
NAS-01-00306	stantec-160961457-05192022-10meta	250ml	27-May-22

END OF REPORT

Report issued by: **Laura Balcells**

Contact: **team@naturemetrics.co.uk**

GLOSSARY

BMWP	Short for biological monitoring working party, an index that can be used to measure water quality by scoring the presence of aquatic invertebrate indicator taxa. The index is reliant on taxa that are less tolerant of polluted water bodies (e.g. Ephemeroptera, Plecoptera, Trichoptera).
BOLD	Barcode Of Life Database - A database from which reference sequences are taken
NCBI	National Centre for Biotechnology Information - A database from which reference sequences are taken.
OTU	Operational Taxonomic Unit; similar sequences are clustered into OTUs at a defined similarity threshold. OTUs are approximately equivalent to species and are treated as such in our analyses. Species-level taxonomic assignments may or may not be possible, depending on the availability of reference sequences and the similarity between closely related species in the amplified marker. It may be possible to refine the taxonomic assignment for an OTU later as more sequences are added to reference databases.
PCR	Polymerase Chain Reaction; a process by which millions of copies of a particular DNA segment are produced through a series of heating and cooling steps. Known as an 'amplification' process. One of the most common processes in molecular biology and a precursor to most sequencing-based analyses.
adapter	short, artificially synthesised nucleotide sequence which attaches to the ends of the target DNA or RNA sequences prior to sequencing. They are typically used to aid in attachment of the target sequence to other functional molecules/sequences.
amplicon	A sequence of DNA which is the source/product of PCR amplification.
bioinformatics	An interface between genetics, computational biology, statistics, and programming in which DNA or other biological data is processed, analysed and integrated into research or communications.

contaminant sequences

The sensitivity of high-throughput sequencing of eDNA means that contamination is always a concern that needs to be minimised.

The sources of contamination are threefold:

Natural - Examples of natural contaminants include: frequent visitors to site, faecal discharge from predators, livestock, wastewater, and fishing bait. This type of contamination is typically unavoidable and very difficult to quantify. Sequences of this type are typically flagged and conservatively removed from the sequencing output. Typical contaminant species include cow, pig, dog, cat, sheep, etc.

Sampling - Human contamination of sampling equipment can reduce the efficiency of the sequencing. This type of contamination can be minimised by stringent contamination protocols, such as PPE.

Laboratory - Residual DNA can contaminate other samples processed at the same time in other labs. At NatureMetrics this is mitigated by a designated eDNA laboratory, strict decontamination procedures, negative controls, and good laboratory practices.

dereplication

The identification of unique sequences so that only one copy of each sequence is reported.

eDNA

Short for 'environmental DNA'. Refers to DNA deposited in the environment through excretion, shedding, mucous secretions, saliva etc. This can be collected in environmental samples (e.g. water, sediment) and used to identify the organisms that it originated from. eDNA in water is broken down by environmental processes over a period of days to weeks. It can travel some distance from the point at which it was released from the organism, particularly in running water. eDNA is sampled in low concentrations and can be degraded (i.e. broken into short fragments), which limits the analysis options.

extraction blank

A DNA extraction with no soil added to assess potential contamination during the DNA extraction process.

gel electrophoresis

The process in which DNA is separated according to size and electrical charge via an electric current, while in a gel. The process is used to confirm the successful amplification of a specifically sized fragment of DNA.

metabarcoding

Refers to identification of species assemblages from community DNA using barcode genes. PCR is carried out with non-specific primers, followed by high-throughput sequencing and bioinformatics processing. Can identify hundreds of species in

each sample, and 100+ different samples can be processed in parallel to reduce sequencing cost.

negative control

Used to determine whether PCR reactions are contaminated.

nt

NCBI nucleotide database

positive control

Used to determine whether the PCR is working correctly.

rRNA

Ribosomal RNA

reference databases

Over time, the DNA sequences of many species have been compiled into publicly accessible databases by scientists from around the world. These databases serve as a reference against which unknown sequences can be queried to obtain a species identification. The most commonly accessed database is NCBI (National Center for Biotechnology Information), which is maintained by the US National Institute of Health. Anyone can search for DNA sequences at <https://www.ncbi.nlm.nih.gov>

richness

The total number of taxa within a sample.

D.2 Salamander eDNA Results (Nature Metrics, 2022)





Table 1. Taxon-by-sample table with proportions.

NMSeqID	Sequence	Kingdom	Phylum	Class	Order	Family	Genus	Species	Similarity	IUCN Red List	Comments	stantec-160961457-05192022-01meta	stantec-160961457-05192022-02meta	stantec-160961457-05192022-03meta	stantec-160961457-05192022-04meta	stantec-160961457-05192022-05meta	stantec-160961457-05192022-06meta	stantec-160961457-05192022-07meta	stantec-160961457-05192022-08meta	stantec-160961457-05192022-09meta	stantec-160961457-05192022-10meta
IM-J775SQ	ACTATGCTCAGCCG	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Carassius</i>	<i>Carassius auratus</i> / <i>Carassius gibelio</i>	100.00	Least Concern	(<i>Carassius auratus</i>)/Not found (Ca	-	-	-	-	-	-	-	1.32	-	-
IM-2B5UCT	ACTATGCTCAGCCA	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Chrosomus</i>	<i>Chrosomus eos</i>	100.00	Least Concern	Species identification b	-	-	-	-	-	7.74	-	-	-	-
IM-J41EPL	ACTATGCCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Bufonidae	<i>Anaxyrus</i>	<i>Anaxyrus americanus</i> / <i>Anaxyrus fowleri</i>	100.00	Least Concern	(<i>Anaxyrus</i>) Species identification b	-	-	-	-	-	-	22.45	-	-	-
IM-8MURK3	ACTATGCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Hylidae	<i>Dryophytes</i>	<i>Dryophytes versicolor</i>	100.00	Least Concern	This sequence was also	-	-	0.81	-	-	-	36.28	-	-	-
IM-1J0I4W	ACTATGCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Hylidae	<i>Pseudacris</i>	<i>Pseudacris crucifer</i>	100.00	Least Concern		-	-	-	-	-	-	0.58	-	-	-
IM-D81T3L	ACTATGCCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Ranidae	<i>Lithobates</i>	<i>Lithobates catesbeianus</i> / <i>Lithobates clamitans</i>	100.00	Least Concern	(<i>Lithobates catesbeianus</i>)/Least C	54.00	-	-	-	-	-	14.53	-	-	2.68
IM-T11ZFI	ACTATGCCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Ranidae	<i>Lithobates</i>	<i>Lithobates pipiens</i>	100.00	Least Concern		-	-	-	-	-	-	4.38	-	-	2.69
IM-6KZV4J	ACTATGCCTCAGCCG	Animalia	Chordata	Amphibia	Anura	Ranidae	<i>Lithobates</i>	<i>Lithobates sylvaticus</i>	100.00	Least Concern		39.61	81.18	73.63	49.27	17.66	55.76	2.27	96.34	43.44	15.39
IM-I69VWH	ACTATGCTTAGCCA	Animalia	Chordata	Amphibia	Caudata	Ambystomatidae	<i>Ambystoma</i>	<i>Ambystoma laterale</i>	100.00	Least Concern	Species identification b	-	0.66	2.84	3.27	12.27	-	12.38	0.66	-	-
IM-J67JAC	ACTATGCCTAGCCA	Animalia	Chordata	Amphibia	Caudata	Ambystomatidae	<i>Ambystoma</i>	<i>Ambystoma unisexual</i>	100.00	Not found	Species identification b	-	-	-	3.01	-	-	-	-	13.53	-
IM-3J58PY	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Anseriformes	Anatidae	<i>Aix</i>	<i>Aix sponsa</i>	100.00	Least Concern	Species identification b	-	-	1.69	4.47	-	23.65	8.18	-	1.02	7.03
IM-T3K94Y	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Anseriformes	Anatidae	<i>Lophodytes</i>	<i>Lophodytes cucullatus</i>	100.00	Least Concern	Species identification b	-	-	3.61	6.57	-	0.24	0.05	-	11.40	-
IM-V99L52	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Anseriformes	Anatidae			-	-		-	11.15	7.96	40.38	28.15	24.45	7.12	-	23.84	-
IM-L05VHO	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Passeriformes	Paridae	<i>Poecile</i>	<i>Poecile atricapillus</i>	100.00	Least Concern	Species identification b	-	-	1.28	-	-	-	-	-	-	-
IM-1YT300	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Passeriformes	Turdidae	<i>Turdus</i>		-	-		-	0.04	-	-	0.14	-	-	-	0.66	14.74
IM-M16C9I	ACTATGCCTGGCCC	Animalia	Chordata	Aves	Passeriformes				6.39	-		-	-	-	-	-	2.32	-	-	-	-
IM-9SWT80	ACTATGCTCAGCCC	Animalia	Chordata	Aves	Pelecaniformes	Ardeidae	<i>Butorides</i>	<i>Butorides virescens</i>	100.00	Least Concern	(<i>Butorides</i>) Species identification b	-	-	0.39	-	-	-	-	-	-	-
IM-X46KJJ	ACTATGCCTGGCCG	Animalia	Chordata	Aves	Piciformes	Picidae	<i>Picoides</i>	<i>Picoides villosus</i>	100.00	Least Concern	(<i>Leuconot</i>) Species identification b	-	-	-	-	-	-	-	-	-	1.83
IM-D860JK	ACTATGCCTAGCCC	Animalia	Chordata	Mammalia	Carnivora	Procyonidae	<i>Procyon</i>	<i>Procyon lotor</i>	100.00	Least Concern		-	-	-	-	-	-	-	-	-	-
IM-3U76J3	ACTATGCTTAGCCC	Animalia	Chordata	Mammalia	Lagomorpha	Leporidae	<i>Sylvilagus</i>	<i>Sylvilagus floridanus</i> / <i>Sylvilagus nuttallii</i>	100.00	Least Concern	(<i>Sylvilagu</i>) Species identification tc	-	-	-	0.13	-	-	-	-	-	54.25
IM-CQ1Q0J	ACTATGCCTAACCA	Animalia	Chordata	Mammalia	Rodentia	Erethizontidae	<i>Erethizon</i>	<i>Erethizon dorsatus</i>	100.00	Not found		-	-	-	-	6.94	9.98	3.66	-	-	-
IM-52EZS4	ACTATGCTTAGCCC	Animalia	Chordata	Mammalia	Rodentia	Sciuridae	<i>Sciurus</i>	<i>Sciurus carolinensis</i> / <i>Sciurus niger</i>	100.00	Least Concern	(<i>Sciurus c</i>) Species identification tc	-	-	-	-	-	5.73	0.17	-	-	1.21
																				3.18	0.18

Table 3. The frequency of occurrence of all detected families.

Class	Order	Family	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	160961457-05192022	# samples
Actinopterygii	Cypriniformes	Cyprinidae	0	0	0	0	0	1	0	1	0	0	2
Amphibia	Anura	Bufonidae	0	0	0	0	0	0	1	0	0	0	1
Amphibia	Anura	Hylidae	0	0	1	0	0	0	2	0	0	0	2
Amphibia	Anura	Ranidae	2	1	1	1	1	1	3	1	1	3	10
Amphibia	Caudata	Ambystomatidae	0	1	2	1	1	0	1	1	2	1	8
Aves	Anseriformes	Anatidae	0	3	3	1	3	3	1	1	2	0	8
Aves	Passeriformes	Paridae	0	1	0	0	0	0	0	0	0	0	1
Aves	Passeriformes	Turdidae	0	1	0	1	0	0	0	1	0	1	4
Aves	Pelecaniformes	Ardeidae	0	1	0	0	0	0	0	0	0	0	1
Aves	Piciformes	Picidae	0	0	0	0	0	0	0	0	0	1	1
Mammalia	Carnivora	Procyonidae	0	0	1	1	1	1	0	0	0	1	5
Mammalia	Lagomorpha	Leporidae	0	0	1	0	0	0	0	0	0	0	1
Mammalia	Rodentia	Erethizontidae	0	0	0	0	0	0	0	0	0	1	1
Mammalia	Rodentia	Sciuridae	0	0	0	0	1	1	0	0	1	1	4

D.3 Salamander Tail Clip Results (Dr. Jim Bogart, 2024)



From: [Jim P Bogart](#)
To: [Straus, Melissa](#)
Subject: Fw: Identification of your salamanders
Date: Friday, July 12, 2024 12:02:07 PM
Attachments: [Samples from Stantec 2024.xls](#)

You don't often get email from jrbogart@uoguelph.ca. [Learn why this is important](#)

From: Jim P Bogart
Sent: Friday, July 12, 2024 11:53 AM
To: melissa.straus@stantec <melissa.straus@stantec>
Subject: Identification of your salamanders

Hi Melissa,

It has been a while but I have finally worked out my new system for identifying *Ambystoma* complex salamanders. I am sending a spread sheet that includes results obtained from your salamander tail tips you gave me in April. I ran three loci AjeD 75 and AjeD346 amplifies microsatellites from both *A. jeffersonianum* and *A. laterale* but the sizes of the microsatellites are different for the two genomes. Sizes only found in *A. laterale* are labelled blue and sizes for *A. jeffersonianum* are tan. AjeD378 only amplifies *A. jeffersonianum* microsatellites so no amplification is labelled blue. Three samples turned out to be *Ambystoma 2-laterale jeffersonianum* or LLJ and one was *A. laterale* (LL). Let me know if you have any questions.

Sorry it took so long - I am still optimizing my new system,

Jim Bogart

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

23 April 2024 DNA Plate Stantec samples

Plate	XDNA#	JPB#	Geno	Locality	AjeD75				AjeD346				AjeD378			
D 9	21445	50967	LLJ	Stantec - 4454 Victoria Road South	124	132	184		268				252			
E 7	21446	50968	LLJ	Stantec - 4454 Victoria Road South	124				268				252			
E 8	21447	50969	LL	Stantec - 4454 Victoria Road South	132				0				0			
E 9	21448	50970	LLJ	Stantec - 4454 Victoria Road South	124	132	184		0				252			

Appendix E Curricula Vitae



Melissa is a senior terrestrial ecologist with technical expertise in wildlife and plant community ecology, wetland science, botany, species at risk, and long-term monitoring programs across various sectors (e.g., federal, municipal, oil and gas, and renewable energy) with the ability to lead and deliver complex environmental projects.

Melissa has a proven track record in implementing key environmental regulations such as the Migratory Birds Convention Act, the Species at Risk Act, and Endangered Species Act. Her skillset includes construction monitoring, vegetation community assessments using Ecological Land Classification (ELC), wetland delineations according to the Ontario Wetland Evaluation System (OWES), Butternut health assessments, and extensive species-specific experience for species at risk, including Jefferson's Salamander, Blanding's Turtle, Bank Swallow, Butler's Gartersnake, Eastern Foxsnake, Massasauga, Bobolink, Eastern Meadowlark, Barn Swallow, Chimney Swift, Eastern Whip-poor-will, Cerulean Warbler and bats.

Melissa has been a lead author and reviewer on numerous technical memorandums and reports during her 20-year career, including environmental impact studies, natural heritage assessments, environmental reports, and existing condition reports. Melissa's experience also includes working and consulting with various indigenous groups and regulatory agencies, including the City of Guelph, Ministry of Environment, Conservation and Parks, and Canadian Wildlife Services.

EDUCATION

M.Sc. in Biology, Trent University, Peterborough, Ontario, Canada, 2009

B.Sc. in Environmental Sciences, Co-op Program, University of Guelph, Guelph, Ontario, Canada, 2003

CERTIFICATIONS & TRAINING

Certificate, St. John Ambulance / Standard First Aid with CPR C + AED, Guelph, Ontario, 2025

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification System for Southern Ontario, Kemptonville, Ontario, Canada, 2010

Certificate, Ontario Ministry of Natural Resources / Ontario Wetland Evaluation System, North Bay, Ontario, Canada, 2012

Certificate, Ontario Ministry of Natural Resources / Butternut Health Assessor, Hamilton, Ontario, 2015

PROJECT EXPERIENCE

Multi-Unit / Family Residential

Natural Heritage Evaluation Peer Reviews, Peterborough, ON, Canada (Peer Reviewer, Present)

Client: County of Peterborough

Conducted peer reviews of Natural Heritage Evaluation reports submitted to support two private severance applications on behalf of the County of Peterborough.

Melissa A. Straus M.Sc.

Terrestrial Ecologist · 20 Years of Experience · Waterloo, Ontario

Environmental Impact Studies/Development Applications - Various, Municipality Of Thames Centre, ON, Canada (Peer Reviewer, Present)
Client: Municipality of Thames Centre
Conducted peer reviews of Environmental Impact Studies/ Development Application Reports for various proposed developments on behalf of the County of Thames Centre Development application scopes ranged from private single-home alterations to full subdivisions.

Watford East Proposed Subdivision, Watford, ON, Canada (Senior Ecologist, 2025-present)
Quality reviewer and task manager for the 2025 field program and forthcoming Environmental Impact Study in support of a residential subdivision.

Cambridge Lands, Proposed Subdivision, Cambridge, ON (Terrestrial Ecologist, 2021-present)
Client: Madison Riverbank Holdings Limited
Assisted with coordination and conducting field studies and the impact study.

1250 Gordon Development, Guelph, ON (Terrestrial Ecologist)
Client: Tricar Developments Inc.
Participated in botanical field studies and corridor surveys in support of a proposed plan of condominium on the property. Lead writer of the forthcoming Environmental Impact Study, which includes ongoing consultation with the City of Guelph.

71 Wyndham Development, Guelph, ON (Terrestrial Ecologist, 2018-2024)
Client: Tricar Developments Inc.
Author of the Environmental Implementation Report and developer of the post-construction bird monitoring program.

220 Arkell Road, Guelph, ON (Terrestrial Ecologist/Task Manager, 2019-2024)
Client: Rockpoint Properties Inc.
Coordinated and participated in a multi-year field program that included movement studies where small mammals, amphibians, and reptiles were trapped and trail cameras were deployed. Additional surveys included targeted searches for Milksnakes, winter raptor surveys, as well as ELC, botanical, and breeding birds. Author of the associated Environmental Impact Studies.

Bluewater Development, Guelph, ON (Project Manager, 2020)
Client: 2204086 Ontario Inc.
Coordinator and participated in a road mortality monitoring program for amphibians and reptiles along a busy 4-lane roadway in Guelph, the results of which were used to develop mitigation measures in consultation with the City of Guelph. Lead writer of the submitted Environmental Impact Study and Environmental Implementation Report.

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Daniels High Park Condominiums, High Park Village and Minto High Park, Toronto, ON (Coordinator, 2015-2019)

Client: The Daniels Corporation, Minto Properties Inc.

Development and coordinator of a bird-building collision monitoring program for three condominium developments near High Park in Toronto. This work led to collaboration with the City of Toronto, Canadian Wildlife Service, and FLAP on the creation of bird collision monitoring requirements for new developments in the City of Toronto. These protocols have since been issued by the Canadian Standards Association.

Metalworks Development, Guelph, ON (Project Manager, 2013-2021)

Client: 2278570 Ontario Inc.

Project manager and lead writer of the Environmental Impact Study, Environmental Implementation Report, and environmental briefs (Phases 2-4 and 6) for the multi-phase Metalworks brownfield development. Based on recommendations contained within the EIR, bird friendly building design was implemented, and a historic chimney will be retained for Chimney Swifts.

148-152 MacDonnell and 150 Wellington Condominium Developments, Guelph, Ontario (Terrestrial Ecologist / Task Manager, 2013)

Client: Tricar Developments Inc.

Vegetation removal surveys and lead writer of the Environmental Impact Study for both properties, including attendance at Environmental Advisory Committee meetings with the City

Federal Government

Multi-seasonal Species at Risk Surveys, Canadian Forces Base, 22 Wing, North Bay, ON (Field Ecologist, 2018 and Project Manager, 2025, 2018)

Client: Defence Construction Canada (on behalf of Department of National Defence (DND))

Participated in the breeding bird, vegetation, amphibian and reptile field program at CFB 22 Wing in 2018. Project manager for 2025 field program.

Nighttime Amphibian Surveys, Canadian Forces Base Borden, Borden, ON (Terrestrial Ecologist, 2018)

Client: Defence Construction Canada (on behalf of Department of National Defence (DND))

Participated in the evening field program and associated reporting to determine the abundance and distribution of amphibians at CFB Borden.

Phase II Species at Risk Surveys, Tremblay Road (Field Ecologist, 2019)

Client: Public Services and Procurement Canada

Completed site surveys of existing conditions, including habitat assessment and targeted surveys to document site existing conditions, including habitat assessments and targeted surveys for Butternut, Western Chorus Frog, Monarch and Eastern Milksnake.

Swift Habitat Assessment and Evidence of Use Surveys, Various Garrisons, Various Locations, ON (Terrestrial Ecologist, 2020-2022)

Client: Defence Construction Canada (on behalf of Department of National Defence (DND))

Implemented field program and assisted with reporting to assess habitat use by Chimney Swifts at various military buildings throughout southern and central Ontario.

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Oil and Gas Pipelines

Annual Integrity Dig Program, Various Sites,
Various Locations, ON (Project Manager, Quality
Reviewer, 2020-present)

Client: Enbridge Gas Inc.

Oversaw the execution environment programs for numerous oil and gas integrity programs conducted annually throughout Ontario, comprised of background and site condition screening, mitigation plan development, and providing recommendations for consideration under the Endangered Species Act.

Sarnia Industrial Line: DOW to Bluewater, Sarnia,
ON, Canada (Lead Terrestrial Ecologist /
Environmental Inspector, 2020-2025)

Client: Enbridge Gas Inc.

Secured an overall benefit permit and amendment for Butler's Gartersnake followed by coordinating the annual field program and developing environmental training resources for the Project.

Bobcaygeon Community Expansion Project,
Bobcaygeon, Kawartha Lakes, ON, Canada
(Senior Ecologist, 2022-2025)

Client: Enbridge Gas Inc.

Assisted with environmental reporting, species at risk permit consultation, oversaw the pre-construction field program and supported the environmental inspection team during construction.

Tweed Community Expansion Project, Tweed,
ON, Canada (Senior Ecologist, 2025-2025)

Client: Enbridge Gas Inc.

Assisted with environmental reporting and species at risk permit consultation.

GTA Project, Greater Toronto Area, ON (Wildlife
Lead, 2015)

Client: Enbridge Gas Distribution

Worked as part of a multidisciplinary team to coordinate the bird nest sweep program for compliance with the Migratory Bird Convention Act during installation of a new gas pipeline within the Greater Toronto Area. This entailed tracking positive locates, establishing construction buffers based on bird species, and coordinating deployment of technical staff for follow-up checks to determine activity status of nests.

Kimball Road Pipeline Extension Project,
Corunna, ON (Lead Terrestrial Ecologist /
Environmental Inspector, 2015)

Client: NOVA Chemicals

Coordinated and conducted environmental surveys including vegetation, amphibian and bird surveys, as well as during construction inspection and compliance monitoring for Butler's Gartersnake and Snapping Turtle.

Sarnia Integrity Dig Program, Sarnia, ON (Lead
Terrestrial Ecologist/Environmental Inspector,
2017-2021)

Client: Plains Midstream Canada

Consulted with First Nations and Environment and Climate Change Canada to secure appropriate Species at Risk Act permits, developed a mitigation plan, and coordinated and conducted compliance inspections for Butler's Gartersnake as part of annual integrity dig work.

Melissa A. Straus M.Sc.

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Dawn Compressor Station Expansion, Dresden, ON (Lead Terrestrial Ecologist, 2015)

Client: Union Gas Ltd.

Coordinated and conducted portions of the extensive 2015 field program for the proposed Dawn Compressor Station Expansion Environmental Impact Study. Tasks included coordination with First Nations groups, meeting with the local conservation authority to discuss permitting, as well as consultation with the Ministry of Natural Resources and Forestry regarding wetland evaluation, and species at risk permitting for Eastern Foxsnake, a listed plant species, and bats.

Kirkwall-Hamilton, Waterdown, ON (Terrestrial Ecologist, 2020)

Client: Enbridge Gas Inc.

Developed, participated, and oversaw the 2020 field program that targeted amphibians, breeding birds (including species at risk), turtles, and terrestrial insects, included consultation during program development with local conservation authorities.

Renewable Energy

Grand Valley III Wind Project, Grand Valley, ON (Coordinator, 2015-2021)

Client: Grand Valley II LP

Coordinator for the 2016-2021 mortality and compensation land monitoring programs, including oversight, data management, reporting, species identification, and agency notification.

Henvey Inlet Wind Energy Centre, Henvey Inlet, ON (Terrestrial Ecologist, 2013-2024)

Client: Pattern Energy

Completed fall migratory raptor surveys during baseline studies as well as led and participated in the restoration monitoring program implemented in 2020, which included adherence to site-specific species at risk protocols.

Amherst Island Wind Energy Project, Amherst Island, ON (Terrestrial Ecologist, 2011-2015)

Client: Algonquin Power & Utilities Corp.

Conducted dusk surveys for Short-eared Owls, winter raptor surveys, auditory surveys for Eastern Whip-poor-will and during-construction monitoring for Blanding's Turtle.

Adelaide Wind Power Project, Strathroy, ON (Coordinator, 2015-2021)

Client: Suncor Energy Products Inc.

Conducted ELC and wildlife habitat assessments pre-construction surveys. Coordinator for the 2015-2021 mortality monitoring program, including oversight of monitoring, data management, reporting, species identification, agency notification for raptors and species at risk, as well as the development of a targeted raptor behavioral monitoring program for review by regulatory agencies.

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Port Dover and Nanticoke Wind Project, Port Dover, ON (Terrestrial Ecologist / Coordinator, 2014-2016)

Client: Capital Power GP Holdings Inc.

Performed environmental monitoring tasks related to migrating Tundra Swans, Bald Eagle behavioral monitoring, and identification and notification of bat and bird species at risk during post-construction monitoring programs. Responsible for coordinating daily monitoring, data management and reporting of post-construction monitoring program.

Roadways

Talbotville Bypass and Highway 4 Widening, Talbotville, ON, Canada (Senior Ecologist, 2025)

Client: MTO West Region

Onsite assessment, consultation, and reporting to Environment and Climate Change Canada during the implementation of a Pileated Woodpecker nest permit.

Highway 401 and Lauzon Parkway Interchange, Windsor, ON (Senior Ecologist, 2025)

Client: MTO West Region

Managed the 2025 field program, comprised of ELC, bat acoustic, and snake coverboard surveys and oversaw the existing conditions and impact assessment report.

Removal of Lawrence Station Bridges and Highway 401 Reconstruction, Township Of Southwold, ON, Canada (Senior Ecologist, 2025)

Client: MTO West Region

Assisted with the existing conditions and preliminary impact assessment.

Highway 401 Roseville Road Bridge Replacement, Cambridge, ON (Terrestrial Ecologist, 2021)

Client: MTO West Region

Assessed existing culverts and bridges for nesting birds, conducted ELC surveys, and conducted significant wildlife habitat assessments.

Highway 40 Improvements, Chatham, Ontario (Terrestrial Ecologist, 2011)

Client: MTO West Region

Conducted reptile and species at risk surveys and habitat assessments.

Highway 24 Improvements, Cambridge, Ontario (Terrestrial Ecologist, 2011)

Client: MTO West Region

Conducted reptile and avian species at risk surveys and habitat assessment.

Highway 6 Bridge Rehabilitations, Guelph, ON (Terrestrial Ecologist, 2020)

Client: MTO West Region

Conducted ELC and habitat assessments for bird species at risk at the Westwood Road overpass and CN overpass.

Aggregates & Rock

Private Pit Development (Senior Ecologist, 2022-present)

Client: CBM Aggregates

Conducted salamander trapping, vegetation surveys and natural environment reporting.

Melissa A. Straus M.Sc.

Terrestrial Ecologist · 20 Years of Experience · Waterloo, Ontario

Natural Environment Report, Pit Application (Peer Reviewer, 2024-2025)

Client: Municipality of Thames Centre

Conducted a peer review of a Natural Environment Report prepared in support of a Class A aggregate pit application on behalf of the County of Thames Centre

Hillsburgh Quarry, Hillsburgh, ON (Terrestrial Ecologist, 2018-2021)

Client: CBM Aggregates

Conducted species at risk surveys for bats and Barn Swallows in onsite buildings, and leading onsite permitting for Barn Swallow.

Melissa A. Straus M.Sc.

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PUBLICATIONS & WHITEPAPERS

Straus, M. Multiple paths after grad school: transition to for-profit companies. Western University Panelist. 2016, 2017, and, 2018.

Straus, M., N. Kopysh, and A. Taylor. Bat Species at Risk and Implication to Infrastructure Projects in Ontario. Canadian Society for Civil Engineering Conference Paper, 2016.

Straus, M.A., K. Bavrlic, E. Nol, D.M. Burke, K.A. Elliott. Reproductive success of cavity-nesting birds in partially harvested woodlots. Canadian Journal of Forest Research, 41: 1004-1017, 2011.

Burke, D., K. Elliott, K. Falk, and T. Pirano. (M. Straus, contributing author). A land manager's guide to conserving habitat for forest birds in southern Ontario. Ministry of Natural Resources and Trent University, 2011.

Straus, M. Reproductive success of cavity-nesting birds in partially harvested woodlots in southwestern Ontario. M.Sc. Thesis, Department of Biology, Trent University, Ontario, Canada, 2009.

Straus, M. The effects of partial harvesting on cavity-nesting bird communities in southwestern Ontario. Society of Canadian Ornithologists (SCO-SOC) Conference Poster, 2007.

Janice is a Terrestrial Ecologist with 20 years of experience in the field of Ecology. She is certified/trained in Ecological Land Classification (ELC) and the Ontario Wetland Evaluation System (OWES), with proven technical skills in completing botanical, bird, mammal, reptile, and amphibian surveys, targeted surveys for species at risk and significant wildlife habitat assessments. Janice has good working knowledge of municipal policy documents, including official plans, as well as the provincial and federal regulatory and legislative requirements related to the protection of natural heritage features, species, and species habitat.

Janice provides support to a variety of projects both in the field and as a contributing author to Environmental Impact Studies (EIS) and other natural heritage assessment reports. This includes the completion of terrestrial field surveys and compilation of reports for projects in various sectors, including Urban Development, Municipal Infrastructure, Transportation, Oil and Gas, and Power and Renewable Energy.

EDUCATION

Bachelor of Science / Honours Biology, University of Western Ontario / Biology, London, Ontario, Canada, 2000

CERTIFICATIONS & TRAINING

Ontario Wetlands Evaluation System (OWES) for Southern Ontario, Ontario Ministry of Natural Resources and Forestry, North Bay, Ontario, 2018

Ecological Land Classification (ELC) for Southern Ontario, Ontario Ministry of Natural Resources, Tobermory, Ontario, Canada, 2007

Government of Canada Security Screening Clearance, Reliability Status (valid until 2028-11-09), Ottawa, Ontario, Canada, 2018

PROJECT EXPERIENCE

Environmental Impact Assessments

710 Huron Road Environmental Impact Study, Kitchener, Ontario (Terrestrial Ecologist, 2014)

Completed breeding bird surveys, ELC surveys and botanical inventories in support of a proposed residential development. Drafted an EIS to assess potential constraints and opportunities associated with the development.

Fairway / Lackner Environmental Impact Study and Environmental Implementation Brief, Kitchener, Ontario (Terrestrial Ecologist, 2014-2017)

Client: Waterloo District School Board

Drafted the natural heritage component of an EIS, in support of a mixed use development proposal. Implemented the post-construction monitoring program as required in the EIB.

Huron South Draft Environmental Impact Study, Kitchener, Ontario (Terrestrial Ecologist, 2014-2018)

Conducted amphibian surveys, breeding bird surveys, ELC surveys and a botanical inventory in support of a proposed residential development. Prepared an EIS to assess potential constraints and opportunities associated with the development. Conducted a site walk with the Region of Waterloo to delineate the woodland boundary. Provided a response to agency comments on the EIS.

Sharp Road and Telephone City Aggregate Lands Environmental Impact Study, Paris, Ontario (Terrestrial Ecologist, 2013)

Completed breeding bird surveys and drafted the natural heritage component of an EIS in support of a mixed use development project.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Richardson Farms Environmental Impact Study, London, Ontario (Terrestrial Ecologist, 2014)
Conducted breeding bird surveys, ELC surveys and botanical inventories in support of a residential development in south London. Drafted an EIS to assess potential constraints and opportunities associated with the proposed development

Victoria Park Village Environmental Implementation Report, Guelph, Ontario (Terrestrial Ecologist, 2015)
Drafted an update to the EIR for a residential development. Conducted a turtle nesting survey as part of the EIR.

Idlewood Creek Restoration Environmental Impact Study, Kitchener, Ontario (Terrestrial Manager, 2017-2018)
Client: City of Kitchener
Total Construction Cost: CAD 1.4M
Confirmed ELC communities and conducted a bat tree roost assessment. Drafted a scoped EIS to assess positive and negative impacts of the Project. Contributed to an Information Gathering Form to summarize terrestrial species at risk habitat and recommend mitigation measures to reduce impacts. Prepared a Species at Risk Mitigation Plan for endangered bats.

Hastings Village Existing Conditions Report, Hastings, Ontario (Terrestrial Manager, 2018)
Completed an ELC survey, summer botanical and wildlife habitat assessment in support of a proposed development. Prepared an Existing Conditions Report to determine constraints and opportunities for the property.

825-875 Main St. Scoped Environmental Impact Study, Cambridge, Ontario (Terrestrial Task Manager, 2016-2017)

Completed a site visit to document existing conditions and prepared a scoped EIS to assess potential impacts on a wetland adjacent to a proposed residential development.

1888 Gordon St. Scoped Environmental Impact Study and Species at Risk Assessment, Guelph, Ontario (Terrestrial Ecologist, 2016-2018)

Client: Tricar

Completed an ELC survey, 3-season botanical inventory, breeding bird surveys, terrestrial crayfish surveys and a wildlife habitat assessment in support of a residential development. Prepared a scoped EIS to describe the natural heritage features in the conservation authority regulation limit and recommend mitigation measures to reduce impacts on the features. Represented the client at a City of Guelph Environmental Advisory Committee meeting to discuss report requirements.

Waterloo Westside Employment Lands Environmental Impact Study, Waterloo, Ontario (Terrestrial Ecologist, 2017-2019)

Client: City of Waterloo

Conducted an ELC survey, a botanical inventory, a wetland delineation, amphibian call count surveys, breeding bird surveys and a wildlife habitat assessment in support of a development in northwest Waterloo. Prepared an EIS to identify natural heritage features and recommend mitigation measures. Consulted with the Grand River Conservation Authority regarding the regulated wetlands on the Project site.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Chicopee Ski Hill Environmental Impact Study,
Kitchener, Ontario (Terrestrial Ecologist, 2017)

Client: Chicopee Ski Hill

Conducted an ELC survey and a spring botanical inventory in support of proposed grading/fill operations to improve the ski slopes. Prepared a scoped EIS to describe the natural heritage features in the conservation authority regulation limit and to recommend mitigation measures to reduce impacts on the features. Submitted an Information Gathering Form to the MNR to discuss potential species at risk habitat and mitigation measures.

Federal Government

CFB Borden Forest Resource Inventory, Borden,
Ontario (Terrestrial Ecologist, 2018)

Client: Department of National Defence

Completed evening amphibian call count surveys and daytime chorus frog call count surveys throughout the base.

Phase II Update Species at Risk Surveys, Ottawa,
ON (Terrestrial Ecologist, 2020)

Client: Public Services and Procurement Canada (PSPC)

Completed targeted surveys for SAR Bats were completed according to PSPC's (2019) National Species at Risk Protocol to address requirements of the federal Species At Risk Act, 2002 and the provincial Endangered Species Act, 2007.

Phase I and II Species at Risk Site Surveys and
Tree Assessment, Ottawa, ON (Terrestrial
Ecologist, 2020)

Client: Public Services and Procurement Canada (PSPC)

Completed targeted surveys for SAR Bats were completed at the Sir John Carling West Annex according to PSPC's (2019) National Species at Risk Protocol to address requirements of the federal Species At Risk Act, 2002 and the provincial Endangered Species Act, 2007.

Municipal

Norval West By-Pass Municipal Class
Environmental Assessment, Halton Hills, ON,
Canada (Terrestrial Ecologist, 2020-present)

Client: Regional Municipality of Halton

Completed the terrestrial field program in support of the Norval By-Pass Municipal Class Environmental Assessment. Surveys included Ecological Land Classification, a botanical inventory, amphibian surveys, breeding bird surveys, a bat maternity roost survey, bat acoustic monitoring surveys, a woodland plot assessment and a wildlife habitat assessment. Compiled the draft Environmental Existing Conditions and Impact Assessment Reports.

Scheifele Bridge Improvements Environmental
Impact Study, Waterloo, ON, Canada (Terrestrial
Ecologist, 2020-present)

Client: Region of Waterloo

Completed the terrestrial field program in support of the Scheifele Bridge Improvements Project and assisted with the drafting of the Environmental Impact Study. Surveys included Ecological Land Classification, a botanical inventory, breeding bird surveys, turtle basking surveys, a bat maternity roost survey and a wildlife habitat assessment.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Cambridge Landfill, Cambridge, Ontario
(Terrestrial Ecologist, 2015-2016)

Client: City of Cambridge

Confirmed ELC and conducted a botanical inventory in support of an EIS for the construction of a system forcemain and electrical conduit for the Cambridge Landfill site. Prepared an EIS to outline mitigation measures to protect natural heritage features.

Waterloo Park Central Promenade Environmental Impact Study, Waterloo, Ontario (2017)

Client: City of Waterloo

Completed ELC, a 3-season botanical inventory, a bat roost survey, amphibian surveys, breeding bird surveys and a wildlife habitat assessment in support of a trail improvement project in Waterloo. Prepared a scoped EIS to address impacts to the natural heritage features identified in the floodplain.

Silver Lake Environmental Impact Study, Waterloo, Ontario (2017-2018)

Client: City of Waterloo

Completed ELC, a 3-season botanical inventory, amphibian surveys, breeding bird surveys and a wildlife habitat assessment in support of improvements to Silver Lake and Laurel Creek in Waterloo. Prepared an EIS to outline the significant natural heritage features in the Study Area and potential impacts related to the improvement areas.

Victoria Park Lake Improvement Project, Kitchener, Ontario (Terrestrial Ecologist, 2013-2014)

Client: City of Kitchener

Completed ELC, vegetation monitoring transect assessments and waterfowl and gull roost surveys for years 2 and 3 of a three year post-construction monitoring program. Authored the natural heritage sections of the year 2 and 3 Post-Construction Monitoring Reports.

City of Kitchener Trail, Kitchener, Ontario (Terrestrial Ecologist, 2015)

Client: City of Kitchener

Completed amphibian surveys, breeding bird surveys and a botanical inventory for lands proposed to be developed for a school access trail, and prepared a field investigation summary for the City of Kitchener.

Oil & Gas

Enbridge Kirkwall-Hamilton Pipeline (Terrestrial Ecologist, 2019-2020)

Client: Enbridge

Completed botanical surveys, breeding bird surveys, amphibian surveys and turtle basking surveys in support of an expansion to the existing pipeline.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Union Gas Existing Conditions Summaries, Various Locations, Ontario (Terrestrial Ecologist, 2017-2018)

Client: Union Gas

Completed species at risk habitat and wildlife habitat assessments to support maintenance activities and integrity digs within the pipeline right of way in Puslinch, Cambridge, St. George, Brantford and Ancaster, Ontario, and provided Existing Conditions Summaries with recommendations to mitigate potential negative impacts. Prepared a species at risk Mitigation Plan for endangered bats for the NPS 12 Pipeline in Brantford.

Enbridge Integrity Digs, Various Sites, Ontario (Terrestrial Ecologist, 2014)

Conducted nest search surveys prior to the removal of vegetation in support of integrity digs to assess the condition of the Enbridge pipeline. Surveys were conducted in various locations throughout southern and eastern Ontario.

Union Gas Brantford to Kirkwall Pipeline, Region of Waterloo to City of Hamilton, Ontario (Terrestrial Ecologist, 2013-2014)

Client: Union Gas

Completed ELC and various wildlife surveys including breeding bird point counts, amphibian call count surveys, salamander surveys, turtle surveys and nightjar surveys in support of an expansion to the existing pipeline.

Union Gas Limited Burlington to Oakville Pipeline, Burlington to Oakville, Ontario (Terrestrial Ecologist, 2014-2015)

Client: Union Gas

Completed snake coverboard surveys, terrestrial crayfish surveys and a bat maternity colony survey in support of an expansion to the existing pipeline.

Union Gas Hamilton to Milton Pipeline Project, Hamilton and Milton, Ontario (Terrestrial Ecologist, 2014-2015)

Client: Union Gas

Completed botanical inventories and various wildlife surveys including snake coverboard surveys, bat maternity colony surveys and salamander surveys in support of an expansion to the existing pipeline.

Union Gas Bright Compressor Station, Bright, Ontario (Terrestrial Ecologist, 2015)

Client: Union Gas

Completed ELC, botanical inventories and amphibian surveys to support an expansion of the Union Gas Bright Compression Station. Assisted in drafting the EIS report, and responded to agency comments to obtain approval of the report.

Railroads

CN Rail Milton Intermodal Terminal Project, Milton, Ontario (Terrestrial Ecologist, 2015-2017)

Client: CN

Completed ELC and botanical inventories and various wildlife surveys including amphibian call count surveys, salamander egg mass surveys, turtle basking surveys, snake coverboard surveys and grassland breeding bird surveys for the proposed CN Intermodal Terminal.

Metrolinx Bowmanville Rail Expansion, Oshawa, Ontario (Terrestrial Ecologist, 2018-present)

Client: Metrolinx

Completed vegetation, bat, amphibian and breeding bird surveys, as well as Species at Risk and Significant Wildlife Habitat assessments in the Project Footprint and the Study Area. Authored the Natural Environment Technical Report Addendum (Version 1).

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Metrolinx Ontario Line, Toronto, ON, Canada
(Terrestrial Ecologist, 2020-present)

Client: Metrolinx

Completed field investigations in support of the Natural Environment Technical Report (NETR) and Species at Risk (SAR) Technical Memos. Compiled the NETR, the Lower Don Natural Heritage Impact Study (NHIS), SAR Technical Memos, and contributing SAR survey recommendations to Environmental Work Plans.

Stouffville Rail Corridor Grade Separation Program and Scarborough Junction Technical Advisor, Stouffville, ON, Canada (Terrestrial Ecologist, 2019-2021)

Client: Metrolinx

Completed vegetation, amphibian, and breeding bird surveys, and bat, Species at Risk, and Significant Wildlife Habitat assessments for four Sites included as part of the Stouffville Rail Corridor Project. Compiled the Natural Environment Technical Reports for each of the four Sites based on the field survey results.

Environmental Monitoring

Terrestrial Monitoring Program, Milton, Ontario
(Terrestrial Ecologist, 2019-2022)

Client: Menkes Milton Industrial

Established and assessed long-term vegetation monitoring plots and conducted amphibian surveys in support of an ongoing monitoring project for the Menkes Milton Industrial Lands.

Carriage Crossing Terrestrial Monitoring Program, Waterloo, Ontario (2017-2022)

Client: Aactiva Holdings Inc.

Monitored the integrity of the construction fencing and the health of adjacent natural heritage features during construction of the Carriage Crossing residential subdivision, and immediately reported issues to the Project Manager. Compiled field investigation summaries for inclusion in the annual Monitoring Reports.

781 Victoria Road Terrestrial Monitoring Program, Guelph, Ontario (Terrestrial Ecologist, 2015-2022)

Client: Reid's Heritage Homes

Assessed 9 vegetation plots and 7 vegetation monitoring stations as part of an ongoing monitoring program, as outlined in the Environmental Implementation Report

University of Waterloo Northwest Campus Environmental Monitoring, Waterloo, Ontario
(Terrestrial Manager, 2014-2022)

Client: University of Waterloo

Monitored the integrity of the construction fencing and the health of the preserved vegetation during construction on the Northwest Campus lands, and reported issues immediately to the Project Manager. Compiled field investigation summaries for incorporation into the annual Monitoring Reports.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Waterloo Westside Lands, Environmental Monitoring, Waterloo, Ontario (Terrestrial Manager, 2014-2022)

Client: Activa Holdings Inc.

Monitored the integrity of the construction fencing and the health of adjacent natural heritage features during construction of the Waterloo Westside residential subdivision, and immediately reported issues to the Project Manager. Compiled field investigation summaries for inclusion in the annual Monitoring Reports.

Roadways

Highway 401 Rehabilitation Sweaburg Road, Woodstock, Ontario, Canada (Terrestrial Ecologist, 2020)

Client: Ministry of Transportation

Completed roadside ELC surveys, SAR habitat assessments and wildlife habitat assessments in support of Highway 401 improvements between Norwich Avenue and Sweaburg Road. Contributed to the Terrestrial Ecosystems Existing Conditions and Impact Assessment Report for the Project.

Beaver Creek Road and Conservation Drive Road Improvements, Waterloo, Ontario (Terrestrial Ecologist, 2014-present)

Client: City of Waterloo

Completed roadside ELC surveys and wildlife habitat assessments in support of a road improvement project through an environmentally sensitive landscape. Compiled a Natural Heritage Report that summarized the field investigations and provided a background review of previous studies. Submitted an Information Gathering Form to the Ministry of Natural Resources and Forestry with recommendations to mitigate impacts on species at risk.

Guelph Line Improvement Project, Milton, Ontario (Terrestrial Ecologist, 2013-2015)

Consulted with MNRF and Conservation Halton staff regarding field work requirements and prepared a detailed workplan based on the discussions. Implemented a comprehensive terrestrial field program in support of proposed road improvements that included ELC, a botanical inventory, amphibian call count surveys, salamander egg mass surveys, turtle basking surveys, bat maternity colony surveys, breeding bird surveys and a wildlife habitat assessment. Drafted the Natural Heritage Report for the Project.

Glendon Drive Streetscape Improvement Project, Municipality of Middlesex Centre, Ontario (Terrestrial Ecologist, 2015)

Client: Municipality of Middlesex Centre

Completed roadside ELC surveys and wildlife habitat assessments and prepared an Existing Conditions Report for the Glendon Drive Streetscape Improvement Project.

Ministry of Transportation Ontario (MTO) Highway 17 Re-route Project, Ignace, Ontario (Terrestrial Ecologist, 2015)

Client: Ontario Ministry of Transportation

Completed a vegetation assessment using the Ecosites of Ontario classification system, a spring botanical inventory and a wildlife habitat assessment for the proposed re-route of Highway 17 at the Revell River. Prepared an Existing Conditions and Preliminary Impact Assessment Report to summarize the natural heritage features along the proposed re-route and identify potential impacts to these features.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Ministry of Transportation Ontario (MTO) Highway 401 Improvements Between Hespeler Road and Wellington Road 32, Cambridge, Ontario (Terrestrial Ecologist, 2014, 2018)

Client: Ministry of Transportation

Completed roadside ELC surveys and wildlife habitat assessments in support of Highway 401 improvements between Hespeler Road and Wellington Road 32. Authored the Terrestrial Ecosystems Existing Conditions and Impact Assessment Report for Phase 2 of the Project.

Power

Bruce Power Expansion, Tiverton, Ontario (Terrestrial Ecologist, 2014-2015)

Client: Bruce Power

Completed a comprehensive terrestrial field program in support of proposed building expansions, including ELC, botanical, amphibian, turtle, bat and breeding bird surveys and a wildlife habitat assessment. Drafted a Natural Heritage Report to assess potential constraints and opportunities associated with the proposed development. Participated in the consultation with MNRF regarding proposed removal of species at risk habitat.

Bruce Power Existing Conditions and Impact Assessment, Kincardine, Ontario (Terrestrial Ecologist, 2017-2018)

Client: Bruce Power

Completed ELC, grassland bird surveys and a wildlife habitat assessment for a proposed commercial development. Contributed to an Existing Conditions and Impact Assessment report for the Site.

Renewable Energy

Niagara Region Wind Farm, Townships of West Lincoln and Wainfleet and the Town of Lincoln, Ontario (Terrestrial Ecologist, 2013-2014)

Client: Niagara Region Wind Corporation

Provided input to the NHA/EIS for the Niagara Region Wind Farm. Completed fall migratory landbird surveys, bat maternity colony surveys, turtle overwintering surveys, snake hibernacula surveys and turtle nesting habitat assessments. Compiled wildlife survey data into a pre-construction monitoring report, as required by the NHA/EIS.

Cedar Point Wind Energy Project, Lambton County, Ontario (Terrestrial Ecologist, 2013)

Conducted bat maternity colony surveys, amphibian call count and egg mass surveys and compiled an amphibian field memo to fulfill pre-construction monitoring requirements related to the NHA/EIS.

Bow Lake Wind Farm, Townships of Smilsky and Peever, Algoma District, Ontario (Terrestrial Ecologist, 2013)

Completed targeted species at risk breeding bird point count surveys, snake hibernaculum assessments, waterfowl nesting surveys, amphibian call count and egg mass surveys, and turtle overwintering surveys in support of the NHA/EIS for the Bow Lake Wind Farm Renewable Energy Act Approval.

** denotes projects completed with other firms*

Janice A Ball B.Sc.

Terrestrial Ecologist · 21 Years of Experience · Waterloo, Ontario

Natural Sciences & Heritage Resources

Ecological Land Classification, Parks Canada*,
Mallorytown, Ontario (Field Technician, 2005-
2007)

Client: Parks Canada

Completed Ecological Land Classification surveys
in support of a large-scale remote sensing project
led by the Ministry of Natural Resources.

Management Planning, Wildlife Surveys and
Monitoring, Credit Valley Conservation Authority*,
Mississauga, Ontario (Natural Heritage
Technician, 2010-2012)

Client: Credit Valley Conservation Authority

Completed ELC assessments and salamander,
amphibian call count and turtle surveys in support
of management planning initiatives. Assisted with
the compilation of a natural heritage report to
summarize the field investigations. Completed
various avian surveys including winter raptor, owl
and shorebird surveys and targeted species at risk
surveys. Monitored a population of Midland
Painted Turtles in Mississauga via radio-telemetry
and trapping surveys.

** denotes projects completed with other firms*

Debra is a Senior Terrestrial Ecologist with experience in the transportation, oil and gas and mining sectors. She has extensive experience in avian biology, technical report writing, survey techniques and protocols. Debra has participated in recovery planning for various avian species at risk, served on many species at risk management and recovery teams, developed, designed and implemented bird monitoring and stewardship programs, and provided scientific oversight, program design and delivery. Debra has strong skills in collecting, compiling, managing, analyzing and reporting field data for large study areas, as well as recruiting, training and supervising field crew members. In her previous role as Ontario Program Manager with Bird Studies Canada, she oversaw a multitude of bird monitoring, research, stewardship, education and outreach initiatives.

Debra is a strong communicator, and has overseen communications materials, prepared media releases, delivered public presentations, coordinated stakeholder workshops, and delivered media interviews. She is accustomed to collaborating with government, non-government, and industry partners, and is skilled at the efficient management of large projects and project budgets. Debra holds memberships in several committees and councils of various natural heritage organizations in both Canada and the United States, and has authored many scientific studies in peer-reviewed journals, and many technical reports including status updates for the Committee of Endangered Wildlife in Canada (COSEWIC).

EDUCATION

M.Sc., Trent University / Watershed Ecosystems Graduate Program, Peterborough, Ontario, Canada, 2001

B.Sc. (Hons.), Ecology and Evolution (Area of Concentration in Environmental Science), University of Western Ontario / Environmental Science, London, Ontario, Canada, 1996

CERTIFICATIONS & TRAINING

Standard First Aid with CPR C + AED, St. John Ambulance, Hamilton, Ontario, 2018

MEMBERSHIPS

Bird Studies Canada, Member

Society of Canadian Ornithologists, Member

American Ornithologists' Union, Member

Society of Canadian Ornithologists, Councillor (2008-2012)

The Ontario Road Ecology Group, Member

Ontario Field Ornithologists, Member

PROJECT EXPERIENCE

Transportation Planning

Municipal and Provincial Road Improvement Projects, Various Sites, Ontario (Terrestrial Ecologist)

Collected wildlife and wildlife habitat data, including Species at Risk, determined potential impacts and mitigation options, contributed to preliminary design route selection and detailed design, prepared technical reports.

** denotes projects completed with other firms*

Debbie Giesbrecht M.Sc.

Terrestrial Ecologist · 24 Years of Experience · Hamilton, Ontario

Oil and Gas Pipelines

Energy East Pipeline (Ontario Wildlife Discipline Lead, 2013-2015)

Client: Trans Canada Pipelines

Prepared Environmental and Socioeconomic Assessments for the National Energy Board for 104 km of new build pipeline, and 30 pump stations across Ontario; designed and implemented field programs; managed data and reporting.

Mining

De Beers Tango Extension of Victor Mine, Hudson Bay Lowlands, Ontario (Project Manager)

Client: De Beers

Designed and implemented a bird monitoring project in consultation with the client using autonomous recording devices to meet Environment Canada's new guidelines for bird monitoring at mining sites. Prepared reports for client; supervised collection of data.

Eagle River Proposed Tailings Management Facility, Wawa, Ontario (Senior Terrestrial Ecologist)

Client: Wesdome

Species at Risk approvals for Woodland Caribou and Eastern Whip-poor-will, senior QC review of baseline reports.

Endangered Species/Species at Risk

Assessments

Various Projects

Prepared construction phase mitigation plans for Blanding's Turtle, Barn Swallow and Massasauga Rattlesnake; registered SAR projects under O Reg. 242/08 of the Endangered Species Act; prepared Bobolink Habitat Management Plans.

Wildlife Ecology, Multiple Sites, Ontario

Familiar with all Ontario wildlife with expertise in terrestrial Species at Risk. Experience conducting field work for birds, amphibians, turtles, snakes and bats. Strong knowledge of life-history, habitat requirements and population threats for Ontario wildlife species.

Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures, Multiple Sites, Ontario

Lead author on this document which was prepared for the Ministry of Natural Resources and Forestry.

Species at Risk, Multiple Sites, Ontario

Extensive experience with federal and provincial Species at Risk, including field identification and monitoring, design and delivery of monitoring programs, recovery planning, and permits/authorizations under the Endangered Species Act. Developed research projects to address habitat requirements for Species at Risk, including Chimney Swift, Barn Swallow and Bank Swallow. Developed mitigation plans and habitat management plans for SAR turtles, snakes and birds. Prepared Notice of Activity forms and Information Gathering Forms.

** denotes projects completed with other firms*

Debbie Giesbrecht M.Sc.

Terrestrial Ecologist · 24 Years of Experience · Hamilton, Ontario

Natural Sciences & Heritage Resources

**Bird Studies Canada (BSC)*, Port Rowan, Ontario
(Ontario Program Manager, 2007-2013)**

Oversaw all Ontario bird monitoring, research, stewardship, education and outreach initiatives in Ontario, including the Ontario Nocturnal Owl Survey, Bald Eagle Monitoring Program, SwiftWatch, Bank Swallow Project, Forest Birds at Risk, Great Lakes Marsh Monitoring Program, and the Bird Science and Education Program.

Participated in recovery planning for Hooded Warbler / Acadian Flycatcher, Barn Owl, Chimney Swift, Golden-winged Warbler, Short-eared Owl, Whip-poor-will, Barn Swallow. Member of Hooded Warbler / Acadian Flycatcher Recovery Team, Southern Ontario Bald Eagle management team, Chimney Swift Recovery Team, Ontario Eastern Habitat Joint Venture Advisory Committee, Bank Swallow Working Group, and Barn Swallow Recovery Working Group. Developed, designed and implemented bird monitoring and stewardship programs, including scientific oversight, program design and delivery. Developed field research projects, analyzed data, and reported on findings to partner organizations. Delivered public presentations, coordinated stakeholder workshops, and delivered media interviews. Secured sufficient funding to support Ontario staff and meet administrative overhead targets through preparing funding proposals to foundations, government agencies, and corporations. Identified new opportunities for programs, and developed new partnerships and opportunities to increase revenue.

**Bird Studies Canada (BSC)*, Port Rowan, Ontario
(Bird Population Biologist, 1999-2007)**

Analyzed bird migration data from across Canada to estimate bird population trends. Compiled bird data and prepared written site descriptions on Important Bird Areas in Canada. Coordinated summer field work for Hooded Warblers, which included nest searching, monitoring, mist netting, colour banding, vegetation sampling. Coordinated field work for Bald Eagles, which included nest access, blood sampling, banding, deployment of satellite telemetry units. Coordinated Ontario Nocturnal Owl Survey, Red-shouldered Hawk and Spring Woodpecker Survey, and Ontario Breeding Bird Survey. Managed and analyzed data, prepared technical reports and funding proposals.

Current Research Projects/Partnerships

Recipient of Stantec R&D Fund grant to investigate habitat selection of Barn Swallows at bridges and culverts in Ontario. Collaborative research project with Bird Studies Canada, Environment and Climate Change Canada and Ministry of Natural Resources and Forestry. Industry supervisor for an NSERC Industrial Post-graduate Scholarship. M.Sc. Student. Collaborative research project looking at movements of juvenile Bald Eagles from the lower Great Lakes. Partners: Bird Studies Canada, University of New Brunswick, Ministry of Natural Resources and Forestry.

** denotes projects completed with other firms*

Debbie Giesbrecht M.Sc.

Terrestrial Ecologist · 24 Years of Experience · Hamilton, Ontario

Roadways

Highway 401 Expansion, GWPs 3024-18-00, 3073-17-00, 3025-18-00, 3078-18-00, 3079-18-00, 3038-19-00, Tilbury to London, Ontario (Senior Terrestrial Ecologist, 2019-present)

Client: MTO West Region

This project includes the preliminary design, environmental assessment and design build ready work to address the future needs of the Highway 401 corridor from Tilbury to London (129 km) within Chatham-Kent, Elgin, Middlesex, and London. The project has been broken down into six GWPs—four to focus on reconstruction and widening of Highway 401 from four to six lanes, and two to focus on interchange improvements. The terrestrial discipline includes study design, mitigation recommendations, impact assessment, and Species at Risk approvals.

Highway 6 Little Current Swing Bridge, Planning, Preliminary Design and Class EA Study, GWP 5268-14-0, Manitoulin Island, Ontario (2018-present)

Client: MTO Northeastern Region

The purpose of the EA for replacement of the Highway 6 Little Current Swing Bridge is to identify a Recommended Plan to address current and future transportation needs at the bridge crossing. Field data were collected at four alignment alternatives to document existing conditions and the information was used to and assess the sensitivity and potential impacts, including consideration of the design alternatives (crossing type), for each alignment. Coordinated field data collection for terrestrial resources and authored the Existing Conditions report for the project.

Large Value Retaine, Southwestern Ontario (Natural Sciences Quality Reviewer, 2018-2020)

Client: MTO West Region

Under the terms of a three year Retainer Agreement for Highway Engineering and Other Services Throughout West Region (Agreement 3017-E-0004/0005, 3017-E-0006/0007), many of the individual assignments had a natural sciences component. The terrestrial ecosystems reports documented existing conditions, assessed site sensitivities and impacts of the contract and recommended environmental mitigation measures.

Agreement 4015-E-0033: Preliminary Design Retainer Services (Senior Ecologist, 2016-2020)

Client: MTO Eastern Region

Lead author for preliminary design and detail design study for carpool lots expansion at Highway 417 (interchange 79) and Highway 416 (interchange 57), including terrestrial resources and SAR.

Senior Reviewer for Class EA preliminary design study for the future widening of Highway 401 from Cobourg to Colborne, involving the replacement and rehabilitation of structures, interchange modifications, and commuter parking lot expansions, including terrestrial resources and SAR.

Detail Design and Class Environmental Assessment Highway 400 North Canal Overpass Replacement, County of Simcoe, Ontario (Senior Ecologist, 2016-2019)

Client: MTO

Senior Reviewer for existing conditions and impact assessment report.

** denotes projects completed with other firms*

Debbie Giesbrecht M.Sc.

Terrestrial Ecologist · 24 Years of Experience · Hamilton, Ontario

Detail Design and Class Environmental Assessment Replacement of South Saugeen River Bridge, County of Grey, Ontario (Senior Ecologist, 2017-2018)

Client: MTO

Prepared existing conditions and impact assessment report, conducted site visit to document existing conditions.

Preliminary Design, Detail Design and Class Environmental Assessment for 145 Culvert Rehabilitation/Replacements, Multiple Sites, Ontario (Senior Ecologist, 2013-2017)

Client: MTO

Senior Reviewer, prepared Species at Risk Mitigation Plan, Notice of Activity Form for Ministry of Natural Resources and created Species at Risk Factsheets for Barn Swallow and Massasauga.

Environmental Retainer Services, East Region , Multiple Sites, Ontario (Senior Ecologist, 2016-2018)

Client: MTO

Lead author of existing conditions and impact assessment reports.

Detail Design and Class Environmental Assessment Highway 401 Reconstruction, Multiple Sites, Ontario (Senior Ecologist, 2014-2017)

Client: MTO

Contributing author to the Terrestrial Ecosystems Existing Conditions and Impact Assessment Report. Senior Reviewer and advisor for the project. Preparation of mitigation plans and ESA authorizations.

Detail Design and Class Environmental Assessment Highway 24 from Brant Road 5/Blue Lake Road to Glen Morris Road, County of Brant, Ontario (Terrestrial Ecologist, 2014-2016)

Client: MTO

Coordinated and performed the site investigations including a road mortality study. Author of Terrestrial Ecosystems Existing Conditions and Impact Assessment Report. Provided recommendation for wildlife enhancements to reduce wildlife mortality and enhance habitat connectivity. These included the installation of large culverts, funnel fencing and the creation of artificial nesting habitat.

Municipal

Heart Lake Road, Brampton, Ontario (Senior Terrestrial Ecologist, 2017-2018)

Client: City of Brampton

Gathered background information; lead author on report which describes the existing conditions including high levels of road mortality.

Dundas Street Road Widening and Grade Separation, Halton, Ontario (Senior Terrestrial Ecologist, 2016-2019)

Client: Regional Municipality of Halton

As Discipline Lead, conducted field work, performed background review, completed bat habitat assessment for SAR, prepared impact assessment report, consulted with MNRF to obtain SAR authorizations.

Regional Road 25 Municipal Class Environmental Assessment, Halton, Ontario (Senior Terrestrial Ecologist, 2018-2019)

Client: Regional Municipality of Halton

Lead author for Natural Environment report.

** denotes projects completed with other firms*

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Bramalea Road (Queen Street to South City Limit)
Municipal Class Environmental Assessment,
Brampton, Ontario (Senior Terrestrial Lead /
QA/QC Reviewer, 2018-2019)
Client: City of Brampton

** denotes projects completed with other firms*

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PUBLICATIONS & WHITEPAPERS

Invited Plenary Presentation. Society of Canadian Ornithologists Annual Meeting, Winnipeg, MB.
Badzinski, D.S. The power of people - engaging citizens in bird and habitat conservation., 2013.

Fitzgerald, T., J. Nocera, E. van Stam, and D. Badzinski. Is habitat limiting the Chimney Swift population in Ontario? Oral Presentation. Society of Canadian Ornithologists Annual Meeting, Winnipeg, MB, 2013.

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Bowman, J., D.S. Badzinski, R.J. Brooks. The numerical response of breeding Northern Saw-whet Owls (*Aegolius acadicus*) suggests nomadism. *Journal of Ornithology* 151:499-506, 2010.

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Blancher, P.J., D. Phoenix, D.S. Badzinski, M.D. Cadman, T.L. Crewe, C.M. Downes, D. Fillman, C.M. Francis, J. Hughes, D.J.T. Hussell, D. Lepage, J.D. McCracken, D.K. McNicol, B.A. Pond, R.K. Ross, R. Russell, L.A. Venier, and R.C. Weeber. Population trend status of Ontario's forest Birds. *The Forestry Chronicle* 85:184-201, 2009.

Melles, S.J., D.S. Badzinski, M.J. Fortin, and K. Lindsay. Differentiating between habitat and social drivers of clustered nesting patterns in territorial songbirds. *Landscape Ecology* 24:519-531, 2009.

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