REPORT

Natural Environment Report

Ojibway Parkway Wildlife Crossing

Submitted to:

City of Windsor

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Submitted by:
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N3E 0A6 Canada

IM20104013

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Distribution List

One PDF - City of Windsor

One PDF - WSP Canada Inc.

Acronym List

ANSI	Area of Natural and Scientific Interest
BMP	Best Management Practices
SARA	Canadian Species at Risk Act S.C. 2002, c. 29 as amended
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CAA	Conservation Authorities Act, 1990 as amended
ELC	Ecological Land Classification
END	Endangered
ESA	Endangered Species Act 2007 as amended
ECCC	Environment and Climate Change Canada
EC	Environment Canada
EA	Environmental Assessment
ESR	Environmental Study Report
ERCA	Essex Region Conservation Authority
ETR	Essex Terminal Railway
EXT	Extirpated
FWCA	Fish and Wildlife Conservation Act, 1997 as amended
DFO	Fisheries and Oceans Canada
HADD	Harmful Alteration, Disruption or Destruction
MBCA	Migratory Birds Convention Act S.C. 1994, c. 22 as amended
MBR	Migratory Birds Regulations
MMAH	Ministry of Municipal Affairs and Housing
MNRF	Ministry of Natural Resources and Forestry
MECP	Ministry of the Environment, Conservation and Parks
NUP	national urban park
NHIC	Natural Heritage Information Centre
OP	Official Plan

OMNRF	Ontario Ministry of Natural Resources and Forestry
OR	Openness Ratio
PPS	Provincial Policy Statement, 2020
PSW	Provincially Significant Wetlands
PIC	Public Information Centres
RSS	reinforced soil slope
SWH	Significant Wildlife Habitat
SC	Special Concern
SAR	Species at Risk
SGNA	Spring Garden Natural Area
SWM	Stormwater Management
THR	Threatened
T5	Tunnel Top T5
WCPP	Wildlife Collision Prevention Program
WVCs	Wildlife-vehicle Collisions
WDBA	Windsor-Detroit Bridge Authority

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The City of Windsor has completed an Environmental Assessment (EA) to consider the construction of a Wildlife Crossing across Ojibway Parkway and Essex Terminal Railway (ETR) tracks south of Broadway Boulevard to re-establish an ecological connection between the natural areas associated with Black Oak Heritage Park and Ojibway Park. The Wildlife Crossing would provide a connection for local tallgrass prairie plant communities and safe passage opportunities for wildlife, including species at risk. The proposed Wildlife Crossing would thereby reduce landscape fragmentation through the improvement of habitat connectivity in the Ojibway Prairie Complex. The Wildlife Crossing would also reduce wildlife-vehicle collisions (WVCs) and their threat to motorists.

The 20 m wide Ojibway Parkway and the eight tracks operated by the ETR to the west of Ojibway Parkway inhibit wildlife movement and ecological functions. Approximately 20,000 vehicles per day travel along the Ojibway Parkway and E.C. Row Expressway, contributing heavily to wildlife mortality, driving hazards, and landscape fragmentation. In addition, traffic along Ojibway Parkway is expected to increase with the development of the nearby Gordie Howe International Bridge. Consequently, the Windsor-Detroit Bridge Authority (WDBA) is a funding partner for the commencement of the EA. The City's intent is to seek future funding from environmental organizations, provincial and federal levels of government, and obtain approval for the remaining amount through the Capital Budget process.

The location and design of the Wildlife Crossing was selected as part of this EA after careful consideration of engineering requirements and existing site conditions, constraints related to land ownership, previous studies, literature, and feedback obtained through a comprehensive consultation program, which was comprised of consultation with the Indigenous Nations, the public, government agencies, ETR, utilities, and key stakeholder groups. The preferred location and design of the Wildlife Crossing consider wildlife-related concerns, including habitat fragmentation and connectivity for several wildlife groups, as well as plants. The preferred location and design also consider the loss of habitat and secondary and cumulative impacts on the existing landscape.

1.2 Background

The Ojibway Prairie Complex is a collection of six closely situated natural areas in the City of Windsor (Figure 1-1). From west to east, these natural areas are:

- Black Oak Heritage Park (formerly known as Black Oak Woods; Ojibway Black Oak Woods),
- Ojibway Park (locally also known as Ojibway Tom Joy Woods Park),
- Ojibway Prairie Provincial Nature Reserve (and the lands referred to in Area of Natural and Scientific Interest mapping as southeast of Nature Reserve),
- Tallgrass Prairie Heritage Park (formerly known as Titcombe Road North),
- Spring Garden Natural Area (SGNA; formerly known as Springgarden Forest; Springgarden Road Prairie), and
- Oakwood Natural Area.

Because of a tremendous biodiversity of vegetation and animal life, the Ojibway Prairie Complex has received the designation of the Ojibway Prairie Remnants Area of Natural and Scientific Interest (ANSI), as well as being

identified as a Carolinian Canada site (Government of Ontario, 2002). The Ojibway Prairie Complex includes wetlands, forest, savanna and prairie, which provide habitat for a significant number of rare plants, insects, reptiles, birds and mammals.

The tallgrass prairie and related plant communities, such as oak savannah, are the dominant feature in the Ojibway Prairie Complex. Tallgrass prairie and oak savannah communities are designated as critically imperilled in Ontario (Rodger, 1998). Altogether 533 flowering plant species have been documented in and around the Ojibway Prairie Complex, of which more than 60 are of prairie affinity (Government of Ontario, 2002). Animal species representative of prairie habitats and found in the Ojibway Prairie Complex include Butler's Gartersnake, Eastern Meadowlark, and False-foxglove Sun Moth, all of which are Species at Risk (Government of Ontario, 2002).

The City has been working with Parks Canada to advance the creation of a national urban park (NUP) at the Ojibway Prairie Complex. The NUP project has progressed past the Pre-feasibility Assessment Phase, which included exploratory work to fully understand the natural and cultural values of the proposed NUP sites, including vegetation communities (present and historical); flora and fauna; significant natural heritage features; significant wildlife habitat; species at risk; and road ecology (WSP, 2023a; WSP, 2023b; WSP, 2023c; WSP, 2024a). The natural areas included in the study area are currently under a variety of jurisdictions, including municipal, provincial, federal, and private.

Important to the NUP program and other proposed projects in the City of Windsor is the maintenance and/or improvement of ecological connections between natural areas. The City has recently completed two wildlife crossing studies with the goal of identifying the species and their existing crossing locations along roads that bisect the Ojibway Prairie Complex and identifying potential movement corridors and/or connection points where ongoing monitoring can be used to inform crossing designs and placement locations (WSP 2023a and WSP 2023d). Preliminary results of these studies indicate that wildlife in the Ojibway Prairie Complex use undeveloped rights-of-way, such as naturalized road easements and utility corridors, to move between the natural areas. Connection points where wildlife approach roadways also include openings in existing fences and where drainage features meet the roads.

Trail camera imagery shows that wildlife will use existing infrastructure, such as culverts and bridges, to facilitate their movements between natural areas (WSP 2023a). The most significant of these crossings is the Tunnel Top T5 (T5), constructed as part of the Rt. Hon. Herb Gray Parkway. This ecopassage stretches over Highway 401 and Highway 3 and has facilitated the movement of wildlife between SGNA and Oakwood Natural Area, which were previously separated by the Huron Church Road (Ministry of Transportation, 2016a). Populations of Species at Risk snakes, both Butler's Gartersnake and Eastern Foxsnake, use this crossing to move between reconnected habitats safely. Other wildlife observed crossing the ecopassage include Wild Turkey, White-tailed deer, Coyote, Northern Raccoon, and Striped Skunk.

Ojibway Parkway carries approximately 20,000 vehicles daily, contributing to the functional separation between the Ojibway Park Area and Black Oak Heritage Park Area. Traffic along Ojibway Parkway is expected to increase with the development of the Gordie Howe International Bridge. The Crossing aims to re-establish an ecological connection between the Black Oak Heritage Park Area and the Ojibway Park Area. The Crossing aims to improve ecological connectivity and provide safe passage for wildlife and Species at Risk (SAR) across the Ojibway Parkway and ETR tracks.

The WDBA is a funding partner for the commencement of the EA. The City intends to seek future funding and obtain approval through the capital budget process. The location of the Crossing has been selected after careful consideration of engineering requirements, existing site conditions, and previous studies and literature.

The preferred location of the Crossing considers wildlife-related concerns, including habitat fragmentation and connectivity for several wildlife groups and plants. It also considers habitat loss and secondary and cumulative impacts on the existing landscape.

The goal of the Crossing is to provide a safe, attractive, fiscally responsible, and minimally impactful ecological connection over the Ojibway Parkway. The Crossing location considers that WVCs tend to occur where animals find it easier to cross roads and where there is habitat availability on either side of the road.

Monitoring would be implemented to determine whether the basic functions of the wildlife crossing are being met and to ensure that this crossing is permeable to wildlife.

1.3 Description of the Project Area and Study Areas

The Project Area is located on the east and west sides of the Ojibway Parkway. On the east side, the study area is within Ojibway Park, managed by the City's Department of Parks and Recreation's Ojibway Nature Centre. The East Study Area extends from Broadway Boulevard in the north to City property limits in the south. The West Study Area is a segment of Black Oak Heritage Park (Figure 1-1). Included in the East Study Area is a naturalized area and the Ojibway Parkway Trail between the ETR tracks and the Ojibway Parkway (Figure 1-1); the ETR and Dainty Foods are excluded from the West Study Area. In addition to the above, the Project Area is also designated as Natural Heritage within the City's Official Plan and contains Essex Region Conservation Authority (ERCA) regulation area (Figure 2-1).

1.3.1 Description of Other Local Ecopassages and Crossings

There are currently two constructed ecopassages within the City, both associated with the Rt. Hon. Herb Gray Parkway (Parkway). T5, located northwest of Todd Lane and Cabana Road West, is 160 meters (m) long by 120 m wide (575 m^2), spanning the below-grade portion of Highway 401. The outer edges of T5 are protected by parapet walls, fencing, and dense vegetation to help safely guide wildlife across the structure. A large concrete box culvert at the east end provides safe passage for small wildlife under the Parkway's integrated multi-use trail.

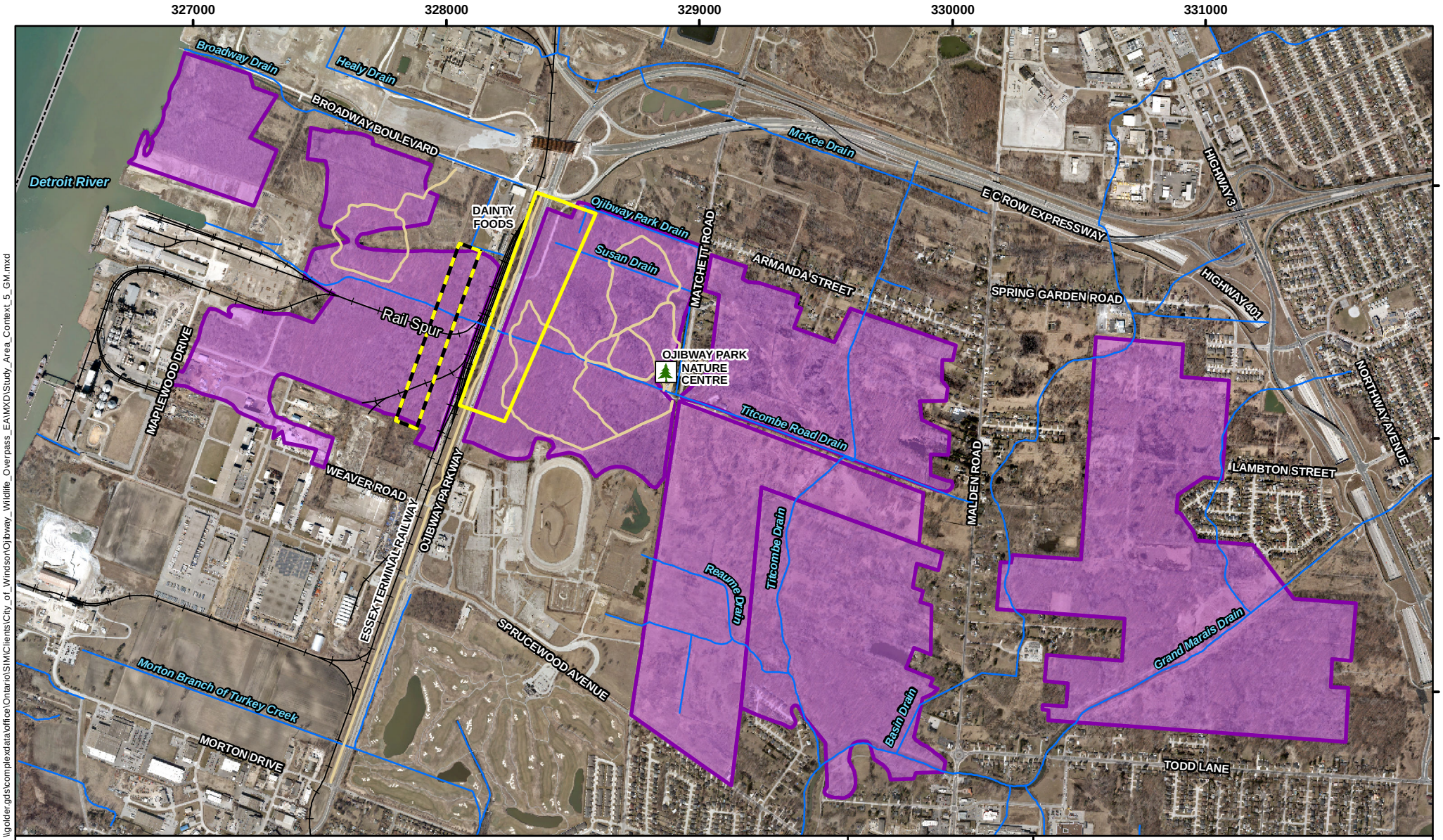
T5 is vegetated with native grasses, wildflowers, and shrubs that provide suitable wildlife habitat on the structure and an effective ecological connection between SGNA and Oakwood Natural Area. The T5 ecopassage is used by various wildlife, including deer, coyote, wild turkey, and two SAR snakes. Ground-nesting birds and SAR plants have also been observed on the structure.

The other ecopassage is located at Matchett Road, just north of Chappus Street. This structure is a 16 m ACO Wildlife KT500 Slotted Tunnel. It fits flush with the roadway, and the slotted upper surface allows airflow in and out of the tunnel. The ecopassage was installed to facilitate the movement of SAR snakes from protected habitat within the Chappus Street Restoration Area (east side of Matchett Road) to created habitat within the Parkway ecological landscape. To date, SAR snakes have approached the tunnel entrance on the east side of Matchett Road but have not yet travelled through the tunnel.

Lastly, there is a desire to provide an ecological connection across Matchett Road and Malden Road, ultimately connecting Ojibway Park and the SGNA. A study under separate cover has evaluated options for this aspiration.

1.4 Description of Adjacent Land Uses

The Ojibway Prairie Complex is fragmented by residential and commercial land uses, a road network of local, collector, and arterial roads, and rail corridors and yards. The provincial Highway/E.C. Row Expressway and new international bridge occur to the north. Other adjacent land uses include lands from a previous operating horse racetrack and a hydro transmission corridor.



LEGEND

- Ojibway Prairie Complex (Prairie Remanants) ANSI
- Ojibway Park Nature Centre

Project Area

- East Study Area
- West Study Area

- Official Park Trail (Ojibway Parkway Multi-use Trail, Ojibway Park Multi-use Trail and Black Oak Heritage Park Multi-use Trail)
- Watercourse / Drain
- Railway
- National Border

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

0 250 500 1,000 1,500 2,000 Metres

Datum: NAD83
Projection: UTM Zone 17N

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

wsp

OJIBWAY PARKWAY WILDLIFE CROSSING

Study Area Context

PROJECT N°: IM20104013	FIGURE: 1-1
SCALE: 1:21,000	DATE: June 2024

1.5 Description of the Proposed Development

The preferred design concept (Project footprint) for the Crossing is a three-span bridge (Figure 1-2) comprised of a 51.3 m span over the ETR tracks, a 21.62 m span over the boulevard area, and a 47.22 m span over the Ojibway Parkway. The span arrangement is uneven because standard horizontal clearances must be provided from the outside ETR tracks to the substructure, and the centre piers must be positioned to avoid existing utilities currently located in the boulevard area. The existing Ojibway Parkway Trail to the west side of Ojibway Parkway would require realignment to pass under the new structure. This design allows the entire crossing to be one continuous bridge, including over the boulevard area, rather than the other alternatives, which have two separate bridges connected with reinforced soil slope (RSS) supported embankments. This allows better sight-lines and access through the structure. Both concrete and steel girders were considered during the preliminary design. Prestressed concrete girders are not considered feasible due to the long spans and significant sustained loading from the soil fill on the bridge. Steel plate girders or box girders are both feasible. The preliminary design has steel plate girders since they would be easier to deliver and install compared to box girders, and the clearance over Ojibway Parkway allows the use of plate girders per the MTO Structural Manual. The girders have a constant depth over the west and middle span but vary on the east span over Ojibway Parkway to meet the MTO requirement for a 6m clearance for plate girders over this type of roadway. The span over ETR tracks must have a minimum vertical clearance of 7.49 m, significantly higher than the required clearance over Ojibway Parkway. To accommodate this rise, the entire bridge deck is sloped at a 3% longitudinal gradient sloping down from West to East. There is also a 0.5% crossfall transversely to encourage positive water drainage.

The approach ramps, including the side slopes of the ramps, are graded at 5:1 slopes. A 5:1 slope was identified as the recommended maximum slope for wildlife for approaches built on level ground. The abutments and piers are expected to be supported on deep foundations. The fully integral abutments would be supported on a single row of steel H-piles, while the piers would be supported on a group of H-piles with a batter to provide the required horizontal resistance. The preferred design also includes continuous concrete barriers along the piers to provide roadside protection. A chain-link fence with wildlife-proof mesh panels mounted on a concrete parapet wall with an architectural finish would run full length along each side of the crossing structure. A concrete retaining wall complete with fencing and a parapet wall would run from the bridge end parallel to the road on the west side of the bridge.

The crossing structure is designed exclusively for wildlife, and human use would be prohibited to minimize disturbance of both wildlife using the crossing and vegetation establishment atop the crossing. Design elements or other measures to deter human use of the Wildlife Overpass would be evaluated and determined during the detailed design phase of this project. These elements may include signage, surveillance equipment, and monitoring.

The preferred design considered ecological recommendations and best practices for road crossings, as is discussed in detail in Section 5.0 (Road Ecology Literature Summary), Section 8.0 (Connectivity Analysis), and Section 9.0 (Alternative Analysis).

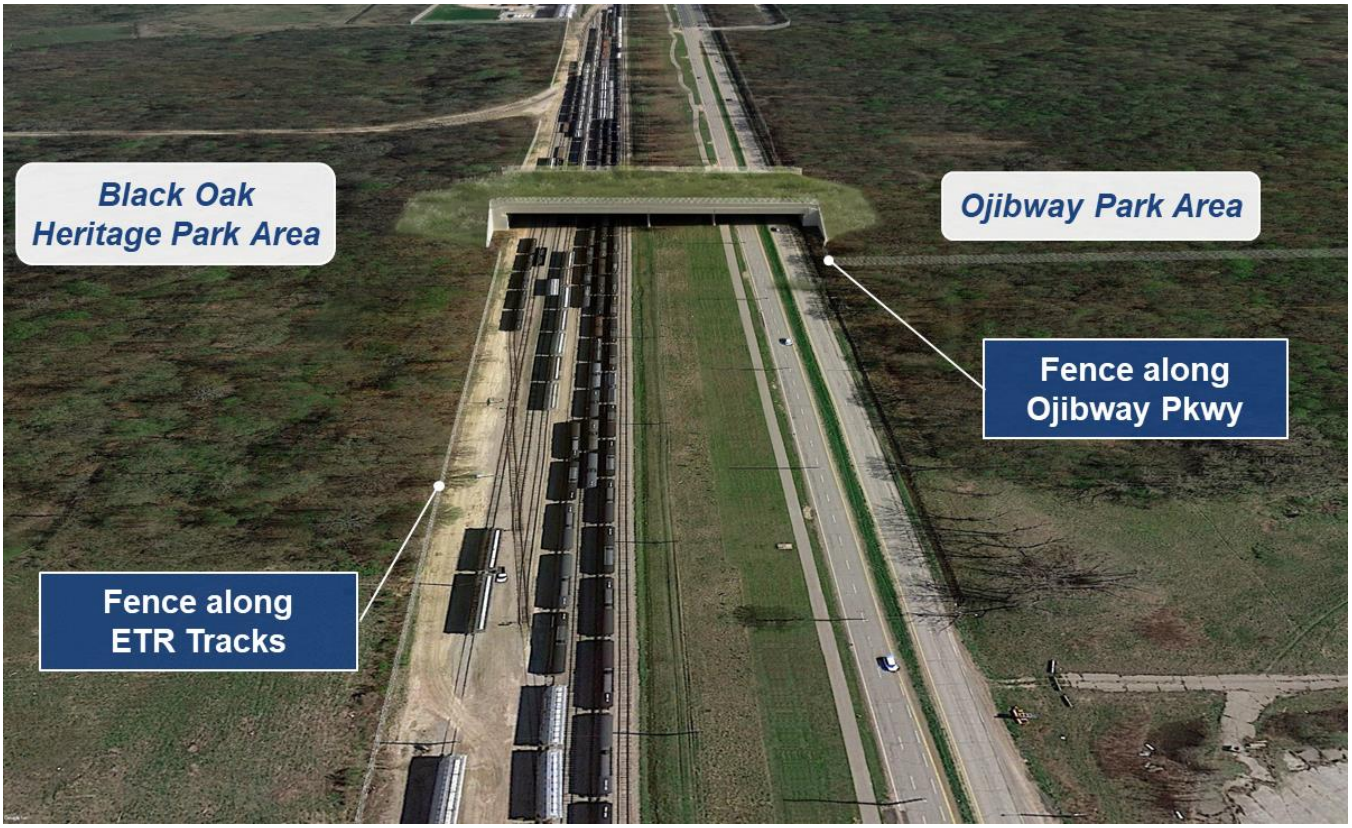


Figure 1-2: Conceptual Rendering of the Preferred Design Concept

2.0 POLICY CONTEXT AND ENVIRONMENTAL DESIGNATIONS

This section elaborates on the current planning context by discussing current land uses and land use policy and regulations on and adjacent to the subject properties. The proposed solution was screened for compliance with plans, policies and legislation relating to the natural heritage which included the following:

2.1 Federal Legislative Requirements

2.1.1 Species at Risk Act, 2002

The Canadian *Species at Risk Act* (SARA; S.C. 2002, c. 29) was passed into law in 2002 and was last amended on 10 June 2024. Environment and Climate Change Canada (ECCC), formerly Environment Canada (EC), administer the SARA throughout Canada. The purpose of the SARA is to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species, and to manage species to prevent further risk to their status. The SARA provides legal protection to SAR listed in Schedule 1 if they have a designation of Extirpated, Endangered, or Threatened with respect to harming the species or its residence. The SARA applies to federal lands (e.g., Canada's oceans and waterways, national parks, military training areas, national wildlife areas, some migratory bird sanctuaries, and First Nations reserve lands) and outside of federal lands to the following:

- Migratory birds (i.e., those species listed under Article I of the *Migratory Birds Convention Act*, 1994) that also fall under Schedule 1 of the SARA. This does not include the species' critical habitat; however, it does include residences of migratory birds which have residence descriptions (i.e., Barn Swallow); and

- Aquatic species that fall under Schedule 1 of the SARA.

SAR with these federal designations require recovery strategies or conservation action plans that identify their critical habitat for mandatory prohibition from damage or destruction. Species listed as Special Concern in Schedule 1 are not legally protected under the SARA but require a management plan. Species listed in Schedule 2 or 3 of the SARA are not legally protected under the SARA. Still, they require status assessment through the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to determine conservation status and priority for recovery and action planning. Notably, the SARA prohibitions can be applied if provincial legislation or voluntary measures do not adequately protect federally listed species and their residence. Generally, compliance with provincial legislation in Ontario satisfies the SARA requirements.

Applicability to the Project

The Project is not located within federal lands. Therefore, the SARA only applies if migratory birds that fall under Schedule 1, migratory birds that have residence descriptions, and aquatic species that fall under Schedule 1 are found in the Project Area. Intermittent municipal drains occur onsite and are mapped as watercourses. These watercourses do not hold water and, therefore, are not fish habitat. SARA applies to this Project concerning federally listed migratory birds that may occur. Additionally, this EA is a municipal undertaking, and no restrictions apply based on potential funding partners. The SARA goals are typically implemented through provincial legislation, policy, and guidelines. The effective SAR legislation for this Project is the *Ontario Endangered Species Act* 2007.

2.1.2 Fisheries Act, 1985

The *Fisheries Act* (R.S.C., 1985, c. F-14) was established in 1985 and last amended 28 August 2019. This Act provides protection to fish and fish habitats such that:

- “No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.” (Section 34.4 (1)), and
- “No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat” (Section 35 (1)).”

The Act defines fish habitat as:

- “water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas” (Section 2 (1)).”

The *Fisheries Act* requires that any development project avoid the death of fish, as well as Harmful Alteration, Disruption or Destruction (HADD) of fish habitat unless authorized by Fisheries and Oceans Canada (DFO). If mitigation measures cannot be applied, and residual effects will cause a HADD, then provisions under the Act may apply (i.e., authorization).

Applicability to the Project

This project does not involve work in or near potential fish habitat. As such, the Fisheries Act does not apply to this project. The Detroit River is 1.5 km west of the Project Area, outside the West Study Area.

2.1.3 Migratory Birds Convention Act, 1994

The *Migratory Birds Convention Act* (MBCA; S.C. 1994, c. 22) was passed in 1917 and updated in 1994, and the last amendment was on 12 December 2017. The MBCA prohibits harming and/or killing most species of birds and/or destroying or collecting their eggs or nests. Protected species are listed under Article I of the MBCA (the MBCA is enforced ECCC). These species are native or naturally occurring in Canada and are species that are known to occur regularly in Canada. Most birds found in Ontario receive protection under the MBCA, and nearly all of the remaining species receive similar protection under the provincial *Fish and Wildlife Conservation Act, 1997* (Section 2.2.2).

The MBCA, together with the Migratory Birds Regulations (MBR; C.R.C., c. 1035), last amended on 30 July 2022 (new MBR 2022), are federal legislative requirements binding members of the public and all levels of government (*Migratory Birds Convention Act*, 1994). The new MBR 2022, provides protection to migratory bird nests when they are considered to have a high conservation value for migratory birds (i.e., generally during the nesting period). The nests of 18 species, whose nests are reused or subsequently used by other species, continue to have year-round nest protection unless they have been shown to be abandoned. The “incidental take” of migratory birds and the disturbance, destruction, or taking of the nest of a migratory bird is prohibited. Bird species not regulated under the Act include Rock Dove, American Crow, Brown-headed Cowbird, Common Grackle, House Sparrow, Red-winged Blackbird, and European Starling. Some species are not protected under the MBCA but are listed under the *Endangered Species Act, 2007* (e.g., Rusty Blackbird).

ECCC and the Canadian Wildlife Service have compiled nesting calendars that show the variation in nesting intensity by habitat type and nesting zone within broad geographical areas distributed across Canada (ECCC, 2024). While this does not mean nesting birds will not nest outside of these periods, the calendars can greatly reduce the risk of encountering a nest.

Applicability to the Project

The MBCA applies to all of Canada. As such, the MBCA is applicable to the Project. Therefore, if a protected species or its nest is encountered during project activities, the Project must comply with the prohibitions of the MBCA and MBR; this includes following appropriate timing windows or Best Management Practices (BMP) for vegetation removals. The Project site occurs in nesting zone C1, which has a regional nesting period of late March to late August. The nesting period is developed based on the nesting history of species known to occur in the general habitat (open, wetland, forest habitats). In open habitats, it is predicted that nesting is likely to start around March 28th and continue to August 26th. In wetland habitats, it is predicted that nesting is likely to start around March 23rd and continue to August 15th. In forest habitats, it is predicted that nesting is likely to start around March 23rd and continue to August 26th. Given the climatic and species variables, vegetation removal should be avoided between March 23rd and August 26th in any given year.

Additionally, the nests of the Pileated Woodpecker, Great Blue Heron, and Green Heron (and 15 other species) have year-round protection from destruction. A mandatory wait period before the nest of these species must be observed. The nest must be proven abandoned before removal and registered, if documented.

2.2 Provincial Legislative Requirements

2.2.1 Endangered Species Act, 2007

The *Endangered Species Act* (ESA) was passed into law in 2007 and came into effect on 30 June 2008 and was last amended on 21 July 2020. The ESA is enforced by the Ministry of the Environment, Conservation and Parks

(MECP); however, SAR are determined by the Committee on the Status of Species at Risk in Ontario (COSSARO). If a species is listed under the ESA as Extirpated, Endangered, or Threatened, Section 9 of the ESA prohibits killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling, leasing, trading or offering to buy, sell, lease or trade a member of the species. Similarly, Section 10 of the ESA prohibits the damage or destruction of the habitat of all Endangered and Threatened species. Habitat is broadly characterized within the ESA as the area prescribed by regulation as the habitat of the species or an area on which the species depends directly or indirectly to carry on its life processes, including reproduction, rearing of young, hibernation, migration or feeding. Habitat is specifically defined for some species. Species listed as Special Concern are not afforded protection under Sections 9 and 10 of the ESA; however, the Provincial Policy Statement provides protection through Significant Wildlife Habitat.

Destruction of SAR and their habitats constitutes a contravention of the ESA unless authorized by the MECP. The MECP may authorize damage to habitat or individuals by way of registration or permit. Permits under the ESA are commonly referred to as “overall benefit permits.” Requirements include the demonstration that reasonable alternatives were considered, documentation of steps taken to limit residual effects on the species, and commitment to measures to be undertaken that will achieve an overall benefit to the species.

Applicability to the Project

Protection under the ESA extends to both public and private lands. Any SAR ranked as Threatened or Endangered that may be impacted by any Project work requires consideration. If impacts on SAR or their habitat cannot be fully avoided, and an exemption does not apply (under the various regulations), a permit or registration will be required under the ESA. Based on fieldwork and secondary sources, a SAR screening was completed to document which SAR are confirmed or considered to have a high potential to occur.

2.2.2 Fish and Wildlife Conservation Act, 1997

The *Fish and Wildlife Conservation Act* (FWCA) was passed into law in 1997 and was last amended on 8 June 2023. The FWCA applies to ‘fish and wildlife’ whereby fish have the same meaning as in the *Fisheries Act*, and wildlife is defined as “an animal that belongs to a species that is wild by nature, and includes game wildlife and specially protected wildlife.” Those species considered “specially protected wildlife” include those specially protected amphibians, birds, invertebrates, mammals, and reptiles, as identified within Schedules 6 to 11 under the FWCA Ontario Regulation 669/98: WILDLIFE SCHEDULES. The FWCA is managed by the Ministry of Natural Resources and Forestry (MNRF). Where wildlife will require collection or relocation at any point in the project (i.e., through trapping/collection and relocation), permits and approvals under the FWCA may be required.

If a provision of the FWCA and a provision of the ESA conflict with respect to an animal, invertebrate, or fish, the provision that gives the most protection prevails.

Applicability to the Project

Permits under the FWCA are contractor-specific, whereby the individual undertaking the work to rescue and relocate or collect wildlife and/or fish will be the responsible party required to obtain the necessary permits and approvals. The probability that wildlife is found in the Project Location and does not leave on its own accord is low. As such, permits/approvals under the FWCA are not expected to be necessary.

2.2.3 Conservation Authorities Act, 1990

The *Conservation Authorities Act* (CAA; R.S.O. 1990, c. C.27) was established in 1990 and was last amended on 6 June 2024. Various proclamations by the Lieutenant Governor also came into force on April 1, 2024. The CAA authorizes the formation of conservation authorities in Ontario and addresses their roles, responsibilities, and governance in resource management and environmental protection. The purpose of the CAA is:

"*The purpose of this Act is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario*."

Part VI "*Regulation of Areas Over Which Authorities Have Jurisdiction*" of the CAA contains "*prohibited activities re watercourses, wetlands, etc*.". Section 28 defines prohibited activities in the area of jurisdiction of an authority. Prohibited activities include works that "*straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland*." Development activities are also prohibited in hazardous lands, wetlands, river or stream valleys, and shorelines if they occur within the authority's area of jurisdiction. However, these prohibitions "*do not apply to an activity within a municipality prescribed by the regulations if, the activity is part of development authorized under the Planning Act; and such conditions and restrictions as may be prescribed for obtaining the exception and on carrying out the activity are satisfied*".

Ontario's 36 conservation authorities no longer have their own Section 28 Ontario Regulation (O. Reg.) for the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. Instead, as of April 1, 2024, the new O. Reg. 41/24: Prohibited Activities, Exemptions and Permits applies. In the Project Area, the authority is ERCA.

Applicability to the Project

The Project footprint falls just outside the ERCA regulated area (Figure 2-1). ERCA regulates the municipal drain watercourses on-site, and due to the proximity, ERCA has been engaged as a government agency. Negative impacts to the drains are not expected.

2.2.4 Planning Act, 1990

The *Planning Act* is provincial legislation that sets out the ground rules for land use planning in Ontario. Established in 1990, the *Planning Act* was last amended on 6 June 2024. The Act describes how land use may be controlled and who may control them. The Planning Act also provides the basis for developing regional and municipal official plan documents to guide development. Municipally, the Project falls under the jurisdiction of the City of Windsor Official Plan (OP; Section 2.3.1). The Provincial Policy Statement (PPS) is issued under Section 3 of the *Planning Act* by the Ministry of Municipal Affairs and Housing (MMAH). Under the *Planning Act*, the PPS is applicable province-wide and provides overall policy directions on matters of provincial interest related to land use planning and development. Regional plans, municipal OPs, and the PPS work together to establish and protect natural features.

2.2.4.1 Provincial Policy Statement, 2020

The Provincial Policy Statement (PPS) came into effect in 1995 and has been amended several times since - in 1997, 2005, 2014, and most recently in 2019. The latest PPS came into effect on May 1, 2020. The PPS provides policy direction on matters of provincial interest related to land use planning and development and promotes the provincial "policy-led" planning system that recognizes and addresses the complex interrelationship among

environmental, economic, and social factors in land use planning (Ministry of Municipal Affairs and Housing, 2020). The PPS is comprised of various policies on development and land use patterns, resource protection and management, and public health and safety. The PPS provides policies specific to natural heritage and states that natural features must be protected for the long term.

The following sections of the PPS are relevant to this report. Section 2 of the PPS provides direction for the wise use and management of resources, including the protection of natural areas and features. Relevant natural heritage policies are in Section 2.1 of the PPS and generally states that the diversity and connectivity of natural heritage (including surface and groundwater features) should be maintained, restored or, where possible, improved. Section 2.2 of the PPS relates more specifically to water resources and supports planning authorities to protect, improve, and restore the quality and quantity of water.

Policy 2.1.4 lists significant natural heritage features where development and site alteration is not permitted in (concerning Ecoregion 7E):

- significant wetlands; and
- significant coastal wetlands.

Policy 2.1.5 lists significant natural heritage features where development and site alteration is not permitted unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, including (concerning Ecoregion 7E):

- significant woodlands;
- significant valleylands;
- significant wildlife habitat (the *Significant Wildlife Habitat Technical Guide* (OMNRF 2000) and Ecoregion schedules (OMNRF 2015) to assist planning authorities and other participants in the land use planning system);
- significant areas of natural and scientific interest; and
- coastal wetlands that are not subject to policy 2.1.4(b).

Policy 2.1.6 states development and site alteration are not permitted in fish habitat except in accordance with provincial and federal requirements.

Policy 2.1.7 states development and site alteration are not permitted in the habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

Policy 2.1.8 states development and site alteration are not permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions. Adjacent lands for the purposes of policy 2.1.8 are lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area. The extent of the adjacent lands may be recommended by the Province or based on municipal approaches which achieve the same objectives.

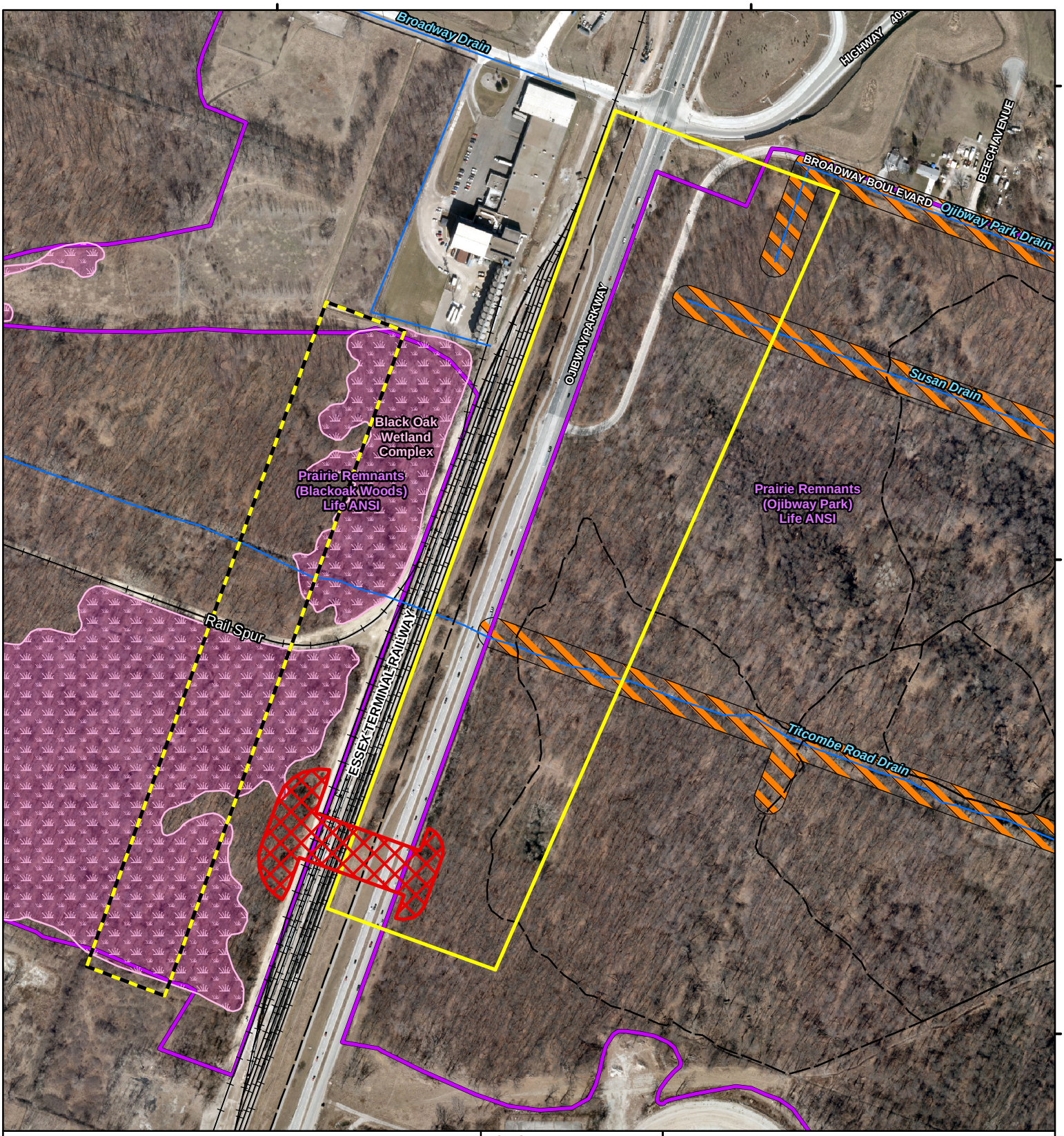
Negative impacts in regard to natural heritage features and areas means “degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified due to single, multiple or successive development or site alteration activities”.

Development, in the context of the PPS, means the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include activities that create or maintain infrastructure (Infrastructure includes sewage and water systems and transit and transportation corridors and facilities) authorized under an EA process or works subject to the Drainage Act.

The PPS provides overall policy direction and is informed by and should be read in conjunction with other provincial, regional, and municipal plans. The more stringent of policies apply unless otherwise explicitly stated.

Applicability to the Project

Significant Wildlife Habitat (SWH) was screened using the *Significant Wildlife Habitat Technical Guideline* (Ontario Ministry of Natural Resources, 2000) and Ecoregion 7E Criteria Schedules (Ontario Ministry of Natural Resources and Forestry, 2015). Fieldwork and secondary sources confirmed the presence of Significant Woodlands in Ecoregion 7E, SWH, and ANSIs (Figure 2-1). The Project must not have a negative impact on the feature and function of the natural features. The impact assessment in Section **10.0** provides a rationale for no negative impacts



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LEGEND

- Project Footprint
- Project Area
- East Study Area
- West Study Area
- PSW Provincially Significant Wetland
- ANSI ANSI
- ERCA Regulation Area
- Watercourse / Drain
- Trails
- Railway

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.
- ERCA regulation limits provided by Essex Region Conservation Authority.

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY PARKWAY WILDLIFE CROSSING

Provincial Policy Context

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 500 Metres

N W E S

PROJECT N°: IM20104013 | **FIGURE: 2-1**

SCALE: 1:5,500 | DATE: May 2024

2.3 Municipal Legislative Requirements

2.3.1 City of Windsor Official Plan, 2013

The Official Plan (OP) provides guidance for the physical development of the municipality over a 20-year period while taking into consideration important social, economic and environmental matters and goals. This plan is adopted by Council under the provisions of the Ontario Planning Act. Schedule A identifies planning districts and policy areas and their associated policies. The Project Area is within the Malden Planning District and straddles the Ojibway Planning District which contains guidelines regarding new development with rear yards abutting existing development.

Environmental designations are shown on Schedule B and C and described in Chapter 5: Environment. Schedule B identifies the Greenway System, which recognizes the Project Area as Natural Heritage. Along Broadway Boulevard, a “recreation way” is proposed. The Greenway System encompasses the Ojibway Park trails (recreation way). Schedule C identifies Development Constraint Areas, identifying the Project Area as natural heritage and within a mineral mining site. As per the OP, the Greenway System is a planned network of the natural environment and recreational elements. Lands identified as Natural Heritage provide for the protection and conservation of Windsor’s most environmentally significant and sensitive natural areas. The policies which establish the permitted uses, ancillary uses, evaluation criteria, protection and conservation of lands designated as Natural Heritage are further described in Chapter 6 Land Use.

Schedule D identifies Land Use types. Schedule D identifies a narrow band of industrial land use along the rail tracks and Ojibway Parkway with the remainder of the Project Area as Natural Heritage land use (corresponding to Schedule B and C). There are three objectives for Natural Heritage in the City:

1) To protect, conserve and improve Windsor’s most environmentally significant and sensitive natural areas.

2) To provide opportunities for recreational uses within Natural Heritage areas.

3) To link Natural Heritage areas to other components of the Greenway System.

Uses permitted in the Natural Heritage land use designation shall be nature reserves and wildland management, and Council may permit ancillary recreation and leisure activities and facilities. Additionally, any proponent of development adjacent to lands designated as Natural Heritage may be required to complete an Environmental Evaluation Report or another suitable study (e.g., Environmental Impact Study or Natural Environment Report) in accordance with the Procedures of the OP. The OP also states the Municipality will prepare a conservation management plan for municipally owned lands that are designated as Natural Heritage and will encourage other landowners to do the same.

Applicability to the Project

The Project Area is designated as Natural Heritage with industrial land along the rail tracks and Ojibway Parkway. This report deals with natural heritage land uses only. The City of Windsor does not have a conservation management plan for Ojibway Park but does have a Management Plan for Black Oak Heritage Park (Sage Earth, 2019). The Black Oak Heritage Park Management Plan does list the re-establishment of connectivity through natural linkages between remnant patches of prairie, savannah, and woodland to allow for undisturbed movement of SAR as a management recommendation. A linkage or connection between the natural areas associated with Black Oak Heritage Park and Ojibway Park would allow for the east-west passage of SAR over the Ojibway Parkway and the ETR tracks. Likewise, a connection over the Ojibway Parkway and ETR tracks would fulfil two of

three objectives for Natural Heritage in the City; to protect, conserve and improve Windsor's most environmentally significant and sensitive natural areas and to link Natural Heritage areas to other components of the Greenway System.

3.0 CONSULTATION

Comprehensive consultation was a key component of the Class EA Study. Consultation was carried out with the public, Indigenous Nations, government agencies, ETR, utilities owners, and key stakeholder groups. The Environmental Study Report (ESR) contains a detailed summary of this consultation. The Public Information Centres (PIC) were held to solicit feedback to inform the planning of the proposed Crossing. Regarding the natural environment, common themes of comments from the public are summarized below.

PIC #1 was held from November 19, 2020, to December 3, 2020, to present the problem statement and the preferred solution for the Crossing (Wildlife Overpass). Generally, PIC #1 showed both support and opposition to the Crossing. The majority of responses were supportive comments and were generally fond of the proposed ecological connection and benefits to wildlife of all kinds, albeit with caveats. Opposition comments focused on the termination at the railway, and a large theme from PIC #1 was the desire to see a species breakdown to show structure options and location options.

PIC #2 was held from April 19, 2021, to May 3, 2021, to present the preliminary preferred Crossing design spanning Ojibway Parkway. Comments received as a result of PIC #2 were similar to those received during PIC #1. PIC #2 comments expressed support for the preferred design with suggestions for consideration in the next phase of the study. These suggestions included considerations related to the Crossing design, future monitoring, wildlife safety measures, and project funding. Comments were also received expressing concern about the crossing not extending over railway tracks, the lack of supporting studies (i.e., road mortality study), and suggestions for other locations and options for the crossing.

PIC #3 was hosted from December 18, 2023, to January 26, 2024, to present the updated preferred design for the Wildlife Crossing that would cross Ojibway Parkway and the ETR tracks and will connect Ojibway Park with the natural areas associated with Black Oak Heritage Park. The majority of comments received as part of PIC #3 expressed support for the preferred design concept.

4.0 METHODS

A background review of available Secondary Source information was completed and supplemented by observations made during field investigations to characterize the natural environment. All fieldwork was completed on City-owned lands, as permission to enter private land was not provided. The additional information gained through consultation was also incorporated as applicable.

Vegetation was surveyed to inform Ecological Land Classification (ELC) delineation and document plant SAR locations. A reconnaissance survey was conducted to determine animal corridors and wildlife camera placements. Wildlife cameras were set up and moved to maximize coverage, and detectors were deployed to document bat species in the area. Breeding bird surveys and Anuran call surveys were also conducted. Survey locations are presented in Figure 4-1. During each visit to the site, the length of Ojibway Parkway within the Project Area was walked to document road mortality. A record of surveys completed, including survey type, date and time, general weather conditions, and surveyors, is provided in Table 4-1. In addition to targeted surveys, opportunistic/incidental wildlife observations were collected during all surveys to record presence and habitat use.

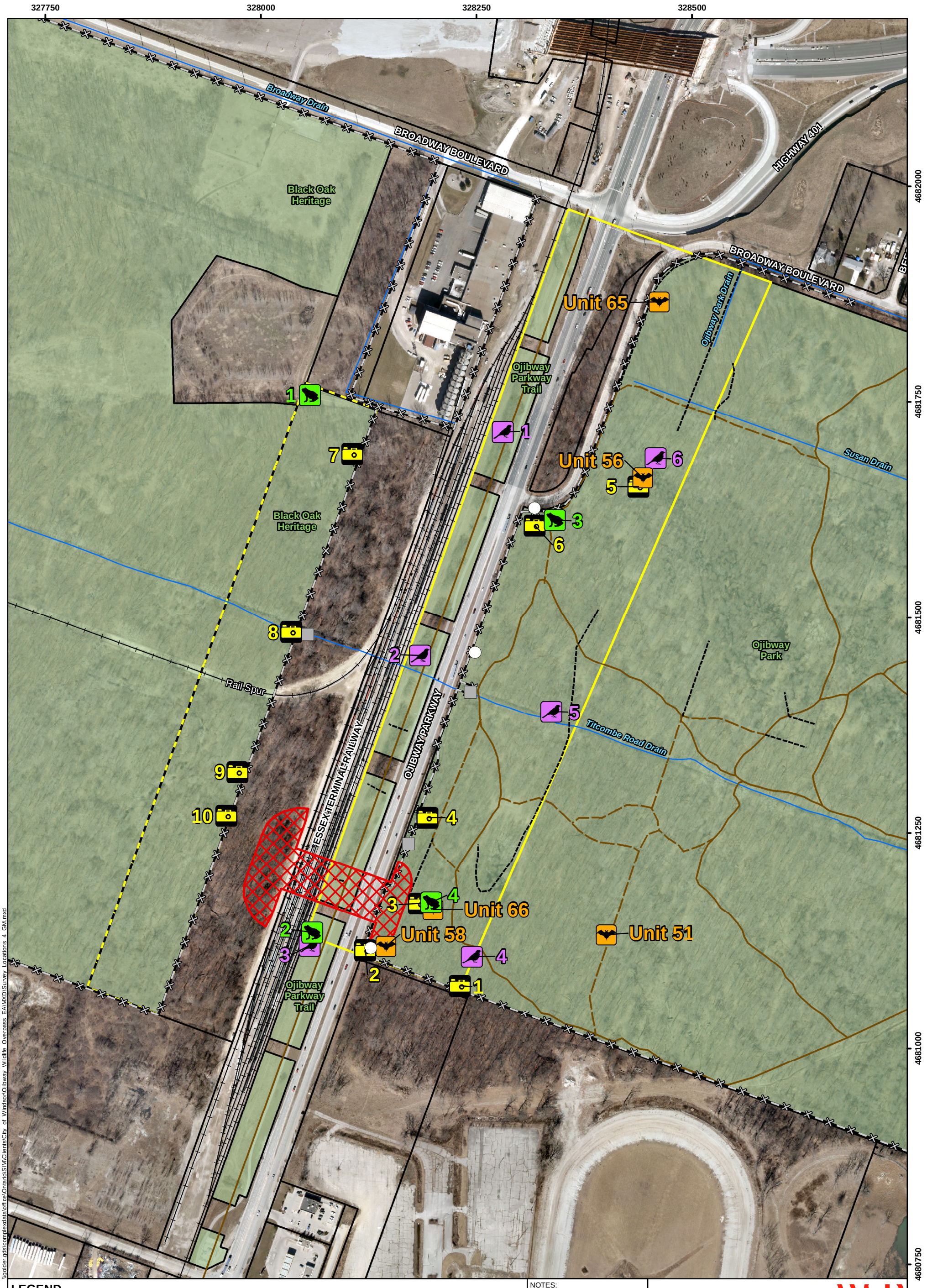
The methods used in conducting the field program components and dates for each survey type are outlined in their respective sections below.

A connectivity analysis for Ojibway Parkway was also completed as described in Section 8.0 Connectivity Analysis.

Table 4-1: Field Survey Record

Survey Type	Date	Time	Weather[1]
Reconnaissance Survey (Animal Corridors and Camera Placements)	23 and 24 June 2020 26 April 2023	N/A	N/A
Bat Detector Placement	23 June 2020	08:00 - 18:00	Clear
Vegetation/ELC	29 July 2020 30 July 2020 31 July 2020 4 August 2020	N/A	N/A
Breeding Bird Surveys Round 1	22 June 2020	06:50 – 08:40	Temperature: 22-24°C Wind: 0 Precipitation: None Cloud Cover: 80-100%
Breeding Bird Surveys Round 2	30 June 2020	06:47 – 08:35	Temperature: 20-22°C Wind: 1 Precipitation: None Cloud Cover: 0%
Anuran Call Surveys Round 1	8 April 2020	20:10 – 21:18	Temperature: 12-13°C Wind: 1 Precipitation: None Cloud Cover: 75-90%
Anuran Call Surveys Round 2	14 May 2020	22:14 – 21:38	Temperature: 15°C Wind: 1 Precipitation: None Cloud Cover: 50-100%
Anuran Call Surveys Round 3	4 June 2020	22:35 – 23:56	Temperature: 24°C Wind: 0 Precipitation: None Cloud Cover: 50-80%
Vegetation/ELC Wetland Delineation (North side of West Study Area)	12-13 June 2023	12:00 – 16:00 08:00 – 12:00	N/A

[1]Wind is recorded on the Beaufort Scale 0=Calm, 1=Light Air, 2=Light Breeze, 3=Gentle Breeze



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LEGEND

- Project Footprint
- Property Boundaries
- Parks

Project Area

- East Study Area
- West Study Area

- Den / Burrow
- Deer Trail
- Unauthorized Footpath
- Official Park Trail
- Chainlink Fence
- Watercourse / Drain
- Railway

- Gap in Fence

- Amphibian Survey Location
- Bat Dectector Location
- Breeding Bird Survey Location
- Camera Location

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 Metres

THE CITY OF WINDSOR ONTARIO, CANADA

wsp

OJIBWAY PARKWAY WILDLIFE CROSSING

Survey Station Locations

PROJECT N°: IM20104013	**FIGURE: 4-1**
SCALE: 1:4,000	DATE: June 2024

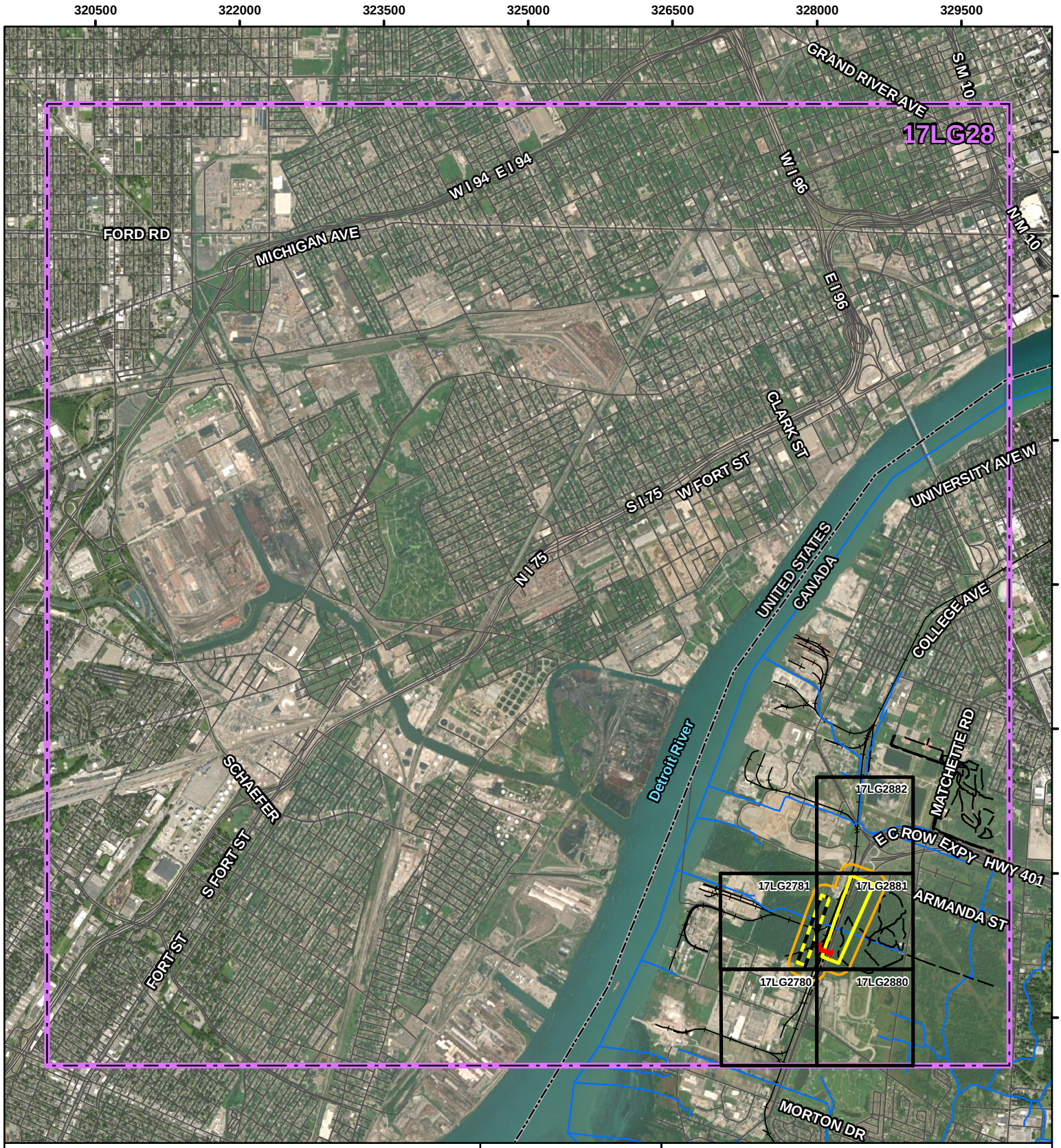
4.1 Desktop Screening and Secondary Source Review

Screening of available background information from existing studies, plans, databases, and other sources was completed. The desktop screening assisted in the preliminary determination of existing Natural Heritage Features and candidate features, and additional sensitivities, to ascertain plant and wildlife species present within the Project Area and 120 m from the Project Area (Figure 4-2), and to contribute to the understanding of watercourses within the Project Area. Data also included potential occurrences of species of conservation concern, including SAR and provincially rare species, and whether any ANSI, Environmentally Sensitive Areas, and Provincially Significant Wetlands (PSW) are located within or adjacent to the Project Area.

Relevant background queries, studies, and reports include:

- Natural Heritage Information Centre (grid 17LG2880, 17LG2881, 17LG2882, and 17LG2781; Figure 4-2) including the Ojibway Prairie Wetland Complex Evaluation (Ministry of Natural Resources - Aylmer District, 2015), General Natural Areas Report for Ojibway Prairie Provincial Nature Reserve, Ojibway Prairie Provincial Nature Reserve Life ANSI, Ojibway Prairie Complex;
- Ontario Nature Reptile and Amphibian Atlas (grid 17LG28; Figure 4-2);
- Ontario Breeding Bird Atlas (grid 17LG28; Figure 4-2);
- eBird Hotspots (Ojibway Prairie Complex (general location)) and SAR records;
- Ontario Butterfly Atlas by the Toronto Entomologists' Association (grid 17LG28; Figure 4-2);
- Land Information Ontario (Aquatic Resource Area);
- iNaturalist (Ojibway Prairie Complex, Windsor, ON, CA Point of Interest);
- Mammals of the Great Lakes Region (Kurta, 1995);
- Amphibians and Reptiles of the Great Lakes Region (Harding, 1997);
- The Physiography of Southern Ontario (Putnam & Chapman, 1984);
- Soil Survey of Essex County (Richards, Caldwell, & Morwick, 1949);
- Black Oak Heritage Park Management Plan (Sage Earth, 2019); and
- Road Mortality of Reptiles and Other wildlife at the Ojibway Prairie Complex and Greater Park Ecosystem in Southern Ontario (Choquette & Valliant, 2016)

[redacted]



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LEGEND

- Atlas Square
- NHIC Square
- Project Footprint

Project Area

- East Study Area
- West Study Area
- Study Area Buffer (120 m)
- National Border
- Railway
- Roads

NOTES:
- Aerial imagery extracted from ESRI basemap imagery, 2019.
- Atlas Square represents the Ontario Amphibian, Breeding Bird, and Butterfly Atlas.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY PARKWAY WILDLIFE CROSSING

Study Area and Secondary Source Areas

PROJECT N°: IM20104013 | **FIGURE: 4-2**

SCALE: 1:54,000 | DATE: May 2024

4.1.1 Problem and Opportunity Statement

Per the Class EA process, Phase 1 is identifying the problem (deficiency) or opportunity. The City of Windsor is taking this opportunity to construct the Ojibway Parkway Wildlife Crossing to accomplish the following:

- Begin to re-establish an ecological connection between the natural areas associated with Black Oak Heritage Park and Ojibway Park;
- Protect sensitive species from roadway mortality by providing a safe passage for area wildlife and species at risk within the Ojibway Prairie Complex; and,
- Protect the traveling public on Ojibway Parkway from wildlife-vehicle interactions.

As long linear features on the landscape, roads and railways are believed to be one of the main obstacles to movement and have impacts on wildlife and wildlife habitat; herein, both types of linear infrastructure are considered together as ‘roads’ (Jackson, 2000; Yanes, Velasco, & Suárez, 1995).

This Class EA Study was initially focused on identifying a wildlife crossing across the Ojibway Parkway. The draft ESR was initially endorsed by the City Council on December 20, 2021. Subsequent to the Council’s endorsement and before issuing the Notice of Study Completion, the draft ESR was circulated to the Indigenous Nations, relevant government agencies, and the ETR for their review. As a result of input from the Indigenous Nations, government agencies, and ETR, the scope of the Class EA Study was broadened to identify a Wildlife Crossing across the Ojibway Parkway and ETR tracks.

Roadways (local roads, rural highways, highways) are required to transport humans and goods. As the human population increases, the dependency on roadways and connectivity to family, friends, and workplaces increases. There has been increased recognition that road design and landscape ecology are intertwined in the last few decades. It has heightened the consideration of road effects on wildlife and corresponding wildlife mitigation strategies (Ministry of Transportation, 2016b). In 2017 and 2018, 48,969 km of new roads were constructed in Canada, an average of 24,000 km per year (Statistics Canada, 2020). The average significantly increased from 9,000 km per year from 2000 to 2016 (Statistics Canada, 2020). Federal budgets for 2019, 2020, and 2021 committed to major municipal infrastructure investments. In the 2020-2021 budget, Infrastructure Canada aims to fund and support the WDBA in advancing the Gordie Howe International Bridge (Government of Canada, 2020). The infrastructure budget will also support communities in their efforts to add climate resilience considerations to their infrastructure planning processes, such as increasing focus on the adoption of natural infrastructure solutions to provide low-cost answers to climate challenges while providing additional benefits in the form of carbon storage, increased wildlife habitats, food security, recreational opportunities, and health benefits (Government of Canada, 2020).

Roadways and their associated infrastructure are a human-dominated need, and wildlife is often not considered. Roadways cut off natural areas, which reduces animals’ and plants' access to resources required for the continued survival of the population. The network of roadways, infrastructure, and extensive agriculture in southern Ontario traps wildlife in a fragmented landscape (habitat fragmentation, barrier effects, and habitat loss and degradation). Animals will still attempt to access natural areas bisected by roadways resulting in wildlife road-kill or WVCs. WVCs have long been understood to be of profound socio-economic, traffic safety, and environmental costs. Data from WVCs are often only reported when the wildlife causes death or significant

property damage- i.e., when a moose or deer is involved. Smaller animals, such as foxes, raccoons, and turtles, tend to be reported if drivers cause an accident while trying to avoid them.

Additionally, data sources are scattered and lacking; however, various monetary values of WVCs exist. The *Wildlife-vehicle Collisions in Canada: A Review of the Literature and a Compendium of Existing Data Sources* (Traffic Injury Research Foundation, 2012) estimates the minimal annual direct cost as $200 million (in 2012) and continuing to rise. In the *Ontario Road Safety Annual Report* (Ministry of Transportation, 2018), WVCs (which involved large animals) resulted in four fatalities, 329 personal injuries, and 11,721 WVCs which caused property damage. According to the Wildlife Collision Prevention Program (WCPP), it is estimated that there are 4 to 8 large animal WVCs every hour in Canada (Wildlife Collision Prevention Program, 2021). The WCPP also estimates that in British Columbia, 18,300 large animal deaths go unrecorded per year and that the costs of clean-up and animal disposal totaled over $770,000 in 2012.

Regarding under-reported small animals, a study was completed on the Thousand Islands Parkway in eastern Ontario over five months and found that 24,000 WVCs occurred (Eberhardt, 2008). Additionally, a local study estimated that SAR reptiles were killed on roads across the Ojibway Prarie Complex at a minimum average of 19 individuals a month (Choquette & Valliant, 2016). As no property damage or personal injuries are reported for small animal WVCs, there is no estimated ‘human cost.’ However, the mortality of tens of thousands of animals a year and approximately 20 SAR a month is an important issue and will have a wide range of spatial and temporal effects on the local wildlife populations (Eberhardt, 2008).

The savings of reducing WVCs would offset the short and long-term costs of wildlife crossings. Likewise, it is believed the cost is quite minimal if incorporated into the renovation of the roadway. Wildlife crossings have been proven effective in reducing WVCs and benefiting biodiversity. A variety of sources regarding road ecology were reviewed. Sources included journals, conference presentations, technical papers (Gray literature), articles, and previous studies in Ontario and beyond. Information on preferred crossing types, crossing widths, ingress and egress locations and styles, fencing considerations, and crossing location preferences were noted and are included within this report.

4.2 Flora and Ecological Land Classification (ELC)

Ecological Land Classification (ELC) vegetation communities were delineated using aerial photography and ground-truthing during a single field survey. Classifications were completed using a combination of methodologies. The Ecological Land Classification for Southern Ontario: First Approximation and Its Application (Lee, et al., 1998) was used first, in keeping with a standardized protocol. However, the 1998 ELC manual was developed in communities not reminiscent of those seen in heavily agrarian landscapes today. An updated version, which is more applicable to agrarian landscapes, has been unofficially released in draft form. This ‘Second Approximation’ more accurately categorizes and describes landscapes in Ecoregions 6E, 7E and is gaining traction as an industry standard. Both ‘Approximations’ use the same methods, but using both provides a more detailed summary of the Project Area.

The PSW between Dainty Foods and the ETR tracks in the West Study Area was investigated where it occurs on City-owned lands. The goal was to confirm the wetland boundary and ELC community, as well as consider existing conditions and influences.

Generally, communities at least 0.5 ha in size are mapped following ELC protocols; however, given the nominal size of the area, vegetation communities less than 0.5 ha have been included. Additionally, communities that are

considered unique (rare and wetland communities) are also delineated if less than 0.5 ha. Substrate type and depth, moisture regime, topography, floral composition, stand structure and disturbance were inventoried to describe and classify vegetation communities. The terminology used is based on ELC sampling protocols that collect information on four vegetation layers (note: some layers may not be present within a vegetation community sampled). The four layers are:

Canopy consists of tall vegetation that reaches the light first, typically composed of tall trees (in a forest community).

Sub-canopy includes vegetation growing just under the canopy, vegetation that receives filtered sunlight through the canopy, typically composed of trees and tall shrubs (in a forest community).

Understory includes vegetation growing below the sub-canopy, typically composed of both tall and low-growing shrubs (in a forest community).

Ground layer consists of the vegetation which is closest to and covers the ground, typically composed of herbaceous vegetation.

ELC is used to identify the presence of rare and/or sensitive vegetation communities and/or species to the extent possible. The occurrence of ELC communities was cross-referenced with provincially significant vegetation communities as identified in the *Significant Wildlife Habitat Technical Guide* (Ontario Ministry of Natural Resources, 2000). Vegetation communities were also used to screened for SWH using the *Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E* (Ontario Ministry of Natural Resources and Forestry, 2015). Note that all species names contained in this report are referred to by common English names; scientific names can be found in the appendices.

4.3 Breeding Bird Surveys

Breeding bird stations were chosen to cover as much of the natural habitat as possible (Figure 4-1). The protocol followed was based on the Ontario Breeding Bird Atlas Guide for Participants (Ontario Breeding Bird Atlas, 2001). Six point counts were done on 22 and 30 June 2020, which is the peak breeding season for most species. Each station was surveyed for 10 minutes in clear, calm weather. During the point count, the observer recorded all bird species and activity seen and heard. Activity seen and heard directly relates to breeding evidence described in the Ontario Breeding Bird Atlas Guide for Participants (Ontario Breeding Bird Atlas, 2001). Breeding evidence is reported in four levels:

1) Species observed in the breeding season,

4) Possible breeding,

5) Probable breeding, and

6) Confirmed breeding.

As some species are area sensitive, a higher level of breeding evidence can inform habitat quality. Additionally, occurrence and abundance can inform SWH.

4.4 Anuran Call Surveys

Amphibians require aquatic habitats for mating, egg incubation, and larval development. The frog and toad species (anurans) that have the potential to occur on-site have distinctive mating calls which can be used in species identification. Therefore Anuran call surveys were completed at aquatic habitats in the Project Area (Figure 4-1). The protocol followed was based on the Marsh Monitoring Program Participant's Handbook for Surveying Amphibians (Bird Studies Canada, 2009 Edition). Four point count locations were surveyed for calling anurans three times; 8 April, 14 May, 4 June 2020, which captures peak breeding seasons. To assure that frogs and toads will be calling, nights with appropriate weather were targeted for surveys.

Anuran call surveys use Call Level Codes to categorize activity intensity and an Abundance Count to estimate numbers.

1) Code 1 - Individuals can be counted; calls are not simultaneous. An Abundance Count records the number of individual frogs of each species calling beside the Code.

7) Code 2 - Calls distinguishable; some simultaneous calling. An Abundance Count estimates the number of individuals frogs of each species calling beside the Code.

8) Code 3 - Full chorus; calls continuous and overlapping. There are too many overlapping calls to allow for any reasonable Abundance Count count or estimate.

Dependence on water makes amphibians particularly susceptible to changes in local environmental conditions and therefore are ideal indicators of local ecosystem health (Bird Studies Canada, 2009 Edition). Additionally, occurrence and abundance can inform SWH.

Surveys specific to documenting other amphibians, such as salamanders or reptiles and turtles, were not completed. Specific surveys for non-vocal groups are costly, and since the Ojibway Prairie Complex wildlife is well documented, secondary source data was relied on for occurrence and habitat data. Results from Anuran call surveys document current vernal pool and wetland habitat potential, and suitable terrestrial features (such as downed logs for egg-laying) were documented during other surveys.

4.5 Bat Detector Surveys

Ontario bat species have a variety of species-specific echolocation call structures, enabling acoustic identification. Bat acoustic surveys were conducted to provide technical documentation for planning and process-related submissions and to detect nocturnal bat activity during the maternal brood-rearing period in June and early July. A combination of MNRF protocols, industry standards, and professional judgement was used for documenting bat activity. All nocturnal bat activity was recorded from 30 minutes before sunset to 30 minutes after sunrise. Five Songmeter SM2Bat+ (Wildlife Acoustics Inc.) ultrasonic recording detectors paired with SMM-U2 ultrasonic microphones (Wildlife Acoustics Inc.) were deployed throughout the East Study Area (Figure 4-1) between June 23 and July 16. Temperature data are taken from Windsor Airport and Windsor Riverside (a Co-operative Climate Network; Government of Canada 2024) stations suggest that temperature during the period ranged from approximately 14.5°C to 35.5°C (minimum and maximum temperatures from June 23 to July 16). In Windsor, from the night of June 26 to the early morning on June 27, thunderstorms and moderate rain occurred. July 10 experienced rainfall for the majority of the day and night. On July 15 and 16, localized rains occurred at the weather stations.

Microphones were positioned as high as possible at locations where higher bat activity levels were likely to occur, such as habitat edges. Bat detectors were configured to begin recording when ultrasonic signals greater than 18 decibels (dB) above the noise floor rolling average were detected. Upon trigger, a 2 to 5-second recording was saved. A signal process then filtered recorded signals and retained those files resembling bat echolocation. All recordings were made in .wav format with a 384 kHz sampling frequency and 16-bit resolution, resulting in real-time, full-spectrum data that afford greater accuracy and confidence when identifying recordings of bat calls to species.

4.5.1 Analytical Processing

All recordings were initially filtered using the Batch File Scrubber of the Sonobat Data Wizard (version 4.4.1). The scrubber was set to remove files containing only tonal signals below 5 kHz and any file where tonal signals resembled noise. Recordings were initially identified to species using Sonobat version 4.4.1 (SonobatTM) automated processing software, running the classifier for the Northeast region and the northeastern US and southern Ontario subregions. Automated classification can provide accurate classifications for clear recordings with a high signal-to-noise ratio, especially for regions of low species diversity. However, most field recordings contain some level of noise which can limit the accuracy of automated software and its ability to detect echolocation calls within recordings.

While automated classification provides an efficient classification of large numbers of echolocation recordings, studies on the accuracy of automated classification caution on relying solely on this method (Rydell, Nyman, Eklof, Jones, & Russo, 2017; Lemen, Freeman, White, & Andersen, 2015; and Menon, Pereira, & Aguiar, 2018). Therefore, a subset of the recordings was also classified manually. When the automated software cannot classify a recording to a specific species due to poor recording quality or call feature overlap between multiple species, it classifies the bat pass as either belonging to a High-frequency or Low-frequency bat. The former emits calls with a minimum frequency above 35 kHz, while the latter emits calls with a minimum frequency below 35 kHz. In Ontario, all bat SAR emit calls in the high-frequency range. Therefore, emphasis was placed on high-frequency passes when selecting calls to classify manually. Specifically, bat passes selected for manual classification included a random subset of 100 recordings from each species group obtained from the autoclassification, with the exception of passes auto-classified as an unknown low-frequency species. For these recordings, the auto-classification result was replaced by the manual classification. These recordings represented 1,556 bat passes, or 7.1 % of all recorded bat passes. In addition, to ensure that no SAR was misclassified, all recordings auto-classified as a high-frequency bat (4,296 passes) were manually inspected but, in the interest of time, were only reclassified if they could be confirmed to be a SAR.

The automated classification used the ‘consensus classification’ decision method in Sonobat. Up to 32 calls within each recording were classified based on over 30 acoustic parameters. The software uses a discriminant analysis to provide an accuracy probability for each classification, and only calls with a probability greater than 90% were accepted. The manual classification was accomplished by comparing qualitative and quantitative parameters of recorded bat calls to a library of known species parameters. Parameters used for species identification included the frequency of maximum energy, minimum frequency, maximum frequency, call duration, the slope of the call, and other more qualitative parameters such as the time-frequency shape of the call, the position of the knee, presence of inflections and terminal curvatures. Less importance was placed on maximum frequency due to its susceptibility to atmospheric attenuation. Calls that could not be classified to a single species were placed in a group named after the two or more species most likely to have produced the call.

4.6 Wildlife Camera Surveys

A reconnaissance survey was conducted to determine animal corridors and wildlife camera placements. It is known that White-tail Deer are locally abundant in the Project Area, but their movement patterns within the Project Area are not documented. Deer trails were mapped to determine movement corridors and how they entered and left the Project Area. In addition, a chain-link fence outlines Ojibway Park and bisects the wetlands in Black Oak Heritage Park. The length of the fences was inspected for gaps and trespass where it was apparent that animals used it. All animal dens, tracks, and signs were also documented to inform camera placement (Figure 4-1).

Camera traps are an effective tool for conducting presence/no detection monitoring and were used to target the presence of mammals in the Project Area. Five motion-activated infrared cameras were set up to conduct passive monitoring of animal use in the East Study Area (Ojibway Park). One camera was moved to a different location (Camera 1 was moved to Camera 6; Figure 4-1). Cameras operated between June 23 to July 17, or until batteries died (Table 4-2). In 2023, one motion-activated infrared camera was set up in the West Study Area (Black Oak Heritage Park) and moved between four locations throughout the year. Cameras 7 and 8 occurred north of the rail spur, while Cameras 9 and 10 occurred south of the rail spur (Figure 4-1).

The camera traps were not time-restricted (i.e., they could be triggered at any point in the 24-hour cycle), and all cameras were set around 5ft in height. No attractants (e.g., bait) were used, as the goal was to capture presence without affecting behaviour.

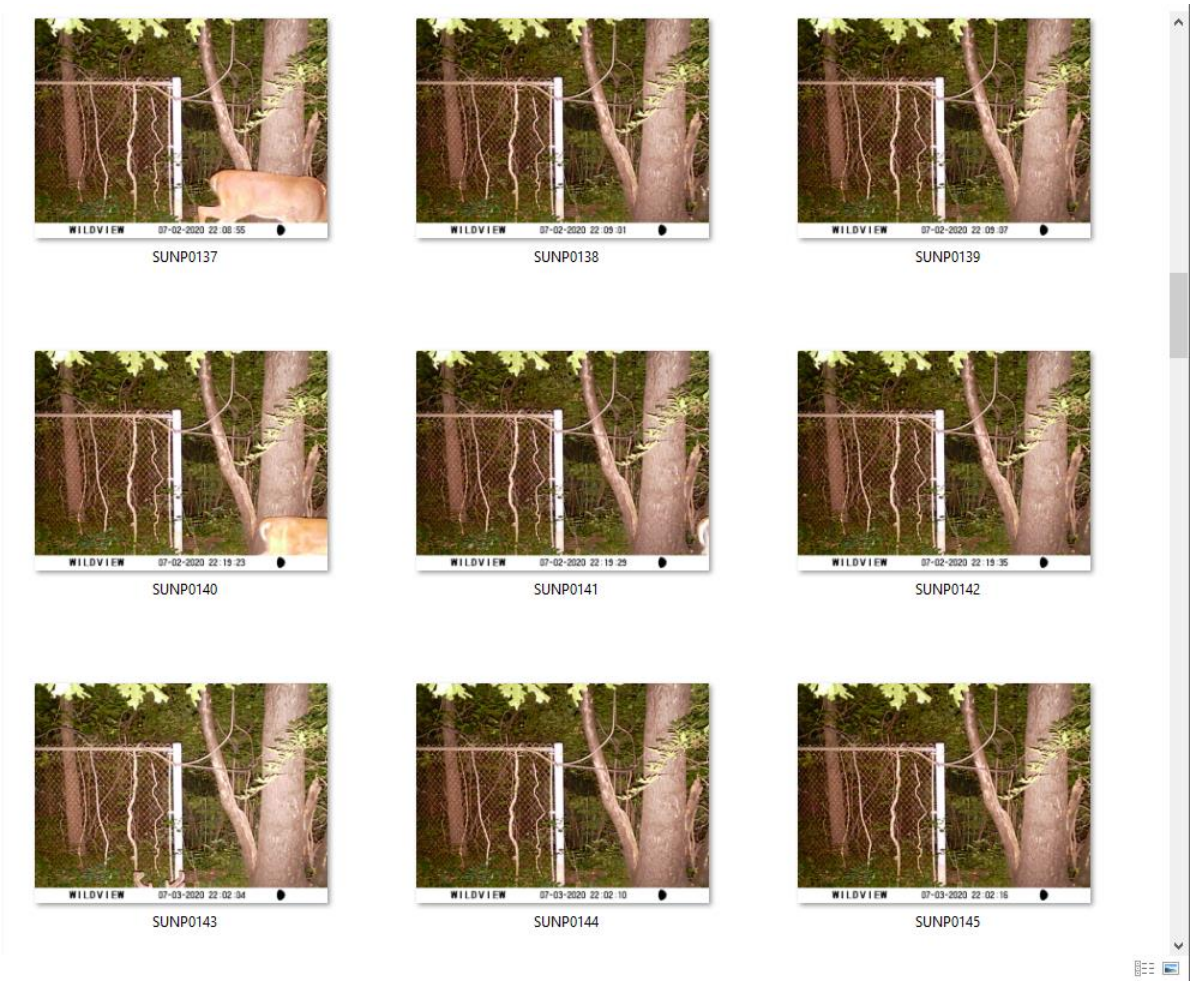
Table 4-2: Camera Run Dates

	Start Date	End Date	Number of Images
Camera 1	23 June 2020	30 June 2020	57
Camera 2	24 June 2020	15 July 2020	69
Camera 3	24 June 2020	15 July 2020	98
Camera 4	24 June 2020	17 July 2020	90
Camera 5	23 June 2020	15 July 2020	393
Camera 6	30 June 2020	12 July 2020	123
Camera 7	31 March 2023	6 April 2023	1,730
Camera 8	1 May 2023	23 May 2023	2,118
Camera 9	26 July 2023	18 August 2023	1,462
Camera 10	25 August 2023	1 October 2023	496

4.6.1 Image Processing

All images from the camera traps were processed manually, as the quantity was low. After downloading images, images were viewed as ‘extra-large icons’ in the file explorer. Viewing images this way allows for a quick review of changes between images (Figure 4-3). Images that show differences or animals are then opened, and species occurrence is documented.

Figure 4-3: Screenshot of using File Explorer to View Images



4.7 Opportunistic/Incidental Observations

During the species-specific surveys listed above, opportunistic surveys of Ojibway Parkway were completed to document animal use or mortality. Additionally, during all surveys, any wildlife sightings, evidence or signs of wildlife use, or other things of note were documented. Findings are included within subsections and species lists (Appendix A).

5.0 ROAD ECOLOGY LITERATURE SUMMARY

A variety of sources regarding road ecology were reviewed. Sources included journals, conference presentations and technical papers, articles, and previous studies in Ontario and beyond. Information on preferred crossing types, crossing widths, ingress and egress locations and styles, fencing considerations, and crossing location preferences were noted and are included within this report. As long linear features on the landscape, roads and railways are believed to be one of the main obstacles to movement and have impacts on wildlife and wildlife habitat; herein, both types of linear infrastructure are considered together as ‘roads’ (Jackson, 2000; Yanes, Velasco, & Suárez, 1995). This Class EA Study was initially focused on identifying a Wildlife crossing across Ojibway Parkway, however, as a result of input received from the public, Indigenous Nations, government

agencies, and key stakeholders, the scope was broadened to identifying a Wildlife Crossing across Ojibway Parkway as well as ETR tracks.

Road Ecology aims to understand roadways and the impacts on wildlife and motorist safety, resources, habitat connectivity, and environmental values. In the 21st century, the impact of roads on wildlife is seen as a significant and growing worldwide issue. The main threats include:

- direct mortality (roadkill or WVCs),
- habitat fragmentation and loss and degradation, which results in inaccessibility to critical resources, and
- the sub-division of populations (barrier effects), which renders populations more susceptible to local extinction or extirpation.

Wildlife crossing structures are intended to increase habitat permeability and connectivity across roads and reduce the negative effects of roadways on wildlife and populations. Wildlife crossing structures can be above-grade (overpasses) or below-grade (underpasses) structures designed to facilitate the movement of animals and connections among populations. Several handbooks and guides exist to summarize literature and provide technical guidelines for the planning, designing, and evaluating of wildlife crossing structures. Handbooks and guides specific to Ontario include:

- *Environmental Guide for Mitigating Road Impacts to Wildlife* (Ministry of Transportation, 2016)
- *Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario* (Ontario Ministry of Natural Resources and Forestry, 2016)
- *A Guide to Road Ecology in Ontario* (Ontario Road Ecology Group, Toronto Zoo, 2010)

The *Wildlife Crossing Structure Handbook Design and Evaluation in North America* (U.S. Department of Transportation, 2011) is also a staple in wildlife crossing guides. Additionally, many Ontario conservation authorities have summarized the above guides' information and created their own handbooks.

5.1 Location of Wildlife Crossing Structure

Mitigating roads for wildlife conservation is most economical during road expansion or upgrade projects (U.S. Department of Transportation, 2011). Therefore, funding for wildlife crossing structures is most likely to originate from specific transportation projects. When funding for mitigation measures, such as wildlife crossings, originates from a specific project, the mitigation is a Project-level Approach. The Project-level Approach is concerned with the transportation corridor and directly adjacent lands. Indeed, Project-level Approaches may not automatically consider how the wildlife crossing structures fit into the larger landscape and regional wildlife corridor network. However, the Ojibway wildlife crossing has been considered in the larger context of the City’s natural areas and aims to begin to reconnect the Black Oak Heritage Park Area to the Ojibway Park Area and beyond. Additionally, the City has identified Ojibway Parkway as a wildlife conflict zone. Wildlife conflict zones are road segments where animals are most likely to interact with the road and, therefore, where mitigation efforts (e.g., wildlife crossings) should be considered (Ministry of Transportation, 2016).

Ultimately, wildlife crossings should not lead to an ecological dead-end and should allow for dispersal and free movement to areas which wildlife requires for biological processes. The Ojibway Parkway wildlife crossing considers the larger landscape and projected land use. A landscape connection from the Detroit River, through

Ojibway Shores and Black Oak Heritage Park Area to SGNA and the existing Rt. Hon. Herb Gray Parkway's connection to Oakwood Natural Area is the ultimate goal from an ecological perspective. The current funding opportunity allows for the first phase of this goal: completion of the Municipal Class EA Study to identify a preferred alternative to re-establish an ecological connection between Black Oak Heritage Park Area and Ojibway Park Area.

Habitat linkage assessments at the landscape level (i.e., the entire City) are not suitable for identifying specific locations for wildlife crossings due to differences in design considerations, such as local conditions and engineering concerns (U.S. Department of Transportation, 2011). Determining the specific placement of wildlife crossings is generally done at the project level, and considerations of wildlife crossing placement begin by determining the wildlife species or groups of concern (U.S. Department of Transportation, 2011). Ideally, crossing structures should be placed where animals naturally approach the road, but crossing locations should be selected based on habitat availability (Ontario Road Ecology Group, Toronto Zoo, 2010). The Environmental Guide for Mitigating Road Impacts to Wildlife (Ministry of Transportation, 2016) outlines a general approach for locating wildlife crossings. The approach uses both the landscape and features of the road itself. Landscape features focus on where natural heritage systems intersect with roads, while road features focus on where infrastructure design and human use intersect. Along the west side of Ojibway Park, a chain-link fence occurs, with gaps within and under specific places (Figure 4-1). The fencing likely funnels animals to these gaps and creates areas of higher concentration of crossings (Ministry of Transportation, 2016), and therefore, increased chances for WVCs. Additionally, the Titcombe Road Drain bisects Ojibway Park and outlets at the Ojibway Parkway (Figure 4-1). The occurrence of culverts is important in assessing wildlife conflict zones as they represent drainage corridors that animals often use (Ministry of Transportation, 2016).

Field-based assessments can help verify and refine where wildlife crossings are required. Field-based assessments are typically conducted during an EA at the preliminary design stage (Ministry of Transportation, 2016). The strategy for field-based assessments, as documented in The Environmental Guide for Mitigating Road Impacts to Wildlife (Ministry of Transportation, 2016) includes:

- Reviewing relevant biophysical information;
    - As noted above and below, the biophysical characteristics of the Project Area have been documented, including existing fencing and gaps, road features, and ELC of adjacent lands and the ROW.
- Integration of data from local naturalists, agencies, and conservation authorities;
    - Local observation records and consultation have been gathered and included in the findings and analysis.
- Employing road ecologists to evaluate wildlife conflict zones for the species on-site and to devise mitigation strategies;
    - As documented throughout this report road, ecology experts have evaluated the site and project constraints to determine the ideal location of a wildlife crossing and fencing.
- Locating and mapping features likely to be associated with wildlife conflict zones such as drainage areas, jersey barriers, habitat features, and the distance to cover.

- Figure 4-1 documents existing fencing and gaps as well as drainage areas. Habitat features and ELC are documented in Figure 6-5.

- Collect systematic on-road observations and additional field sampling, as applicable.

One method to determining the site-specific location of a wildlife crossing is often road mortality surveys (i.e., roadkill surveys). However, the use of road mortality data alone provides a very limited scope of wildlife movement areas. Low road-kill levels do not necessarily mean that wildlife road mortality is not a concern (Ministry of Transportation, 2016). Basing crossing locations on wildlife sightings (road mortality) alone is problematic as road mortality may be responsible for the current diminished populations (Ontario Road Ecology Group, Toronto Zoo, 2010; Ministry of Transportation, 2016). In some animal groups, the locations where wildlife are struck by vehicles may not be the same area where they safely cross the road. Smaller, slow-moving animals (e.g., amphibians) benefit from crossings in locations with high amounts of mortality. In contrast, larger or fast-moving animals may be crossing safely elsewhere, and the road mortality hotspot may have many other factors associated with it (e.g., poor sightlines) (U.S. Department of Transportation, 2011).

Combining road mortality data with habitat linkage or movement models (U.S. Department of Transportation, 2011) can support the understanding of wildlife movement as models should be tested with empirical field data (e.g., road-kill locations). Telemetry has been commonly used to gather field data on successful road crossing locations, usually through intensive monitoring of wildlife movements. Other field methods for movement tracking include mark-recapture studies, animal tracking (in snow or track beds), camera detection, and genetic sampling. These programs are often effort and cost heavy and require multiple years to complete. Likewise, habitat linkage or movement models require research and specialists to conduct GIS-based movement models. It is ideal to use both theoretical and empirical data in pre-construction activities to determine the site-specific location of wildlife crossings when possible. However, crossings are often required reactively instead of proactively and decisions regarding crossing location and design are necessary without preconstruction studies (U.S. Department of Transportation, 2011).

In cases where preconstruction studies are not available, habitat models (verse site-specific), rapid assessments, local knowledge, and compatibility of adjacent land use can be used to determine crossing location and type.

5.1.1 Habitat Models and Rapid Assessments

Habitat models and rapid assessments may consist of the opinion of experts or qualitative models based on the best available information obtained from the literature. The advantages of habitat models are that the validity can be high if a consensus model is used and GIS software to assist is readily available. Limitations of modelling are that it works best when having a narrow taxonomic focus, and like all models, they are best when validated with field data. A rapid assessment differs from the habitat model in that there is no quantitative analysis of expert opinion or modelling. Experts delineate where they believe key corridors are located on a given section of roadway. The advantages are that rapid assessments are quick and easy to carry out, and if a consensus among specialists is achieved, the legitimacy can be high. Rapid assessments have the added ability to be of a broad taxonomic focus, including plants (Ruediger & Lloyd, 2003). The limitations of rapid assessments are a lack of qualitative criteria. For both methods, it is also important to consider who is determined as an expert and how transparent the process is when it comes to finding broader support for the model's findings.

Road mortality studies for reptiles and spatial analysis studies were completed on the east side of Ojibway Park (along Matchett Road and Malden Road) by others (Choquette & Valliant, 2016). This suggests that reptiles

moved in a southeast-northwest route along the utility right-of-way therefore providing a potential function as a corridor connecting Lasalle Woods to SGNA, Ojibway Prairie Provincial Nature Reserve, Tallgrass Prairie Heritage Park, and the northeast corner of Ojibway Park. A connection between Black Oak Heritage Park and Ojibway Park would help connect reptile movement from the east side of the complex west towards Black Oak Heritage Park. No other habitat models for other taxa exist for the Ojibway Park area.

The rapid assessment approach was completed for the Crossing; however, it was supplemented through the EA process with an alternatives assessment. Fieldwork was completed to determine where animals were already crossing, which was determined by trampled vegetation paths. Existing gaps in the chain-link fence were also documented, as they are likely the location of crossings. Road mortality data from the City was received, and road mortality was also noted during field visits.

5.1.2 Local Knowledge

Long-term residents can provide valuable information about where and how wildlife move across the landscape. In areas where potential crossing locations are limited, local knowledge can help guide the planning of wildlife crossings. Residents and recreational users have communicated that White-tailed Deer are frequently hit by traffic along Ojibway Parkway in the Project Area. Other information obtained from PICs indicates that reptiles (snakes and turtles) actively use the area. The area is also said to be a refuge for mid and large mammals such as Coyote, Red Fox, and Gray Fox. Data indicating several Red Fox and Coyote road-kills from various locations around southwest Windsor were provided.

5.1.3 Coordination and Compatibility of Adjacent Land Use

One of the most important factors in site selection for wildlife crossings is adjacent land use compatibility (current and future). When the property for the wildlife crossing, areas for mitigation measures (e.g., post-construction rehabilitation), and fencing are not owned by the proponent (e.g., the municipality, region, conservation authority) which builds the crossing, an agreement and understanding on long-term responsibilities and financial investments must be understood by all parties. Additionally, an adjacent landowner may have a long-term plan for their property, which would negate the crossing. Therefore, wildlife crossing planning must consider adjacent owners and long-term land use.

Likewise, coordination between internal departments (e.g., operations, engineering, parks) must be forecasted to understand how to integrate concerns around growing infrastructure and changing landscapes (U.S. Department of Transportation, 2011). Wildlife crossings can only be as effective as the management strategies developed and the funding and ability to implement them. For wildlife corridors to fulfill their function as habitat connectors, impacts from development and human disturbance must be mitigated. Long-term planning and landscape connectivity must be understood to ensure the local-scale connection is effective.

As part of the Class EA Study, the Study Team consulted with the ETR to discuss the possibility of incorporating an overpass over the railway tracks and request information that may be useful to describe potential railway impacts on wildlife. During earlier conversations, ETR identified that it would consider accepting an overpass over the railway tracks. However, prior to issuing the Notice of Study Completion and the mandatory 30-day review period, ETR expressed several concerns, noting that they wish to avoid any crossing over its rail yard, whether by span over its rail yard, by grade-separated crossing, or otherwise.

Detailed consultation with the ETR is discussed in Section 12.4 of the ESR.

5.1.4 Spacing of Crossings

The spacing of wildlife crossings varies based on the variability of landscape, terrain, population densities, home ranges, and the section of available roadway. Wildlife crossings are permanent structures within a changing landscape. The lifespan of wildlife crossing structures is around 70–80 years (U.S. Department of Transportation, 2011). Therefore, the location and design of the crossings need to accommodate the changing dynamics of habitat and climatic conditions and their wildlife populations over time (U.S. Department of Transportation, 2011). Generally, in fragmented landscapes, fewer crossings are required compared to non-fragmented landscapes. At the landscape level, crossings can be placed with dominant topographic features (watercourses) or avoid unsuitable areas such as steep terrain. The spacing of crossings should also consider that home range size varies over time, species, and resource availability and distribution. Wildlife crossings must connect to and form an integral part of the larger landscape. Additional crossings may not need to be placed on a linear stretch of road but on other roadways within the regional movement corridor. Crossing of various types and sizes can also be considered, along with microhabitat elements that will enhance movement.

When roads bisect large expanses of continuous habitat, it is thought that crossing structures for smaller animals, including amphibians, turtles, and snakes, be spaced 300 m apart (Ministry of Transportation, 2016; Ontario Ministry of Natural Resources and Forestry, 2016). For White-tailed Deer, it is recommended that crossings be spaced 1.4 km apart (Bissonette & Adair, 2008).

5.2 Type of Wildlife Crossing Structure

Ojibway Parkway is predicted to transport 870 to 1,065 vehicles during peak hours (pm and am, respectively) between the Black Oak Heritage Park Area and the Ojibway Park Area in 2035 (Canada-United States-Ontario-Michigan Border Transportation Partnership, 2008); thus, modifying motorist behaviour is not feasible. Therefore, the City aims to modify animal behaviour to reduce WVCs and provide an effective landscape connection. Crossing structures and fencing have been shown to be effective measures in reducing WVCs and providing connections between fragmented habitats (Ministry of Transportation, 2016). To address structure type, species-specific behaviours should be incorporated into the crossing structure design. However, sometimes these concerns are offset by other project constraints, including the cost of the structure, available material and expertise, and physical limitations of the site, e.g., soil, terrain, hydrology (U.S. Department of Transportation, 2011). Ultimately, wildlife crossings have two purposes; to 1) connect habitats and populations and 2) reduce road mortality. When facilitating connections, overpasses and underpasses are discussed, while specific measures and habitat and infrastructure adaptations are considered for reducing WVCs. Habitat and infrastructure adaptations can include signage, lighting, ROW maintenance (removing habitat to increase sightlines a reduce WVCs), and road infrastructure (e.g., curbs, drainage grates, jersey barriers, the width of road median).

5.2.1 Overpass vs. Underpass Crossings

Wildlife crossings come in a variety of shapes and sizes, depending on their specific objective. Overpass designs are landscape bridges, wildlife overpasses, multi-use overpasses, canopy crossings (Table 5-1). Underpass designs are viaducts, large mammal underpasses, multi-use underpasses, underpasses with waterflow, small and medium mammal underpasses, modified culverts, and herptile tunnels. Determining the type of wildlife crossing structure most suitable for a given location will depend on several criteria. Selection begins by identifying a general wildlife crossing type that conforms to the wildlife habitat connectivity potential for the target species and topography of the site chosen (U.S. Department of Transportation, 2011). When selecting wildlife crossing types where a roadway bisects habitat of high conservation value, mixed-use (wildlife-human) crossings should not be

used (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Additionally, landscape bridges and large wildlife overpasses have been proven to be the most effective structures for multiple species (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016).

Previous research indicates that larger animals prefer 50 m wide overpasses compared to underpasses and European standards aim for this width. In Ontario, the first wildlife overpass had a width of 30 m but was a straight deck, which means animals had a straight view across (Ministry of Transportation, 2016). Generally, wildlife crossings should not be greater than 230–260 ft (70–80 m) in length except in special situations, such as spanning highways (U.S. Department of Transportation, 2011).

Wildlife crossings will often be focused on a species of conservation interest (e.g., threatened or endangered), a species-specific group (e.g., amphibians or reptiles), or they can be implemented to reduce threats to motorist safety (e.g., deer). Preferably wildlife crossings will be designed to allow for movement of the greatest diversity of wildlife species (Table 5-2). Ojibway Park Area and Black Oak Heritage Park Area have large mammals- ungulates (deer); high-mobility medium-sized mammals- carnivores (coyote, fox); low mobility medium-sized mammals (raccoon, skunk, groundhog); small mammals (voles, mice); amphibians; and reptiles

Table 5-1: General Wildlife Crossing Designs

Type	Usage	Species & Groups	Dimensions Minimum	Dimensions Recommended
Overpass				
Landscape Bridges	designed exclusively for wildlife use	Due to their large size, they are used by the greatest diversity of wildlife and can be adapted for amphibian and reptile passage[1, 2] Used on large roadways where underpasses are not feasible or may be too long (>25m)[2] Birds will fly over wildlife overpasses, and research in Australia has shown that forest birds use overpasses to cross roads (Ministry of Transportation, 2016)	W: 230 ft (70 m)	W: >330 ft (>100 m)
Wildlife Overpass (smaller than landscape bridges)	designed exclusively for wildlife use	Wide range of wildlife from small to large[1,2] Used on large roadways where underpasses are not feasible or may be too long (>25m)[2] Birds will fly over wildlife overpasses, and research in Australia has shown that forest birds use overpasses to cross roads (Ministry of Transportation, 2016)	W: 130-165 ft (40-50 m) Width varies however 50 m wide has been recommended in the literature[2]	W: 165-230 ft (50-70 m)
Multi-use Overpass	designed for wildlife-human use	benefit generalist type species from small to large[1]	W: 32 ft (10 m)	W: 50-130 ft (15-40 m)
Canopy Crossings	designed exclusively for wildlife use	exclusively for semi-arboreal (e.g., Flying Squirrel, Red Squirrel) and arboreal species (e.g., bats and birds).	N/A	N/A
Underpass				
Viaduct	Multi-purpose	Due to their large size, they are used by the greatest diversity of wildlife and can be adapted for amphibian and reptile passage[1]	No minimum, larger than underpasses	No recommended, larger than underpasses
Large Mammal Underpass	designed exclusively for wildlife use	wide range of wildlife from small to large[1]	W: 23 ft (7 m) H: 13 ft (4 m)	W: >32 ft (>10 m) H: >13 ft (>4 m)
Multi-use Underpass	designed for wildlife-human use	wide range of wildlife from small to large, if adapted[1]	W: 16.5 ft (5 m) H: 8.2 ft (2.5 m)	W: >23 ft (>7 m) H: >11.5 ft (>3.5 m)
Underpass with Flow	Wildlife and drainage	wide range of wildlife from small to large, if adapted[1]	W: dependent on hydrologic channel 6.5 ft (2 m) H: 10 ft (3 m)	W: dependent on hydrologic channel >10 ft (>3 m) H: 13 ft (>4 m)
Small to Medium-sized Mammal Underpass	Wildlife and drainage	Range of wildlife from small to large, if adapted[1] Size selection is based on the target species needs or connectivity objective at the site.	W: 1-4 ft (0.3-1.2 m) H: 1-4 ft (0.3-1.2 m) OR 1-4 ft diameter (0.3-1.2 m)	< 10 ft (3.0 m) is usual size2
Modified Culvert	Wildlife and drainage	range of wildlife from small to medium, if adapted[1]	W: 1.5 ft (0.5 m) Clearance: >3 ft (>1 m)	W: >3 ft (>1 m) Clearance: >4 ft (>1.5 m)

Type	Usage	Species & Groups	Dimensions Minimum	Dimensions Recommended
Herptile Tunnel (Open Top)	designed exclusively for wildlife use	Amphibians and reptiles, range of small to medium-sized mammals[1]	Dimensions vary depending on target species or taxa, or local conditions. Tunnels range from 1–3 ft (0.35–1 m) in diameter	

Note(s)

1. (U.S. Department of Transportation, 2011)
2. (Ontario Ministry of Natural Resources and Forestry, 2016)

Table 5-2: Suitability of wildlife crossing design type for species and groups

Species/Group	Landscape Bridge	Wildlife Overpass	Multi-use Overpass	Canopy Crossing	Viaduct	Large Mammal Underpass	Multi-use Underpass	Underpass with Waterflow	Small-to medium mammal Underpass	Modified Culvert	Herptile Tunnel
Ungulates- Deer	✪	✪	⊗	N/A	✪	⊙	⊗	⊙	⊗	⊗	N/A
Carnivores – Coyote, Fox	✪	✪	✪	N/A	✪	✪	✪	✪	✪	⊙	N/A
Low Mobility Mammal- Raccoon, Skunk	✪	✪	✪	N/A	✪	✪	✪	✪	✪	✪	⊙
Semi-arboreal Mammals (Red Squirrel	⊙	⊙	⊙	✪	⊙	⊙	⊙	⊙	⊗	⊗	⊗
Semi-aquatic Mammals	⊙	⊙	⊙	N/A	⊙	⊙	⊙	✪	⊙	✪	⊙
Small Mammals - voles, mice	✪	✪	✪	⊙	✪	✪	✪	✪	✪	✪	⊙
Amphibians	⊙	⊙	⊙	N/A	⊙	⊙	⊙	⊙	⊙	✪	✪
Reptiles	✪	✪	✪	N/A	✪	✪	✪	⊙	✪	✪	⊙

Note(s)

✪ [Recommended]
⊙ [Possible if adapted]
⊗ [Not Recommended]

5.2.2 Openness Ratio

Openness Ratio (OR) was used early in the field of road ecology to describe and measure the stimulus of a given underpass to approaching deer by calculating height times width and then dividing by length (U.S. Department of Transportation, 2011). The thought is that, in theory, an underpass could be so long and confining that it could preclude deer use and that deer prefer underpasses with a clear view of the horizon (Reed & Ward, 1985). OR has gained popularity and has been applied to all animal groups, likely because it is a simple metric. However, simply relying on a 'magic metric' is short-sighted and does not consider other factors that could influence use. OR is not provided within this report as the preferred alternative is an overpass design, and OR does not apply for an entirely open structure.

The line of sight is considered an important crossing feature, and it is thought that wildlife should be able to see suitable habitats on the other side of the structure (Ontario Road Ecology Group, Toronto Zoo, 2010). An overpass that creates a landscape connection will provide this line of sight and even provides suitable habitat.

5.3 Fencing Type

Wildlife fencing is the most effective and preferred method to guide wildlife to the structure and prevent intrusions onto the roadway (Ontario Road Ecology Group, Toronto Zoo, 2010; U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Thereby, effective wildlife fencing and crossing structures can significantly reduce many harmful impacts of roads on wildlife populations. Fences need to be impermeable to wildlife to keep WVCs to a minimum and ensure that wildlife crossings are used. In general, both sides of the roadway must be fenced in equal lengths (symmetric; U.S. Department of Transportation, 2011), and fencing must be designed for target species (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Fencing is a key part of a mitigation plan and needs to consider what happens for wildlife that becomes trapped on the road. Escape ramps, gates, or doors must be used to allow for one-way movement off the road (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016).

Fencing may be continuous or disconnected, and there are various strategies to bridge the gaps. The literature summary was reviewed for suggested design details for all wildlife. Fencing material ranges in material, gauge, and size. A similarity for permanent fencing is that fencing material should be attached to the back-side (non-roadway side) of posts, so impacts from accidents or plows will only impact the fence material and not the posts.

Metal fencing material (paige wire, chain link) is longer lasting when galvanized (Class III) and installed with steel posts. For smaller animals, solid materials are preferred as a larger gauge chain link would allow passage, and a smaller gauge can cause some animals to get stuck. When choosing to fence for smaller animals, fence bottoms should be buried with a lip to prevent digging under fences, and the tops of fences should have a lip to prevent climbing or jumping over. Fencing for small and medium mammals is joined to large mammal fencing and is placed on the non-roadway side.

The fence ends must consider animal behaviour. If animals encounter a fence and cannot go over or under, they tend to follow the fencing until they can pass. Hopefully, an animal will find the crossing and cross over safely. However, if an animal finds the fence end, they can cross the road. Alternatively, some animals will choose to graze or nest inside the fence. To prevent undesirable fence ends, fencing should end at a wildlife crossing or terminate in unsuitable habitat. When fencing cannot terminate at a crossing, fencing should extend beyond suitable habitat and be 'looped' or angled. The terminus should consist of a curve away from the roadway to redirect animals that may have followed the fence to the terminus back towards the crossing. One note is that in

areas of continuous non-fragmented habitat, fencing will not extend the entire road length as it poses a barrier to wildlife movement (Ministry of Transportation, 2016). Another consideration for fence ends is motorists (Ontario Road Ecology Group, Toronto Zoo, 2010). If signage and motorist speed can be reduced at fence ends, WVCs may be reduced. At the very least, maintaining motorist sightlines at the fence end may reduce WVCs.

Generally, fencing for large mammals should be a minimum of 8.0 ft (2.4 m) high with post-separation on average every 14-18 ft (4.2-5.4 m) (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). For small and medium mammals, the standard height of fencing is 0.6 m (2 ft) above the ground with a lined or buried bottom and top lip (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Fencing must physically connect to the crossings to ensure no gaps or holes exist. Maintenance costs for fencing may be 1% of fencing construction costs per year (Ministry of Transportation, 2016).

5.3.1 A Note on Predation

It is a concern that wildlife crossings and fencing increase the risk of predation. However, studies have not substantiated this (Ontario Road Ecology Group, Toronto Zoo, 2010 and U.S. Department of Transportation, 2011). While some studies find a predation event, it is unknown whether it was natural or observed because of the increased monitoring. Likewise, predation is so low that fencing and crossings are still considered beneficial, as road mortality is significant (Ontario Road Ecology Group, Toronto Zoo, 2010).

5.4 Gates and Escape Ramps

If wildlife becomes trapped on the roadway, they need to be able to exit safely. The most effective means of escape is through a steel swing gate, hinged metal door or earthen ramp (U.S. Department of Transportation, 2011). The number, type and location of escape structures will depend on the target species, terrain, and habitat adjacent to the highway fence.

Earthen ramps or jump-outs allow wildlife (large and small) to safely exit right-of-ways on their own. The outside walls of the escape ramp must be smooth and high enough to discourage wildlife from jumping onto the ramp and access the right-of-way but not too high to prevent wildlife from jumping off. Jump-outs range in height from 1.5-2.2 m for deer and are spaced at about 0.5 km (Ministry of Transportation, 2016). The landing spot around the outside wall must consist of loose soil or other soft material to prevent animal injury. It is also recommended for large animals that escape ramps are positioned in a setback in the fence, so animals can assess the situation before deciding to use the jump out or continue walking along the roadway. For small- and medium-sized mammals, natural objects (for climbing species) or small, hinged doors at ground level allow them to escape the roadway on their own.

One-way gate designs require special considerations, so they swing back into place when moved but also allow animals to push through (Ministry of Transportation, 2016). Jump-outs require maintenance to remove vegetation from the ramp and the jump-out floor (Ministry of Transportation, 2016).

5.5 Monitoring

The criteria used to measure the effectiveness will depend on the intended purpose of the wildlife crossings. Monitoring can range from a single-species approach focused on the population within the roadway to more complex monitoring of ecological processes and functions within regional landscapes of conservation importance. As mentioned above, there are ultimately two purposes for wildlife crossings: 1) to connect habitats and populations and 2) to reduce mortality on roads. Whether the crossings are functional for local populations

depends on how well the crossing is planned and designed. Monitoring should determine whether the basic functions of wildlife crossings are being met and provide demographic information on the number of individuals using the crossing structure and their gender (U.S. Department of Transportation, 2011).

As the project is to target all area wildlife and all species from a project area cannot be monitored, the selection of focal (or a few) species will occur. Species selected for monitoring will serve as an indicator of change and maintenance of ecological processes and a focal species that will provide a large enough dataset to analyze effectiveness. It is also beneficial if the focal species is the most sensitive when adapting to wildlife crossing. Various wildlife survey methods exist, ranging from cost-effective and simple to complex and expensive.

Monitoring will focus on both the crossing structure and fencing. Each type of monitoring has advantages and disadvantages. Monitoring the effectiveness of crossings and fencing should set performance objectives and goals, establish baseline conditions, determine the best methods to monitor/study design, and resolve management questions associated with the project objectives. Monitoring should continue for a period of time in which the target species experiences one population cycle or more if the target species is short-lived. Monitoring of wildlife crossing structures has shown that an adaptation period and learning curve does exist (U.S. Department of Transportation, 2011; Ontario Road Ecology Group, Toronto Zoo, 2010; Ministry of Transportation, 2016). The adequate length of a monitoring program must allow time for wildlife to adapt to changes in the surrounding habitat.

Monitoring should document three levels of biological organization;

- genetic connectivity, predominantly adult male movement across road barriers;
- demographic connectivity, genetic connectivity with confirmed adult female movement across road barriers; and
- functional connectivity, genetic and demographic connectivity with confirmed dispersal of young females that survive and reproduce.

These three levels form the basis for developing natural resource management and conservation plans and should be applied to long-term monitoring of wildlife crossings to determine if mitigation systems benefit wildlife populations (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Monitoring that measures population-level effectiveness, such as before-after-control-impact studies, is required to evaluate and optimize mitigation dollars. Ideally, pre-construction monitoring would take place for some years before the construction of the crossing. Pre-construction monitoring would allow for a ‘before-after’ study design. A ‘before-after’ study could demonstrate crossing effectiveness. Depending on the availability to complete studies before the construction of the crossing, the monitoring may have to rely on a ‘control-impact’ design. In a ‘control-impact’ study, the only data collected is for the period after the mitigation (crossing) construction. The inference made is that if the control and impact sites differ in some environmental variable, this difference is (in part) due to the mitigation. However, ‘control-impact’ studies are only applicable if control and impact sites are identical in the absence of mitigation. Table 5-3 lists types of monitoring measures based on purpose and provides a high-level summary of details regarding target species, timing and frequency, location, and cost.

Additionally, specific benchmarks and thresholds should be agreed to by the stakeholders and agencies involved to trigger adaptive management. For example, a target of five WVCs a year is acceptable, but WVCs exceeding five would require further fencing considerations. As landscape conditions and population dynamics vary over

time, short- and long-term monitoring and performance targets should be assessed periodically and readjusted accordingly. The lead agency and other stakeholders need to know how their mitigation investment dollars are being spent and how the technology can be transferred to future projects. Taxpayers will also want to know whether the measures are effective.

Table 5-3: Mitigation Monitoring Measures

Monitoring Purpose	Available Monitoring Methods	Timing (Pre or Post construction)	Target Species	Check Frequency	Area of Use	Cost and Cost Loading
Effectiveness of wildlife crossing structures	Camera traps (infrared and motion-activated)	Post	Deer, medium mammals	1-7 days	Ingress/egress and middle of crossing	High and front-loaded
	Tracks and track beds (ink and soot panels)	Post	Deer, medium mammals	1-3 days	Ingress/egress and middle of crossing	High and front-loaded
	Snow tracking	Post	Deer, medium mammals	Seasonal	Ingress/egress and middle of crossing	Low and continuous
	Monitor herbivory and scat	Post	Mammals	Monthly	Along crossing	Low and continuous
	Visual bird and bat surveys	Pre and Post	Birds and Bats	Weekly and Seasonal	Along crossing and Ojibway Parkway	Medium and continuous
	Pitfall traps	Pre and Post	Small mammals and amphibians, some reptiles	Daily and seasonal	Ingress/egress	High and front-loaded
Monitor wildlife use of locations throughout and adjacent to the project area	Deer highway mapping	Pre and Post	Deer	Seasonal	Ojibway Park, Black Oak Heritage Park and adjacent lands	Low and continuous
	Monitor microhabitat (camera traps)	Post	All small and medium animals	1-7 days	Ingress/egress and middle of crossing- microhabitat elements such as brush piles, pools, etc.	High and front-loaded
	Visual Implant Elastomer (VIE)/Mark-Recapture studies	Pre and Post	Amphibians	Weekly/Seasonal	Wetlands in Black Oak Heritage Park and Ojibway Park	High and continuous
	Radiotelemetry	Pre and Post	Deer	Seasonal	Black Oak Heritage Park and Ojibway Park	High and front-loaded
Evaluate the effectiveness of wildlife fencing	Maintenance/patrol crews report animals inside fencing	Post	All	As occurs/ 6 months	Median/ROW	Low and continuous
	Systemic checks of fencing	Post	All	Monthly	Fence line	Medium and continuous
	WVCs with Road mortality surveys	Pre and Post	All	Nightly and seasonal	Median/ROW	Medium and continuous
	Carcass removal by maintenance crews and agency staff	Pre and Post	Deer, medium mammals	As occurs	Median/ROW	Low and continuous

Note(s)

Front-loaded indicates an initial cost in equipment but does not include the continuous cost of person-effort. Continuous indicates person effort cost only.

6.0 BIOPHYSICAL ENVIRONMENT

Essex County is in the Mixedwood Plains Ecozone and the Ecoregion 7E (Lake Erie-Lake Ontario Ecoregion). Essex County lies in the southwestern extremity of Southern Ontario, and Kent County on the east is the only land boundary. It is bounded by Lake St. Clair to the north, the Detroit River to the west, and Lake Erie to the south. Essex County is well supplied with roads and railways connecting the county to other parts of the province and the City of Windsor in the northwest section of the county.

Essex County is located in the warmest part of the Province and has the lowest annual precipitation (Richards, Caldwell, & Morwick, 1949). High temperatures and low precipitation have made for a historically rich prairie landscape (Richards, Caldwell, & Morwick, 1949). The wet prairie (and related savannah) landscape was historically present as an almost continuous strip along the shoreline of the western Lake Erie basin (Ministry of Natural Resources and Forestry, 2021). On the Canadian side, wet prairies were found in Windsor along the shores of the Detroit River and along the eastern Lake St. Clair shoreline. It is estimated that 45 square km of prairie and savannah were present before European settlement (Ministry of Natural Resources and Forestry, 2021). Once dominant, prairies are now only a portion of the City of Windsor, and Essex, Kent, and Lambton Counties (Government of Ontario, 2002). The Ojibway Prairie Complex contains the largest protected remnants of prairie and savannah in Ontario.

Similarly, the natural forest that covered Essex County is nearly all gone (Richards, Caldwell, & Morwick, 1949) as European settlement and subsequent farming removed natural ecosystems in support of agriculture, much like the rest of southern Ontario. In a 1941 census, almost 87% of Essex County was farmland (Richards, Caldwell, & Morwick, 1949) while in The Ecosystems of Ontario (Crins, Gray, Uhlig, & Wester, 2009), it was estimated that 78% of the Ecoregion is cropland and pasture and 7% is developed (urban areas and road networks).

Figure 6-1: Ojibway Park

Although wet prairies were historically dominant, prairies and oak savannahs also occurred on drier sites. The communities occurred on sandy to very fine sands and sandy loams, which varied in site moisture from wet-mesic, through mesic to dry-mesic (Ministry of Natural Resources and Forestry, 2021). On the heavier soils, the original forest was an association of broad-leaved trees, and elms (American and Rock) probably occurred most frequently. They were intermingled with ash, oak, hickory, Sycamore, and Silver Maple. Also found were species that do not grow in the more northerly sections of Ontario, such as American Chestnut, Tulip

Tree, Mockernut and Pignut Hickory, Black Gum, Blue Ash, Cucumber Tree, PawPaw, Kentucky Coffee-tree, Eastern Redbud, Red Mulberry and Sassafras (Richards, Caldwell, & Morwick, 1949).

The flora and fauna of Ecoregion 7E are the most diverse in Canada. In Essex County, Black Walnut, Sycamore, Swamp White Oak and Shagbark Hickory are common (Richards, Caldwell, & Morwick, 1949) and a mosaic of vegetation communities includes Swamp Pin Oak swamps and Black Oak forests, successional forests and shrub thickets, and forb prairie species now growing in old fields (Ministry of Natural Resources and Forestry, 2021a and Government of Ontario, 2002).

Ecoregion 7E is the most densely populated, urbanized, and industrialized Ecoregion in Ontario and is the most imperiled in Canada due to the amount of natural habitat that has been removed (Crins, Gray, Uhlig, & Wester, 2009). Many of Ontario's SAR occur in this region, especially herpetofauna species. Typical mammals inhabiting this ecoregion include White-tailed Deer, Northern Raccoon, Striped Skunk, and the Virginia Opossum. Characteristic birds include Green Heron, Virginia Rail, Cooper's Hawk, Eastern Kingbird, Willow Flycatcher, Brown Thrasher, Yellow Warbler, Common Yellowthroat, Northern Cardinal, Savannah Sparrow, and Wild Turkey, which has been re-introduced into the ecoregion (Crins, Gray, Uhlig, & Wester, 2009).

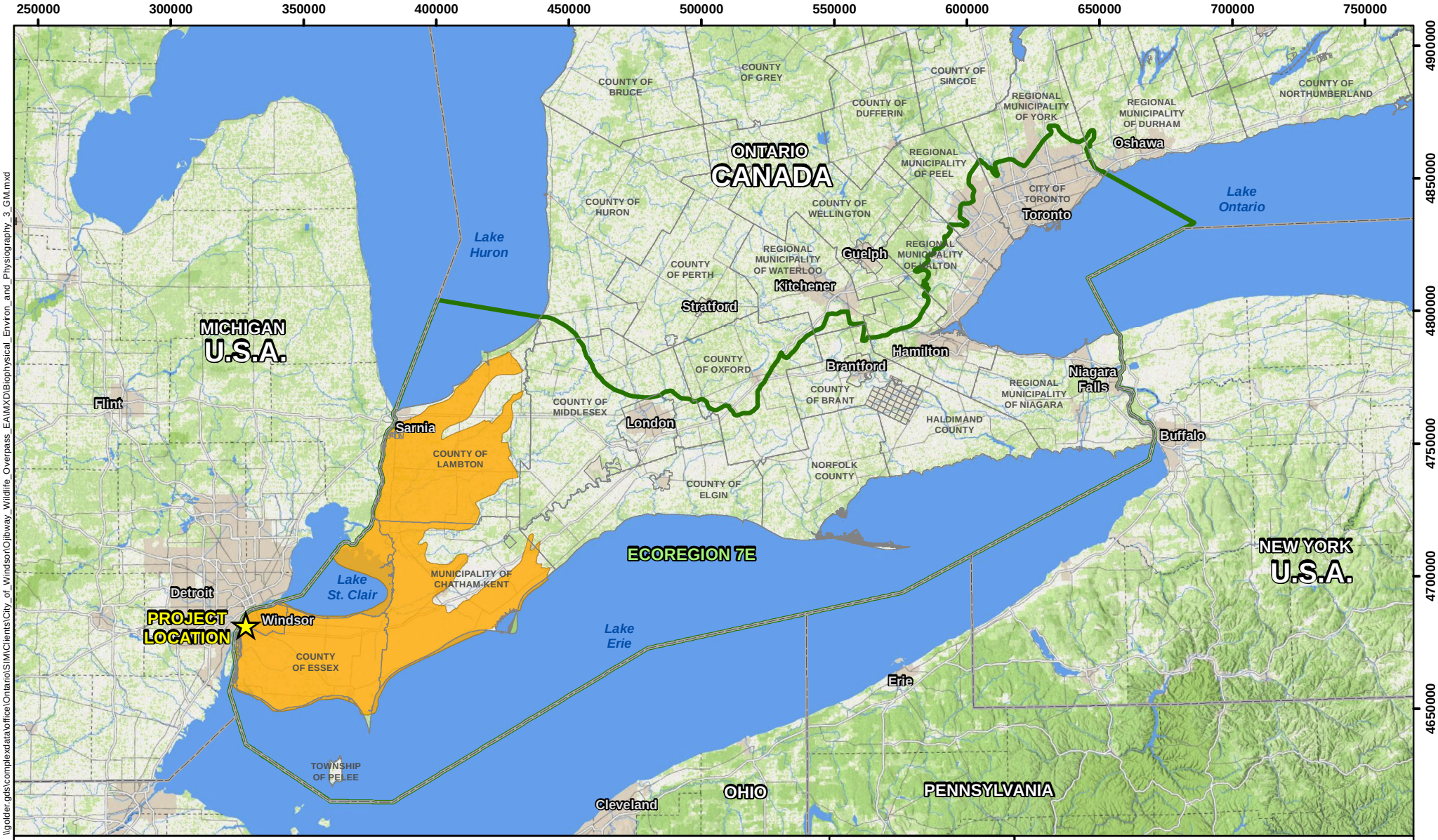
A review of background information, ground-truthing, and surveys were completed to provide site-specific context for extant biophysical conditions within the Project Area, including landform, physiography, and geology but focusing on the presence of aquatic and terrestrial features. The following sections summarize the key biological environment features identified through the desktop studies and field surveys.

6.1 Secondary Source Review

Species lists gathered from existing databases are provided in Appendix A. No fish habitat exists in the Project Area. The majority of the species information was obtained from atlases and iNaturalist. A data request to the Natural Heritage Information Centre (NHIC) was made to determine if wetland evaluation reports were available or if other background reports on the ANSI and nature reserve could be provided. Information gathered from these sources contributed to understanding historic and existing conditions (e.g., candidate features and additional sensitivities) and species lists for the Project Area. Information from these secondary sources is included throughout the report.

6.1.1 Landform and Physiography

The Project Area occurs in the physiographic region known as the St. Clair Clay Plains (Figure 6-2). The St. Clair Clay Plains adjoin Lake St. Clair to Lake Erie and both lakes to Lambton County via the St. Clair River. There are minor variations in levelness across the plain, which have had a great effect on vegetation and soils (Putnam & Chapman, 1984). Most of the plain has such imperfect drainage that dredged ditches and tile underdrains have had to be installed to provide satisfactory conditions for crop growth (Putnam & Chapman, 1984; Richards, Caldwell, & Morwick, 1949). Glacial lakes left shallow deposits of lacustrine clay, smoothed knolls, and a deep cover of overburden on limestone bedrock when retreating, lending to the area defined as a sand/till plain (Putnam & Chapman, 1984; Chapman & Putman, 2007).



LEGEND

- Project Location
- Ecoregion 7E
- Physiographic Region (St. Clair Clay Plains)
- Municipal Boundary (Single and Upper Tier)
- National and State Borders

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 25 50 100 150 200 Kilometres

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY PARKWAY WILDLIFE CROSSING

Biophysical Environment and Physiography

PROJECT N°: IM20104013 | **FIGURE: 6-2**

SCALE: 1:2,000,000 | DATE:May 2024

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6.1.2 Soil and Bedrock Geology

The soil on any site is a complex result of a distinct set of conditions, including climate, vegetation, relief, drainage, parent material, and cultural practices (Richards, Caldwell, & Morwick, 1949). Soils in the Project Area have been broadly mapped as Granby Sand, and the bedrock underlying the county is mostly limestone of Devonian age (Richards, Caldwell, & Morwick, 1949). The Granby is the poorly drained member of the Fox catena and exhibits the characteristics of the Dark Gray Gleisolic soils. It occurs chiefly in one large block south of the City of Windsor (Richards, Caldwell, & Morwick, 1949). The surface and subsoil are primarily dark Gray sandy loam over Gray or mottled sand, with clay at depths of 3 feet or more, and is stone-free. The coarse-textured lacustrine deposits of sand, gravel, minor silt and clay littoral deposits (The Ontario Geological Survey, 2003) resulted in slightly acid to slightly alkaline soils, lending to land use for general vegetable farm crops and pasture. In some areas, woodlots have remained (Richards, Caldwell, & Morwick, 1949).

Soils in the Project Area are mostly medium and coarse outwash, with fine sands in some areas. Soils overlay impervious clayey till, which impedes soil drainage and consequently, soils may be saturated or flooded in the spring (Ministry of Natural Resources and Forestry, 2021). As the topography is almost level, there is poor natural drainage (Richards, Caldwell, & Morwick, 1949).

6.1.3 Drainage

The available storm servicing information provided for use in this study indicates that there are three (3) municipal drains in the Study Area (Ojibway Park Drain, Titcombe Road Drain, and Susan Drain). These drains are understood to be regulated by ERCA. The municipal drains are understood to be regulated by ERCA; however, they do not occur within the Project footprint (Figure 2-1). As such, no features in the immediate vicinity of the Crossing are considered to provide significant hydrologic routing or storage (i.e., attenuation) of stormwater runoff. The available elevation data indicates that the study area and the surrounding region is fairly flat (i.e., overland slopes less than 2%). The City's open data for the storm sewers and municipal drains indicate multiple open drains crossing Ojibway Parkway from east to west before merging near the intersection with Broadway Street. A review of available aerial imagery indicates the presence of roadside ditches on both sides of Ojibway Parkway in select locations within the Study Area limits, which route the stormwater in the road right-of-away to one of the drains.

6.2 Flora and Ecological Land Classification (ELC)

6.2.1 East Study Area

The area is comprised of a vegetated strip between Ojibway Parkway and the ETR tracks and a portion of the Ojibway Park. A total of four ELC community types were identified within the East Study Area (Figure 6-5), with 81 species of plants observed (Appendix A). Of the plant species recorded in the East Study Area, 8 (<10%) are non-native to the region. Non-natives were widespread and occasional.

Ojibway Park is dominated by Swamp Pin Oak swamp, with an area of prairie and Black Oak woodland present. The prairies are wet-mesic on moderate to poorly-drained coarse outwash, and Prairie Cordgrass, Canada Goldenrod, Bluejoint Reedgrass, Culver's Root, Virginia Mountain Mint, and Wild Bergamot dominate in various degrees (Ministry of Natural Resources and Forestry, 2021).

6.2.1.1 Dry Black Oak Woodland Vegetation Type (WODM3-2)

The vegetated strip between Ojibway Parkway and the railyard Figure 6-3). In the East Study Area, this community is 3.58 ha. There is no ELC code for this community under the First Approximation. The Second Approximation community code is WODM3-2 under the Deciduous Woodland Community Series. Deciduous Woodland Communities have less than 60-75% canopy cover.

Figure 6-3: Dry Black Oak Woodland Vegetation Type (WODM3-2)

The Black Oak canopy covers between 25-60% of the community and oaks are over 25 m in height. Based on the size of the trees, this community appears to be mid-aged. Due to the location of the community, the area is disturbed by animal and human use and non-native species are widespread. The sub-canopy is between 10-25 m in height and covers between 25-60%. The sub-canopy is comprised of Black Oak, Sassafras, and to a lesser extent Pignut Hickory. The understory is between 1-2 m in height and covers 10-25% of the community. The understory is comprised of regenerating Black Oak and Sassafras, as well as Autumn Olive. The ground layer is less than a meter in height and has greater than 60% vegetation cover. The ground layer contains non-native cool-season grasses such as Smooth Brome and Tall Fescue.

The soil analysis characteristics showed the community is sandy loam with a moisture regime of 3. Soil horizons were undefined, and mottles and gley were found at 100 cm. Depth to bedrock was greater than 120 cm.

6.2.1.2 Dry-Fresh Black Oak Deciduous Forest Type (FODM1-3)

Largest community and the general community type of the East Study Area. In the East Study Area, this community is 12.42 ha. Under the First Approximation, the community is classified as FOD1-3. The Second Approximation community code is FODM1-3 under the Deciduous Forest Community Series. Deciduous Forest Communities have greater than 60-75% canopy cover. There is a vernal pool (<0.2 ha) adjacent to the Dry Black Oak Tallgrass Savannah Type (SVDM1-1/TPS1-1) in the south of the East Study Area.

The canopy covers greater than 60% of the community, and the canopy is over 25 m in height. Black Oak is dominant, followed by Black Cherry, Pignut Hickory, White Oak, and Red Maple in variable abundance. Based on the size of the trees, this community appears to be mid-aged. Due to the location of the community, some areas are more disturbed than others. Deer browse is moderate and non-native

species are widespread. The sub-canopy is 10-25 m in height and covers between 10-25% or 25-60% in various areas. The sub-canopy is comprised of the same species present in the canopy, and Black Oak is dominant. The understory is 1-2 m in height, and vegetation cover is 10-25% or 25-60% in various areas. The understory is comprised of Gray Dogwood, Black Cherry, American Hazelnut, and Witch-hazel. The ground layer is less than a meter in height and has greater than 60% vegetation cover. The ground layer contains Gray Dogwood, Virginia Creeper, Northern Dewberry, and Pennsylvania Sedge. Snags, fallen logs, and vernal pools occur throughout this community.

The soil characteristics showed the community is sandy loam with a moisture regime of 2. The A horizon was dark coloured and a fine mull; horizons were distinct and non-stony. Mottles were found at 90-95 cm, but gley was not found and the depth to bedrock was greater than 120 cm.

6.2.1.3 Pin Oak Mineral Deciduous Swamp Type (SWDM1-3)

Large swamp community in the East Study Area (Figure 6-4). In the East Study Area, this community is 0.79 ha. Under the First Approximation, the community is classified as SWD1-3. The Second Approximation community code is SWDM1-3 under the Deciduous Swamp Community Series. Deciduous Swamp Communities have greater than 25% tree canopy cover, and trees are greater than 5 m in height. Deciduous Swamp Communities are dominated by hydrophytic shrub and tree species and are typically fern and sedge-rich. These communities have variable flooding regimes, with less than 2 m water depth. Standing water or vernal pooling is greater than 20% of ground cover in the spring, and in areas like the City of Windsor, flooding duration is short, and the substrate is aerated by early to mid-summer.

Figure 6-4: Pin Oak Mineral Deciduous Swamp Type (SWD1-3; SWDM1-3)

The Deciduous Swamp canopy cover is variable and sometimes relatively open (60-80% canopy closure); the canopy is over 25 m in height. Pin Oak is the dominant species, followed by Silver Maple, Eastern Cottonwood, Bur Oak, and Swamp White Oak in variable abundance. In some areas, Silver Maple is locally dominant or equal to Pin Oak. Based on the size of the trees, this community appears to be mid-aged. Due to the location of the community, some areas are more disturbed than others, and non-native species are widespread. The sub-canopy is 2-10 m in height and covers between 25-60%. The sub-canopy is comprised of the same species present in the canopy, and Pin Oak is dominant. The understory is 1-2 m in height, and cover is 10-25%. The understory is comprised of canopy species

regeneration, including Silky Dogwood, Gray Dogwood, Green Ash, and Northern Dewberry. The ground layer is less than a meter in height and has approximately 25% vegetation cover. The ground layer contains Virginia Creeper, poison-ivy, Northern Dewberry, Rice Cutgrass, Royal Fern, and Sensitive Fern. Snags, fallen logs, and vernal pools occur throughout this community.

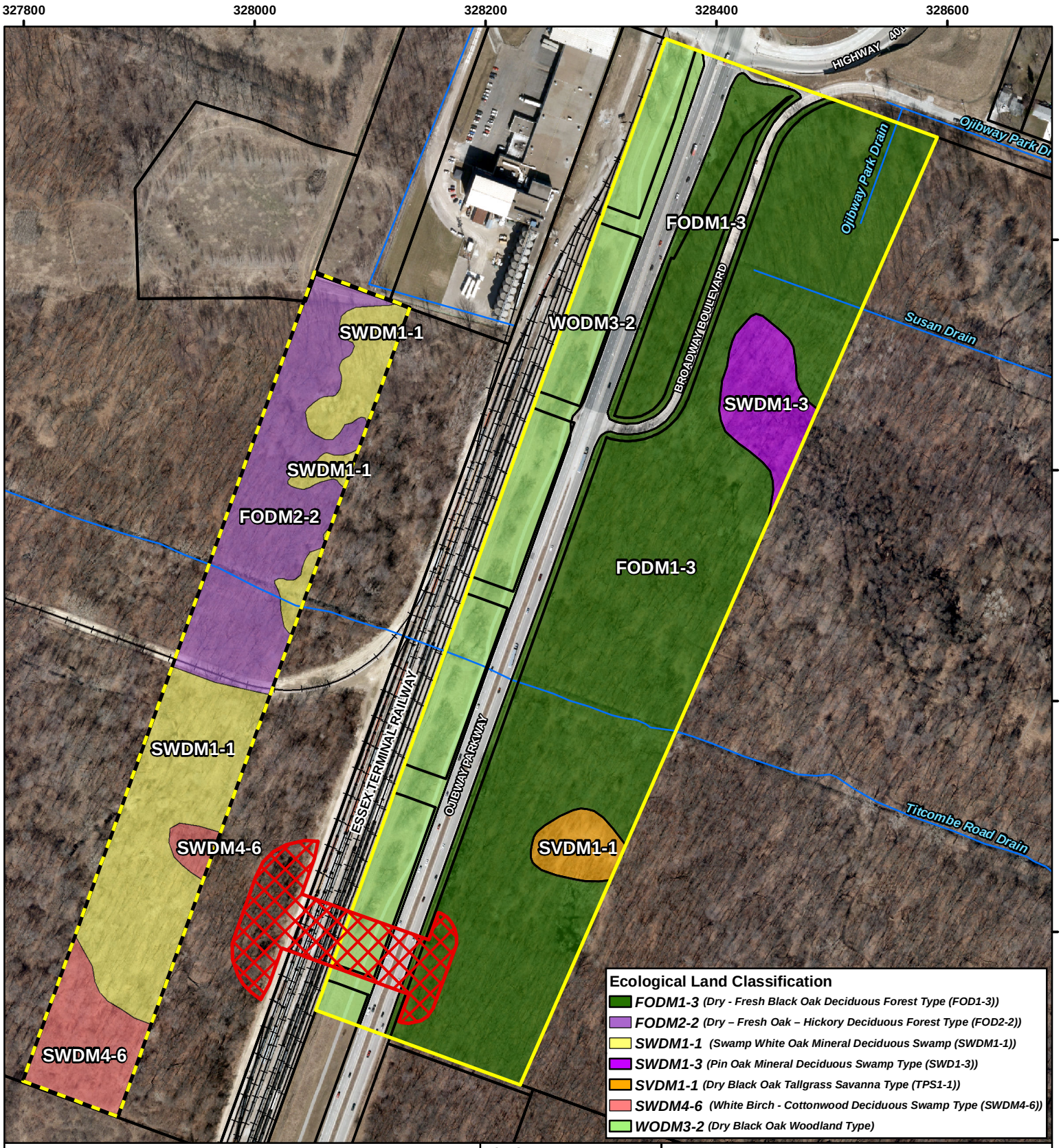
The soil analysis characteristics showed the community varied from fine sand with a moisture regime of 4-5 with mottles at 40 cm and gley at 90 cm to sandy clay loam with a moisture regime of 3-4 where the depth of organics (mineral, decomposing lead litter, roots, and woody material) is 5 cm, mottles at 70 cm and gley at 120 cm. Depth to bedrock was greater than 120 cm, and horizons were distinct and stone-free.

6.2.1.4 Dry Black Oak Tallgrass Savannah Type (SVDM1-1)

A small community (0.38 ha) in the East Study Area is typical of an inclusion; however, due to its ecological significance, it is delineated as its own community. Under the First Approximation, the community is classified as TPS1-1. The Second Approximation community code is SVDM1-1 under the Deciduous Savannah Community Series. Savannah tree cover is greater than 25% but less than 35%; a semi-open treed community with a variable cover of open-grown trees. Natural areas typically have unique flora, whereas areas with a cultural legacy have invasive herbaceous, shrub, and tree species. This community is typically subject to seasonal extremes in moisture conditions, including spring flooding and summer drought. Historically, frequent fires maintained the savannah as an open habitat, which halted successional processes. The General Natural Areas Report (Ministry of Natural Resources and Forestry, 2021) classifies the larger savannah community canopy as dominated by open-grown Swamp Pin Oak with Swamp White Oak, Red Maple, and Black Oak. The report also states that Trembling Aspen is established and spreading, and a discontinuous layer of Gray Dogwood is present and locally prominent. The ground layer supports forest and wet-mesic prairie species.

The Black Oak canopy and sub-canopy covers less than 10% of the community, and mature oaks are over 25 m in height. Due to the location, the area is disturbed by animal and human use, and non-native species are widespread. The understory is between 0.5-1 m in height and covers less than 10% of the community. The understory is comprised of regenerating Black Oak, as well as Pignut Hickory and Autumn Olive. The ground layer is the dominant layer and contains more than 60% vegetation cover. The ground layer is 0.5 m or less in height and contains prairie graminoids such as Little Bluestem, Big Bluestem, Showy Tick-trefoil, Wild Lupine, Northern Dewberry, Round-headed Bush-clover, and Wand Bush-clover.

The soil analysis characteristics showed the community is loamy sand with a moisture regime of 1-2. The A horizon was dark coloured and a fine mull; horizons were distinct and non-stony. Mottles and gley were not found, and depth to bedrock was greater than 120 cm.



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LEGEND

- Project Footprint
- Property Boundaries
- Watercourse / Drain
- Railway

Project Area

- East Study Area
- West Study Area

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

0 50 100 200 300 400 Metres

Datum: NAD83
Projection: UTM Zone 17N

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY WILDLIFE CROSSING

Ecological Land Classification Delineation

PROJECT N°: IM20104013 | **FIGURE: 6-5**

SCALE: 1:4,500 | DATE: May 2024

6.2.1.5 Flora Characteristics

There were ten provincially rare (S1-S3) species present during surveys, 11 locally rare species, and ten locally uncommon species (Oldham, 2017). Twenty-two species are prairie and savannah indicator species present throughout the ELC communities (SOFIA, 2020). Additionally, five plant SAR are confirmed in the Project Area. [redacted] (Figure 7-1). Detailed species lists are found in Appendix A, and a summary of species of conservation concern (including SAR) found during surveys is summarized in Table 6-1. It is recommended that species that occur in Table 6-1 be considered in future planting and restoration plans.

Table 6-1: Flora Species of Conservation Concern

Scientific Name	Common Name	S-Rank	ESA	Essex County	SOFIA
Andropogon gerardi	Big Bluestem	S4		Uncommon	Yes
Schizachyrium scoparium	Little Bluestem	S4		Uncommon	Yes
Panicum virgatum	Old Switch Panic Grass	S4		Uncommon	Yes
Spartina pectinata	Fresh Water Cordgrass	S4		Uncommon	Yes
Nyssa sylvatica	Black Gum	S3		Uncommon	
Osmunda regalis	Royal Fern	S5		Uncommon	
Apocynum androsaemifolium	Spreading Dogbane	S5		Uncommon	
Pteridium aquilinum	Bracken Fern	S5		Uncommon	
Osmundastrum cinnamomeum	Cinnamon Fern	S5		Uncommon	
Solidago juncea	Early Goldenrod	S5		Uncommon	
Vernonia gigantea	Giant Ironweed	S1?		Status unknown or not specified	Yes
Lespedeza virginica	Slender Bush-clover	S1	END	Rare	Yes
Symphyotrichum praealtum	Willow-leaved Aster	S2	THR	Rare	Yes
Veronicastrum virginicum	Culver's Root	S2		Rare	Yes
Liatris spicata	Dense Blazing Star	S2	THR	Rare	Yes
Liparis liliifolia	Purple Twayblade	S2S3	THR	Rare	Yes
Lupinus perennis	Sundial Lupine	S2S3		Rare	Yes
Carya glabra	Pignut Hickory	S3		Rare	Yes
Lespedeza capitata	Round-head Bush-clover	S4		Rare	Yes
Euphorbia corollata	Flowering Spurge	S4		Rare	Yes
Chimaphila maculata	Spotted Wintergreen	S2	THR	Rare	
Galium asprellum	Rough Bedstraw	S5		Rare	

Scientific Name	Common Name	S-Rank	ESA	Essex County	SOFIA
Quercus palustris	Pin Oak	S4		Common	Yes
Quercus velutina	Black Oak	S4		Common	Yes
Desmodium canadense	Showy Tick-trefoil	S4		Common	Yes
Agrimonia parviflora	Swamp Agrimony	S4		Common	Yes
Calamagrostis canadensis	Canada Blue-joint	S5		Common	Yes
Helianthus divaricatus	Woodland Sunflower	S5		Common	Yes
Amphicarpaea bracteata	American Hog-peanut	S5		Common	Yes
Rudbeckia hirta	Black-eyed Susan	S5		Common	Yes

Note(s)

S-Rank= Provincial (Sub-national) Rank, S1=Critically Imperiled, S2=Imperiled, S3=Vulnerable, S4=Apparently Secure, S5=Secure. S#S#=Range. Breeding Status Qualifiers: B – Breeding, N – Nonbreeding, M – Migrant. ? =Inexact or Uncertain.

ESA= Endangered Species Act (Ontario), END= Endangered, THR= Threatened

Essex County= List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E) (Oldham, 2017)

SOFIA= Southern Ontario Floral Inventory Analysis (SOFIA) for prairie and savannah indicators (SOFIA, 2020)

The prairie, oak savannah, and woodland remnants in southwestern Windsor, LaSalle, and Sandwich West Township are known to be floristically rich (Ministry of Natural Resources and Forestry, 2021). Ultimately, 490 plant species were documented with fieldwork and during a review of secondary sources (Appendix A). Of the species documented, 343 (70%) are native species and 147 (30%) are non-native species. Within secondary sources are 65 provincially rare (S1-S3) species; nine provincially endangered or threatened species; two provincial species of special concern; 50 locally rare and 18 locally uncommon species; and 118 prairie and savannah indicator species (SOFIA). Provided the vegetation community types present in Ojibway Park, there is a moderate to high probability that additional SAR will occur in the Project Area.

6.2.2 West Study Area

ELC vegetation communities were delineated using aerial photography and ground-truthing during field surveys. Field surveys were undertaken on public property only, as permission to access private lands was not provided. The vegetation communities in Black Oak Heritage Park are summarized by the dominant species comprising the vegetation communities (Sage Earth, 2019; WSP, 2024a).

6.2.2.1 Dry – Fresh Oak – Hickory Deciduous Forest Type (FODM2-2)

The FODM2-2 occurs north of the ETR tracks and within Black Oak Heritage Park boundaries. This community is slightly elevated, distinguishing it from the delineated provincially significant wetland, which occurs largely within the ETR lands. The FODM2-2 contains numerous active tracks and trails perpetuating disturbance and the spread of invasive species in the community.

Figure 6-6 Black Oak in Black Oak Heritage Park

Under the First Approximation, the community is classified as FOD2-2. The Second Approximation community code is FODM2-2 under the Deciduous Forest Community Series. The Dry – Fresh Black Oak – Hickory Deciduous Forest has a canopy dominated by Black Oak, Black Cherry, and Pignut Hickory with a subcanopy abundant in Black Cherry and Pignut Hickory. The understory contains abundant Gray Dogwood, Herbaceous Greenbrier, and young Black Cherry. The ground cover is dominated by Wild Sarsaparilla, American Hog-peanut, Bracken Fern, Flat-topped White Aster, Interrupted Fern, and Black Snakeroot.

6.2.2.2 Swamp White Oak Mineral Deciduous Swamp (SWDM1-1)

Under the First Approximation, the community is classified as SWD1-1. The Second Approximation community code is SWDM1-1 under the Deciduous Swamp Community Series. The dominant deciduous swamp community in the West Study Area is the provincially rare Swamp White Oak Mineral Deciduous Swamp (SWDM1-1). The wetlands in the West Study Area have been assessed multiple times. In 2014, the Black Oak Wetland Complex Evaluation (ER40) was finalized and indicates that the wetland north of the rail spur is Unit 6 while Unit 5 occurs south of the rail spur. Unit 6 is similar to the description provided in the Black Oak Heritage Management Plan (Sage Earth 2019) for SWDM1-1. Fieldwork in 2023 explored the wetland edges which occur within park boundaries and also documented similarity to SWDM1-1. Fieldwork also aligned with the wetland evaluation which indicates that the substrate is sand with a 20 to 30 cm depth to mottles and 10 to 20% coverage of mottles. The wetland evaluation reached the water table at 70 cm in the wetland south of the rail spur.

During 2023 fieldwork, it was confirmed that the aforementioned FODM2-2 was distinguished from the irregular PSW boundaries. Like FODM2-2, the wetland fringes that occur in the park contain active tracks and trails that obscure the wetland edges. Chain-link fencing marking property boundaries divides the wetland, with the majority of the wetland occurring on ETR lands. Trails continue through gaps in the fencing, providing some connectivity for animals between the two properties.

The canopy contains abundant Black Oak, Swamp White Oak, Red Maple, Pin Oak, and Bitternut Hickory. The subcanopy is comprised of Sassafras, White Mulberry, Manitoba Maple, Downy Hawthorn, and Black Cherry. The understory contains young canopy and subcanopy species, as well as native

shrubs including Rough-Leaved Dogwood, Silky Dogwood, Gray Dogwood and American Hazelnut. The groundcover layer is dominated by Thicket Creeper, Poison Ivy, Wild Geranium, and a variety of native Ferns (Sensitive Fern, Royal Fern, and Lady Fern).

A combination of mapping was used to depict this community in Figure 6-5. The PSW Unit 6 was mapped north of the rail spur as SWDM1-1, while ELC mapping from the Black Oak Heritage Park Management Plan (Sage Earth 2019) was adopted for south of the rail spur.

6.2.2.3 White Birch - Cottonwood Deciduous Swamp Type (SWDM4-6)

There is no ELC code for this community under the First Approximation. The Second Approximation community code is SWDM4-6 under the Deciduous Swamp Community Series. The wetlands in the West Study Area have been assessed previously. In 2014, the Black Oak Wetland Complex Evaluation (ER40) was finalized and indicated that the wetland south of the rail spur is Unit 5. The Black Oak Heritage Park Management Plan (Sage Earth 2019) determined two communities within Unit 5.

The wetland evaluation (ER40) depicted a successional or disturbed wetland type with Freeman's Maple, Swamp White Oak, and Eastern Cottonwood in the canopy, while species such as Silky Dogwood, American Elm, Riverbank Grape, Western Poison Ivy, and Virginia Creeper were dominant throughout. Mapping from the Black Oak Heritage Park Management Plan (Sage Earth 2019) was determined to be up-to-date and is used in Figure 6-5. The Management Plan describes this community as follows.

The community is located along the park's south edge and is characteristic of disturbance. The canopy is dominated by Black Walnut and Eastern Cottonwood and abundant with Bitternut Hickory. The subcanopy is abundant in Black Walnut, White Mulberry, Manitoba Maple, Downy Hawthorn, and Black Cherry. The understory contains American Plum as well as abundant Amur Honeysuckle, Rough-Leaved Dogwood, Silky Dogwood, and regenerating Black Cherry, Black Walnut, Green Ash, and Manitoba Maple. The groundcover layer is dominated by Black Snakeroot, Blue-Joint Reedgrass, Devil's Beggar's Ticks, Enchanter's Nightshade, Flat-Topped White Aster, Foul Manna Grass, Northern Dewberry, Pennsylvania Sedge, Riverbank Grape, Tall Hairy Agrimony, Thicket Creeper, Western Poison Ivy, White Avens, and White Cutgrass (Sage Earth, 2019).

The wetland evaluation indicates that the substrate is sand with a 20 to 30 cm depth to mottles and 10 to 20% coverage of mottles. The wetland evaluation reached the water table at 70 cm.

6.3 Breeding Bird Surveys

Breeding bird surveys were conducted to characterize the nature, extent, and significance of avian usage within the Project Area. During surveys, a total of 20 species of birds were documented from six point-counts (Figure 4-1 and Table 6-2; detailed species lists in Appendix A). Four additional birds were observed incidentally during other surveys. The majority of species documented are associated with wooded and successional habitats, and no SAR birds were documented during the field investigations. One species,

Figure 6-7: House Wren at Ojibway Park

House Wren, was confirmed breeding (Figure 6-7) and was seen carrying nesting material to a nest during incidental surveys. An additional eight bird species were considered probable breeders, five were possible breeders, and 11 were observed with no evidence of breeding noted (Table 6-2).

Table 6-2: Bird Species Documented During Fieldwork

	Scientific Name	Common Name	Incidental	Highest Breeding Evidence
	Agelaius phoeniceus	Red-winged Blackbird		PO
	Cardinalis	Northern Cardinal		PR
	Cyanocitta cristata	Blue Jay		PO
	Dumetella carolinensis	Gray Catbird	x	PR
	Melanerpes carolinus	Red-bellied Woodpecker	x	O
	Melospiza melodia	Song Sparrow		O
	Mniotilta varia	Black-and-white Warbler		O
*	*Passer domesticus*	House Sparrow		PR
	Passerina cyanea	Indigo Bunting	x	PR
	Picoides pubescens	Downy Woodpecker	x	PO
	Picoides villosus	Hairy Woodpecker	x	O
	Quiscalus quiscula	Common Grackle		O
	Sayornis phoebe	Eastern Phoebe	x	O
	Setophaga pensylvanica	Chestnut-sided Warbler		O
	Setophaga petechia	Yellow Warbler		PR
	Setophaga ruticilla	American Redstart		PO
	Sitta carolinensis	White-breasted Nuthatch	x	O
	Spinus tristis	American Goldfinch		O
*	*Sturnus vulgaris*	European Starling		O
	Thryothorus ludovicianus	Carolina Wren		PR
	Troglodytes aedon	House Wren	x	C
	Turdus migratorius	American Robin		O
	Vireo gilvus	Warbling Vireo		PO
	Vireo olivaceus	Red-eyed Vireo		PR

Note(s)

1 *=Introduced Species

2 C= Confirmed, PR= Probable, PO= Possible, O= Observed/ no evidence of breeding]

A review of secondary sources identified 193 additional species of birds (Appendix A). The majority of which are found in sources that extend beyond the Project Area. Within secondary sources are 20 provincially rare (S1-S3) species, 11 provincially endangered or threatened species, 12 provincial species of special concern, and four locally significant species (SOFIA). Given the range of successional habitat and vegetation communities present, there is a moderate probability for SAR birds to occur in the Project Area.

6.4 Anuran Call Surveys and Herptiles

Anuran call surveys were conducted to characterize the nature, extent, and significance of Anurans (frogs and toads) usage within and adjacent to the Project Area. During surveys, a total of two species of Anurans were documented from four-point counts (Figure 4-1; species lists in Appendix A). American Toad and Western Chorus Frog were documented calling from suitable habitat at appropriate breeding times, and it is assumed both species successfully breed at Station 1, 3, and 4 (Table 6-3). American Toad and Green Frog were documented in the Black Oak Wetland Complex PSW report.

Table 6-3: Species Documented During Anuran Call Surveys

Station Number	April Survey	May Survey	June Survey
1	American Toad Western Chorus Frog	American Toad Western Chorus Frog	None
2	Western Chorus Frog at Station 4 were heard	None	None
3	Western Chorus Frog	American Toad Western Chorus Frog	None
4	Western Chorus Frog	American Toad Western Chorus Frog	None

No SAR, provincially rare (S1-S3), or locally significant Anurans occur in the Project Area (the two SAR Anurans in Ontario do not have ranges that overlap the Project Area).

An inventory of habitat features on-site determined that the swamp community and vernal pools are suitable breeding habitat (seasonal standing water) for some amphibians (frogs, toads, salamanders). Other features such as large downed trees, debris piles, and rock piles present suitable habitat for snakes (Figure 6-8) although no snake species were observed during surveys. Secondary sources, including previously completed work in the Windsor area by the City and others (Choquette & Valliant, 2016) documented the presence of eight snake species, some of which were historical occurrences only. Common snake species present include the Eastern Gartersnake, Red-bellied Snake, and Dekay's Brownsnake. Northern Watersnake was also documented from the 10 x 10 km Ontario Reptile and Amphibian Atlas but is likely to occur along the Detroit River (not in the Project Area). The four other snake species potentially present are listed as Endangered or Threatened in Ontario and are provincially rare and locally significant. [redacted]

Various sources and reports identify seven turtle species that could be found in the Project Area. Common and urban-adapted turtle species that may be present include the Snapping Turtle, Midland Painted Turtle, and pond sliders (non-native turtles). Four other turtle species documented in secondary

sources are listed as Endangered or Threatened in Ontario and are provincially rare and locally significant; all four have been determined to have a low or no chance of occurring. The Project Area has no permanent bodies of water, limiting the ability for some species to persist on site throughout the year. However, some turtles travel long distances over land to find mating and nesting opportunities. This seasonal travel may occur through the Project Area. During field surveys, one nesting Midland Painted Turtle was documented outside the Project Area.

Figure 6-8: Example of potentially suitable snake habitat feature.

6.5 Mammals

6.5.1 Bat Detector Surveys

Ultrasonic recording detectors and analysis of documented calls were conducted to determine the presence of bat species in the East Study Area. Four SAR bat species are found in Ontario, but only the Little Brown Bat has occurrence data that overlaps the Project Area (Humphrey C, 2017; Humphrey & Fotherby, 2019). Species confirmed on the five detectors placed throughout the East Study Area (Figure 4-1) include Little Brown Bat, Eastern Red Bat, Silver-haired Bat, Big Brown Bat, and Hoary Bat.

A total of 21,786 bat passes were recorded at units 51, 56, 58 and 65 (Table 6-4). Due to technical issues, unit 66 recorded for only a single hour, so results from this detector have been excluded from this report. Unit 58 recorded the lowest number of passes accounting for only 4.16% (907/21,786) of bat passes. Only two passes were classified as belonging to a SAR, one as a Little Brown Bat at unit 65 and the other as an unknown myotis species at unit 56. These two passes represented only 0.01% of all bat passes, excluding unknown high-frequency bat passes, suggesting that these recorded SAR were not residents within the East Study Area and very rarely foraged within the East Study Area and/or surrounding habitats.

Although 1,952 passes were classified as an unknown high-frequency species, and therefore could belong to a SAR, most are likely to have been produced by Eastern Red Bat. Eastern Red Bat accounted for 10.7% (2,325/21,786) of all recorded bat passes and was most active at units 51 and 65 (Figure 6-9). This level of activity for this species can be considered very high when compared to other studies for

Eastern Red Bat (Fern, Davis, Baumgardt, Morrison, & Campbell, 2018; Cadwell, Carter, & Doll, 2019). Eastern Red Bat was most active during the first hour of monitoring, followed by a marked reduction in activity throughout most of the night, with a final but much smaller peak at the end of the night (Appendix B). The peak in activity in Eastern Red Bat within the first hour of recording could indicate that this species was roosting near the sampling sites (units 51 and 65) but may also result from temporal niche partitioning between Big Brown Bat and Eastern Red Bat. Nevertheless, the relatively high activity of Eastern Red Bats within the first hour of monitoring suggests that the Project Area and surrounding habitat is of value to this species, either as foraging or roosting habitat (Fern, Davis, Baumgardt, Morrison, & Campbell, 2018; Muthersbaugh, Ford, Powers, & Silvis, 2019).

Overall, Big Brown Bat had the highest activity. The hourly activity of Big Brown Bat followed a gaussian (normal) distribution, beginning low and gradually increasing to reach a peak in the middle of the night and then dropping at the end of the night (Appendix B). The very high activity level of Big Brown Bat (especially at unit 56; Table 6-4) would indicate that the East Study Area represents an important foraging site for this species.

Hoary Bat and Silver-haired Bat accounted for similar proportions of bat passes (Hoary Bat: 3.2%, Silver-haired Bat: 3.0%). Compared to Big Brown Bat and Eastern Red Bat, their activity was relatively low. However, approximately 28% (6,050 passes) of bat passes were classified as an unknown low-frequency species. These recordings could not be classified to a species because of their poor quality, stemming from a low signal-to-noise ratio and fragmentation of the signal due to echoes. Given the high activity of Big Brown Bat, most of these unclassified passes were likely from Big Brown Bat, but many may have also come from Silver-haired Bat and Hoary Bat.

Table 6-4: Results from Automated and Manually Vetted Classification of Echolocation Calls

	Species	Unit 51	Unit 56	Unit 58	Unit 65	Unit 66	Total
High-Frequency Species	MYLU*	0	0	0	1	0	**1**
	MYSE*	0	0	0	0	0	**0**
	MYLE*	0	0	0	0	0	**0**
	Myotis sp.	0	1	0	0	0	**1**
	PESU*	0	0	0	0	0	**0**
	LABO	1102	20	47	1156	0	**2,325**
	HiFspp	719	54	109	1070	0	**1,952**
Low- Frequency Species	LACI	0	4	88	613	0	**705**
	LANO	81	1	4	570	0	**656**
	EPFU	2744	4433	30	2340	0	**9,547**
	LANO.EPFU	136	122	85	200	1	**544**
	LoFspp	1606	1123	543	2778	4	**6,054**
	Unknown	0	2	1	3	0	**6**
	TOTAL	**6,388**	**5,760**	**907**	**8,731**	**5**	**21,791**

1 Due to technical issues, unit 66 recorded for only a single hour
2 * denotes Species at Risk
3 MYLU = Little Brown Myotis (*Myotis lucifugus*)
4 MYSE = Northern Myotis (*Myotis septentrionalis*)
5 MYLE = Eastern Small-footed Myotis (*Myotis leibii*)
6 PESU = Tricoloured Bat (*Perimyotis subflavus*)
7 LABO = Eastern Red Bat (*Lasiurus borealis*)
8 HiFspp = high-frequency species
9 LACI = Hoary Bat (*Lasiurus cinereus*)
10 LANO = Silver-haired Bat (*Lasionycteris noctivagans*)
11 EPFU = Big Brown Bat (*Eptesicus fuscus*)
12 LANO.EPFU = Either of the two
13 LoFspp = low-frequency species

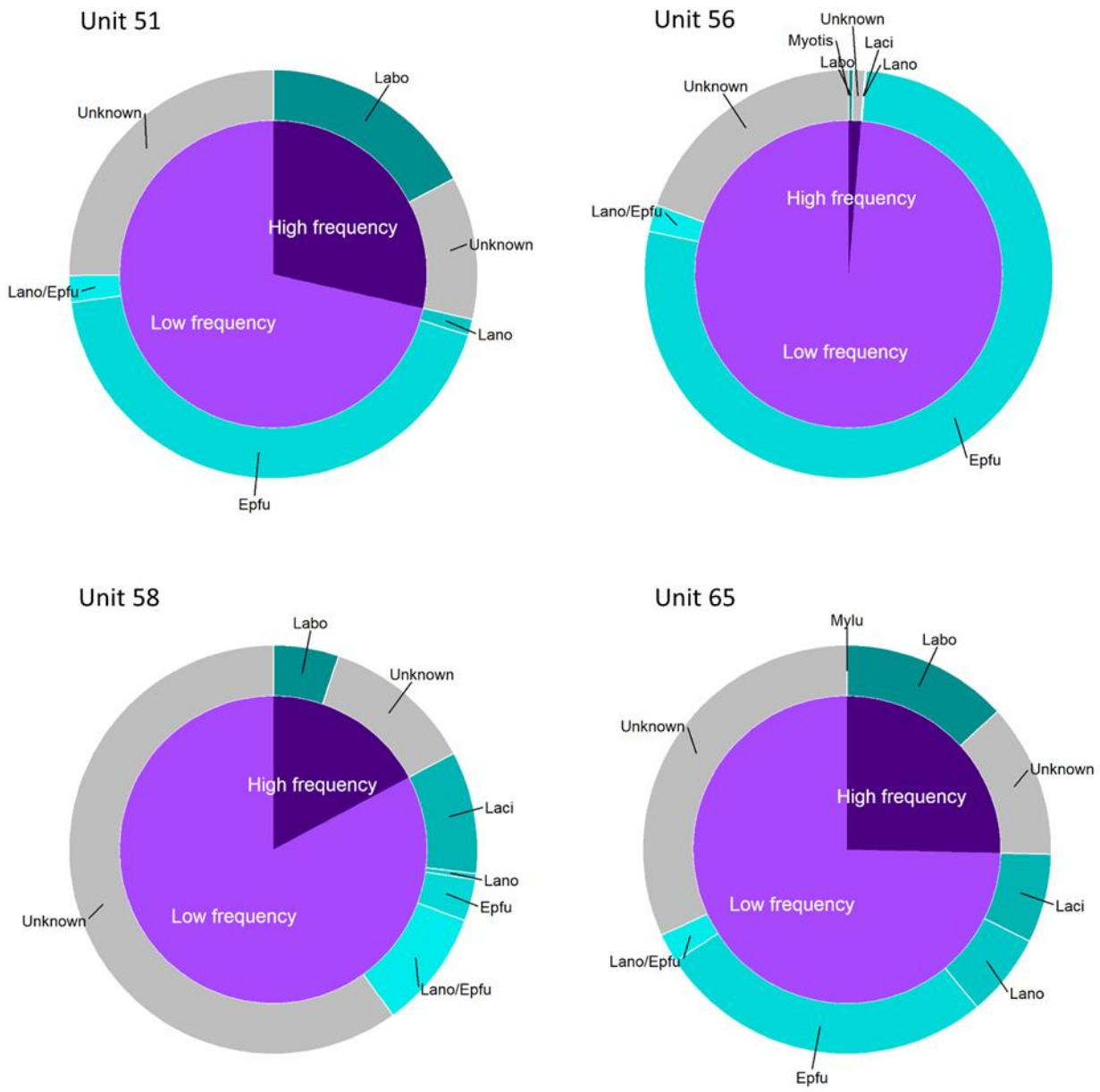

Figure 6-9: Proportions of Number of Passes Per Hour for Each Species at Each Detector

6.5.2 Wildlife Camera Surveys

Wildlife camera surveys, or camera traps, were used to characterize possible animal movement corridors and to document mammals on site. As a part of deploying camera traps, reconnaissance surveys were conducted to determine possible corridors throughout Ojibway Park and across Ojibway Parkway into Black Oak Heritage Park. Deer trails are abundant throughout the Project Area; with some trails being used much more frequently than others (Figure 6-10). In general, deer movement follows official and unauthorized park trails and drainage features (Figure 6-13). Where the Titcombe Drain exits the Ojibway Park, there is a large gap in the perimeter chain-link fence. It is an obvious movement corridor for animals, and likely humans, across Ojibway Parkway (Figure 6-11).

Figure 6-10: Deer Highway at Ojibway Park in the vernal pool south of the SVDM1-1/TPS1-1

The existing chain-link fence delineates City-owned land and occurs at the south border of Ojibway Park, along Ojibway Parkway and Broadway Boulevard, and between Black Oak Heritage Park and ETR lands. The span of fencing was walked to document gaps and areas where trespass under the fencing was obvious (Figure 6-13). In addition to deer highways, obvious trespass and gaps in fencing, burrows and dens were also documented to inform camera locations. In the East Study Area, six locations were included in camera trap surveys (Figure 4-1; Figure 6-13). Camera 1, 2, 3, and 4 were located at the south end of the area while cameras 5 and 6 were located at the north end. Camera 1 was located on an official park trail and captured the most human activity (users of the trail), and had low wildlife species diversity and abundance compared to north cameras. Similarly Camera 3 captured comparable human use along an unauthorized trail (Figure 6-13), and also had low wildlife species diversity and abundance compared to north cameras. Cameras 2 and 4 were in close proximity to Cameras 1 and 3; however, they did not record any humans but still had low wildlife species diversity and abundance compared to north cameras.

Cameras 5 and 6 were set up in the north portion of the East Study Area and had the highest number of wildlife photos and the highest species diversity. Camera 5 was set up in the swamp community (SWDM1-3 in Figure 6-13) along a deer trail, and no human use was documented. Camera 5 was the most productive camera, capturing photos of deer fawns, deer sleeping and resting for prolonged periods, and was the only camera to document coyotes. Small mammals using the same space as deer or on their own were also documented at Camera 5. Camera 6 was set up at animal burrows and confirmed the active burrow of a raccoon family.

Four locations in the West Study Area were included in camera trap surveys (Figure 4-1; Figure 6-13). Cameras 7 and 8 were located at the north end of the West Study Area, and Cameras 9 and 10 were

located at the south end. Cameras 7 through 10 were all located along the chain-link fencing shared with ETR near gaps and areas of trespass. Camera 7 was positioned near a large brush pile (desirable habitat for many species), and Camera 8 was positioned at a gap in the fencing corresponding to the Drain; throughout May, the Drain held water. Cameras 7 and 8 both documented humans and off-leash dogs, while Cameras 9 and 10 did not. Cameras 9 and 10 were in locations with large gaps under the fencing, which documented species such as Coyote, Raccoons, Skunks, and Squirrels crossing under.

White-tailed Deer was the most abundant species documented. Smaller and meso-mammals such as Raccoon, Striped Skunk, Groundhog, Eastern Cottontail, Opossum, and Eastern Gray Squirrel were also confirmed. Coyote and Wild Turkey were also documented several times. Less common and unexpected species included a species of bat and fireflys in Ojibway Park. Select photos from camera traps are provided in Appendix C.

Eastern Chipmunk was observed during surveys but not documented in camera traps. Other mammals not captured in camera traps are likely still present in the Project Area or adjacent to the Project Area. Small mammals such as shrews (Northern Short-tailed Shrew), rats, mice, and voles (White-footed Mouse, Deer Mouse, Meadow Vole, Muskrat, House Mouse, Norway Rat, Meadow Jumping Mouse) have the potential to occur and be undocumented or underrepresented. Meso-and large mammals such as Red Fox, Gray Fox, and weasels (Ermine, Long-tailed Weasel, Mink) may also occur in the Project Area.

6.5.3 Road Mortality Data

Road mortality data is collected and compiled by the City of Windsor for those WVCs reported by the public on highways and arterial roadways in the City, including Ojibway Parkway and Broadway Boulevard. The data represents only dead animals called in by the public for removal by the City. The City provided road mortality data from 10th October 2014 to 3rd September 2020. The location (sometimes provided by a center point for an address), species, and year are provided in Figure 6-14. Unsurprisingly, only four species were documented overall: White-tailed Deer, Virginia Opossum, Raccoon, and Striped Skunk. These species are large, odorous, and/or are apparent in the field of view when driving or walking, which is why they are most frequently reported. Road mortality of smaller species, including amphibians, reptiles, and small mammals, is most likely under-reported. Collisions resulting in injury only, or where there is a near miss, are not currently compiled or reported in a publicly available database.

Figure 6-11: Movement Corridor at Titcombe Road Drain Looking East Across Ojibway Parkway

Figure 6-12: Areas of Trespass Under Chain-link Fencing

327750
328000
328250
328500
4682000
4681750
4681500
4681250
4681000

Broadway Drain
BROADWAY BOULEVARD
HIGHWAY 401
BROADWAY BOULEVARD
Ojibway Park Drain
Susan Dra
FODM1-3
SWDM1-3
SWDM1-1
FODM2-2
FODM1-3
ESSEX TERMINAL RAILWAY
OJIBWAY PARKWAY
WODM3-2
SVDM1-1
Titcombe Road Drain
SWDM1-1
SWDM4-6
1
2
3
4
5
6
7
8
9
10

\\golder.gds\complexdata\office\Ontario\SIM\Clients\City of Windsor\Ojibway Wildlife Overpass EA\MXD\Trails 2 GM.mxd

Ecological Land Classification

- *FODM1-3 (Dry - Fresh Black Oak Deciduous Forest Type (FOD1-3))*
- *FODM2-2 (Dry – Fresh Oak – Hickory Deciduous Forest Type (FOD2-2))*
- *SWDM1-1 (Swamp White Oak Mineral Deciduous Swamp (SWDM1-1))*
- *SWDM1-3 (Pin Oak Mineral Deciduous Swamp Type (SWD1-3))*
- *SVDM1-1 (Dry Black Oak Tallgrass Savanna Type (TPS1-1))*
- *SWDM4-6 (White Birch - Cottonwood Deciduous Swamp Type (SWDM4-6))*
- *WODM3-2 (Dry Black Oak Woodland Type)*

LEGEND

- Project Footprint
- Project Area
  - East Study Area
  - West Study Area
- Property Boundaries
- Deer Trail
- Unauthorized Footpath
- Official Park Trail
- Chainlink Fence
- Unauthorized Trail
- Watercourse / Drain
- Railway
- Gap in Fence
- Trespassing Under Fence
- Camera Location (Lebelled with ID)
- Gap in Fence
- Den / Burrow

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

0 50 100 200 300 400 Metres

Datum: NAD83
Projection: UTM Zone 17N

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY PARKWAY WILDLIFE CROSSING

Deer Trails and Highways, Fencing Gaps and Trespass, Ojibway Park Trails and Camera Locations

PROJECT N°: IM20104013 | **FIGURE: 6-13**

SCALE: 1:4,000 | DATE: June 2024

\\golder.gds\complexdata\office\Ontario\SIM\Clients\City_of_Windsor\Ojibway_Wildlife_Overpass_EA\MXD\Dead_Animals_5_GM.mxd

LEGEND

Dead Animal Locations

Species	Year
Deer	2016
Raccoon	2017
Skunk	2018
Unknown	2019
	2020

- Project Footprint
- Property Boundaries
- Watercourse / Drain
- Railway

Project Area

- East Study Area
- West Study Area

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.
- Location of dead animals provided by City of Windsor.

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 500 Metres

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

WSP

OJIBWAY PARKWAY WILDLIFE CROSSING

Locations of Dead Anminals by City Services

PROJECT N°: IM20104013 | **FIGURE: 6-14**

SCALE: 1:5,500 | DATE: June 2024

6.6 Other Wildlife Species

No additional targeted surveys were completed for insect species (e.g., butterfly or dragonfly surveys). However, several incidental sightings of common arthropods were recorded during fieldwork, all of which have been previously recorded for the area in secondary sources (Appendix A; Figure 6-15). No additional wildlife SAR were observed in the Project Area during field visits.

One provincially rare (S1-S3) gastropod, three provincially rare (S1-S3) spiders, and 43 provincially rare (S1-S3) insects (i.e., Lepidoptera, Odonata, Hymenoptera, Orthoptera) are known to occur in the general area as recorded in secondary sources. Several of these rare species are also considered provincial SAR, including Proud Globelet (Endangered), Yellow-banded Bumble Bee, and Monarch (Special Concern). Wild Indigo Duskywing is also a prairie and savannah indicator species.

Figure 6-15: Twelve-spotted Skimmer female (left) Banded Hairstreak (right) at Ojibway Park

7.0 EVALUATION OF SIGNIFICANCE

7.1 Species of Conservation Concern, Including Species at Risk

In Ontario, Species of Conservation Concern include SAR and rare and rapidly declining species. SAR are species whose individuals or populations are considered Extirpated (EXT), Endangered (END), Threatened (THR), or Special Concern (SC), as determined by the provincial COSSARO and the federal COSEWIC. SAR in the Project Area are regulated by the provincial ESA. The potential for SAR and rare species to occur within the Project Area was determined based on a review of secondary source information and the completion of field investigations. Information collected was then used to evaluate SAR occurrence potential based on habitat preferences for each species. Provincially rare species are those with a provincial rank (sub-national rank) of S1, S2, or S3 and are considered provincially vulnerable to imperilled. Provincially rare species are tracked by the NHIC, and provincial rarity does not automatically provide listing under the ESA. Species which are provincially rare and not SAR are considered in SWH.

An NHIC search was completed for the squares that encompass the Project Area. It is important to note that the NHIC search is based on element occurrences and does not necessarily confirm species' presence or absence within the Project Area. Based on the results obtained from the NHIC database, a total of 349 species records, 13 records of restricted species, and six records of provinical rare plant communities have been observed to have element occurrences that overlap the Project Area. Species lists indicate which species were documented in NHIC (Appendix A). Most records are provincially rare (265 of 349), and only 84 records are SAR. SAR records from NHIC results are summarized in Table 7-1.

[redacted]

Table 7-1: NHIC SAR Records

Common Name	Scientific Name	ESA Status
White Colicroot	*Aletris farinosa*	END
Eastern Whip-poor-will	*Antrostomus vociferus*	THR
Smooth Yellow False Foxglove	*Aureolaria flava*	THR
American Chestnut	*Castanea dentata*	END
Snapping Turtle	*Chelydra serpentina*	SC
Spotted Wintergreen	*Chimaphila maculata*	THR
Eastern Wood-pewee	*Contopus virens*	SC
Blanding's Turtle	*Emydoidea blandingii*	THR
[redacted]	[redacted]	[redacted]
Northern Map Turtle	*Graptemys geographica*	SC
Kentucky Coffee-tree	*Gymnocladus dioicus*	THR
Reversed Haploa Moth	*Haploa reversa*	THR
Barn Swallow	*Hirundo rustica*	SC

Common Name	Scientific Name	ESA Status
Wood Thrush	*Hylocichla mustelina*	SC
Yellow-breasted Chat	*Icteria virens*	END
Slender Bush-clover	*Lespedeza virginica*	END
Dense Blazing-star	*Liatris spicata*	THR
Purple Twayblade	*Liparis liliifolia*	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	END
Red Mulberry	*Morus rubra*	END
Proud Globelet	*Patera pennsylvanica*	END
False-foxglove Sun Moth	*Pyrrhia aurantiago*	END
Bank Swallow	*Riparia riparia*	THR
Climbing Prairie Rose	*Rosa setigera*	SC
Massasauga (Carolinian population)	*Sistrurus catenatus pop. 2*	END
Riddell's Goldenrod	*Solidago riddellii*	SC
Eastern Musk Turtle	*Sternotherus odoratus*	SC
Eastern Meadowlark	*Sturnella magna*	THR
Willow-leaved Aster	*Symphyotrichum praealtum*	THR
Butler's Gartersnake	*Thamnophis butleri*	END
Blue Ash	*Fraxinus quadrangulata*	THR

Note(s)

1 END= Endangered, THR= Threatened, SC=Special Concern
2 Aquatic species have been removed due to no habitat present in the Project Area.
3 Queried in April 2024

In addition to the above, a review of publicly available resources identified three additional species at risk within the Ojibway Prairie Complex. These species, along with the source of information, are cited below:

- Eastern Foxsnake (Carolinian Population) (END) (Ministry of Natural Resources, 2010; Environment and Climate Change Canada, 2020; Pratt, 2010; URS Canada Inc., 2008)
- Spotted Turtle (END) (Pratt, 2010)
- Eastern Hog-nosed Snake (THR) (Pratt, 2010; URS Canada Inc., 2008)

WSP completed a screening of SAR to evaluate the probability of occurrence in the Project Area. The probabilities of SAR within the Project Area are based on an assessment of each species' habitat preferences/needs in conjunction with background information and other secondary source information.

Based on the results of field investigations and background and secondary data sources, a list of species protected under the ESA that could potentially occur was generated. For each species, an assessment was made as to the likelihood of habitat occurrence in the Project Area based on the biology of the

species and the results of field investigations. Each species was classified into one of five probabilities of occurrence:

- Confirmed: species for which suitable habitat is present in the Project Area and the species was confirmed during field investigations or confirmed in secondary sources (e.g., consultation with MECP).
- High: those species recorded in the vicinity of the Project Area during field surveys or typically within 10 km and recorded in the past 20 years in secondary sources. The preferred habitat is abundant within the Project Area. Species with a high probability of occurrence would be expected to breed within or frequently use the habitats available within the Project Area and would be known to have a high relative abundance within the region (i.e., compared to other regions in Ontario).
- Moderate: species for which suitable habitat is present but limited or uncommon in the Project Area and breeding in the area is rare. However, species with moderate probabilities of occurrence may intermittently use the area for foraging, migration, or movement to other parts of their home range and therefore may have been documented in secondary sources or field surveys.
- Low: those species recorded in the vicinity of the Project Area, but whose preferred habitat does not occur or is extremely limited within the Project Area. These species may intermittently move through the Project Area but are unlikely to become permanent residents. These species have likely not been documented in secondary sources or field surveys, but historical records are possible.
- None: those species whose preferred habitat is completely absent from the Project Area. It is unlikely these species have been documented. However, historical or vagrant records (e.g., a species that is currently outside their wintering and breeding area) may exist.

Note that other SAR may come into the area, or species already occurring in the area may be up-listed at any time. Species that have a moderate or high potential to occur in the Project Area or have been confirmed in the Project Area will be carried forward to the impact assessment.

Five SAR have been confirmed in the Project Area (Appendix D), while several more have a high or moderate probability of occurring. One confirmed species is listed as endangered, and four are listed as threatened.


The figure has been redacted to protect specific plant species at risk from poaching/ harvesting

7.2 Natural Heritage Features

The City considered the provincial natural heritage features of significance identified below when developing the Greenway System (the City's natural heritage system). Based on the assessment described below, the designation and mapping provided in Schedules B, C, and D are accurate.

7.2.1 Areas of Natural and Scientific Interest (ANSI)

ANSI are defined in the PPS as “areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.” Life science ANSI are significant representative segments of Ontario’s biodiversity and natural heritage. Provincially significant life science ANSI includes the most significant and best examples of the natural heritage features in the province (Ontario Ministry of Natural Resources, 2010). Ojibway Park and Black Oak Heritage Park are part of a Life Science ANSI of provincial significance (Figure 1-2).

7.2.2 Significant Wetlands and Other Wetlands

In the West Study Area, the PSW Black Oak Wetland Complex (ER40), has been delineated and evaluated by the province (Figure 2-1). The PSW was evaluated in 2014 and wetland unit numbers 5 and 6 occur in the West Study Area. The evaluation notes that the PSW aids in maintaining the existing wetland habitat within the City of Windsor, of which is an uncommon to rare feature within the city limits. This wetland complex is entirely designated as coastal wetland, comprising of one riverine and a series of palustrine wetlands that feed into a connective drain system that ultimately influences the Detroit River Area of Concern.

The province has not delineated any wetlands within Ojibway Park. However, during fieldwork, it was determined that a swamp wetland community type does occur within Ojibway Park (Figure 6-5). The MNRF has not identified this area as provincially significant. Therefore, in accordance with PPS definitions, the swamp wetland identified within the East Study Area is not considered significant for the purposes of this report.

7.2.3 Significant Woodlands

In the East Study Area, the province has mapped wooded areas in the boulevard between Broadway Boulevard and Ojibway Parkway (Figure 7-2). The area mapped by the province is referred to as a hedgerow[1] (GeoHub, 2019) and included as FODM1-3 ELC delineation. According to the Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010), woodland areas are considered to be generally continuous even if intersected by narrow gaps 20 m or less in width between crown edges. The crown gap over Broadway Boulevard is approximately 10 m; therefore, this wooded area is considered an extension of the forest within Ojibway Park. The wooded area (delineated FODM1-3) in the East Study Area, as described above, is considered a significant woodland; the rationale is provided below.

Woodlands are treed areas that provide environmental and economic benefits. Benefits can include erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of

[1] Identified features that meet the Treed Area[2] description and are not a plantation. These features must be linear in nature with no feature wider than 30 metres and yet with a minimum width of 10 metres. Hedgerows are captured as separate features from connected treed areas (GeoHub, 2019).

[2] Interpreted feature > 2 metres in height, >60% canopy coverage (GeoHub, 2019).

carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products (Ministry of Municipal Affairs and Housing, 2020). Woodlands may be delineated according to the Forestry Act definition or the Province's ELC system definition for "forest" (Ministry of Municipal Affairs and Housing, 2020). Significant Woodland means an area that is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history. These are to be identified using criteria established by the MNRF (Ministry of Municipal Affairs and Housing, 2020). The MNRF has established the following criterion to determine significance and states that woodlands that meet a suggested minimum standard for any one of the criteria listed below should be considered significant (Ontario Ministry of Natural Resources, 2010).

1) Woodland Size Criteria
2) Ecological Functions Criteria
    a) Woodland interior
    b) Proximity to other woodlands or other habitats
    c) Linkages
    d) Water protection
    e) Woodland diversity
3) Uncommon Characteristics Criteria
4) Economic and Social Functional Values Criteria

The Woodland Size Criteria bases significance based on the size of the 'parcel' in the context of forest cover in the region/county. Essex County and Chatham-Kent County have less than 5 percent forest cover (Ontario Ministry of Natural Resources, 2010), and therefore any 'parcel' over 2 ha in size should be considered significant. Ojibway Park is approximately 68 ha in size.

Under the woodland interior section, any 'parcel' with any interior habitat in any county with less than 15% forest cover is considered significant. Interior habitat is measured as the area within a 'parcel' 100 m from the edge. Ojibway Park has approximately 36 ha of interior wooded area.

Under proximity to other woodlands or other habitats section considers the 'parcel' significant if it is close to other significant natural areas. The Ojibway Park would be considered significant based on proximity to Ojibway Prairie Provincial Nature Reserve, Tallgrass Prairie Heritage Park, and Black Oak Heritage Park.

Woodlands should be considered significant if they are located within a defined natural heritage system or provide a connecting link between two other significant features. Ojibway Park is located within the City of Windsor's natural heritage system; however, it does not directly link other parks as roadways bisect the larger area. In some locations, specifically, the area between Ojibway Park and the Ojibway Prairie Provincial Nature Reserve and Tallgrass Prairie Heritage Park the crown gap is approximately 20 m and, therefore, can be considered linked (Ontario Ministry of Natural Resources, 2010).

Woodlands should be considered significant if they are located within a sensitive or threatened watershed or in proximity to sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse, or fish habitat. ERCA mapping places Ojibway Park within a level 2 Significant Groundwater Recharge Area (Figure 7-2). Ojibway Park would be considered significant based on its location within a groundwater recharge area.

Woodland habitat loss is one of the most serious threats to biological diversity. Woodlands should be considered significant if they have a naturally occurring composition of native forest species that have declined significantly or have a high native diversity through a combination of composition and terrain. Black Oak Heritage Park has several SAR plants and should be considered significant. Likewise, under Uncommon Characteristics Criteria, woodlands should be considered significant if they have a unique species composition; a vegetation community with a provincial ranking; habitat of rare, uncommon, and/or restricted plant species; and are characterized as older communities.

Lastly, the Economic and Social Functional Values Criteria considers woodlands with high-value ecosystem services, such as air-quality improvement or recreation, to be significant if those services exist at a sustainable level. Ojibway Park and the Ojibway Nature Centre provide significant recreational and educational opportunities to the public.

In the West Study Area, wooded areas are mapped by the province in Black Oak Heritage Park and ETR lands. The area mapped by the province is referred to as treed, the definition of which is > 2 m in height, >60% canopy coverage (GeoHub, 2019). The Black Oak Heritage Park Management Plan (Sage Earth, 2019) delineates these wooded areas as various forest communities of differing ages. Based on the same level of evaluation as above, the woodland in the West Study Area Black Oak Heritage Park is likewise considered significant based on the following.

The Woodland Size Criteria bases significance based on the size of the ‘parcel’ in the context of forest cover in the region/county. Essex County and Chatham-Kent County have less than 5 percent forest cover (Ontario Ministry of Natural Resources, 2010), and therefore any ‘parcel’ over 2 ha in size should be considered significant. The wooded areas are approximately 31 and 36 ha in size. The wooded areas are divided by the ETR tracks, however, the crown gap is approximately 20 m and, therefore, can be considered linked (Ontario Ministry of Natural Resources, 2010).

Under the woodland interior section, any ‘parcel’ with any interior habitat in any county with less than 15% forest cover is considered significant. Interior habitat is measured as the area within a ‘parcel’ 100 m from the edge. Black Oak Heritage Park has approximately 36 ha of interior wooded area.

Under proximity to other woodlands or other habitats section considers the ‘parcel’ significant if it is close to other significant natural areas. The Black Oak Heritage Park would be considered significant based on proximity to Ojibway Park.

Woodlands should be considered significant if they are located within a defined natural heritage system or provide a connecting link between two other significant features. Black Oak Heritage Park is located within the City of Windsor’s natural heritage system; however, it does not directly link other parks as roadways bisect the larger area.

Woodlands should be considered significant if they are located within a sensitive or threatened watershed or in proximity to sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse, or fish habitat. ERCA mapping places the Park within a level 2 Significant Groundwater

Recharge Area. Black Oak Heritage Park would be considered significant based on its location within a groundwater recharge area.

Woodland habitat loss is one of the most serious threats to biological diversity. Woodlands should be considered significant if they have a naturally occurring composition of native forest species that have declined significantly or have a high native diversity through a combination of composition and terrain. Black Oak Heritage Park has several SAR plants and should be considered significant. Likewise, under Uncommon Characteristics Criteria, woodlands should be considered significant if they have a unique species composition; a vegetation community with a provincial ranking; habitat of rare, uncommon, and/or restricted plant species; and are characterized as older communities.

Lastly, the Economic and Social Functional Values Criteria considers woodlands with high-value ecosystem services, such as air-quality improvement or recreation, to be significant if those services exist at a sustainable level. Black Oak Heritage Park provides significant recreational and educational opportunities to the public.

328000 328250 328500 328750

4682250 4682000 4681750 4681500 4681250 4681000 4680750

Broadway Drain
BROADWAY BOULEVARD
HIGHWAY 401
BEECH AVENUE
BROADWAY BOULEVARD
Ojibway Park Drain
Ojibway Park Drain
FODM1-3
SWDM1-3
Susan Drain
SWDM1-1
FODM2-2
SWDM1-1
WODM3-2
FODM1-3
Titcombe Road Drain
ESSEX TERMINAL RAILWAY
OJIBWAY PARKWAY
SWDM4-6
SWDM1-1
SVDM1-1
Ojibway Park Nature Centre
SWDM4-6

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Ecological Land Classification

- *FODM1-3* (Dry - Fresh Black Oak Deciduous Forest Type (FOD1-3))
- *FODM2-2* (Dry – Fresh Oak – Hickory Deciduous Forest Type (FOD2-2))
- *SWDM1-1* (Swamp White Oak Mineral Deciduous Swamp (SWDM1-1))
- *SWDM1-3* (Pin Oak Mineral Deciduous Swamp Type (SWD1-3))
- *SVDM1-1* (Dry Black Oak Tallgrass Savanna Type (TPS1-1))
- *SWDM4-6* (White Birch - Cottonwood Deciduous Swamp Type (SWDM4-6))
- *WODM3-2* (Dry Black Oak Woodland Type)

LEGEND

- Project Footprint
- Project Area
  - East Study Area
  - West Study Area
- Watercourse / Drain
- Railway
- Ojibway Park Nature Centre
- Significant Ground Water Recharge Area (Level 2)

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.
- Wooded area extracted from LIO, NDMNRF.
- Significant groundwater recharge area (level 2) provided by Essex Region Conservation Authority,

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 Metres

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

wsp

OJIBWAY PARKWAY WILDLIFE CROSSING

Significant Woodland Evaluation

PROJECT N°: IM20104013 | **FIGURE: 7-2**

SCALE: 1:4,500 | DATE: May 2024

7.2.4 Significant Valleylands

Valleylands are a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year. Based on the results of this assessment, there are no valleylands in the Project Area.

7.2.5 Fish Habitat

Fish habitat is defined in the Fisheries Act, and under the PPS means spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. Based on the results of this assessment, no fish habitat occurs in the Project Area.

7.2.6 Adjacent Lands

Adjacent lands are the lands relevant to which impacts must be considered and the compatibility of a development proposal must be addressed. The extent of adjacent lands may vary, depending on such factors as hydrology, topography, soil conditions, potential disruption of wildlife movement patterns, land use and other features (Ontario Ministry of Natural Resources, 2010). Planning authorities may also define adjacent lands. The City of Windsor OP states that the identification of adjacent lands will be determined on a site-specific basis by the Municipality, in consultation with the province and/or ERCA, and in accordance with policy 10.2.5.4 of this Plan. Policy 10.2.5.4 states that provincial policies will be fulfilled.

Adjacent lands typically encompass a distance of 120 m from a feature or area for which potential negative impacts are being assessed. To address the potential negative impacts from this proposed project, field studies and review of secondary source information were completed within 120 m of the Project Area. This evaluation of significance includes any natural heritage features that occur within that 120 m (Figure 4-2).

7.2.7 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) is considered of provincial significance in Ontario. Development in SWH is prohibited unless it can be demonstrated that development will have no negative impact on features and functions. Wildlife habitat is considered “significant” if it is deemed ecologically important in terms of feature, function, representation or amount, and contributes to the quality and diversity of an identifiable geographic area or Natural Heritage System (Ministry of Municipal Affairs and Housing, 2020). Within Ecoregion 7E, criteria for evaluating SWH are provided in MNRF Ecoregion schedules for Ecoregion 7E (Ontario Ministry of Natural Resources and Forestry, 2015). Other provincial documents used to identify and assess SWH are the *Natural Heritage Reference Manual* (Ontario Ministry of Natural Resources, 2010), the *Significant Wildlife Habitat Technical Guide* (Ontario Ministry of Natural Resources, 2000), and the *Significant Wildlife Habitat Mitigation Support Tool* (SWHMiST) (Ontario Ministry of Natural Resources and Forestry, 2014).

SWH has been evaluated for the Project Area and seven have been evaluated as candidate and four as confirmed. The commonality between all these habitat types is that they occur (or may occur) within the overall Ojibway Park and Black Oak Heritage Park. Habitats not discussed below were evaluated as not present as either habitat requirements or species are not present (Appendix D). The ten SWH discussed below were determined to be either candidate or confirmed.

7.2.7.1 Seasonal Concentration Areas

Seasonal concentration areas are those where wildlife species occur annually in aggregations at certain times of the year. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. Some wildlife species will concentrate where they can rest and feed and other wildlife species require habitats where they can survive winter (Ontario Ministry of Natural Resources and Forestry, 2015).

7.2.7.1.1 Raptor Wintering – Candidate

Bald Eagle, Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, and Short-eared Owl are documented in secondary source information, but nests have not been confirmed in the Project Area. The habitat for this type of SWH is >20 ha, and it is a combination of forest and upland communities; field/meadow sites >15ha adjacent to woodlands are required. Based on potential species occurrences and vegetation communities present, Raptor Wintering SWH is considered a candidate in Ojibway Prairie Provincial Nature Reserve (based on desktop review). As Ojibway Park is considered continuous with the Ojibway Prairie Provincial Nature Reserve, the East Study Area is also considered a candidate for Raptor Wintering SWH. Black Oak Heritage Park is constrained on all sides and does not have >15 ha of field/meadow habitat within and, therefore, can not be considered significant.

7.2.7.1.2 Bat Maternity Colonies – Candidate

Both indicator species, Big Brown Bat and Silver-haired Bat, were reported in the East Study Area. Big Brown Bat had the highest bat activity within the East Study Area. It is thought that the East Study Area represents an important foraging site for Big Brown Bats, but maternity colonies were not confirmed. The required habitat type, mature deciduous forest, occurs. To qualify as suitable habitat, the forest must have >10 large diameter (>25cm DBH) wildlife trees per hectare. Wildlife trees were not inventoried as it was assumed the density of trees would fit the criteria. This SWH type is considered Candidate SWH as maternity colonies were not confirmed; however, based on recordings, maternity colonies could be present in other areas within Ojibway Park. It is also assumed that Black Oak Heritage Park is candidate SWH for this type and the adjacent natural ETR lands.

7.2.7.1.3 Reptile Hibernaculum – Candidate

Eastern Gartersnake, Northern Watersnake, Northern Red-bellied Snake, DeKay's Brownsnake, Butler's Gartersnake, Eastern Foxsnake, and Massassauga have been documented in the general area in secondary source information. Within the East Study Area rock piles which appear to be set fairly deep into the ground along a ditch line were documented. Based on other studies in the City snakes hibernate in similar habitat. It is also noted that small mammal burrows and cavities within root structures of large trees could be potentially suitable hibernacula.

7.2.7.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare vegetation communities often contain rare species, particularly plants and small invertebrates, which depend on such habitats for their survival and cannot readily move to or find alternative habitats. One of the most important criteria for determining a rare vegetation community is the current representation of the community within a planning area based on its area relative to the total landscape, or the number of examples within the planning area. NHIC uses a system that considers the provincial rank of a species or community type as a tool to prioritize protection efforts (the sub-national or s-rank) (Ontario Ministry of Natural Resources and Forestry, 2015).

7.2.7.2.1 Savannah – Confirmed

A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60% and is extremely rare in Ontario. There is no minimum size to be considered significant, which is why the TPS1-1 community within the East Study Area was delineated separately and not as an inclusion (Section 6.2.1.4). The site is not in a natural state and non-native species are widespread, however, exotic species are still likely less than 50% vegetative cover. To be considered significant the site must not be dominated by exotic or introduced species. Nine tallgrass indicator species were documented in the TPS1-1 during fieldwork and numerous others were documented in secondary source information that was reviewed for the area. From Appendix N in the Technical Guide two indicator species were confirmed, *Lespedeza virginica* and *Liatris spicata*, lending to the confirmation of SWH.

7.2.7.2.2 Other Rare Vegetation Communities – Confirmed

This SWH includes plant communities that often contain rare species which depend on the habitat for survival. The NHIC search of grid 17LG2781 documented two types, Moist - Fresh Black Oak - White Oak Tallgrass Woodland Type (TPW2-1) which occurs outside the East Study Area, and Moist - Fresh Black Oak Tallgrass Savannah Type. Moist - Fresh Black Oak Tallgrass Savannah Type is not an ELC community within the first or Second Approximation so it is assumed that this community refers to the Dry Black Oak Tallgrass Savanna Type is (TPS1-1/SVDM1-1). The Dry Black Oak Tallgrass Savanna Type occurs in the East Study Area and is confirmed under Savannah SWH above. Additionally, the NHIC ranks Pin Oak Mineral Deciduous Swamp Type (SWD1-3/SWDM1-3) as S2S3, confirming this community are SWH.

Based on Appendix M of the technical guide (Ontario Ministry of Natural Resources, 2000), Dry Black Oak Deciduous Forest Type, delineated as Dry-Fresh Black Oak Deciduous Forest Type (FODM1-3/FOD1-3), is also significant and it occurs in the East Study Area. All vegetation communities delineated in Ojibway Park are confirmed as significant.

Based on Appendix M of the technical guide “Dry – Fresh Oak – Hickory Deciduous Forest Type (FOD2-2)” which is FODM2-2 under the second approximation occurs in the West Study Area.

7.2.7.2.3 Woodland Raptor Nesting Habitat – Candidate

Woodland raptor nesting sites are rarely identified but are sensitive habitats that are often used annually. Northern Goshawk, Cooper’s Hawk, Sharp-shinned Hawk, Red-shouldered Hawk, and Broad-winged Hawk have been documented in the general area in secondary sources. All natural or conifer plantation woodland/forest stands >30 ha with >4 ha of interior habitat (interior habitat is defined as a 200 m buffer in this instance) are considered suitable habitat. Habitat is present (approximately 14 ha of interior habitat in Ojibway Park) and continuous within the East Study Area. Likewise, habitat is present in Black Oak Heritage Park (approximately 8 ha of interior habitat). However, no nests were confirmed in either study area.

It is unlikely Northern Goshawk is nesting in the Project Area as they prefer old-growth forests with many conifers (Ontario Ministry of Natural Resources and Forestry, 2014). Similarly, Sharp-shinned Hawk nest almost exclusively in coniferous forests (Ontario Ministry of Natural Resources and Forestry, 2014) and is unlikely to nest in the Project Area.

Red-shouldered Hawk could be an occurrence in the Project Area but is not as likely some other species as they nest in mature mixed and deciduous forests with minimum shrubs and saplings. In Ontario, Red-

shouldered Hawk seems to prefer maple-beech-hemlock forests (Ontario Ministry of Natural Resources and Forestry, 2014).

The most likely raptor species to nest in the Project Area, which are also documented in secondary sources, is Cooper's Hawk. Cooper's Hawk tend to nest in intermediate-aged and mature upland deciduous forests. Cooper's Hawk hunt at the edge of forests and in forest openings and are common in urban areas (Ontario Ministry of Natural Resources and Forestry, 2014). Broad-winged Hawk also tends to nest mostly in intermediate-aged dense mixed and deciduous forests however they usually nest far from areas of human disturbance. Broad-winged Hawk eats mostly amphibians, insects, and meadow voles (Ontario Ministry of Natural Resources and Forestry, 2014).

7.2.7.2.4 Amphibian Breeding Habitat: Woodland – Candidate

These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations. Only one indicator species for woodland breeding was documented during fieldwork, the Western Chorus Frog. SWH habitat is defined as the presence of a wetland, pond, or woodland pool (including vernal pools) >500 m2 within or adjacent (within 120 m) to a woodland (no minimum size). Although the habitat in Ojibway Park and Black Oak Heritage Park meets the habitat requirement, this SWH is considered a candidate site as only one of the listed frog species was documented calling, and no salamander species were documented. To confirm this SWH type, a breeding population of salamander/newt or two or more frog species with at least 20 individuals must be recorded.

7.2.7.2.5 Amphibian Breeding Habitat: Wetland – Confirmed

Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within south and central Ontario landscapes. SWH habitat requirements are wetlands >500 m^2, and studies must confirm the presence of breeding populations of;

- 1 or more of the listed newt/salamander species; or
- 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses); or
- 2 more of the listed frog/toad species with Call Level Codes of 3; or
- Wetland with confirmed breeding Bullfrogs.

Two wetland breeding indicator species, American Toad and Western Chorus Frog, were documented calling in the Project Area in varying call codes; Western Chorus Frog was documented at code 3. Only three surveys were completed (per protocols); this likely has underrepresented abundance. American Toads have low detection rates, and climatic variables greatly influence (induce or inhibit) call activity, which the existing protocol does not cover adequately (Allard, 2012; Hughes, 2017; Hughes, 2019). Therefore, it is assumed that the two listed indicator species can be documented at Call Level Codes of 3 during the correct weather and seasonal timing. This SWH type is considered to be confirmed in the East and West Study Areas. It is also assumed that the delineated wetlands in Black Oak Heritage Park and the adjacent natural ETR lands are candidate SWH for this type based on the PSW evaluation, which documents American Toads, Green Frogs, and various tadpoles.

7.2.7.2.6 Woodland Area-Sensitive Bird Breeding Habitat – Candidate

Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area-sensitive interior forest songbirds. Habitats are considered to be typically large, mature (>60 yrs. old) forest stands or woodlots >30 ha. Habitat is confirmed where interior forest breeding birds are breeding. Studies must confirm the presence of nesting or breeding pairs of three or more of the indicator species. All the indicator species have been documented in the general area through secondary sources of information. None were documented in the Project Area during breeding bird surveys.

The habitat present in the Project Area (and Ojibway Park) is considered to be approximately 60 years old (based on historical imagery) and contains interior woodland habitat. It is also assumed that Black Oak Heritage Park and the adjacent natural ETR lands is candidate SWH for this type.

7.2.7.3 Habitats of Species of Conservation Concern

Habitats of Species of Conservation Concern include wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. Habitats of Species of Conservation Concern do not include habitats of Endangered or Threatened species, as identified by the ESA, 2007 (Ontario Ministry of Natural Resources and Forestry, 2015).

7.2.7.3.1 Special Concern and Rare Wildlife Species

These species are quite rare or have experienced significant population declines in Ontario. Several species documented in secondary sources are listed as Special Concern. These species must be documented within the Project Area to confirm the presence of SWH.

Confirmed species include:

- Wood Thrush;
- Black Gum;
- Pignut Hickory;
- Culver's Root;
- Sundial Lupine, and
- Giant Ironweed.

Linking SWH on-site is completed by defining the area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH. The Dry Black Oak Woodland Vegetation Type (WODM3-2), Dry-Fresh Black Oak Deciduous Forest Type (FODM1-3; FOD1-3), and Dry Black Oak Tallgrass Savannah Type (SVDM1-1; TPS1-1) are all confirmed SWH.

Candidate species include:

- Climbing Prairie Rose;
- Riddell's Goldenrod;
- Eastern Wood-Pewee;
- Monarch;

- Yellow-banded Bumble Bee, and
- All provincially rare (S1-S3) species not documented above (Appendix A).

7.2.7.4 Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas (Ontario Ministry of Natural Resources and Forestry, 2015). Where a confirmed or candidate Specialized Habitat for Wildlife has been identified Animal Movement Corridors must also be identified.

7.2.7.4.1 Amphibian Movement Corridors

Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations. Movement corridors must be determined when Amphibian Breeding Habitat –Wetland is confirmed or candidate. As Amphibian Breeding Habitat –Wetland confirmed mapping a brief discussion is provided. As corridors connect breeding habitat to foraging and wintering habitat and the species documented are American Toad and Western Chorus Frog, the corresponding life-history traits are considered.

Western Chorus Frog

- For breeding and tadpole development, it requires seasonally dry temporary ponds devoid of predators, particularly fish (Government of Canada, 2011).
- The species hibernates in its terrestrial habitat, under rocks, dead trees or leaves, or in loose soil or animal burrows, even though these sites are sometimes flooded (Government of Canada, 2011).

American Toad

- Breed in a diversity of permanent or temporary shallow aquatic features (Canadian Herpetological Society, 2021).
- American Toads are habitat generalists and can be found in a wide range of terrestrial habitats outside of the breeding season, including deciduous and mixed forests (Canadian Herpetological Society, 2021).
- Individuals hibernate below the frost line in burrows that they excavate in sandy soils, mammal burrows, crevices in bedrock and other underground cavities (Canadian Herpetological Society, 2021).

Corridors can be mapped from the habitat in all directions. Corridors should have at least 15 m of vegetation on both sides of a waterway or be up to 200 m wide of woodland habitat. Habitat is considered continuous if any gaps are <20 m (Ontario Ministry of Natural Resources, 2010; Ontario Ministry of Natural Resources and Forestry, 2015). The Ojibway Parkway is wider than 20 m, and therefore, potential movement corridors stop at the Parkway. Corridors should consist of native vegetation with a diversity of community layers. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant. Shorter corridors are more significant than longer corridors, however, amphibians must be able to get to and from their summer and breeding habitat.

It is likely that amphibians breeding within the East Study Area (and the larger habitat of Ojibway Park) are increasingly isolated and must find breeding, foraging, and wintering habitat all within Ojibway Park. Some movement may occur to the north, east, and south of Ojibway Park, where terrestrial or breeding habitat occurs. Stormwater Management (SWM) Ponds occur north and south of Ojibway Park at the highway 401 on-ramp (north of Ojibway Park Drain) and the Windsor Raceway, respectively. SWM Ponds are designed to retain runoff and associated pollutants resulting in degraded areas with degraded water quality (high pH, high pesticide and road salt concentrations). SWM Ponds are also normally dominated by non-native and invasive plants. However, SWM Ponds are regularly colonized by pond-breeding amphibians and can create a biological sink, altering the assemblages of amphibian populations in urban areas. Some species are attracted to the longer hydroperiods provided by SWM Ponds. But, some species are more sensitive to the degraded water quality, and tadpoles do not survive past metamorphosis. Ultimately, amphibians may migrate to SWM Ponds, but the successional generations may not migrate out of SWM Ponds, reducing genetic flow and creating genetic dead-ends. Because of this, SWM Ponds are not considered SWH or desirable habitat for movement corridors. Additionally, the SWM Ponds adjacent to Ojibway Park do not contain any strips of native vegetation or diversity of community layers.

On the east side of Ojibway Park is the Tallgrass Prairie Heritage Park and Ojibway Prairie Provincial Nature Reserve, where the Ojibway Prairie Wetland Complex is mapped. Matchett Road occurs between Ojibway Park and the wetland complex, but the road is less than 20m wide, which doesn't disclude a movement corridor from being mapped. Based on the above, approximate SWH movement corridors are mapped within Ojibway Park and along Titcombe Road Drain where vegetation is present (Figure 7-3).

It is also assumed that Black Oak Heritage Park and the adjacent natural ETR lands are candidate SWH for Amphibian Breeding Habitat –Wetland; therefore, corridors have been mapped (Figure 7-3). Black Oak Heritage Park is also isolated, and amphibians here need to find suitable habitats within the park.

328000
328500
329000
329500
330000
4682000
4681500
4681000

BROADWAY BOULEVARD
BEECH AVENUE
CHAPPUS STREET
E C ROW EXPRESS
Ojibway Park Drain
Susan Drain
ARMANDA STREET
Titcombe Drain
WERNER AVENUE
MATCHETTE ROAD
MALDEN ROAD
ORIOLE BOULEVARD
TITCOMBE ROAD
Titcombe Road Drain
OJIBWAY PARKWAY
ESSEX TERMINAL RAILWAY
WEAVER ROAD

\\golder.gds\complex\data\office\Ontario\SIM\Clients\City_of_Windsor\Ojibway_Wildlife_Overpass_EA\MXD\Approx_Amphib_Movement_Corridors_2_GM.mxd

LEGEND

- Project Footprint
- Project Area
- East Study Area
- West Study Area
- Approximate Wetlands and Vernal Pools
- Approximate Amphibian Movement Corridor
- Approximate Woodland Limit
- Property Boundaries
- Watercourse / Drain
- Railway

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

0 100 200 400 600 800 1,000 Metres

Datum: NAD83
Projection: UTM Zone 17N

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

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OJIBWAY PARKWAY WILDLIFE CROSSING

Approximate Amphibian Movement Corridors

PROJECT N°: IM20104013 | **FIGURE: 7-3**

SCALE: 1:6,500 | DATE: May 2024

8.0 CONNECTIVITY ANALYSIS

A connectivity analysis was completed to determine the preferred location and to identify potential and alternative locations for ecopassages on Ojibway Parkway. The goals and objectives of the Ojibway crossing is to re-establish an ecological connection between Black Oak Heritage Park Area and Ojibway Park Area. The ultimate goal of re-establishing the ecological connection between these natural areas and Oakwood Natural Area, could be achieved in combination with other proposed efforts in the City (e.g., Matchett, Malden, T5). The connectivity analysis was a desktop exercise and had a unique study area; the study area for this exercise focused on the permeable space area between the Detroit River on the west, Matchette Road on the east, the highways and development lands in the north, and the industrial lands in the south.

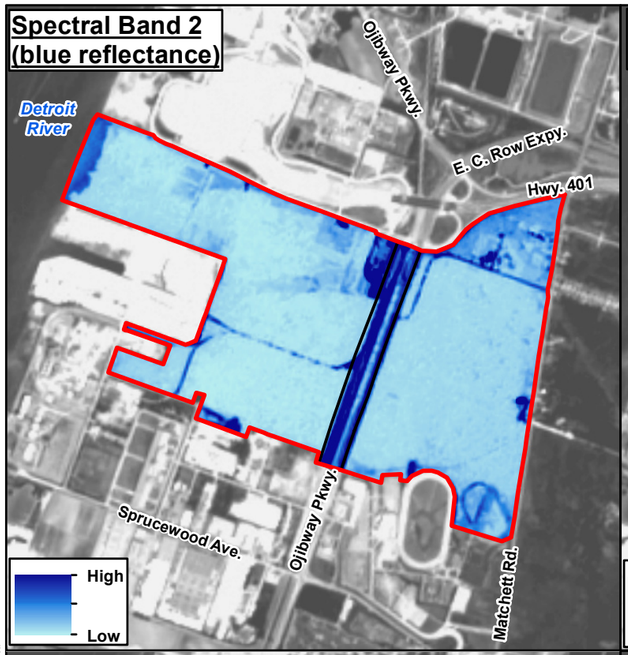
The connectivity analysis for the optimal ecopassage location used the least resistive (lowest impedance) wildlife movement corridor habitat patch GIS modelling. Sentinel 2A (European Space Agency) multi-spectral satellite imagery (10 m by 10 m spatial resolution), collected on June 18, 2020, was used as the raw data input for constructing the wildlife movement impedance surface. Various reflectance bands along with multi-spectral imagery derived index layers were combined into an eight-layer stacked data pool to be used in an unsupervised image classification procedure (Figure 8-1).

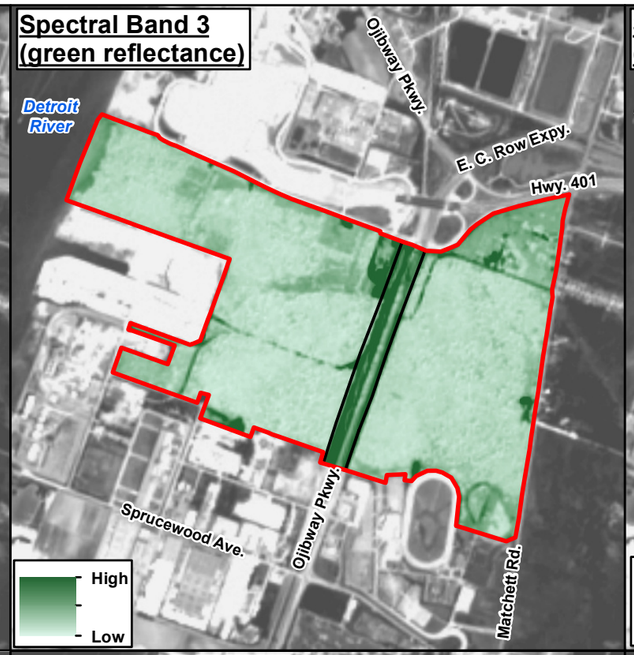
The ISODATA (k-means) clustering algorithm was used on this data pool to categorize every 10 m by 10 m pixel into specific clusters based on overall similarities of reflectance characteristics from the layer stack. The resulting classified imagery was further aggregated into ordinal categories using visual inspection and known landscape features, such as golf courses, existing ecopassage locations (e.g., T5), and vegetation communities within the study area. The ordinal categories were ranked from 1, low wildlife movement impedance/resistivity (i.e., most suitable wildlife habitat), to 5, high wildlife movement impedance/resistivity (i.e., least suitable wildlife habitat). These categories were combined to generate the wildlife movement impedance surface. This surface functioned as the basis for habitat connectivity and corridor identification across the study area (Figure 8-2 – MAP A for wildlife movement impedance surface).

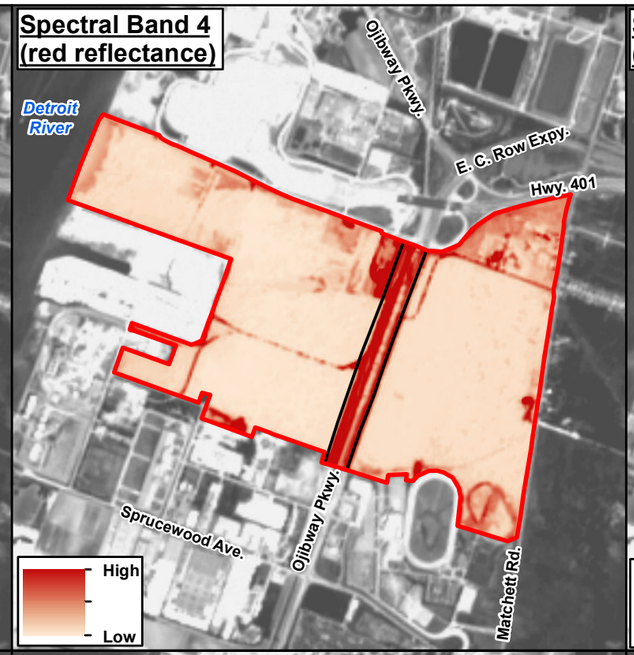
Patches of pixels categorized with the lowest impedance values from the wildlife movement impedance surface were isolated in areas in the western and eastern portions of the study area. These patches of land were considered “good” habitat fragments for general wildlife within the study area based on the image classification and category aggregation performed earlier. A cumulative landscape wildlife movement resistivity surface was generated extending outward from good habitat patches on the west and subsequently extending outward from good habitat patches east (Figure 8-2 - MAP B and C for information regarding the cumulative landscape wildlife movement resistivity surfaces).

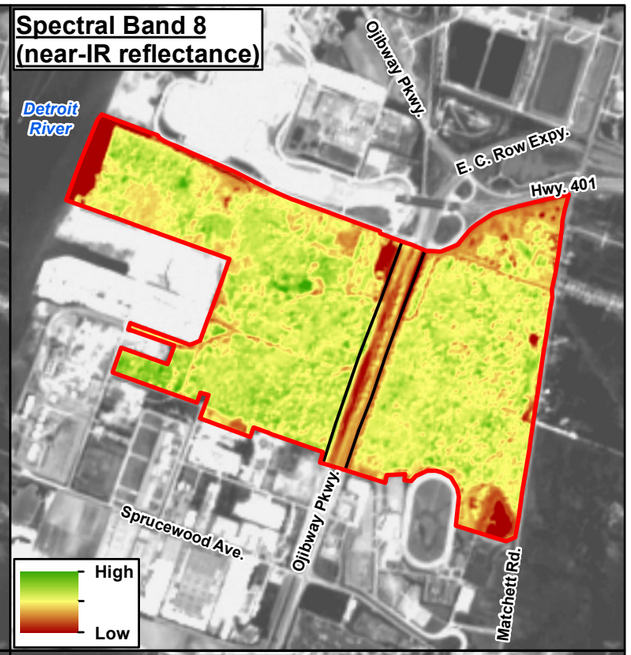
The two cumulative landscape wildlife movement resistivity surfaces (one extending from good habitat on the west side of Ojibway Parkway and one extending from good habitat east of Ojibway Parkway) were combined to identify the lowest cumulative impedance connective corridors crossing the study area, and therefore; crossing Ojibway Parkway. A density slicing technique was used on the combined cumulative landscape wildlife resistivity surface to highlight primary, secondary, and tertiary corridor areas connecting good habitat patches on one side of the study area to the other (Figure 8-3 – MAP A for information regarding the combined cumulative landscape wildlife resistivity surface and corridor areas). The results of the least resistive (lowest impedance) wildlife movement corridor habitat patch connectivity analysis was simplified to help illustrate generalized good wildlife crossing corridors. Also, segments of

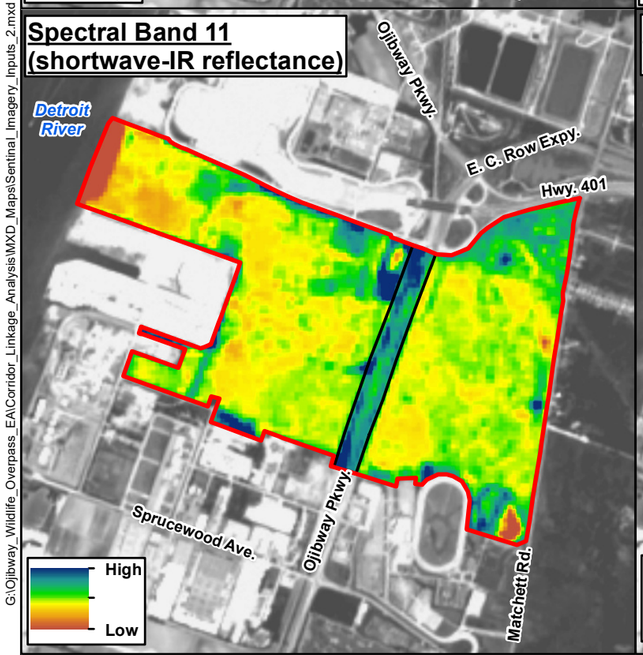
Ojibway Parkway were identified as Primary Crossing Areas, Secondary Crossing Areas, and Tertiary Crossing Areas based on the results from the analysis (Figure 8-3 – MAP B for information regarding the wildlife movement corridors and crossing locations/areas).

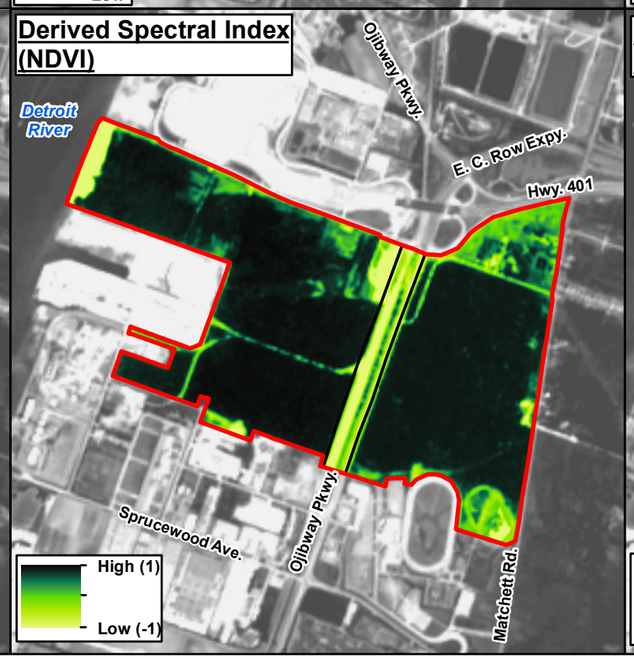


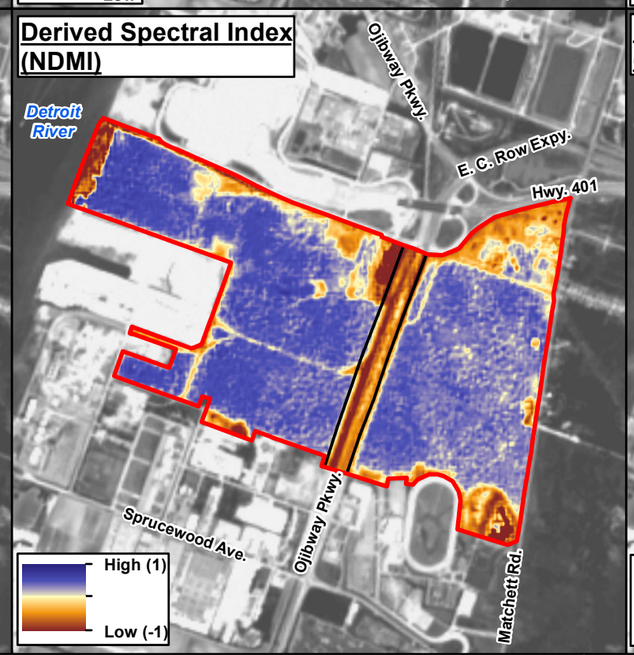


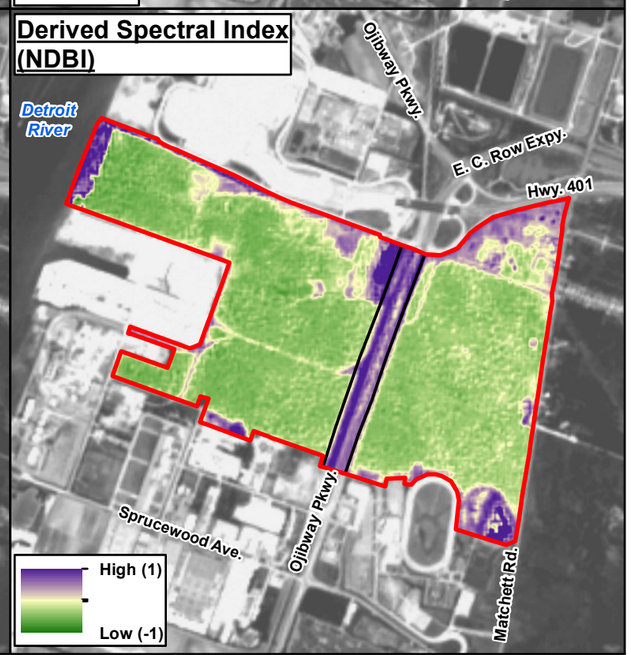












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LEGEND

Approximate Study Area

Ojibway Parkway and adjacent Rail Corridor Wildlife Crossing Area of Interest Boundary

Sentinel 2A Imagery and Imagery Derived Input Information:

- Spectral Band 2: Blue reflectance values. Ten metre resolution imagery with 16-bit scale reflectance ramp. Reflectance digital number values represent wavelength range 458-523 nm.
- Spectral Band 3: Green reflectance values. Ten metre resolution imagery with 16-bit scale reflectance ramp. Reflectance digital number values represent wavelength range 543-578 nm.
- Spectral Band 4: Red reflectance values. Ten metre resolution imagery with 16-bit scale reflectance ramp. Reflectance digital number values represent wavelength range 650-680 nm.
- Spectral Band 8: Near infrared reflectance values. Ten metre resolution imagery with 16-bit scale reflectance ramp. Reflectance digital number values represent wavelength range 785-899 nm.
- Spectral Band 11: Shortwave infrared reflectance values. Twenty metre resolution imagery with 16-bit scale reflectance ramp. Reflectance digital number values represent wavelength range 1565-1655 nm.
- Derived Spectral Index (NDVI): Normalized Difference Vegetation Index (band 8 - band 4 / band 8 + band 4). Derived spectral index indicating variation in vegetation growth and productivity.
- Derived Spectral Index (NDMI): Normalized Difference Moisture Index (band 8 - band 11 / band 8 + band 11). Derived spectral index indicating variation in vegetation water content and plant biomass.
- Derived Spectral Index (NDBI): Normalized Difference Built-up Index (band 11 - band 8 / band 11 + band 8). Derived spectral index indicating variation in urbanized, built-up or anthropogenic developed areas.

NOTES:
- Road and Municipal border info extracted from Ontario GeoHub, NDMNRF 2021
- Sentinel 2A satellite data extracted from Copernicus Open Access Hub, European Space Agency, Scene Date is June 18, 2020. L1C_T17TLG_A026063_20200618T162536

Datum: NAD83
Projection: UTM Zone 17N

0 1 2 4 6 Kilometres

THE CITY OF WINDSOR ONTARIO, CANADA

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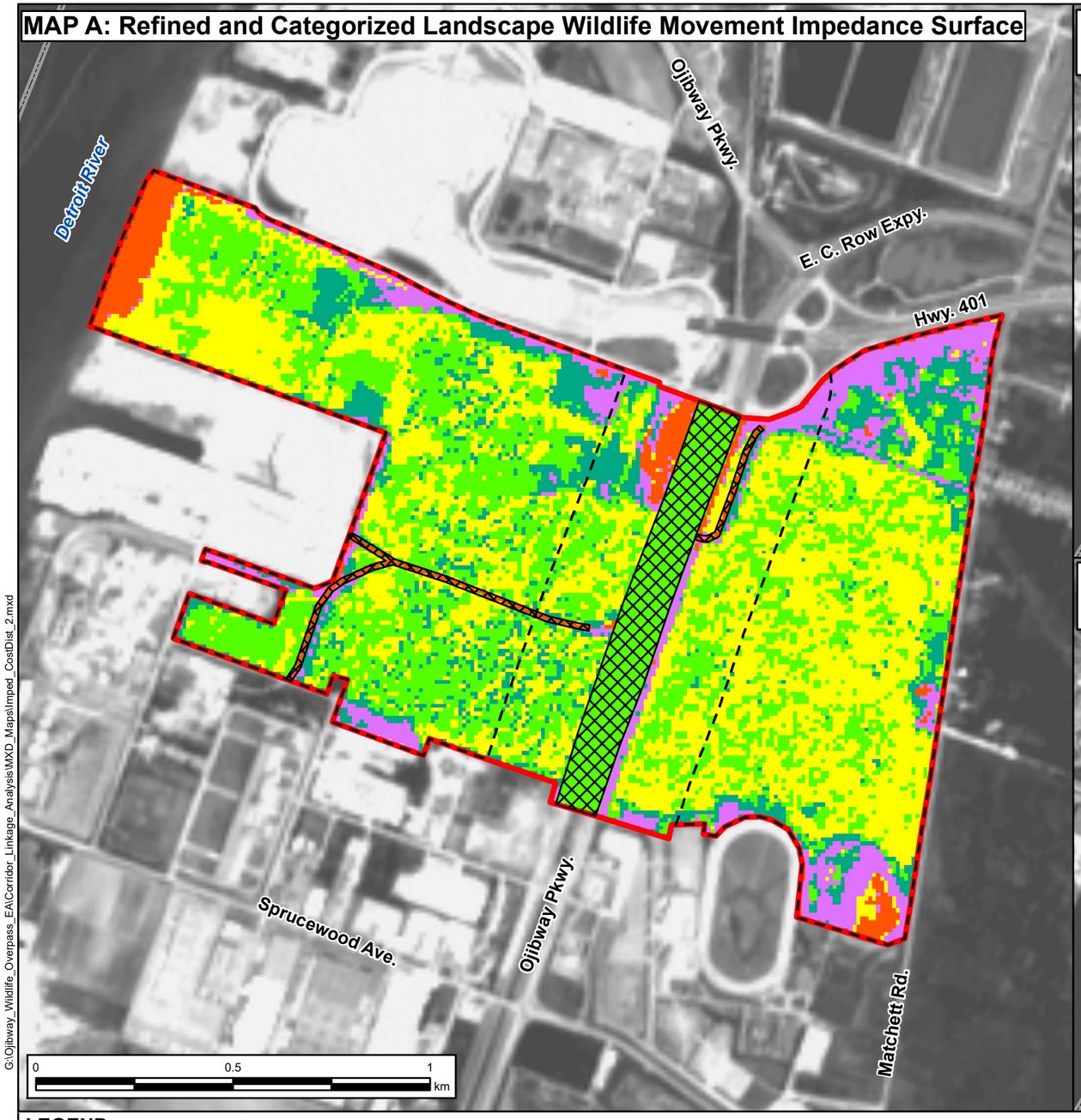
OJIBWAY PARKWAY WILDLIFE CROSSING

Sentinel 2A Satellite Platform Imagery and Imagery Derived Inputs for Inclusion in General Landscape Wildlife Movement Impedance Surface

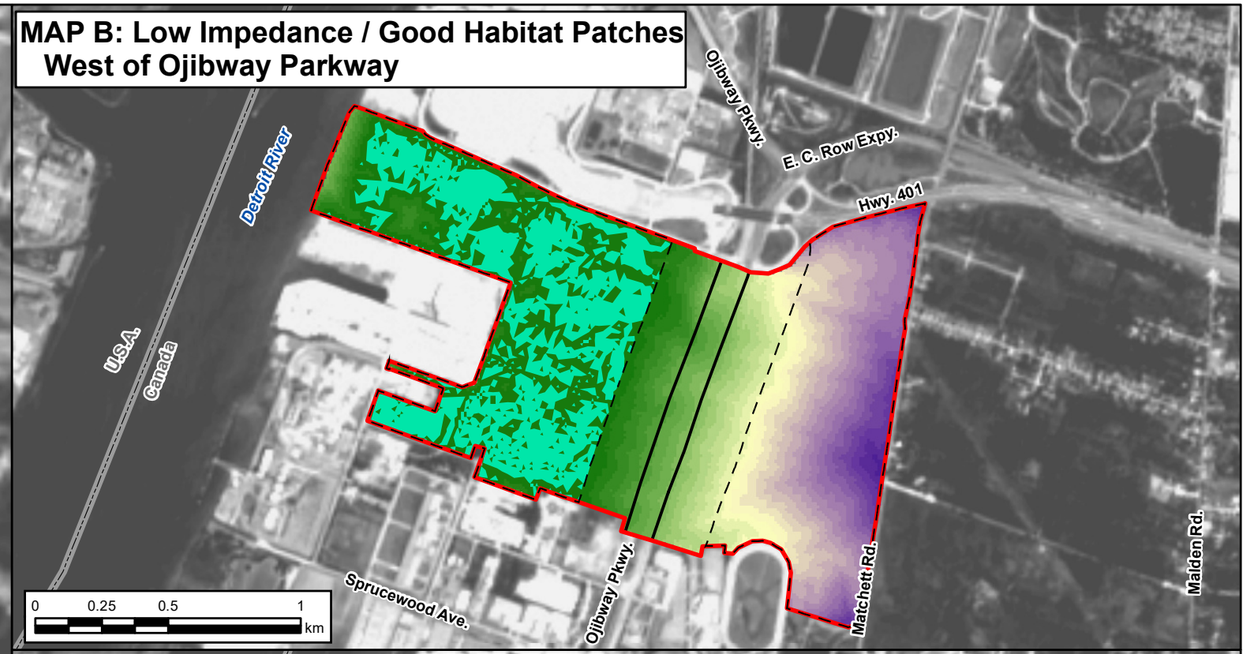
PROJECT N°: IM20104013 | **FIGURE: 8-1**

SCALE: 1:27,500 | DATE: September 2023

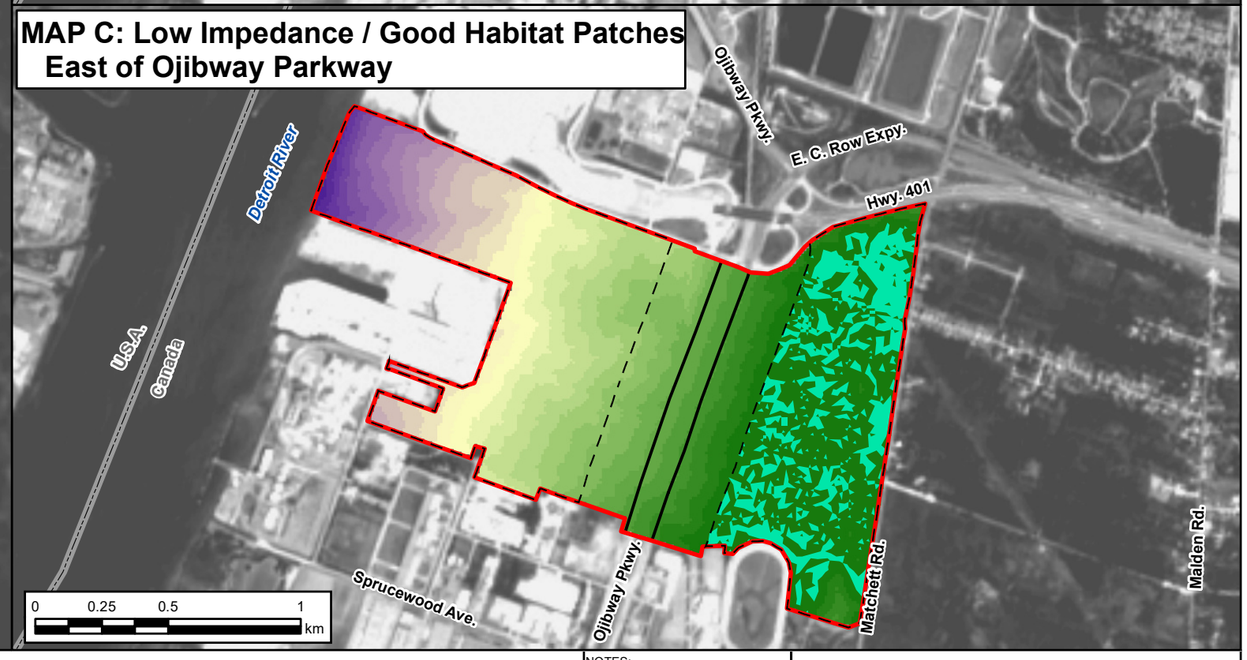
MAP A: Refined and Categorized Landscape Wildlife Movement Impedance Surface



MAP B: Low Impedance / Good Habitat Patches West of Ojibway Parkway



MAP C: Low Impedance / Good Habitat Patches East of Ojibway Parkway



LEGEND

- Approximate Study Area
- Ojibway Parkway and adjacent Rail Corridor Wildlife Crossing Area of Interest Boundary
- Habitat connectivity model areas east and west of Ojibway Parkway crossing area
- National Border

MAP A:

- Areas where Categories were refined due to visual inspection of anthropogenic influence and applying even impedance distribution across potential wildlife crossing area

Categorized Landscape Wildlife Movement Impedance Surface

- Low Impedance Area for general Wildlife Movement across the Landscape (good habitat: prairie, meadow, moderately treed natural area, etc.)
- High Impedance Area for general Wildlife Movement across the Landscape (not good habitat: urban infrastructure, anthropogenic structures, unvegetated areas, open water, etc.)

MAP B and C:

- Low Impedance / Good Habitat Patches isolated to the west side of Ojibway Parkway (Map B) and east side of Ojibway Parkway (Map C)

Cumulative Landscape Wildlife Movement Resistivity based on Wildlife Movement Impedance Surface Categories Extending outward from good habitat patches (west of Ojibway Parkway on Map B, east of Ojibway Parkway on Map C)

- High accumulated Impedance moving across the landscape from good habitat patches
- Low accumulated Impedance moving across the landscape from good habitat patches

NOTES:
- Road and Municipal border info extracted from Ontario GeoHub, NDMNRF 2021
- Sentinel 2A satellite data extracted from Copernicus Open Access Hub, European Space Agency, Scene Date is June 18, 2020. L1C_T17TLG_A026063_20200618 T162536

Datum: NAD83
Projection: UTM Zone 17N

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THE CITY OF WINDSOR ONTARIO, CANADA

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OJIBWAY PARKWAY WILDLIFE CROSSING

Resultant Categorized Landscape Wildlife Movement Impedance Surface and Cumulative Landscape Wildlife Movement Resistivity Analysis from Good Habitat East and West of Ojibway Parkway

PROJECT N°: IM20104013 | **FIGURE: 8-2**

SCALE: MAP A: 1:13,000, MAP B, C: 1:22,500 | DATE: September 2023

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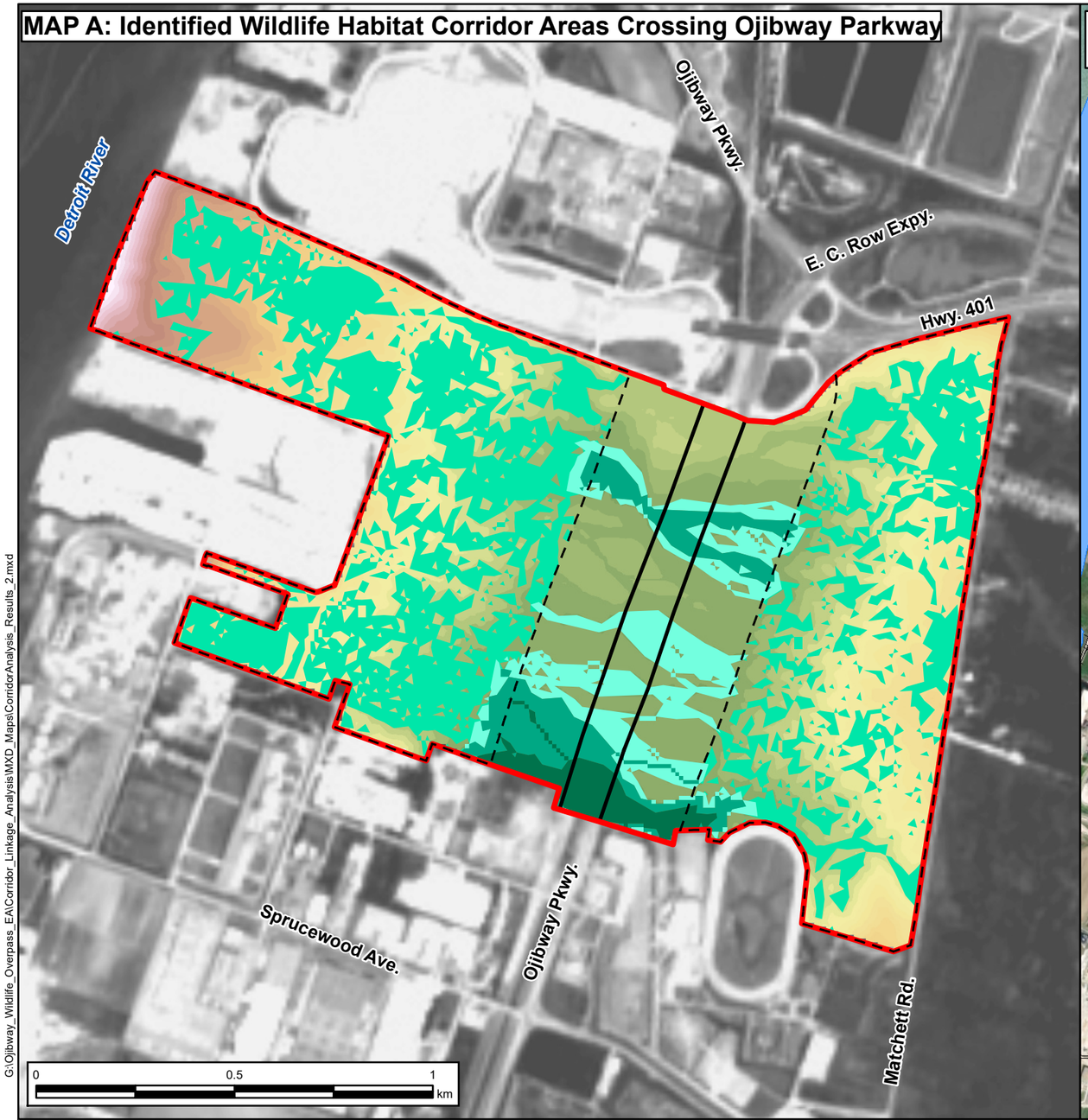
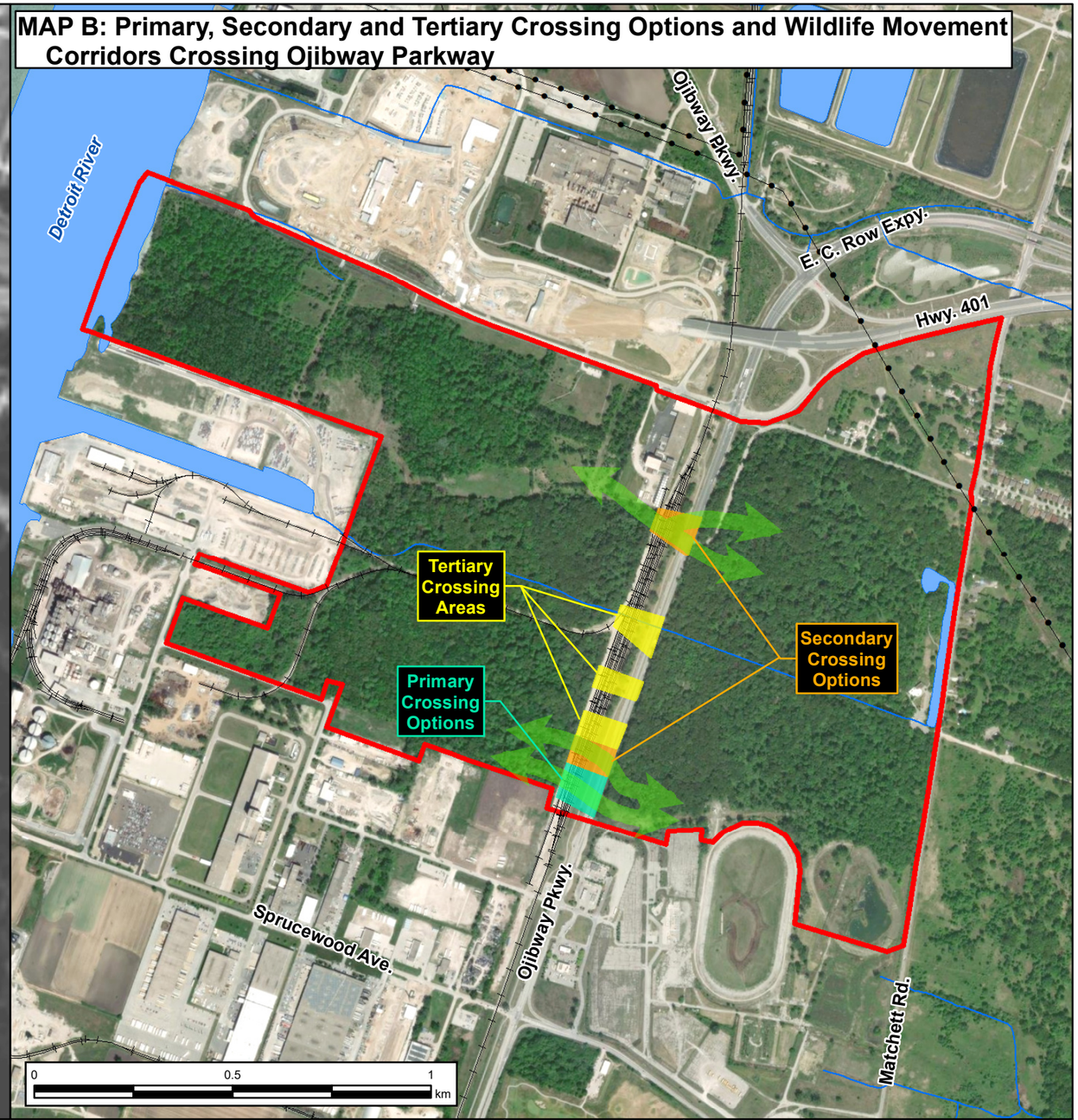
MAP A: Identified Wildlife Habitat Corridor Areas Crossing Ojibway Parkway



MAP B: Primary, Secondary and Tertiary Crossing Options and Wildlife Movement Corridors Crossing Ojibway Parkway



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LEGEND

- Approximate Study Area
- Ojibway Parkway and adjacent Rail Corridor Wildlife Crossing Area of Interest Boundary
- Habitat connectivity model areas east and west of Ojibway Parkway crossing area
- Railway
- Hydro Line

MAP A:

- Low Impedance / Good Habitat Patches isolated to the west side and east side of Ojibway Parkway

Identified corridor Areas Crossing Ojibway Parkway

- Primary Corridor Area (lowest wildlife movement resistivity from good habitat west of Ojibway Parkway and east of Ojibway Parkway)
- Secondary Corridor Area (lower wildlife movement resistivity from good habitat west of Ojibway Parkway and east of Ojibway Parkway)
- Tertiary Corridor Area (low wildlife movement resistivity from good habitat west of Ojibway Parkway and east of Ojibway Parkway)

Combined Cumulative Landscape Wildlife Movement Resistivity Surface Indicating Overall Low/High Impedance Corridors from Good Habitat Patches West of Ojibway Parkway and Good Habitat Patches East of Ojibway Parkway

- High Combined Cumulative Impedance Area moving across the landscape from good habitat patches
- Low Combined Cumulative Impedance Area moving across the landscape from good habitat patches

MAP B:

- Primary and Secondary Wildlife Movement Corridors crossing Ojibway Parkway
- Primary Crossing Location
- Secondary Crossing Location
- Tertiary Crossing Area

NOTES:
- Road and Municipal border info extracted from Ontario GeoHub, NDMNRF 2021
- Sentinel 2A satellite data extracted from Copernicus Open Access Hub, European Space Agency, Scene Date is June 18, 2020. L1C_T17TLG_A026063_20200618T162536
- Aerial imagery (Map B) extracted from ESRI basemap imagery service (scene date: May/June 2023)

Datum: NAD83
Projection: UTM Zone 17N

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THE CITY OF WINDSOR ONTARIO, CANADA

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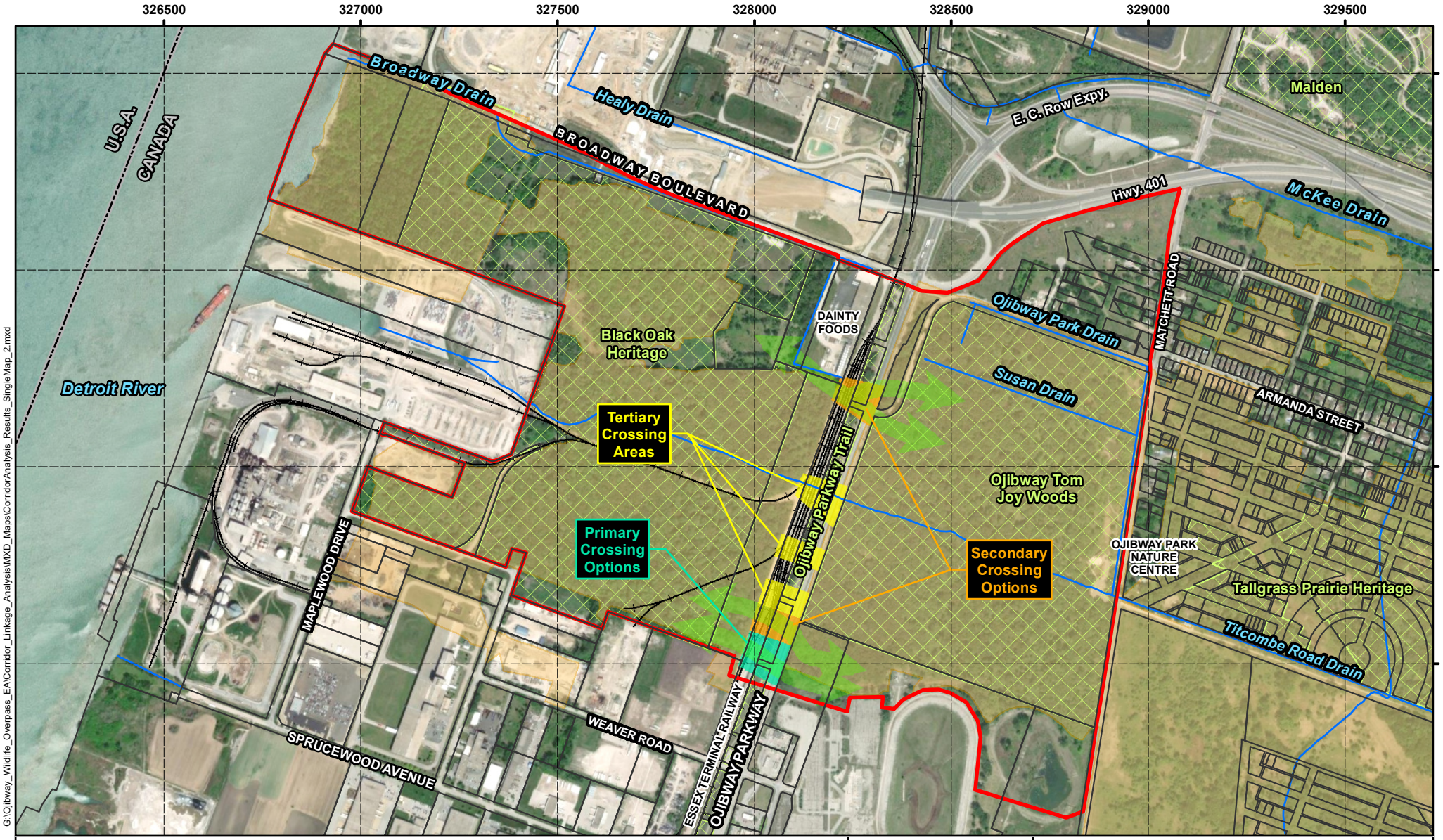
OJIBWAY PARKWAY WILDLIFE CROSSING

Resultant Wildlife Habitat Corridor Areas and Primary, Secondary and Tertiary Crossing Options and Wildlife Movement Corridors Crossing Ojibway Parkway

PROJECT N°: IM20104013	**FIGURE: 8-3**
SCALE: 1:13,000	DATE: September 2023



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LEGEND

- Approximate Study Area
- National Border
- Railway
- Property Parcels
- Parks (labelled with name)
- Watercourse / Drain
- Natural Heritage Feature (ANSI, Provincially Significant Wetland, Environmentally Significant Area or Provincial Park)
- Primary and Secondary Wildlife Movement Corridors crossing Ojibway Parkway
- Primary Crossing Location
- Secondary Crossing Location
- Tertiary Crossing Area

NOTES:
- Aerial imagery extracted from ESRI basemap imagery service (scene date: May/June 2023)
- Property parcels and parks extracted from City of Windsor Open Data Catalogue, (https://opendata.citywindsor.ca/ 2023)

Datum: NAD83
Projection: UTM Zone 17N

0 250 500 1,000 1,500 2,000 Metres

THE CITY OF WINDSOR ONTARIO, CANADA

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OJIBWAY PARKWAY WILDLIFE CROSSING

Potential Wildlife Crossing Locations

PROJECT N°: IM20104013 | **FIGURE: 8-4**

SCALE: 1:13,500 | DATE: September 2023

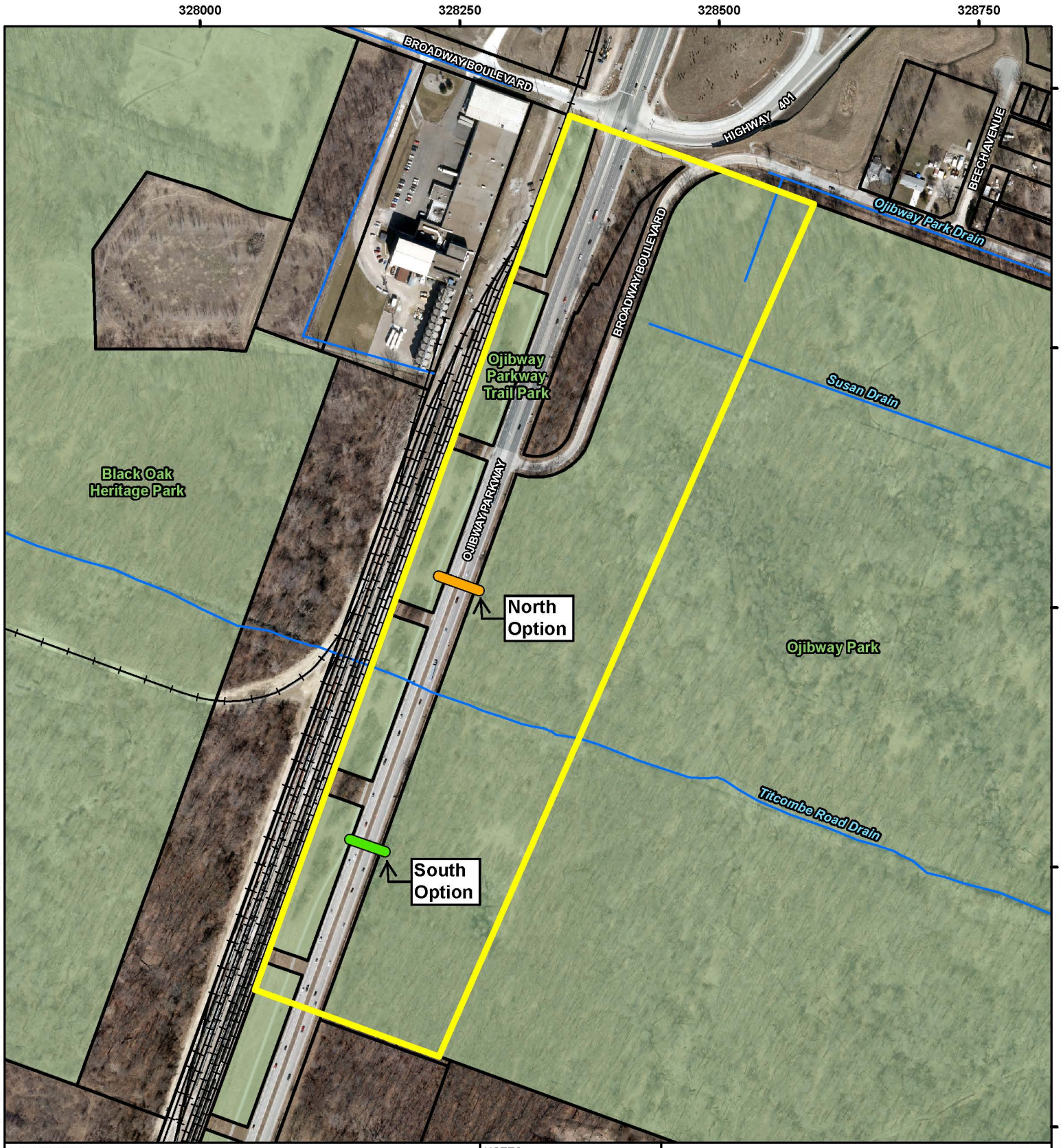
9.0 ALTERNATIVE ANALYSIS

The evaluation of alternatives was a two step process, in accordance with the Schedule ‘C’ Class EA process. As part of Phase 2 of the Class EA, Alternative Solutions (overpass vs underpass) were evaluated to identify a Preferred Solution. In Phase 3 of the Class EA, alternative designs were identified and evaluated to identify a preferred design for the Preferred Solution. Note that Phase 1 of the process is the Problem and Opportunity Statement and is discussed in Section 4.1.1 and Phase 4 is to document the EA process in an ESR for public review. This document contributed to the development of the ESR.

As Phase 2, Alternative Solutions, requires that various reasonable solutions be identified to address the problem and opportunity identified in Phase 1, three alternatives were presented. The first alternative was “Do Nothing,” which would maintain existing conditions and would not involve a wildlife crossing. The second alternative was an underpass crossing, while the third was an overpass crossing. As part of both Alternative 2 and 3, sub-alternatives were developed, based on the location of the structure: North Option and South Option (Figure 9-1).

The current conditions do not have appropriate fences or large steep embankments to deter animals from crossing the road or funnel animals to better crossing points. Animals will continue to cross Ojibway Parkway by the same means and methods they currently do, risking WVC and mortality. Therefore, Alternative 1 was not selected. To accommodate the goal of creating an ecological connection, there is a wide range of options that serve various purposes when considering the optimal ecopassage solution. Both the optimal design and location of the connection to join these two natural areas were considered. The Crossing aims to be an ecopassage in the true sense of the word. It would be built with a dedicated purpose as an ecological connection and, therefore, would accommodate all wildlife, including plants. The literature recommends that if a crossing is over 25 m in length (span), a large underpass or overpass is preferred for all types of wildlife. Due to engineering restrictions and recommendations for the most effective crossings in the literature, an overpass was selected. The location of the ecopassage considered the following items:

- The distribution and quality of existing wildlife habitat on either side of selected locations.
- Hydrology of the surrounding area (based on the site's drainage characteristics and risk of standing water and flooding of potential ecopassage structure).
- Future land use based on known or potential future changes to site characteristics (future land use and maintenance practices can change based on discussions/agreements with municipalities).
- Constructability of culverts and fencing is scored based on the levelness of ground (important for fencing installation), height of the road platform above grade, length of tunnel required, and presence of utilities and consequently ease of construction.
- Barrier fencing extent is based on land ownership (i.e., the extent of fencing which could be installed).



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LEGEND

- Approximate Study Area
- Parks
- Watercourse / Drain
- Railway
- Property Boundaries

Alternative Wildlife Crossing Locations

- North Option
- South Option

0 50 100 200 300 400 500 Metres

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

Datum: NAD83
Projection: UTM Zone 17N

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THE CITY OF WINDSOR ONTARIO, CANADA

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OJIBWAY PARKWAY WILDLIFE CROSSING

Alternative Wildlife Crossing Locations

PROJECT N°: IM20104013

Figure 9-1

SCALE: 1:5,000

DATE: October 2020

As part of Class EA Phase 3, an initial set of four (4) design options was developed and evaluated to identify a preliminary design for the Wildlife Crossing. These design options were comprised of Wildlife Crossing options across Ojibway Parkway, connecting Ojibway Park with the median area between Ojibway Parkway and the ETR tracks. These design options and their evaluation and preliminary preferred design were shared with Indigenous Nations, the public, government agencies, ETR, utility owners, and key stakeholders through PIC #2 in April 2021. A key comment received was to extend the crossing across the ETR tracks to provide connectivity between the Ojibway Park Area and the Black Oak Heritage Park Area. Following PIC #2, the draft ESR was presented to the City Council for endorsement. Subsequent to the Council endorsement, and prior to issuing the Notice of Study Completion, the draft ESR was circulated to the Indigenous Nations, relevant Government Agencies, and the ETR for their review. The feedback received prompted the continuation of the Class EA Study. Accordingly, the Study Team completed additional work to explore design options for the Wildlife Crossing across Ojibway Parkway and the ETR tracks. This involved reevaluating the location of the crossing and identifying potential design alternatives for connecting Ojibway Park Area with the natural areas associated with Black Oak Heritage Park. Ultimately, the preferred design for the Wildlife Crossing over Ojibway Parkway and the ETR tracks was chosen through the development and evaluation of revised design options. The following sections discuss the identification and evaluation of **“initial”** and **“revised”** design options.

The following initial design options were identified for the Wildlife Crossing over Ojibway Parkway:

- Alternative 1 - Wildlife Overpass (3 Span Bridge),
- Alternative 2 - Wildlife Overpass (4 Span Bridge),
- Alternative 3 - Wildlife Overpass (2 Span Bridge), and
- Alternative 4 – Wildlife Overpass (4 Span Arch Culvert).

Each design option would utilize a different type of girder system to support the bridge (overpass) deck. The height of the girders would affect the elevation of the fill placed atop the bridge deck. This would ultimately affect the grading of the approaches, especially the western approach along the railway, which is constrained by the width of the road right of way and the existing drainage feature paralleling the railway. The approach grading is anticipated to affect the ability, or willingness, of wildlife to utilize the structure and, as such, is the basis of the environmental concerns associated with the alternative design concepts.

Alternative 2 - Wildlife Overpass (4 Span Bridge) was selected as the Preliminary Preferred Design Concept due to a number of advantages compared to the other alternatives. This option included a 4-Span Wildlife Overpass Bridge crossing Ojibway Parkway, connecting Ojibway Park with the median area between Ojibway Parkway and the ETR tracks. This initial Preferred Solution was located at the North Option due to avoiding plant SAR in Ojibway Park. A summary of the key impacts and benefits (evaluation of design options) is provided in the ESR.

As noted above, a key comment was received during PIC #2 to extend the crossing across the ETR tracks to provide connectivity between the Ojibway Park Area and the Black Oak Heritage Park Area. Accordingly, following PIC #2, the Study Team completed additional work to identify and evaluate design options for the Wildlife Crossing across the Ojibway Parkway and ETR tracks. As part of this work, the preferred location was also reconsidered due to the location of PSW on the west side of the ETR tracks. A connectivity analysis (Section 8.0) was completed to contribute to the preferred location.

The following four (4) revised design options were developed:

- Revised Design Option 1 - South Crossing, Single Span over ETR tracks, Four Span over Ojibway Parkway, Soil Fill between ETR tracks and Ojibway Parkway
- Revised Design Option 2 - South Crossing, Single Span over ETR tracks, Single Span over Ojibway Parkway, Soil Fill between ETR tracks and Ojibway Parkway
- Revised Design Option 3 - South Crossing, Three Span Bridge (bridge span over boulevard between ETR tracks and Ojibway Parkway)
- Revised Design Option 4 - Split Crossing, Single span over Ojibway Parkway (North), Single Span over ETR tracks (South)

Revised Design Option 3 was identified as preferred due to the following reasons:

- The slopes across the bridge will not create an impediment to the line of sight for medium sized mammals or deer.
- Direct impacts to species at risk plants are anticipated however, they may be mitigated through transplanting.
- Impacts to the Black Oak Wetland Complex are minimized.
- The boulevard beneath the bridge will remain open which would optimize ongoing visibility throughout the area to guard against the prospect of suspicious behaviour/use.
- Open configuration would allow for continued public use of the space and would accommodate any future road expansion (if required).

Conceptual rendering of the Revised Design Option 3 is provided in Figure 1-2 The Environmental Study Report provides a summary of the key impacts and benefits (evaluation of design options). The following sub-sections provide greater detail on the environmental considerations that determined the alternative design concepts for the Preferred Solution.

9.1 Natural Heritage Constraints on Location of Crossing

To inform possible locations of a wildlife crossing, the biophysical attributes and evaluation of significance were considered. First, confirmed Threatened and Endangered plant species were mapped, along with critical habitat setbacks, as recommended by habitat regulations or recovery strategies (Figure 7-1). [redacted]

- [redacted]
- [redacted]

[redacted]

Second, the critical habitat and habitat of animal SAR defined in recovery strategies were also considered. Critical habitat is defined in the SARA as the habitat that is necessary for the survival or recovery of a SAR. Critical habitat is defined in federal recovery strategies for some species (or in an action plan); when defined, there may be regulatory implications. Critical habitat located on nonfederal lands is protected by provisions in or measures under SARA or other Acts of Parliament, including the laws of the province or territory. The discretion to protect critical habitats on non-federal lands that are not otherwise protected rests with the Governor in Council. Identifying critical habitat is not a component of a recovery strategy prepared under the ESA. However, it is recommended that the approach used to identify critical habitats in federal recovery strategies and any new scientific information be considered when developing habitat regulations under the ESA. The critical habitat for the following SAR fauna was considered:

- Eastern Hog-nosed Snake: Critical habitat has not yet been defined for the Eastern Hog-nosed Snake (Kraus, 2011). It is assumed that, like other SAR snake species, Ojibway Park and Black Oak Heritage Park Area are potential habitat.
- Eastern Foxsnake: Critical habitat for Eastern Foxsnake is indicated with a 50 x 50 km UTM grid square, which includes the City of Windsor. Critical habitat occurs when the description of critical habitat from the Recovery Strategy is met (Government of Canada, 2017). The recovery strategy describes critical habitat as the areas prescribed under O. Reg 832/21. The habitat regulation for Eastern Foxsnake protects sites used for nesting, hibernation, and communal shedding and basking, as well as areas within 1,500 metres of an Eastern Foxsnake that are suitable for it to carry out its life processes (e.g. foraging and thermoregulation). The regulation applies where the snake occurs in the City of Windsor (Government of Ontario, 2021). It is assumed that Ojibway Park and Black Oak Heritage Park Area are potential habitat.
- Massasauga: The three primary sites that provide critical habitat for the Massasauga, and in which the species has been observed in the 1971 to 2010 period, have been identified in the City of Windsor: Ojibway Prairie Provincial Nature Reserve, SGNA, and in the Town of LaSalle Woodlot (Ontario Ministry of Natural Resources and Forestry, 2016). Ojibway Park is not mapped as critical habitat but may be supporting habitat as forest within 1.2 km of an occurrence of the species is defined as Category 3 habitat under the General Habitat Description (Government of Ontario, 2021) under the ESA.

- Butler's Gartersnake: Critical habitat for Butler's Gartersnake is documented within the 1 x 1 km standardized UTM grid squares (17LG2881) where habitat and biophysical attributes are met (EC 2016 and MECP 2019). In the (COSEWIC, 2010) report, it is identified that significant Butler's Gartersnake habitat is expected to be removed to allow for a multilane parkway expansion and a new bridge in the City of Windsor (Gordie Howe International Bridge). The identification of Butler's Gartersnake critical habitat is based on three criteria: habitat occupancy, habitat suitability, and habitat connectivity between local subpopulations. It is assumed that Ojibway Park and Black Oak Heritage Park Area are potential habitat..

As it is assumed or considered that Ojibway Park and Black Oak Heritage Park are potential habitat for various SAR snake species, the habitat is not specifically mapped, but potential impacts were considered when evaluating crossing locations. Several potential snake habitat features were found and mapped (Figure 9-2). The significance of natural heritage features in the Project Area was evaluated in Section 7.2 above. It was found that avoidance of ANSI, Significant Woodlands, and SWH was not possible when considering a crossing anywhere in the Project Area. Therefore, these elements are likewise not mapped but are considered in the impact evaluation. Alternatively, mapped PSW does occur in both the north and south options, but the removal of PSW can be avoided with the south option (Figure 2-1), which is in compliance with the PPS (PPS does not permit development and site alteration in significant wetlands). While options, such as a Minister's Zoning Order, exist to build in significant wetlands, a desktop connectivity analysis was also completed to determine the preferred location (Section 8.0). The South Option was ultimately determined to be the Preferred Option.

A study on the spatial and temporal patterns of reptile movement and road mortality completed on the east side of Ojibway Park, along Matchett Road and Malden Road, was reviewed, and the authors' recommendations were considered (Choquette & Valliant, 2016). The study found that reptiles moved in a southeast-northwest route along the utility right-of-way located north of Ojibway Park. The study's authors suggest a wildlife crossing at the industrial site, Dainty Foods, and closing Broadway Boulevard to vehicle traffic. However, for the purpose of this EA, a crossing at the industrial site is not supported as the property is not owned by the City or other agencies that can dedicate lands in perpetuity for long-term wildlife conservation. Lastly, a crossing north of the Broadway Boulevard and Ojibway Parkway intersection would require two structures if Broadway Boulevard is to remain open.

Based on the abovementioned constraints, both the North and South Options impact natural heritage features. The North Option would land in a PSW, while the South Option would require transplanting plant SAR. Revised Design Option 4 considered a Split Crossing: one crossing over the Ojibway Parkway in the North and another crossing over the ETR tracks in the south. This Split Crossing would join in the middle and increase the time wildlife spent on the crossing, require more fencing, and increase potential areas of fencing failure. Ultimately, the South Option was selected as the connectivity analysis supported the location, impacts to the PSW can be avoided (remaining in compliance with the PPS), and the City has previous success in transplanting plant SAR and working with ESA permitting to provide overall benefit to SAR.

9.1.1 Other Constraints on Location

No geotechnical constraints were found to influence the location of the proposed wildlife crossing (WSP, 2024b). The Project Area is relatively flat, and the Titcombe Road Drain occurrs close to the parkway. The proposed overpass would be graded to direct stormwater runoff toward the ends of the Crossing and towards the natural spaces, rather than draining onto the Ojibway Parkway directly. It is expected that

due to the naturalized surface of the Crossing the structure would contribute little additional runoff. It is anticipated to reduce the volume of runoff through absorption and storage within the soil and reduction through evapotranspiration. On this basis, the quantity impacts of the proposed crossing to stormwater runoff are anticipated to be insignificant, and stormwater quantity controls are not considered to be warranted.

Additionally, potential road user (e.g., vehicles, cyclists and pedestrians) conflicts exist at every road intersection. However, the possibility of these conflicts can be greatly reduced through proper channelization and appropriate traffic controls. The intersection design must provide sufficient sight distance for road users to perceive potential conflicts and to carry out the actions needed to negotiate the intersection safely. Sight distance requirements must be considered both for approaching the intersection and departing from the stopped position at the intersection. The minimum sight distance criterion for vehicles approaching an intersection, or travelling along a turning roadway, is stopping sight distance based on design speed. Given that the proposed Ojibway Parkway Wildlife Crossing would be located south of Broadway Boulevard, a review of sight distances was completed.

The sight distances for the proposed Wildlife Overpass over Ojibway Parkway were reviewed based on the guidelines provided in the Transportation Association of Canada's Geometric Design Guide for Canadian Roads, Chapter 9, Intersections (2017). The site distance analysis was conducted using a design speed of 90 km/h for Ojibway Parkway (the posted speed for Ojibway Parkway is 70 km/h). The required sight distance for passenger cars departing from a stopped position at an intersection to a 90 km/h design speed roadway is 190 m. For this project, it would mean that the vehicles making left turns from Broadway Boulevard onto Ojibway Parkway would require a clear sight distance of 190 m to make a left turn on Ojibway Parkway. Additionally, the required sight distance for passenger cars travelling on a 90 km/h design speed roadway to accommodate left turns is 140 m. For this project, it would mean that the vehicles approaching Broadway Boulevard on Ojibway Parkway would require a clear sight distance of 140 m to accommodate vehicles on Ojibway Parkway turning left onto Broadway Boulevard. The sightline distances are shown on Figure 9-2.

To meet sight-line and other engineering structural requirements, the intersection near Broadway Boulevard and Dainty Foods had to be avoided. This required the North Option to be placed south of the intersection but also supported the South Option.

Future land use was also considered based on known site characteristics. The City of Windsor, ETR, and Dainty Foods own lands within and adjacent to the Project Area. ETR has been engaged as a stakeholder as the crossing is proposed over the railway. Additionally, the City of Windsor has committed to sustainability in all forms, including active transportation for the City's human population (City of Windsor, 2019). Active transportation (e.g., walking, cycling and transit) enhances community health and safety, quality of life, and air quality. As a part of this commitment, the City has proposed adding Broadway Boulevard to the sidewalk and bicycle network (City of Windsor, 2019). A pedestrian crossing at Broadway Boulevard to the west side of Ojibway Parkway would be ideal to direct potential human use away from the Crossing.

POSTED SPEED ALONG OJIBWAY PARKWAY = 70KM/H
DESIGN SPEED USED = 90 KM/H

WEAVER ROAD

OJIBWAY PARKWAY

BASED ON TABLE 9.9.12 FROM GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (JUNE 2017)

140.0m

190.0m

BASED ON TABLE 9.9.4 FROM GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (JUNE 2017)

4.40m

BROADWAY BOULEVARD

BASED ON PAGE 66 FROM GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (JUNE 2017)

90.0m

SHELL

TIM HORTONS

MARIGOLD DR.

BASED ON TABLE 9.9.1 FROM GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (JUNE 2017)

OJIBWAY PARKWAY
WILDLIFE CROSSING
CITY OF WINDSOR
SIGHT LINE ANALYSIS FROM TAC
GEOMETERIC DESIGN GUIDE CHAPTER 9

wsp

Project No.	IM20104013
Date	JULY 2024
Scale	NTS
Drawing No.	9-2

9.2 Preferred Location

The refined location should maximize effectiveness by choosing the area where animals naturally approach to cross the Ojibway Parkway and ETR lands based on the field assessment and likelihood from a literature review. It is acknowledged that no single set of variables identifies all preferred crossing locations (Barnum, 2003), and the Crossing should not be biased to any one group of species. The entire Project Area is a wildlife conflict zone, and as documented in the literature summary, WVCs can not always be relied on. Other methods have evolved to determine crossing locations and road mortality data can not replace incorporating information about the surrounding habitat and landscape structure into an analysis of crossing locations. Studies indicate that suitable habitat (and distance to), linear guideways, slope steepness and complexity, and barriers are correlated to higher rates of crossings (Ministry of Transportation, 2016). In one study, it was found that the presence of suitable habitat on both sides of the road was the baseline condition required for animals to cross the roadway regularly (Barnum, 2003). Better habitats had higher rates of crossing, which could be important for species habitat specialists. Species with broad habitat preferences (e.g., deer, coyotes) had a greater opportunity to be affected by other factors (Barnum, 2003).

As mentioned above, a rapid assessment approach was completed for the Ojibway Parkway Overpass, supplemented through the EA process with an alternatives assessment. Fieldwork was completed to determine where animals were already crossing, which were determined by trampled vegetation paths. Existing gaps in the chain-link fence were also documented as it is likely the location of crossings. Road mortality data from the City was received, and during field visits, road mortality was also noted. Habitats and gaps, wildlife species in the area, SAR, rare plant communities, drainage, and previous studies were all considered.

9.3 Overpass Design Features

Ojibway Parkway fragments two areas of the Ojibway Prairie Remnants ANSI (i.e., Ojibway Park Area and Black Oak Heritage Park Area). ANSI's have been designated to recognize the need to protect the remnant ecosystems effectively (Government of Ontario, 2002). To begin to reestablish an ecological connection, an overpass crossing (an ecopassage) has been proposed. As the Crossing is not directed to any specific species or target species group, the design considers requirements for all species.

Figure 9-3: Common Eastern Bumblebee on Ojibway Parkway

As an overpass was determined to be the best alternative, a melded approach of a landscape bridge and wildlife overpass was selected. The largest size feasible was selected as the Crossing aims to restore the habitat connection between the the natural areas associated with Black Oak Heritage Park Area and the Ojibway Park Area. It is intended to meet the movement needs of a broad spectrum of wildlife from large mammals, small mammals, amphibians and reptiles, invertebrate taxa, and plants. Microhabitat features and vegetation placement would be designed to enhance crossings by bats, insects, and birds. The Crossing structure is designed exclusively for wildlife, and human use is prohibited to provide an effective crossing.

The vegetation would be a heterogeneous environment, combining open areas with shrubs. The more natural a crossing appears, the more effective it would be (Ontario Road Ecology Group, Toronto Zoo, 2010). Plant species which are native and local to the area would be used in landscaping, and to maximize continuity, native soils should be used. Soils removed for the Crossing construction should be used on the ingress and egress points if not overburdened with invasive species. Soils from outside the region should be avoided. Soils must be deep enough for water retention of plants, and drainage should slope slightly (2-3%) from the center longitudinal axis to the sides. Since the bridge deck of the crossing itself can only support less than 3 ft of soil (0.85 m) due to its weight, the woody plantings on the deck should consist of shallow-rooting shrub species. The landscape design should have woody vegetation on the edges of the structure to provide cover and refuge. At the same time, the Crossing center should be left open with low-lying native herbaceous vegetation (i.e. local tallgrass prairie species). Woody debris, ponds (depressions), and rock piles should be placed in a stepping-stone fashion to provide microhabitats. Micro-habitats would be especially important immediately after construction while vegetation is growing. Large boulders and brush piles can be used to block any vehicle or human passage on the Crossing.

Approach ramps should have gentle slopes (e.g., 5:1 or less). Roads of any type should not pass in front of or near the entrance to the landscape bridge, as this would hinder wildlife use of the structure.

A minimum width of 50 m was selected based on the literature. Previous research has shown that large animals prefer wide overpasses (50 m), and wide overpasses with microhabitat elements are considered more effective at allowing animals to cross. In Europe, it has been recommended to build overpasses between 40-50 m for small and large animals (Ministry of Transportation, 2016).

9.4 Other Design Features

Effective wildlife fencing that is impermeable to wildlife is the most effective and preferred method to guide wildlife to the structure and prevent intrusions onto the roadway (Ontario Road Ecology Group, Toronto Zoo, 2010; U.S. Department of Transportation, 2011; Ministry of Transportation, 2016). Fencing is a key part of a mitigation plan and needs to consider what happens for wildlife that becomes trapped on the road. Escape ramps, gates, or doors must be used to allow for one-way movement off the road (U.S. Department of Transportation, 2011; Ministry of Transportation, 2016).

On both sides of Ojibway Parkway and Black Oak Heritage Park Area, 8.0 ft (2.4 m) high fencing must be installed that runs the length of natural areas (Figure 9-4). Permanent galvanized (Class III) chainlink fencing installed on steel posts spaced 4.2-5.4 m (14-18 ft). The fencing material should be attached to the non-roadway side of the posts. Solid material fencing designed for small animals affixed to the base. The solid material should be at least 0.6 m (2 ft) above the ground with a 20 cm buried bottom and top lip. The fencing (both chain link and solid) must physically connect to the Crossing to ensure no gaps or holes exist. The solid fencing material must be permanent (i.e., not geotextile fencing) and is typically a product such as galvanized mesh, concrete, sheet metal, or vinyl walls. Brands such as Animex and ACO are popular, however, more products are emerging, such as E-Fence™ by ERTEC. E-Fence™ also includes one-way escapes as built-in features and is highly customizable. While E-Fence™ is not solid, it prevents animal movement and does not have mesh which could risk animals becoming stuck.

Irrelevant of fencing type, areas for escape should be included to allow small animals to escape the roadway. One-way escape gates (such as those in E-Fence™) for smaller animals would be beneficial along Broadway Boulevard (Figure 9-4). It is recommended for deer that escape ramps be placed at 500

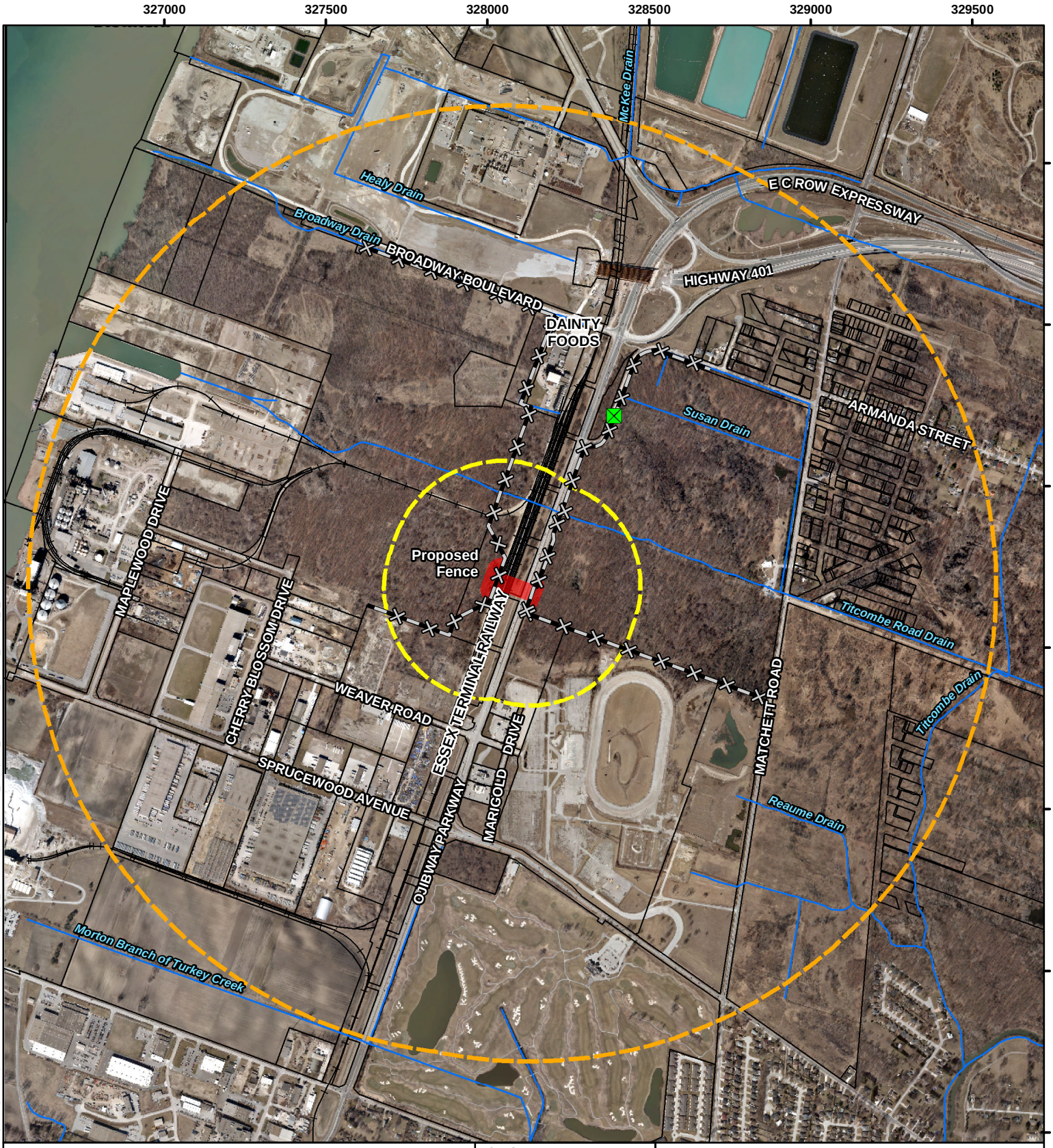
m intervals (Ministry of Transportation, 2016). No escape ramps for deer are proposed as 500 m from the proposed crossing would occur outside the City owned lands, within PSWs, or in locations where area is inadequate. Escape ramps require large areas to implement as they should be set back in fencing and have a landing spot consisting of loose soil or other soft material. Large animal escape ramps were considered at Susan Drain and near the south property line but due to the limited length of the fencing and the impact of escape ramps they were considered unnecessary at these locations.

9.5 Additional Crossings

As the recommended spacing for large mammal crossings which target White-tailed Deer is 1.4 km apart (Bissonette & Adair, 2008) additional crossings along Ojibway Parkway were considered inconsequential based on the current fragmented landscape. Figure 9-4 shows a 1.4 km distance from the Preferred Alternative's location, the edge of the natural areas is approximately 800 m north and 250 m south from the Preferred Alternative.

A crossing structure for small animals and herptiles was also considered. Crossing structures for smaller animals (culverts, herptile tunnels) should be spaced 300 m apart (Ministry of Transportation, 2016). However, the Preferred Wildlife Crossing is larger than the small culvert and herptile tunnel types considered under the 300 m distance suggestion. The option of a smaller under the road crossing has not been discounted but would be considered under adaptive management. Adaptive management would consider a herptile tunnel north of the Preferred Alternative's location if it proves unsuccessful for herptile crossing. It is recognized that crossings of various types and sizes, along with microhabitat elements, could enhance movement.

Additional crossings are not included in the EA along the linear corridor of Ojibway Parkway. Nevertheless, at the landscape level, the City wishes to reconnect Black Oak Heritage Park Area to Oakwood Natural Area. To do so, additional crossings are considered and being evaluated along other roads in the natural areas (e.g., Matchett and Malden Roads) under separate cover. The City hopes to re-connect an integral part of the larger regional natural heritage network.



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LEGEND

- Project Footprint
- Property Boundaries
- Chainlink Fence
- One-way Escape Gate (Approximate Location)
- Spacing for Small Animals and Herptiles Crossings (300 m)
- Spacing for White-tailed Deer Crossings (1.4 km)
- Watercourse / Drain
- Railway

0 100 200 400 600 800 1,000 Metres

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

Datum: NAD83
Projection: UTM Zone 17N

N W E S

THE CITY OF WINDSOR ONTARIO, CANADA

wsp

OJIBWAY PARKWAY WILDLIFE CROSSING

Minimum Wildlife Fencing Requirements and Additional Crossings

PROJECT N°: IM20104013 | **FIGURE: 9-4**

SCALE: 1:16,000 | DATE: June 2024

10.0 IMPACTS ON NATURAL HERITAGE AND SPECIFIC MITIGATION MEASURES

The following analysis of the Project's potential to interact with the natural environment has been completed based on the current understanding of the proposed Project works, the existing conditions within the Project Area, as determined through field investigations and background resources available at this time of this analysis, and professional judgement. Impacts may be short-term (i.e., occurring during construction and resolving a short time after construction) or long-term (i.e., lasting effects of construction or effects resulting from the altered ground). Impacts may also be positive (i.e., restoring ecological connections) and negative. Positive impacts from the Crossing could be that in areas with suitable habitats crossings may lead to recolonization and range expansion (Ontario Road Ecology Group, Toronto Zoo, 2010). In addition, crossings in areas with increasing road density will greatly benefit the local ecology (Ontario Road Ecology Group, Toronto Zoo, 2010). As well, some potential negative impacts may be minimized by implementing mitigation measures during construction and incorporating long-term mitigation measures into the project design.

The following section provides a summary of potential direct and indirect impacts to the natural environment relative to the project design. It provides recommended measures and strategies to avoid, minimize and/or reduce impacts and associated risks. The proposed crossing is to provide a safe, attractive, fiscally responsible, and minimally environmentally impactful connection over Ojibway Parkway. The Project footprint is 0.2 ha within the FODM1-3 community in the East Study Area and 0.5 ha within the ETR lands in the West Study Area (Figure 6-5). Past disturbance to the area includes clearing, cultivation, ditching, draining, use by recreational vehicles, and topsoil removal (Ministry of Natural Resources and Forestry, 2021). The past disturbance is not used to justify impacts but rather to understand previous impacts and, therefore, consider mitigation measures.

10.1 Potential Aquatic Impacts

No fish habitat exists in the Project Area; however, Titcombe Road Drain is a municipal drain near the Preferred Alternative. Based on the current understanding, there would be no in-water works associated with this Project, and the drain would not be relocated. The structure itself is not expected to change water flow, and existing conditions are expected to remain post-construction.

10.2 Potential Species of Conservation Concern and Species at Risk Impacts

Surveys confirmed the presence of five plant SAR. Other plant species considered to have a moderate potential of occurring are White Colicroot, American Chestnut, Climbing Prairie Rose, and Riddell's Goldenrod. These species were not documented during field surveys, nor has the Ojibway Nature Center documented these species in the East Study Area. To confirm the presence of American Chestnut and provincially rare species, such as Black Gum and Pignut Hickory, a tree inventory should be completed.

In secondary sources, provincially rare species such as Culver's Root, Sundial Lupine, and Giant Ironweed have been documented in the general area. These species were not observed during field surveys, but additional surveys could be completed in the Project Area to ensure absence. If documented, these species could be transplanted. These species could also be considered for seed collection and replanting options.

Bird species such as Cerulean Warbler, Eastern Wood-Pewee, Red-headed Woodpecker, and Wood Thrush were all documented in secondary sources. Cerulean Warbler and Wood Thrush were documented in sources that contain areas much larger than the Project Area. In contrast, Eastern Wood-Pewee and Red-headed Woodpecker were documented within the Project Area on iNaturalist. As these species rely on specific habitat features, the retention of habitat is considered key. Eastern Wood-Pewee breeds in mature to intermediate-aged forests with an open understory, often being associated with clearings and edges. Red-headed Woodpecker breeds in areas with a high density of dead trees that can be used for nesting and perching. Both species, Eastern Wood-Pewee and Red-headed Woodpecker, can be found in a wide variety of habitats, especially when migrating. As forest area would be removed for the completion of the Crossing, a reduction in habitat would occur until restoration and replanting are successful.

Suitable habitat for various snake species has a moderate chance of occurring and preferred habitat is not limited to the area of the Preferred Alternative. Likewise, invertebrate species such as Monarch and Yellow-banded Bumble Bee have a moderate chance of breeding on-site. Both species are feeding generalists, but Monarch requires milkweeds for egg-laying. Preferred habitat is not limited to the area of the Preferred Alternative, and preferred host plants can be incorporated into restoration and planting plans.

10.2.1 Mitigation Measures for Species of Conservation Concern and Species at Risk Impacts

During detailed design, when a footprint is refined, a tree inventory should occur to document tree removals. A mitigation plan suitable for site requirements and removals must be completed to compensate for tree removals. Mitigation trees should be incorporated into the design of the wildlife crossing to build a ‘wall’ of vegetation along the outer edges of the ramps and shrubs along the edge of the Crossing. Herbaceous native species removed for the footprint of the Crossing should be included in the seed mixes and plantings. Species to consider include Culver’s Root, Sundial Lupine, Giant Ironweed, milkweeds, and New Jersey Tea. The establishment of a heterogeneous ecosystem across the wildlife crossing would be essential in mitigating negative impacts from crossing development.

The overall impact of the wildlife crossing on Species of Conservation Concern and SAR is considered to be positive as there will be increased space for plant life movement and establishment as well as gene flow for animal species that Ojibway Parkway may currently segregate.

The Project Footprint falls within known populations of SAR. Permitting under the Endangered Species Act, 2007 would be required (Section 13.0).

10.3 Potential Areas of Natural and Scientific Interest Impacts

Ojibway Park Area and Black Oak Heritage Park Area are part of a Life Science ANSI of provincial significance. The ANSI was established to represent Ontario’s biodiversity and natural heritage. Appropriate design and management of restoration post-construction may also increase biodiversity in the area. The Crossing would also have a positive impact on the ANSI for scientific study and education purposes.

10.3.1 Mitigation Measures for Areas of Natural and Scientific Interest Impacts

The construction of the wildlife crossing would not negatively impact the ANSI’s biodiversity and natural heritage characteristics. On the contrary, the wildlife crossing may provide a positive impact in the form of

scientific study and education and further enhance and support the ANSI designation. It is recommended that the City allocate funds to support long-term studies of the Crossing and education through the Ojibway Nature Center regarding road ecology. The City may also wish to partner with Universities and local non-profits for monitoring and studies.

10.4 Potential Wetland Impacts

Drainage of wetland areas can cause mortality or stress to animals and possible changes in species composition, as is seen in the disturbed SWDM4-6 community. Access to the ETR lands has not been provided, and therefore, the true limits of wetlands and PSW are not known. A decade has passed since the PSW was evaluated and conditions may have changed. Invasive species can dominate communities in short time frames and stochastic environmental events (e.g., floods) can drastically change an ecosystem within five (5) years. Changes have already been noted in species compensation in the reduction of American Elm and Green Ash due to Dutch Elm Disease and Emerald Ash Borer. The increase of Eastern Cottonwood also indicates disturbance and changing conditions.

To ensure the Crossing does not further impact community changes the form and function of the wetlands in the ETR must be better understood.

10.4.1 Mitigation Measures for Wetland Impacts

Based on the current Project Location a small overlap of the delineated PSW exists. However, a field fit of the location is still possible in detail design which could result in avoidance of PSW limits. Likewise, a complete field investigation (ecology and hydrology to refine location of wetland pockets) of the natural ETR lands would benefit the understanding of existing conditions as well as restoration requirements. Groundwater would also need to be understood from a geotechnical perspective.

Mitigation for the loss of wetland form and function, if it is found to occur may include:

- schedule grading to avoid times of high runoff volumes (spring and fall),
- minimize changes in land contours and natural drainage,
- develop and implement an erosion and sediment control plan, and
- revegetate as soon as possible.

Additionally, the removal of wetland areas should be compensated for, with the objective of a net gain in habitat function with the local watershed. The location of wetland compensation should be within Black Oak Heritage Park. Ideally, compensation could go towards restoration of existing wetlands within the park.

10.5 Potential Significant Woodland Impacts

The woodlands in the Project Area are considered significant. Direct impacts would include the loss of canopy coverage until regrowth occurs, and indirect impacts include an increased edge effect. The Project footprint removes 0.7 ha of vegetation from the Significant Woodlands in the East and West Study Areas. Currently, interior forest habitat is measured as either 100 m (Ontario Ministry of Natural Resources, 2010) or 200 m (Ontario Ministry of Natural Resources and Forestry, 2015) from the forest edge (Figure 10-1), which is a fixed way of accounting for edge effects. This method doesn't consider the impacts of trails and human use or some nuances of land use. The current reduction of interior forest

habitat is represented in Table 10-1. Based on the footprint, the edge is pushed further into Ojibway Park, and the interior forest is reduced but not eliminated. The reduction of interior forest does not change the significance criteria of the woodland (Section 7.2.3). Likewise, the reduction of interior forest does not change the habitat evaluation of interior forest for avian species (Section 7.2.7.2).

Table 10-1: Interior Forest Habitat Loss

Interior Buffer	Study Area	Area (ha)
200 m	East	0.01
100 m	East	0.37
200 m	West	0.56
100 m	West	0.82

10.5.1 Mitigation Measures for Significant Woodland Impacts

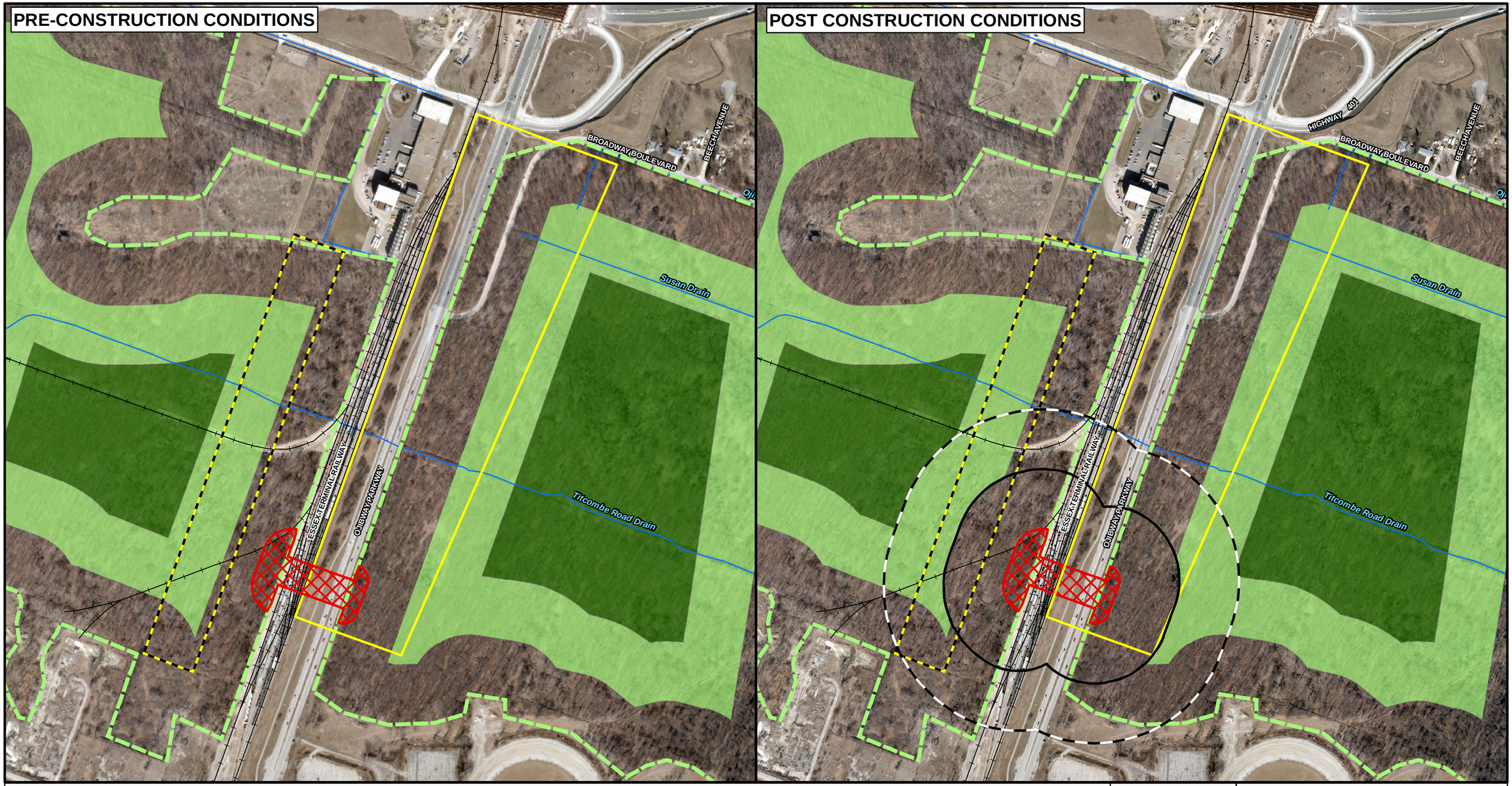
The form and function of the Significant Woodland would remain after construction impacts and removal of 0.57 ha of interior forest habitat (200 m buffer). Moreover, regeneration of the area combined with restoration and enhancement and the extension of habitat across the Crossing would reinstate the woodland area (and potentially increase area) and reduce edge effects in the long-term.

10.6 Potential Significant Valleyland Impacts

Based on the current understanding, no valleylands exist in the Project Area.

PRE-CONSTRUCTION CONDITIONS

POST CONSTRUCTION CONDITIONS



LEGEND

- Project Footprint
- Project Area
  - East Study Area
  - West Study Area
- Project Footprint Buffer
  - 100 m
  - 200 m
- Approximate Woodland Limit
- Railway
- Watercourse / Drain
- Interior Forest Habitat
  - 100 m Buffer
  - 200 m Buffer

0 200 400 600 800 1,000 Meters

NOTES:
- Aerial imagery extracted from Essex County interactive map, 2019.

Datum: NAD83
Projection: UTM Zone 17N

THE CITY OF WINDSOR ONTARIO, CANADA

wsp

OJIBWAY WILDLIFE CROSSING

Interior Forest Habitat

PROJECT N°: IM20104013 | **FIGURE: 10-1**

SCALE: 1:6,000 | DATE: May 2024

10.7 Potential Significant Wildlife Habitat Impacts

Candidate SWH includes Raptor Wintering, Bat Maternity Colonies, Reptile Hibernaculum, Woodland Raptor Nesting Habitat, Amphibian Breeding Habitat: Woodland, Woodland Area-Sensitive Bird Breeding Habitat, and Special Concern and Rare Wildlife Species. Confirmed SWH includes Savannah and Other Rare vegetation communities, Amphibian Breeding Habitat: Wetland, and Special Concern and Rare Wildlife Species. The commonality between all these habitat types is that they occur (or may occur) within the overall Ojibway Park and Black Oak Heritage Park.

Raptor Wintering based on potential species occurrences and vegetation communities present Raptor Wintering SWH is considered candidate in Ojibway Park. As Ojibway Park is considered continuous with the Ojibway Prairie Provincial Nature Reserve, the Reserve is also considered a candidate for Raptor Wintering SWH. Therefore, the forest community is considered Candidate SWH in the Project Area. Modifying vegetation structure or drainage patterns in fields or forests supporting a winter roost may make it unattractive (Ontario Ministry of Natural Resources and Forestry, 2014). The Project footprint would not reduce or negatively alter the available vegetation structure (interior woodland) of the forest or change drainage patterns. Black Oak Heritage Park is constrained on all sides and does not have >15 ha of field/meadow habitat within and, therefore, can not be considered significant.

Bat Maternity Colonies SWH could be confirmed somewhere within Ojibway Park (it is also assumed that Black Oak Heritage Park is candidate SWH for this type and the adjacent natural ETR lands). Recordings confirmed that Big Brown Bat had the highest bat activity within the Project Area, and it is thought that the Project Area represents an important foraging site for Big Brown Bats. There are several factors responsible for the decline of bat populations, and the most important threats include White Nose Syndrome, destruction of hibernating bats and nursery colonies, habitat loss, and persecution. Developments that result in significant forest clearing will impact nursery colonies. Deforestation near and between maternity colony sites and feeding areas may decrease prey availability, foraging efficiency, and increase vulnerability to predators (Ontario Ministry of Natural Resources and Forestry, 2014). The Preferred Solution would result in a relatively small (0.3178 ha) removal of forest and is not expected to alter maternity colonies or foraging efficiency. In the long-term, the Crossing may be used by bats as a flyway between the natural areas associated with Ojibway Park and Black Oak Heritage Park.

Reptile Hibernaculum snakes depend on hibernation sites located below frost lines in burrows, rock crevices and other natural locations (e.g., tree roots) to escape freezing temperatures. An abundance of such sites is needed to ensure overwinter survival. The access to subterranean crevices is much more important than the vegetation communities that are present. Development may affect hibernacula or the effectiveness of hibernacula if it involves or removes the area of accumulated rock and woody or significantly reduces forest size. Changes to local hydrology or hydrogeology can either drown out or desiccate hibernating snakes. All known rock piles are located outside the Project footprint and excavation has previously been completed for the ditch running parallel to Ojibway Parkway. Previous work in the area has not uncovered hibernacula and has likely compacted soil. No impacts to hibernacula sites are expected.

Rare Vegetation Communities, Savannah and Other Rare Vegetation Communities are confirmed in the Project Area. The Savannah is located outside the Project footprint, so no impacts are expected. Likewise, the Pin Oak Mineral Deciduous Swamp Type SWDM1-3/SWD1-3 is outside the Project footprint, so no impacts are expected. The Dry Black Oak Deciduous Forest Type FODM1-3/FOD1-3 is the community in which the footprint

occurs. The community code would not change with the removal of the vegetation. The Dry Black Oak Deciduous Forest Type should be considered in the development of restoration and planting plan goals.

Woodland Raptor Nesting SWH may occur in Ojibway Park Area, Black Oak Heritage Park, or adjacent natural areas. Most woodland raptors have highly specialized habitat requirements and may be vulnerable to minor changes in habitat. Forests provide nesting, roosting, and prey opportunities for woodland raptors. Nesting raptors tend to be widely spaced (>1 km apart). Site alterations that reduce the availability of forest cover effectively remove productive habitat (e.g., prey production) from the territory of resident breeding pairs. Development in the vicinity of a nest may cause birds to abandon the area, particularly if development increases the level of human activity in the area (Ontario Ministry of Natural Resources and Forestry, 2014). No raptor nests were found in the Project Area, and the Project Area currently has very high levels of human activity. The most likely raptor to nest in the Project Area is Cooper's Hawk. Cooper's Hawk is an edge specialist and is unlikely to be impacted by the Preferred Solution.

Amphibian Breeding Habitat: Woodland has been evaluated in the Project Area. For a woodland pond to function as a breeding pond, it requires shallow, unpolluted water (permanent or temporary) and emergent and submergent vegetation. The surrounding woodland habitat must provide a closed canopy offering a shaded, moist understory to retain breeding pond function and an abundance of downed woody debris to act as cover. Lastly, breeding ponds must be close to summer habitat (Ontario Ministry of Natural Resources and Forestry, 2014). Development that results in the draining or filling of woodland ponds will destroy the function of the pond. Development on adjacent land can significantly impact breeding pond functions if it alters ground or surface water quality or quantity. Furthermore, adjacent development can have a very high impact if it separates the breeding habitat from the summer or winter habitat.

The Crossing structure would not drain or fill woodland ponds in the area and would not change the local hydrology or hydrologic function. The Crossing may positively impact amphibians by connecting suitable habitats within and nearby Black Oak Heritage Park Area with the Ojibway Park Area.

Amphibian Breeding Habitat: Wetland has also been confirmed in the Project Area. Most amphibians require a source of water to reproduce. During spring, many of these species concentrate in breeding ponds to mate and lay eggs. Timing of breeding, the length of time required for larvae to transform into adults, and specific habitat requirements differ among species. These parameters are important in determining what breeding species of amphibians a pond or wetland can support (Ontario Ministry of Natural Resources and Forestry, 2014). Development has the greatest potential to affect the function of breeding ponds and wetlands and summer ranges simply when expansive areas are impacted and/or changes are made to the hydrological function of the area (Ontario Ministry of Natural Resources and Forestry, 2014).

American Toad and Western Chorus Frog are confirmed breeding in the Project Area. American Toad breeds in temporary and permanent woodland pools, plus has adapted a wide, versatile breeding niche and breeds successfully in urban areas wherever water may collect. Western Chorus Frog breeds in shallow, temporary pools with vegetation in woodlands but has also adapted to agricultural areas, shrublands, and wet meadows. It is expected that the form and function of the wetland breeding habitats in the Project Area would remain, wetlands would not be drained or filled and a change in hydrology is not anticipated. The Crossing aims to reconnect Black Oak Heritage Park Area to the Ojibway Park Area (and beyond) and, therefore, potentially increase the breeding and foraging opportunities for amphibians.

Woodland Area-Sensitive Bird Breeding Habitat is generally used to indicate species that require large intact areas of forest to fulfil life processes. The species' sensitivity to forest fragmentation varies, and the habitat requirements of breeding birds susceptible to habitat fragmentation are extremely variable and complex. Birds vulnerable to forest fragmentation require large contiguous blocks of forest for successful nesting. The requirements of individual species may also depend upon whether it is in the core of its range or at the periphery. Impacts may occur in several ways; the most obvious direct impact is habitat loss. Indirect effects include increased predation, parasitism, and disturbance (Ontario Ministry of Natural Resources and Forestry, 2014).

When complete avoidance is not possible, and the SWH is large, minimizing the amount of habitat affected may be a satisfactory mitigation option, e.g., make the development footprint where it affects the habitat as small as possible, and site it at the edge of the habitat to minimize habitat fragmentation. Generally, if the amount of retained habitat is large enough to support the most sensitive species present, all other species should be protected (Ontario Ministry of Natural Resources and Forestry, 2014). The impact of direct removal of vegetation from the footprint would not reduce interior forest sizes to levels below what species usually require. Additionally, as stated previously, the restoration and planting plans would aim to replace habitat cover, at a minimum.

The indirect impacts of predation, parasitism, and human disturbance are considered in the SWH MiST (2014). The MiST provides a table that summarizes the general susceptibility of species in this index to indirect effects of development. All indicator species have relatively low susceptibility to humans using habitats recreationally, as is already occurring. Other factors considered in the table are avian predators, mammalian predators, and parasitism. Avian predators are species like Cooper’s Hawk which hunt along forest edges and Blue Jays, American Crows, and Common Grackles, which predate nests. Mammalian predators are naturally occurring predators (e.g., Virginia Opossum, Striped Skunk, Raccoon, Coyote, Red Fox) and outdoor house cats or feral cats. Parasitism is considered as nest parasitism by Brown-headed Cowbird. The basis of these indirect impacts is that in a fragmented and smaller block of habitat, nests are more easily located by predators and obligate nest parasites (i.e., Brown-headed Cowbird). The footprint would not further fragment the habitat or increase access to nests. There are no new corridors to be cut within the woodland, maintaining the form and function.

Special Concern and Rare Wildlife Species represent a broad group, and the treatment of plants and animals is somewhat different - plants are relatively restricted in their movements while animals may be more wide-ranging. When protecting habitat, the general habitat functions and composition which support life processes must be identified (Ontario Ministry of Natural Resources and Forestry, 2014). Due to the extensive list and significance of other features on-site, the entire site is also considered SWH under this category. Impacts considered above include habitat changes (edge effects) and potential loss in breeding habitat for amphibian, avian, and bat species when vegetation is removed for the Preferred Alternative. Invertebrate SAR has also been considered above. This Impact Assessment index considers habitat requirements not already examined, such as the indirect effects such as invasive species.

Various reptile habitat features such as downed trees, brush piles, and rock piles were documented in the East Study Area. These features do not occur in the footprint of the Preferred Alternative. For some species, development has the potential to have a variety of indirect effects. Even if the habitat is left intact, it may become unsuitable as a result of changes in the microclimate such as windthrow and drainage, human trampling, and invasion by exotic species (Ontario Ministry of Natural Resources and Forestry, 2014). Various mitigation measures are presented to reduce indirect effects and maintain form and function. In summary, mitigation should consist of a restoration and planting plan which includes site-specific plantings (e.g., by including plantings to

eliminate creating a new edge) to mitigate effects such as windthrow. Additionally, controlling human use and invasive species should be considered.

Drainage from the structure would not be significant as the structure is to include appropriate soil depths for water retention (for plant growth), as well as microhabitat features such as stepping pools for water retention to support wildlife movement.

10.7.1 Mitigation Measures for Significant Wildlife Habitat Impacts

The form and function of SWH would remain after construction impacts and removal of 0.3178 ha of forest. The PPS requires a balance such that there may be occasions when the proposed development is more in the public interest and minimizing the amount of habitat affected is a satisfactory mitigation option (Ontario Ministry of Natural Resources and Forestry, 2014). In the case of the Ojibway Parkway Crossing, the footprint affects the habitat as little as possible, and is at the edge of the habitat to minimize fragmentation and disturbance. Additionally, creation of the Crossing would provide habitat as well as improving habitat connectivity.

The restoration and planting plan would mitigate effects such as windthrow by including plantings to eliminate creation of a new edge. The Dry Black Oak Deciduous Forest Type would be considered a target community for restoration, and plant species that typically comprise the shrub and groundcover layers of this community would be included in the planting plan for the Crossing top. Microhabitat features such as stepping pools for water retention to support wildlife movement would also be included. Areas outside the Project footprint would be protected by temporary construction exclusion fencing and creation and implementation of an Erosion and Sediment Control Plan (ESCP). Temporary exclusion fencing may also be designed to keep wildlife out of active construction and may doubly serve as tree protection. It is also recommended that an invasive species management plan be created and implemented as part of construction and post-construction environmental management.

Best practices also consider known impacts and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (Ontario Ministry of Natural Resources and Forestry, 2014). Human use is currently very high and has resulted in various footpaths off the approved trail system. Footpaths must be closed, and trails near the Crossing should be patrolled to prevent human use of the Crossing. Signage and a public education campaign may help people understand the unique characteristics of crossing and the value of leaving it undisturbed.

Regarding animal life, continued monitoring of bat populations via detectors may confirm Big Brown Bat foraging is not deterred by the construction of the Crossing, and future monitoring on the Crossing may confirm use as a corridor or foraging habitat. In general, to prevent harm to nesting birds, removal of vegetation should be conducted outside of the typical bird nesting period in this area (April 1st to August 31st). The nesting period should also protect sensitive woodland raptor nesting in this eco-district if it is occurring.

It is likely that amphibians breeding within the Project Area (and the larger habitat of the Parks) are increasingly isolated and must find breeding, foraging, and wintering habitat all within Ojibway Park Area and Black Oak Heritage Park Area. Some successful movement may occur to the east as discussed in Section 7.2.7.4 (Figure 7-3). It is unlikely that successful movement currently occurs across Ojibway Parkway between Ojibway Park Area and Black Oak Heritage Park Area. The proposed Crossing may provide a new movement corridor for amphibians leading to gene flow between populations and result in a positive impact.

10.8 Other Potential Impacts

General impacts to the terrestrial ecosystem typically associated with construction that can be mitigated are:

- Disturbed areas and vegetation loss as a result of construction activities (e.g., trampling and removal of vegetation);
- Soil compaction from equipment, access routes, or laydown areas;
- Introduction of invasive and non-localized plant material from previous construction sites and disturbance activities;
- Construction activity may cause localized, short-term increases in noise and vibrations, which could disturb wildlife and deter animals from the area. Wildlife could also be disturbed by artificial lighting if construction occurs outside of daylight hours and permanent lighting along Ojibway Parkway;
- Dust from work activities may settle on vegetation, which may also disrupt wildlife and their habitat; and
- Contamination of vegetation communities due to the unplanned release or discharge of deleterious substances to the environment, including fuels (diesel and propane), lubricants (engine oil, transmission oil, etc.), and coolants (ethylene glycol).

10.8.1 Mitigation Measures for Other Potential Impacts

Most short-term impacts can be mitigated with the design and implementation of erosion and sediment control (ESC) measures (e.g., silt fencing), consistent with Ontario Provincial Standards and Specifications, and a construction staging and project phasing plan. In general:

- It is recommended that all staging areas occur outside natural areas;
- ESC measures should be maintained through all phases of the Project until vegetation is re-established, and all disturbed ground is permanently stabilized;
- All ESC measures should be inspected at least weekly and during and immediately following precipitation events to ensure that they are functioning properly and are maintained and/or upgraded as required;
- If the ESC measures are not functioning properly, no further work would occur until the sediment and/or erosion problem is addressed;
- Staging, and access areas would be minimized as feasible to avoid disturbing the natural environment beyond the proposed disturbance limit;
- Operate and store materials and equipment in such a manner that prevents any deleterious substance from entering the natural environment;
- Construction should occur during daylight hours to minimize intrusive lighting. If lighting is required adjacent to wildlife habitat areas, design lighting or install shades to emit down and away from the natural area;
- In the long-term, if lighting would be required along Ojibway Parkway it should be designed to emit down and away from natural areas. Low-pressure sodium lamps or UV filters should be used, and lighting should not occur on the Crossing;

- Prohibit access to the extent possible to any natural areas outside of the Project footprint to ensure the protection of these areas; this includes temporary access. An ESC fence should be installed around the perimeter of the work area to provide a visual barrier and to isolate wildlife from the work area. Road mortality and mortality monitoring within the construction footprint should occur during herptile movement season/times;
- Ensure a Spill Management Plan (including spill kit materials, instructions regarding their use, education of staff, and emergency contact numbers) is present on-site at all times for implementation in the event of an accidental spill. All spills are to be reported to the MECP Spills Action Centre (SAC) at 1 800-268-6060;
- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, and noxious weeds; and
- Identify local regulatory authorities and have contact information available on site. Local regulatory authorities are to include the MECP, MNRF, ERCA, the City and local emergency service providers.

10.9 Cumulative Impacts and Impacts Summary

Short-term impacts, such as those general impacts which may occur during construction, and long-term impacts have been discussed above. The direct and indirect nature of impacts has also been considered. Ultimately, there would be no negative impact on the form and function of the Project Area. Some potential negative impacts would be eliminated or minimized by implementing mitigation measures during construction and incorporating long-term mitigation measures into the design. The Project footprint is 0.2 ha within the FODM1-3 community in the East Study Area and 0.5 ha within the ETR lands in the West Study Area. Post-construction, the impacted area would be restored and enhanced with a restoration and planting plan to replace removed habitat at a 1:1 ratio.

There is expected to be a positive cumulative impact as the Crossing would increase space for plant life movement and establishment as well as gene flow for animal species currently segregated, enhancing the landscape and connectivity for various wildlife. For example, it is unlikely that a successful amphibian movement currently occurs between Ojibway Park Area and Black Oak Heritage Park Area. The proposed Crossing may provide a new movement corridor for amphibians, leading to gene flow between populations and resulting in a positive impact. The proposed crossing, in combination with the SGNA – Oakwood Natural Area crossing (Tunnel Top 5) and the potential crossing(s) at Malden and Matchett Roads, would result in cumulative positive effects for wildlife movement through natural areas in the City.

10.9.1 Mitigation Summary

A summary of the above mitigation is provided below, and the next section details monitoring and management recommendations:

- During detailed design, when a footprint is refined, a vegetation and tree inventory should occur to document vegetation and tree removals and to confirm species in the footprint.
    - It is recommended that all staging areas occur outside natural areas.
    - A mitigation plan suitable for site requirements and removals must be completed to compensate for vegetation and tree removals (Section 11.1).

- Areas outside the Project footprint will be protected by temporary construction exclusion fencing and the creation and implementation of an ESCP, developed by a professional and consistent with Ontario Provincial Standards and Specifications (and considerations in Section 10.8.1). A construction staging and project phasing plan will be required.
    - Temporary exclusion fencing may also be designed to keep wildlife out of active construction and may doubly serve as tree protection.
- Construction should occur during daylight hours to minimize intrusive lighting. If lighting is required adjacent to wildlife habitat areas, design lighting or install shades to emit down and away from the natural area. In the long term, if lighting will be required along Ojibway Parkway, it should be designed to emit down and away from natural areas. Low-pressure sodium lamps or UV filters should be used, and lighting should not occur on the Crossing.
- It is also recommended that an invasive species management plan be created and implemented as part of construction and post-construction environmental management.
- Human use resulting in various footpaths deviating from the approved trail system must be closed, and trails near the Crossing should be patrolled/monitored to prevent human use of the Crossing.
- Signage and a public education campaign may help people understand the unique characteristics of crossing and the value of leaving it undisturbed.
- It is recommended that the City allocate funds to support long-term studies of the Crossing and education through the Ojibway Nature Center regarding road ecology. The City may also wish to partner with Universities and local non-profits for monitoring and studies.
    - Scientific study and education further enhance and support the ANSI designation.
- Monitor bat populations via detectors to assess whether the construction of the crossing deters Big Brown Bat foraging.

11.0 MONITORING AND MANAGEMENT RECOMMENDATIONS

Performance evaluation of the Crossing depends upon adequate monitoring and determining who will be responsible for monitoring in the long-term. As mentioned above, there are ultimately two purposes for wildlife crossings: 1) to connect habitats and populations and 2) to reduce mortality on roads. Monitoring should determine whether the basic functions of the wildlife crossing are being met and provide demographic information on the number of individuals using the Crossing structure and their gender (U.S. Department of Transportation, 2011). Monitoring programs should not be limited to a single species or confined to certain taxonomic groups, as doing so may fail to recognize the requirements of other non-target species and ecological processes (Center for Environmental Excellence by AASHTO, 2020). It is recommended that the City pursue research options and monitoring support from Universities and local NGOs to secure funding for monitoring. Additionally, specific benchmarks and thresholds which will trigger the implementation of adaptive management practices should be agreed to by the stakeholders and agencies involved during the detailed design phase.

11.1 Restoration and Planting Plan

A restoration and planting plan (i.e., Ecological Restoration Plan or natural environmental design) will be prepared as part of the Project's detailed design phase. The restoration and planting plan (the plan) would utilize ecological principles to guide the design, planting, and maintenance of the overpass and associated landscapes. The plan would include clear restoration goals, objectives, and indicators to easily assess progress over time. The plan would describe a Monitoring and Adaptive Management Plan based on routine observations, reporting, and updating knowledge, and the adjustment of management actions to include alternative ways to meet Project goals/objectives and provide the greatest ecological benefits to plant and wildlife species. Lastly, the plan would include a Vegetation Management Plan that is consistent with the targeted restored ecological communities. The Vegetation Management Plan would include a description of BMPs and mitigation measures to protect SAR during the work activities.

Below are key considerations for the development of the plan, the Monitoring and Adaptive Management Plan, and the Vegetation Management Plan. Ecological principles in the plan would include, but are not limited to:

- The use of native, locally sourced (to the extent practical) plant and seed material (such as those documented in Section 6.2.1.2). Herbaceous species removed for the footprint of the Crossing should be included in the seed mixes and plantings.
- Transplanting of individual plants which would be impacted by construction onto the natural areas created on the approach ramps or atop the bridge.
- Plant species selection compatible with site-specific growing conditions, including soil conditions, topography, aspect, soil moisture regime, and adjacent vegetation communities;
- Use of vegetation cover and structure to help guide or direct wildlife to the overpass approaches;
    - incorporated into the design of the wildlife crossing is to build a 'wall' of shrubs along the outer edges of the Crossing. Native communities would be the target at egress points, and species that typically comprise the shrub and groundcover layers of this community would be included in the planting plan for the Crossing top, reducing-edge effects in the long term;
    - this consideration of successional processes may provide benefits such as increasing the native biodiversity or reducing the long-term need for vegetation management (e.g., invasive species removal).
    - selection of host plants for insects and other wildlife. Species to consider include Culver's Root, Sundial Lupine, Giant Ironweed, milkweeds, and Jersey Tea;
- It is also recommended that an invasive species management plan be implemented.
- Use of vegetation cover and structure to facilitate wildlife use and movement across the overpass;
- Creation of habitat features and refuge areas (microhabitat) on the overpass to offer security and protection to wildlife, such as stepping pools for water retention;
- Consideration of less palatable or less favourable plant species closest to the Ojibway Parkway to discourage wildlife use of the restored right-of-way;

- Consideration of plant species that would help manage human activity near the overpass approach, but would not interfere with wildlife movement such as thorned native species; and
- It may be necessary to designate “no-spray” areas to ensure that significant plant species are not adversely affected. Planting the roadside with native flowers mixes (ensuring that the plants within the mix are native) may reduce the incidence of invasion of the significant habitat for the species by non-native species.

Components of the Monitoring and Adaptive Management Plan would include, but are not limited to;

- Routine site inspections to;
  - observe the health, growth, and flowering of planted and seeded species;
  - the presence of weeds, pests and/or disease;
  - plant replacement and/or maintenance needs (e.g., pruning, staking, watering);
  - need for re-seeding or other remedial actions following a disturbance;
  - the presence of wildlife and/or signs of wildlife use;
  - the need for broader vegetation management (e.g., mowing); etc.
- Routine photo-monitoring from fixed points to capture vegetation changes over time and before and after treatments; and
- Formal vegetation sampling utilizing plots and/or transects to quantitatively assess plant species richness and cover over time, and for the evaluation of seeded species success and natural colonization.
- The results of Monitoring and Adaptive Management would inform vegetation management on the overpass and in associated restored landscapes. The Vegetation Management Plan would include, but is not limited to, the following BMPs for wildlife and SAR:
- Plan work to avoid carrying out activities when SAR or sensitive wildlife (i.e., breeding birds) are potentially present in the landscaped areas;
- Minimize any damage to existing/restored vegetation by selecting designated access routes and staging areas; selecting appropriate equipment, including the use of hand tools and hand application techniques in and around sensitive areas; and by prohibiting access to existing vegetated areas outside of the management zones;
- Develop an invasive species management plan to control the spread of exotics. Common Reed is abundant and dominates the current roadside ditch along Ojibway Parkway. Invasives species would displace native species on the Crossing and rehabilitated areas. Native animal species may avoid the Crossing it is becomes dominated by invasives.
- Develop and implement a SAR training and reporting procedure for the landscape contractor/maintenance provider to increase awareness of SAR, mitigate potential encounters with SAR, and report all encounters such that further mitigation and/or adaptive management can be considered; and

- Adhere to all applicable federal, provincial, and municipal legislation and regulations that protect SAR, wildlife, and environmentally sensitive areas.

11.2 Wildlife Crossing Monitoring and Management

The goals and objectives of the Ojibway Crossing are to reduce WVCs and reduce barrier effects to wildlife movement. To monitor change and maintenance of ecological processes it is recommended that monitoring of vegetation occur. As recommended in the restoration and planting plan (Section 11.1) two types of vegetation monitoring should occur:

- Routine photo-monitoring from fixed points to capture vegetation changes over time and before and after management/treatments; and
- Formal vegetation sampling utilizing plots and/or transects to quantitatively assess plant species richness and cover over time, and for the evaluation of seeded species success and natural colonization.

To monitor wildlife movement a few focal wildlife species should be selected. Focal species monitoring should be able to provide a large enough dataset to analyze the effectiveness of the Crossing (i.e., the species is successfully moving across, in both directions). Effectiveness monitoring should also consider the effectiveness of mitigation measures (i.e., the permanent fencing) and the effectiveness of design features such as stepping pools/ponds. Monitoring for various types of effectiveness will likely require monitoring of additional species, species which may be sensitive in adapting to the wildlife crossing. Monitoring species which are slower to adapt will require longer term monitoring and will also be a good indicator of ecological process and maintenance needs.

Covering a variety of animal species also provides options that range in cost and complexity. Selection of species and monitoring methods should also consider that baseline studies to define the extent of road/traffic impacts to wildlife have not been thoroughly completed. The first recommendation is to start baseline monitoring on Ojibway Parkway before and during construction from the road shoulder. Note, all monitoring on roads must only be conducted if safe to do so. Second recommendation is the selection of a reference site which has comparable size and traffic volume and adjacent habitat to the current Ojibway Parkway. Studies could compare the Crossing to the T5 crossing or Matchett Road east of Ojibway Park if traffic volume on is comparable. Additionally, monitoring on Matchett Road would serve to gather data for future crossings.

If pre-crossing conditions can be documented for Ojibway Parkway, a key management question should be ‘is road-related mortality increasing or decreasing as a result of the Ojibway crossing?’ This question would be answered by completing road mortality surveys on Ojibway Parkway over the course of several years. There is also the question does the Crossing encourage more connectivity? This question, while valuable, requires complex and lengthy surveys of populations both in Black Oak Heritage Park and Ojibway Park. For example, mark-recapture programs of Anuran species could inform this question.

Ultimately, the question the City would wish to answer is ‘are animals able to disperse and are populations able to carry out migratory movements across the Crossing?’. To answer this question, it is recommended that the following monitoring occurs on ingress/egress points and the top of the Crossing:

- Camera traps (infrared and motion-activated);
  - Plus, use of camera traps at microhabitat features;
- Monitor herbivory and scat during vegetation plot monitoring;

- Monitor bat populations via detectors;
- Deer highway mapping, monitor decrease use (trails that regrow) and new trails; and
- Road mortality surveys to monitor breaches and suitable endpoints in fencing.

Last of all, to aid in monitoring efforts, the City should coordinate internal communication with maintenance crews to communicate about carcass removal along Ojibway Parkway, Broadway Boulevard, highway on-ramps, and future roads in the area. Internal coordination should also extend to fence maintenance. Mitigation strategies developed around land-use planning should not terminate with the construction process. It is also recommended that the City be proactive at both local and regional scales to ensure that the Crossing would remain functional over time.

11.3 Fencing Monitoring and Management

At fencing ends, signage that indicates to drivers that wildlife concentration may increase should be implemented. Adapting driver behaviour for a short distance may be effective in reducing WVCs at fence ends. Additionally, fences and escape ramps are not permanent structures and may be subject to constant damage. Fences must be checked regulatory by walking the entire fence line, identifying gaps, breaks and other defects caused by natural and non-natural events (U.S. Department of Transportation, 2011).

11.4 Adaptive Management

Adaptive management is a systematic process for continually improving management policies, monitoring, design, or practices by learning from the outcomes of previous programs. For example, adaptive management is changing the design of a wildlife crossing in subsequent phases or projects after collecting data on the effectiveness of current structures or phases. Likewise, adaptive management includes:

- changing microhabitat elements if monitoring shows they do not facilitate movement.
- Irrigation of vegetation, especially in the first few years.
- Monitor and document human use and take necessary action to control it.
    - Footpaths must be closed, and trails near the Crossing should be patrolled to prevent human use of the Crossing. Signage and a public education campaign may help people understand the crossing's unique characteristics and the value of leaving it undisturbed.
- If invasive species are dominating the regrowth removal must occur. It is recommended that an invasive species management plan is designed for Ojibway Park, Black Oak Heritage Park, and adjacent habitats.
- Changing, improving, or adding fencing (design or materials) that may be deficient in preventing animals from accessing the road. Similar for escape ramps, if animals are continuing to get stuck on the roadway more escape ramps or different designs may be needed.
- The addition of different types of wildlife crossing structures (e.g., herptile crossings) may be required should monitoring reveal previously undocumented or unique populations or habitat linkages.

Components of the Monitoring and Adaptive Management Plan would include, but are not limited to:

- Routine site inspections to observe the health, growth, and flowering of planted and seeded species; the presence of weeds, pests and/or disease; plant replacement and/or maintenance needs (e.g., pruning, staking, watering); need for re-seeding or other remedial actions following a disturbance; the presence of wildlife and/or signs of wildlife use; the need for broader vegetation management (e.g., mowing); etc.

12.0 POLICY CONFORMITY

This report has identified the biophysical conditions and the significance of the Project Area. Specific actions that would be undertaken to eliminate, reduce or compensate the impacts listed in Section 10.0. A comparison of proposed activities with relevant policies is also summarized below.

As introduced in the policy context, several federal, provincial, and municipal acts, policies, and plans apply to the Project. Completing construction between October to March respects many appropriate timing windows and avoids direct harm to individuals; no contravention occurs.

Significant wetlands are protected from development and site alteration and other natural heritage features are protected unless it can be demonstrated that there will be no negative impacts (Ministry of Municipal Affairs and Housing, 2020). Reducing or compensating for removed and destroyed habitat is not preferred; elimination of the risk is preferred. Through an alternative assessment, the placement of the Crossing has been selected to avoid significant wetlands. Overall impacts would not negatively affect the form and function of the natural heritage features in the area. The cumulative impact of the Crossing is expected to be positive. Various mitigation measures have been proposed to ensure the maximum benefit of the Crossing and the proposed plan is reached.

Species at Risk are protected through the ESA, and harm or destruction of individuals or habitat of threatened or endangered species is prohibited unless a permit to do so is obtained; it is expected that a permit would be required (13.0).

The Project Area is designated as Natural Heritage and industrial land along the rail tracks and parkway under the City's OP. There are three objectives for Natural Heritage in the City:

1) To protect, conserve, and improve Windsor's most environmentally significant and sensitive natural areas.

2) To provide opportunities for recreational uses within Natural Heritage areas.

3) To link Natural Heritage areas to other components of the Greenway System.

A connection over the Ojibway Parkway would fulfil two of three objectives for Natural Heritage in the City; to protect, conserve and improve Windsor's most environmentally significant and sensitive natural areas and to link Natural Heritage areas to other components of the Greenway System. Uses permitted in the Natural Heritage land use designation are nature reserves and wildland management. These terms are not defined in the OP, and Council should be engaged to determine the designation of the proposed crossing. In addition, the Black Oak Heritage Park Management Plan lists the re-establishment of connectivity through natural linkages between remnant patches of prairie, savannah, and woodland to allow for undisturbed movement of Species at Risk as a management recommendation.

13.0 PERMITS AND APPROVALS

Although WSP is not undertaking the permitting associated with this Project, it is recommended that consultation with respective agencies (e.g., MNRF (regarding the ANSI, PSW), and MECP) should occur to identify the proposed plans for this Project to assist with permitting and any associated approval processes.

The Project footprint falls just outside the ERCA regulated area (Figure 2-1). ERCA has been engaged as part of the Class EA process. The Project footprint falls within provincially regulated features such as the Ojibway Prairie Remnants ANSI. No negative impact is expected, however, MNRF was contacted as part of the Class EA process. Likewise, the footprint occurs in regulated habitat of SAR species. MECP should be engaged through a Information Gathering Form. During fieldwork and secondary source review, it was found that a variety of SAR was documented in the East Study Area. This document and the ESR can be used to complete an Avoidance Alternative Form and ultimately permitting.

As this is a City project it is not anticipated that tree removal permits, specific to tree by-laws, will be required. Internal consultation with Parks and Recreation is recommended for planting related requirements. Internal consultation is also anticipated to determine long-term maintenance and monitoring.

14.0 RECOMMENDATIONS

It is recommended that the required adjacent lands be acquired, zoned, or managed as a reserve or protected area in perpetuity. The City has committed to adding Broadway Boulevard to the sidewalk and bicycle network (City of Windsor, 2019). This area is currently a low priority site; it is recommended that this become a high priority site to allow for a human east-west connection to reduce the chance of human use of the Crossing.

15.0 SUMMARY

The City retained WSP to undertake a Class EA study to consider the construction of a Wildlife Crossing over the Ojibway Parkway and ETR tracks, south of Broadway Boulevard. The purpose of the Crossing is to begin to reestablish an ecological connection between the natural areas associated with Black Oak Heritage Park and Ojibway Park in the City of Windsor. Approximately 20,000 vehicles per day travel along the Ojibway Parkway and E.C. Row Expressway, contributing heavily to wildlife mortality, driving hazards, and landscape fragmentation. Traffic along Ojibway Parkway is expected to increase with the development of the Gordie Howe International Bridge. Therefore, the Crossing aims to provide safe passage for area wildlife and SAR and ecological connectivity.

The WDBA is a funding partner for the commencement of the EA and to determine the location of the Wildlife Crossing. The City's intent is to seek future funding from environmental organizations, provincial and federal levels of government and obtain approval for the remaining amount through the Capital Budget process. To determine the location of the Crossing WSP completed a biophysical inventory, connectivity analysis, and evaluated the policy context/landowners of the Project Area. WSP also referred to literature and previous studies to best determine the location and design of the Crossing. PICs, fieldwork, background and secondary source review, and literature findings, informed the Alternatives Assessment, and the Preferred Location was determined. The South option to avoid the PSW was selected as the preferred location.

Further, the ideal crossing for this project was determined to be a large overpass. The large overpass allows for the most design plasticity to target the widest variety of potential wildlife. Fencing and other features, such as escape gates, were also considered and recommended. Impacts to the form and function of existing natural

features and areas were evaluated, and no negative impact was found. On the contrary, the project would result in a positive impact by providing a safe connection for wildlife and a minimally environmentally impactful connection over the Ojibway Parkway. Species at Risk permitting will be required.

As the performance evaluation of the Crossing depends upon adequate monitoring and adaptive management, recommendations for both have been provided. Monitoring recommendations focus on Crossing and fencing effectiveness by implementing various types of surveys and targetting a variety of wildlife.

16.0 CLOSURE

This report summarizes the existing natural heritage conditions of the Project Area and the predicted environmental effects of the proposed Project activities. The findings presented in this report are based on WSP's professional experience and expertise relative to natural environment inventories and Project impacts.

If you should have any questions regarding this submittal or require further Project-related information, please contact the undersigned.

Sincerely,

WSP Canada Inc.

Samantha Hughes
Lead Biologist

Season Synder
Senior Biologist

SH/SS/sp

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APPENDIX A

Species Lists

Legend

*=Introduced Species

S rank (provincial)= NatureServe Subnational Conservation Status Definitions. The term "subnational" refers to state or province-level jurisdictions (e.g., California, Ontario).

G rank (global)= NatureServe Global Conservation Status Definitions

RANK	DEFINITION
GX **SX**	**Presumed Extirpated**—Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. [equivalent to "Regionally Extinct" in IUCN Red List terminology]
GH **SH**	**Possibly Extirpated** – Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.
G1 **S1**	**Critically Imperiled** At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
G2 **S2**	**Imperiled** — At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3 **S3**	**Vulnerable** — At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4 **S4**	**Apparently Secure** — At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5 **S5**	**Secure** — At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
G#G# **S#S#**	**Range Rank —** A numeric range rank (e.g., G2G3, G1G3) is used to indicate uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).

GU **SU**	**Unrankable —** Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.
GNR **SNR**	**Unranked —** Global rank not yet assessed.
GNA **SNA**	**Not Applicable —** A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities. A global conservation status rank may be not applicable for several reasons, related to its relevance as a conservation target. For species, typically the species is a hybrid without conservation value, or of domestic origin. For ecosystems, the type is typically non-native (e.g, many ruderal vegetation types), agricultural (e.g. pasture, orchard) or developed (e.g. lawn, garden, golf course).
?	**Inexact Numeric Rank -** Denotes inexact numeric rank; this should not be used with any of the Variant Global Conservation Status Ranks or GX or GH.
Q	**Questionable taxonomy that may reduce conservation priority -** Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level and not at a national or subnational level.
C	**Captive or Cultivated Only -** Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The "C" modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to "Extinct in the Wild (EW) in IUCN's Red List terminology (IUCN 2001).

COSEWIC= The Committee on the Status of Endangered Wildlife in Canada

ESA= Endangered Species Act, 2007, S.O. 2007, c. 6

SARA Schedule 1= Species at Risk Act (SC 2002, c. 29)

EXT	**Extinct** - A species shall be classified as an extinct species if it no longer lives anywhere in the world.
EXP	**Extirpated** - A species shall be classified as an extirpated species if it lives somewhere in the world, lived at one time in the wild in Ontario, but no longer lives in the wild in Ontario.
END	**Endangered** - A species shall be classified as an endangered species if it lives in the wild in Ontario but is facing imminent extinction or extirpation.
THR	**Threatened** - A species shall be classified as a threatened species if it lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening to lead to its extinction or extirpation.

SC	**Special Concern** - A species shall be classified as a special concern species if it lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered because of a combination of biological characteristics and identified threats.

Coefficient of Wetness = indicates the plant's soil moisture tolerance
Coefficient of Conservatism = numeric values assigned to plant species to indicate their sensitivity to anthropogenic disturbance

	Scientific Name	English Name	Narrow Taxon Group	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Essex County Status from Oldham Carolinian List	SOFIA Tallgrass Indicator Species	Coefficient of Wetness	Coefficient of Conservatism	Secondary Source (Table 2)	ELC (Table 2)
	Juniperus virginiana	Eastern Red Cedar	conifers	S5	G5				Native, Common		3	4	x	
*	*Pinus nigra*	Austrian Pine	conifers	SNA	GNR						5		x	
	Pinus strobus	Eastern White Pine	conifers	S5	G5				Native, Rare		3	4	x	
*	*Pinus sylvestris*	Scots Pine	conifers	SNA	GNR				Introduced, Rare		3		x	
*	*Abutilon theophrasti*	Velvetleaf	dicots	SNA	GNR				Introduced, Common		3		x	
	Acalypha rhomboidea	Common Three-seeded Mercury	dicots	S5	G5				Native, Common		3	0	x	
	Acer negundo	Manitoba Maple	dicots	S5	G5				Native, Common		0	0	x	
	Acer rubrum	Red Maple	dicots	S5	G5				Native, Common		0	4	x	x
	Acer saccharinum	Silver Maple	dicots	S5	G5				Native, Common		-3	5	x	x
*?	*Achillea millefolium*	Common Yarrow	dicots	SNA	G5						3		x	
	Actaea pachypoda	White Baneberry	dicots	S5	G5				Native, Common		5	6	x	
*	*Aegopodium podagraria*	Goutweed	dicots	SNA	GNR						0		x	
	Agalinis purpurea	Purple False Foxglove	dicots	S4S5	GNR						-3	8	x	
	Agalinis tenuifolia	Slender-leaved False Foxglove	dicots	S4S5	G5				Native, Rare		-3	7	x	
	Ageratina altissima	White Snakeroot	dicots	S5	G5				Native, Common		3	5	x	
	Agrimonia gryposepala	Hooked Agrimony	dicots	S5	G5				Native, Common		3	2	x	x
x	*Agrimonia parviflora*	Swamp Agrimony	dicots	S4	G5				Native, Common	Yes	-3	4	x	x
	Agrimonia striata	Woodland Agrimony	dicots	S4	G5						3	3	x	
*	*Ailanthus altissima*	Tree-of-heaven	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Alliaria petiolata*	Garlic Mustard	dicots	SNA	GNR				Introduced, Common		0		x	
	Ambrosia artemisiifolia	Common Ragweed	dicots	S5	G5				Native, Common		3	0	x	
	Ambrosia trifida	Great Ragweed	dicots	S5	G5				Native, Common		0	0	x	
	Amelanchier arborea	Downy Serviceberry	dicots	S5	G5				Native, Uncommon		3	5	x	
x	*Amphicarpaea bracteata*	American Hog-peanut	dicots	S5	G5				Native, Common	Yes	0	4	x	x
x	*Anemonastrum canadense*	Canada Anemone	dicots	S5	G5				Native, Common	Yes	-3	3	x	
x	*Anemone cylindrica*	Long-headed Anemone	dicots	S4	G5				Native, Rare	Yes	5	7	x	
	Anemone quinquefolia	Wood Anemone	dicots	S5	G5				Native, Common		0	7	x	
	Anemone virginiana	Tall Anemone	dicots	S5	G5				Native, Common		3	4	x	
x	*Apios americana*	American Groundnut	dicots	S5	G5				Native, Common	Yes	-3	6	x	
	Apocynum androsaemifolium	Spreading Dogbane	dicots	S5	G5				Native, Uncommon		5	3	x	x
	Apocynum cannabinum	Hemp Dogbane	dicots	S5	GNR						0	3	x	
	Aquilegia canadensis	Red Columbine	dicots	S5	G5				Native, Common		3	5	x	
*	*Aquilegia vulgaris*	European Columbine	dicots	SNA	GNR				Introduced, Rare		3		x	
	Aralia nudicaulis	Wild Sarsaparilla	dicots	S5	G5				Native, Common		3	4	x	
*	*Arctium lappa*	Great Burdock	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Arctium minus*	Common Burdock	dicots	SNA	GNR				Introduced, Common		3		x	
*	*Armoracia rusticana*	Horseradish	dicots	SNA	GNR				Introduced, Rare		0		x	
	Asarum canadense	Canada Wild-ginger	dicots	S5	G5				Native, Uncommon		5	6	x	
x	*Asclepias hirtella*	Tall Green Milkweed	dicots	S1	G5				Native, Rare	Yes	5	10	x	
x	*Asclepias incarnata*	Swamp Milkweed	dicots	S5	G5				Native, Common	Yes	-5	6	x	
x	*Asclepias purpurascens*	Purple Milkweed	dicots	S1	G5?				Native, Rare	Yes	3	10	x	
x	*Asclepias sullivantii*	Prairie Milkweed	dicots	S2S3	G5				Native, Rare	Yes	5	8	x	
	Asclepias syriaca	Common Milkweed	dicots	S5	G5				Native, Common		5	0	x	x

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x	*Asclepias tuberosa*	Butterfly Milkweed	dicots	S4	G5				Native, Uncommon	Yes	5	8	x	
x	*Asclepias verticillata*	Whorled Milkweed	dicots	S4	G5				Native, Rare	Yes	5	6	x	
x	*Asclepias viridiflora*	Green Cornet Milkweed	dicots	S2	G5				Native, Rare	Yes	5	10	x	
	Asimina triloba	Pawpaw	dicots	S3	G5				Native, Rare		0	10	x	
x	*Aureolaria flava*	Smooth Yellow False Foxglove	dicots	S2?	G5	THR	THR	THR	Native, Rare	Yes	5	10	x	
x	*Baptisia tinctoria*	Yellow Wild Indigo	dicots	S1S2	G5				Native, Rare	Yes	5	10	x	
*	*Barbarea vulgaris*	Bitter Wintercress	dicots	SNA	GNR				Introduced, Common		0		x	
*	*Berberis thunbergii*	Japanese Barberry	dicots	SNA	GNR				Introduced, Uncommon		3		x	
*	*Berteroa incana*	Hoary Alyssum	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Bidens frondosa	Devil's Beggarticks	dicots	S5	G5				Native, Common		-3	3	x	
	Boehmeria cylindrica	Small-spike False Nettle	dicots	S5	G5				Native, Common		-5	4	x	
	Calystegia sepium	Hedge False Bindweed	dicots	S5	G5				e, status unknown or not spe		0	2	x	
*	*Campanula rapunculoides*	Creeping Bellflower	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Campsis radicans	Trumpet Creeper	dicots	S2?	G5				Native, Rare		0	3	x	
*	*Capsella bursa-pastoris*	Common Shepherd's Purse	dicots	SNA	GNR				Introduced, Common		3		x	
	Cardamine bulbosa	Bulbous Bittercress	dicots	S4	G5				Native, Common		-5	8	x	
	Cardamine douglassii	Limestone Bittercress	dicots	S4	G5				Native, Common		-3	7	x	
*	*Cardamine hirsuta*	Hairy Bittercress	dicots	SNA	GNR				Introduced, Rare		3		x	
	Carya cordiformis	Bitternut Hickory	dicots	S5	G5				Native, Common		0	6	x	
x	*Carya glabra*	Pignut Hickory	dicots	S3	G5				Native, Rare	Yes	3	9	x	x
	Carya ovata	Shagbark Hickory	dicots	S5	G5				Native, Common		3	6	x	
	Castanea dentata	American Chestnut	dicots	S1S2	G4	END	END	END	Native, Uncommon		5	8	x	
*	*Catalpa speciosa*	Northern Catalpa	dicots	SNA	G4?				Unconfirmed Report		3		x	
x	*Ceanothus americanus*	New Jersey Tea	dicots	S4	G5				Native, Rare	Yes	5	7	x	
*	*Celastrus orbiculatus*	Oriental Bittersweet	dicots	SNA	GNR				Introduced, Rare		5		x	
	Celastrus scandens	Climbing Bittersweet	dicots	S5	G5				Native, Common		3	3	x	
	Celtis occidentalis	Common Hackberry	dicots	S4	G5				Native, Common		0	8	x	
*	*Centaurea stoebe*	Spotted Knapweed	dicots	SNA	GNR				Introduced, Uncommon		5		x	x
*	*Centaurium pulchellum*	Branching Centaury	dicots	SNA	GNR				Introduced, Uncommon		0		x	
	Cephalanthus occidentalis	Eastern Buttonbush	dicots	S5	G5				Native, Common		-5	7	x	x
	Ceratophyllum demersum	Common Hornwort	dicots	S5	G5				Native, Rare		-5	4	x	
	Cercis canadensis	Eastern Redbud	dicots	SX	G5				Native, Historical		3	8	x	
	Chelone glabra	White Turtlehead	dicots	S5	G5				Native, Common		-5	7	x	
	Chimaphila maculata	Spotted Wintergreen	dicots	S2	G5	THR	THR	END	Native, Rare		5	10	x	x
*	*Cichorium intybus*	Wild Chicory	dicots	SNA	GNR				Introduced, Common		5		x	x
	Cicuta maculata	Spotted Water-hemlock	dicots	S5	G5						-5	6	x	x
	Circaea canadensis	Broad-leaved Enchanter's Nightshade	dicots	S5	G5				Native, Common		3	2	x	x
*	*Cirsium arvense*	Canada Thistle	dicots	SNA	G5				Introduced, Common		3		x	x
x	*Cirsium discolor*	Field Thistle	dicots	S3	G5				Native, Uncommon	Yes	5	9	x	
	Cirsium muticum	Swamp Thistle	dicots	S5	G5				Native, Rare		-5	8	x	
*	*Cirsium vulgare*	Bull Thistle	dicots	SNA	GNR				Introduced, Common		3		x	
	Claytonia virginica	Eastern Spring Beauty	dicots	S5	G5				Native, Common		3	5	x	
*	*Clematis terniflora*	Sweet Autumn Clematis	dicots	SNA	GNR						5		x	
	Clematis virginiana	Virginia Clematis	dicots	S5	G5				Native, Rare		0	3	x	

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	Collinsonia canadensis	Canada Horsebalm	dicots	S4	G5				Native, Common		0	8	x	
x	*Comandra umbellata*	Bastard Toadflax	dicots	S5	G5				Native, Common	Yes	3	6	x	
*	*Convolvulus arvensis*	Field Bindweed	dicots	SNA	GNR				Introduced, Common		5		x	
	Coreopsis lanceolata	Lance-leaved Tickseed	dicots	S4	G5				Unconfirmed Report		3	5	x	
x	*Coreopsis tripteris*	Tall Tickseed	dicots	S1S2	G5				Native, Uncommon	Yes	0	9	x	
	Cornus drummondii	Rough-leaved Dogwood	dicots	S4	G5				Native, Common		0	4	x	
	Cornus obliqua	Silky Dogwood	dicots	S5	G5				Native, Common		-3	2		x
	Cornus racemosa	Grey Dogwood	dicots	S5	G5				Native, Common		0	2	x	x
	Corylus americana	American Hazelnut	dicots	S5	G5				Native, Common		3	5	x	x
	Corylus cornuta	Beaked Hazelnut	dicots	S5	G5						3	5	x	
	Crataegus crus-galli	Cockspur Hawthorn	dicots	S4	G5				Native, Common		0	4	x	
	Cryptotaenia canadensis	Canada Honewort	dicots	S5	G5				Native, Common		0	5	x	
	Cuscuta cephalanthi	Buttonbush Dodder	dicots	S2	G5				Native, Rare		5	8	x	
*	*Datura stramonium*	Jimsonweed	dicots	SNA	GU				Introduced, Rare		5		x	
*	*Daucus carota*	Wild Carrot	dicots	SNA	GNR				Introduced, Common		5		x	x
x	*Desmodium canadense*	Canada Tick-trefoil	dicots	S4	G5				Native, Common	Yes	0	5	x	x
x	*Desmodium perplexum*	Perplexed Tick-trefoil	dicots	S4	G5				Native, Uncommon	Yes	5	6	x	
*	*Dianthus armeria*	Deptford Pink	dicots	SNA	GNR				Introduced, Common		5		x	
*	*Dipsacus fullonum*	Common Teasel	dicots	SNA	GNR				Introduced, Common		3		x	
	Dirca palustris	Eastern Leatherwood	dicots	S4	G4				Native, Rare		0	7	x	
	Doellingeria umbellata	Flat-top White Aster	dicots	S5	G5						-3	6	x	x
*	*Elaeagnus angustifolia*	Russian Olive	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Elaeagnus umbellata*	Autumn Olive	dicots	SNA	GNR				Introduced, Rare		3		x	x
*	*Eranthis hyemalis*	Winter Aconite	dicots	SNA	GNR						5		x	
	Erechtites hieraciifolius	Eastern Burnweed	dicots	S5	G5				Native, Common		3	2	x	
	Erigeron annuus	Annual Fleabane	dicots	S5	G5				Native, Common		3	0	x	
x	*Erigeron canadensis*	Canada Horseweed	dicots	S5	G5				Native, Common	Yes	3	0	x	
	Erigeron philadelphicus	Philadelphia Fleabane	dicots	S5	G5				Native, Common		-3	1	x	
x	*Erigeron strigosus*	Rough Fleabane	dicots	S5	G5				Native, Common	Yes	3	4	x	
*	*Euonymus alatus*	Winged Euonymus	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Euonymus europaeus*	European Euonymus	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Euonymus fortunei*	Climbing Euonymus	dicots	SNA	GNR				Introduced, Rare		5		x	
	Eupatorium perfoliatum	Common Boneset	dicots	S5	G5				Native, Common		-3	2	x	
*	*Eupatorium serotinum*	Late Boneset	dicots	SNA	G5				Introduced, Rare		0		x	
x	*Euphorbia corollata*	Flowering Spurge	dicots	S4	G5				Native, Rare	Yes	5	7	x	x
*	*Euphorbia cyparissias*	Cypress Spurge	dicots	SNA	G5				Introduced, Rare		5		x	
*	*Euphorbia maculata*	Spotted Spurge	dicots	SNA	G5?				Introduced, Common		3		x	
x	*Euthamia caroliniana*	Slender Fragrant Goldenrod	dicots	S1	G5				Native, Rare	Yes	-3	10	x	
	Euthamia graminifolia	Grass-leaved Goldenrod	dicots	S5	G5				Native, Common		0	2	x	x
	Eutrochium maculatum	Spotted Joe Pye Weed	dicots	S5	G5						-5	3	x	x
x	*Eutrochium purpureum*	Purple Joe Pye Weed	dicots	S4	G5				Native, Rare	Yes	0	8	x	
	Fallopia scandens	Climbing False Buckwheat	dicots	S4S5	G5				Native, Common		0	3	x	
*	*Ficaria verna*	Fig-root Buttercup	dicots	SNA	GNR				Introduced, Rare		-3		x	
x	*Fragaria virginiana*	Wild Strawberry	dicots	S5	G5				Native, Common	Yes	3	2	x	

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	Fraxinus americana	White Ash	dicots	S4	G5				Native, Common		3	4	x	
	Fraxinus pennsylvanica	Green Ash	dicots	S4	G5				Native, Common		-3	3	x	x
	Fraxinus quadrangulata	Blue Ash	dicots	S2?	G5	THR	THR	SC	Native, Rare		3	9	x	
	Galium aparine	Common Bedstraw	dicots	S5	G5				Native, Common		3	4	x	
	Galium asprellum	Rough Bedstraw	dicots	S5	G5				Native, Rare		-5	6		x
	Galium circaezans	Licorice Bedstraw	dicots	S5	G5				Native, Common		3	7	x	
*	*Galium mollugo*	Smooth Bedstraw	dicots	SNA	GNR						5		x	
	Galium triflorum	Three-flowered Bedstraw	dicots	S5	G5				Native, Common		3	4	x	
	Gaylussacia baccata	Black Huckleberry	dicots	S4	G5				Native, Uncommon		3	8	x	
x	*Gentiana andrewsii*	Andrews' Bottle Gentian	dicots	S4	G5?				Native, Uncommon	Yes	-3	6	x	
x	*Gentianopsis crinita*	Greater Fringed Gentian	dicots	S5	G5				Native, Rare	Yes	-5	8	x	
	Geranium maculatum	Spotted Geranium	dicots	S5	G5				Native, Common		3	6	x	x
	Geum canadense	Canada Avens	dicots	S5	G5				Native, Common		0	3	x	
	Geum laciniatum	Rough Avens	dicots	S4	G5				Native, Common		-3	4	x	
*	*Glechoma hederacea*	Ground-ivy	dicots	SNA	GNR				Introduced, Common		3		x	
x	*Gleditsia triacanthos*	Honey Locust	dicots	S2?	G5				Native, Uncommon	Yes	0	8	x	
	Gymnocladus dioicus	Kentucky Coffee-tree	dicots	S2	G5	THR	THR				3	6		
	Hackelia virginiana	Virginia Stickseed	dicots	S5	G5				Native, Common		3	5	x	
	Hamamelis virginiana	American Witch-hazel	dicots	S4S5	G5				Native, Common		3	6	x	x
*	*Hedera helix*	English Ivy	dicots	SNA	GNR				Introduced, Rare		3		x	
x	*Helenium autumnale*	Common Sneezeweed	dicots	S4	G5				Native, Uncommon	Yes	-3	7	x	
x	*Helianthus divaricatus*	Woodland Sunflower	dicots	S5	G5				Native, Common	Yes	5	7	x	x
x	*Helianthus giganteus*	Giant Sunflower	dicots	S5	G5				Native, Common	Yes	-3	6	x	
*?	*Helianthus maximiliani*	Maximilian Sunflower	dicots	SNA	G5				Introduced, Historical		5		x	
	Helianthus tuberosus	Jerusalem Artichoke	dicots	SU	G5				e, status unknown or not spe		0	1	x	
	Hepatica americana	Round-lobed Hepatica	dicots	S5	G5				Native, Rare		5	6	x	
	Heracleum maximum	American Cow Parsnip	dicots	S5	G5				Native, Rare		-3	3	x	
*	*Hesperis matronalis*	Dame's Rocket	dicots	SNA	G4G5				Introduced, Uncommon		3		x	
*	*Hibiscus trionum*	Flower-of-an-hour	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Hylodesmum glutinosum	Large Tick-trefoil	dicots	S4	G5				Native, Uncommon		5	6	x	
x	*Hypericum gentianoides*	Gentian-leaved St. John's-wort	dicots	S1	G5				Native, Rare	Yes	3	10	x	
	Hypericum mutilum	Dwarf St. John's-wort	dicots	S4	G5				Native, Rare		-3	6	x	
*, x	*Hypericum perforatum*	Common St. John's-wort	dicots	SNA	GNR				Introduced, Common	Yes	5		x	
	Hypericum punctatum	Spotted St. John's-wort	dicots	S5	G5				Native, Common		0	5	x	
	Ilex verticillata	Common Winterberry	dicots	S5	G5				Native, Common		-3	5	x	
	Impatiens capensis	Spotted Jewelweed	dicots	S5	G5				Native, Common		-3	4	x	
	Juglans nigra	Black Walnut	dicots	S4?	G5				Native, Common		3	5	x	x
*	*Juglans regia*	English Walnut	dicots	SNA	GNR						5		x	
x	*Krigia biflora*	Two-flowered Dwarf-dandelion	dicots	S2	G5				Native, Uncommon	Yes	3	10	x	
	Lactuca biennis	Tall Blue Lettuce	dicots	S5	G5				Native, Rare		0	6	x	
*	*Lactuca serriola*	Prickly Lettuce	dicots	SNA	GNR				Introduced, Common		3		x	
*	*Lamium amplexicaule*	Common Dead-nettle	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Lamium purpureum*	Purple Dead-nettle	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Lathyrus palustris	Marsh Vetchling	dicots	S5	G5				Native, Uncommon		-3	6	x	

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*	*Lathyrus tuberosus*	Tuberous Vetchling	dicots	SNA	GNR				Introduced, Rare		5		x	
x	*Lechea mucronata*	Hairy Pinweed	dicots	S3	G5				Native, Rare	Yes	5	9	x	
x	*Lechea pulchella*	Leggett's Pinweed	dicots	S1	G5				Native, Rare	Yes	5	10	x	
*	*Leonurus cardiaca*	Common Motherwort	dicots	SNA	GNR				Introduced, Common		5		x	
*	*Lepidium campestre*	Field Peppergrass	dicots	SNA	GNR				Introduced, Common		5		x	
x	*Lespedeza capitata*	Round-headed Bush-clover	dicots	S4	G5				Native, Rare	Yes	3	7	x	x
x	*Lespedeza violacea*	Wand Bush-clover	dicots	S4?	G5				Native, Rare	Yes	5	8	x	
x	*Lespedeza virginica*	Slender Bush-clover	dicots	S1	G5	END	END	END	Native, Rare	Yes	5	10	x	x
*	*Leucanthemum vulgare*	Oxeye Daisy	dicots	SNA	GNR				Introduced, Common		5		x	
x	*Liatris spicata*	Dense Blazing-star	dicots	S2	G5	THR	THR	THR	Native, Rare	Yes	0	9	x	x
*	*Linaria vulgaris*	Butter-and-eggs	dicots	SNA	GNR				Introduced, Common		5		x	x
	Lindera benzoin	Northern Spicebush	dicots	S4	G5				Native, Common		-3	6	x	
	Liriodendron tulipifera	Tulip Tree	dicots	S4	G5				Native, Uncommon		3	8	x	
x	*Lithospermum canescens*	Hoary Puccoon	dicots	S3	G5				Native, Rare	Yes	5	10	x	
	Lobelia cardinalis	Cardinal Flower	dicots	S5	G5				Native, Uncommon		-5	7	x	
	Lobelia inflata	Indian-tobacco	dicots	S5	G5				Native, Uncommon		3	3	x	
	Lobelia siphilitica	Great Blue Lobelia	dicots	S5	G5				Native, Common		-3	6	x	
x	*Lobelia spicata*	Pale-spike Lobelia	dicots	S4	G5				Native, Rare	Yes	0	8	x	
	Lonicera dioica	Limber Honeysuckle	dicots	S5	G5				Native, Common		3	5	x	
*	*Lonicera japonica*	Japanese Honeysuckle	dicots	SNA	GNR				Introduced, Uncommon		3		x	
*	*Lonicera maackii*	Maack's Honeysuckle	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Lonicera morrowii*	Morrow's Honeysuckle	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Lonicera tatarica*	Tatarian Honeysuckle	dicots	SNA	GNR				Introduced, Uncommon		3		x	
*	*Lotus corniculatus*	Garden Bird's-foot Trefoil	dicots	SNA	GNR				Introduced, Common		3		x	
x	*Ludwigia alternifolia*	Bushy Seedbox	dicots	S1	G5				Native, Rare	Yes	-5	10	x	
x	*Lupinus perennis*	Sundial Lupine	dicots	S2S3	G5				Native, Rare	Yes	5	10	x	x
	Lycopus americanus	American Water-horehound	dicots	S5	G5				Native, Common		-5	4	x	
*	*Lysimachia arvensis*	Scarlet Pimpernel	dicots	SNA	GNR				Introduced, Rare		3		x	
x	*Lysimachia ciliata*	Fringed Yellow Loosestrife	dicots	S5	G5				Native, Common	Yes	-3	4	x	
x	*Lysimachia quadriflora*	Four-flowered Yellow Loosestrife	dicots	S4	G5?				Native, Rare	Yes	-5	10	x	
x	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife	dicots	S4	G5				Native, Rare	Yes	3	8	x	
*	*Lysimachia vulgaris*	Garden Yellow Loosestrife	dicots	SNA	GNR						-3		x	
x	*Lythrum alatum*	Winged Loosestrife	dicots	S3	G5				Native, Common	Yes	-5	5	x	
*	*Lythrum salicaria*	Purple Loosestrife	dicots	SNA	G5				Introduced, Common		-5		x	
	Malus coronaria	Sweet Crabapple	dicots	S4	G5				Native, Common		5	5	x	
*	*Malus pumila*	Common Apple	dicots	SNA	G5				Introduced, Rare		5		x	
*	*Medicago lupulina*	Black Medick	dicots	SNA	GNR				Introduced, Common		3		x	
*	*Medicago sativa*	Alfalfa	dicots	SNA	GNR						5		x	
*	*Melilotus albus*	White Sweet-clover	dicots	SNA	G5				Introduced, Common		3		x	
*	*Melilotus altissimus*	Tall Yellow Sweet-clover	dicots	SNA	GNR						5		x	
*	*Melilotus officinalis*	Yellow Sweet-clover	dicots	SNA	GNR				Introduced, Common		3		x	
	Menispermum canadense	Canada Moonseed	dicots	S4	G5				Native, Common		0	7	x	x
	Mentha canadensis	Canada Mint	dicots	S5	G5				Native, Common		-3	3	x	
*	*Mentha spicata*	Spearmint	dicots	SNA	GNR				Introduced, Rare		-3		x	

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	Mimulus ringens	Square-stemmed Monkeyflower	dicots	S5	G5				Native, Common		-5	6	x	
	Monarda fistulosa	Wild Bergamot	dicots	S5	G5						3	6	x	
	Monotropa uniflora	Indian-pipe	dicots	S5	G5				Native, Uncommon		3	6	x	
*	*Morus alba*	White Mulberry	dicots	SNA	GNR				Introduced, Common		0		x	
	Morus rubra	Red Mulberry	dicots	S2	G5	END	END	END	Native, Rare		3	10	x	
x	*Nabalus albus*	White Rattlesnakeroot	dicots	S5	G5				Native, Common	Yes	3	6	x	
x	*Nabalus racemosus*	Glaucous Rattlesnakeroot	dicots	S5	G5				Native, Rare	Yes	-3	10	x	
	Nelumbo lutea	American Lotus	dicots	S2S3	G4				Native, Uncommon		-5	10	x	
*	*Nepeta cataria*	Catnip	dicots	SNA	GNR				Introduced, Common		3		x	
	Nymphaea odorata	Fragrant Water-lily	dicots	S5	G5				Native, Rare		-5	5	x	
	Nyssa sylvatica	Black Gum	dicots	S3	G5				Native, Uncommon		-3	9	x	x
	Oenothera biennis	Common Evening-primrose	dicots	S5	G5				Native, Common		3	0	x	
x	*Oenothera gaura*	Biennial Gaura	dicots	S3	G5				Native, Uncommon	Yes	3	4	x	
*	*Origanum vulgare*	Wild Marjoram	dicots	SNA	GNR						5		x	
	Osmorhiza longistylis	Smooth Sweet Cicely	dicots	S5	G5				Native, Common		3	6	x	
	Ostrya virginiana	Eastern Hop-hornbeam	dicots	S5	G5				Native, Common		3	4	x	
	Oxalis stricta	Upright Yellow Wood-sorrel	dicots	S5	G5				Native, Common		3	0	x	
	Oxybasis glauca	Oak-leaved Goosefoot	dicots	S4?	G5						-3		x	
x	*Oxypolis rigidior*	Stiff Cowbane	dicots	S2	G5				Native, Uncommon	Yes	-5	9	x	
	Packera aurea	Golden Groundsel	dicots	S5	G5				Native, Rare		-3	7	x	
	Panax trifolius	Dwarf Ginseng	dicots	S4	G5				Native, Rare		5	8	x	
	Parthenocissus quinquefolia	Virginia Creeper	dicots	S4?	G5				Native, Common		3	6	x	x
*	*Pastinaca sativa*	Wild Parsnip	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Pedicularis canadensis	Canada Lousewort	dicots	S5	G5				Native, Uncommon		3	7	x	
	Pedicularis lanceolata	Swamp Lousewort	dicots	S4	G5				Native, Rare		-3	9	x	
x	*Penstemon digitalis*	Foxglove Beardtongue	dicots	S4	G5				Native, Rare	Yes	0	6	x	
x	*Penstemon hirsutus*	Hairy Beardtongue	dicots	S4	G4				Native, Common	Yes	5	7	x	
	Penthorum sedoides	Ditch Stonecrop	dicots	S5	G5				Native, Common		-5	4	x	
	Persicaria amphibia	Water Smartweed	dicots	S5	G5				Native, Uncommon		-5	5	x	
*	*Persicaria maculosa*	Spotted Lady's-thumb	dicots	SNA	G3G5				Introduced, Common		-3		x	
	Persicaria pensylvanica	Pennsylvania Smartweed	dicots	S5	G5				Native, Common		-3	3	x	
	Persicaria virginiana	Virginia Smartweed	dicots	S4	G5				Native, Common		0	6	x	x
	Phlox divaricata	Wild Blue Phlox	dicots	S4	G5				Native, Common		3	7	x	
	Phryma leptostachya	Lopseed	dicots	S4S5	G5				Native, Common		3	6	x	x
	Physocarpus opulifolius	Eastern Ninebark	dicots	S5	G5				Native, Rare		-3	5	x	
	Phytolacca americana	Common Pokeweed	dicots	S4	G5				Native, Common		3	3	x	
	Pilea pumila	Dwarf Clearweed	dicots	S5	G5				Native, Common		-3	5	x	
*	*Pilosella caespitosa*	Meadow Hawkweed	dicots	SNA	GNR				Introduced, Uncommon		5		x	
*	*Plantago lanceolata*	English Plantain	dicots	SNA	G5				Introduced, Common		3		x	
*	*Plantago major*	Common Plantain	dicots	SNA	G5				Introduced, Uncommon		3		x	
	Plantago rugelii	Rugel's Plantain	dicots	S5	G5				Native, Common		0	1	x	
	Platanus occidentalis	Sycamore	dicots	S4	G5				Native, Common		-3	8	x	
	Podophyllum peltatum	May-apple	dicots	S5	G5				Native, Common		3	5	x	
x	*Polygala sanguinea*	Blood Milkwort	dicots	S3	G5				Native, Rare	Yes	3	9	x	

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x	*Polygala verticillata*	Whorled Milkwort	dicots	S3?	G5				Native, Rare	Yes	5	7	x	
x	*Polygonum tenue*	Slender Knotweed	dicots	S2	G5				Native, Rare	Yes	5	10	x	
*	*Populus alba*	White Poplar	dicots	SNA	G5				Introduced, Rare		5		x	
	Populus deltoides	Eastern Cottonwood	dicots	S5	G5						0	4	x	x
	Populus grandidentata	Large-toothed Aspen	dicots	S5	G5				Native, Uncommon		5	5	x	
	Populus tremuloides	Trembling Aspen	dicots	S5	G5				Native, Common		0	2	x	x
*	*Potentilla recta*	Sulphur Cinquefoil	dicots	SNA	GNR				Introduced, Common		5		x	
	Potentilla simplex	Old-field Cinquefoil	dicots	S5	G5				Native, Common		3	3	x	
	Proserpinaca palustris	Marsh Mermaidweed	dicots	S4	G5				Native, Rare		-5	7	x	
	Prunella vulgaris	Common Self-heal	dicots	S5	G5						0	0	x	
	Prunus nigra	Canada Plum	dicots	S4	G4G5				Native, Uncommon		3	4	x	
	Prunus serotina	Black Cherry	dicots	S5	G5				Native, Common		3	3	x	x
	Prunus virginiana	Chokecherry	dicots	S5	G5				Native, Common		3	2	x	
	Pseudognaphalium obtusifolium	Fragrant Cudweed	dicots	S5	G5				Native, Rare		5	4	x	
x	*Pycnanthemum tenuifolium*	Slender Mountain-mint	dicots	S3	G5				Native, Rare	Yes	0	8	x	
x	*Pycnanthemum verticillatum var. pilosum*	Hairy Mountain-mint	dicots	S1	G5T5				Native, Rare	Yes	3	8	x	
x	*Pycnanthemum virginianum*	Virginia Mountain-mint	dicots	S4	G5				Native, Common	Yes	-3	6	x	
	Quercus alba	White Oak	dicots	S5	G5				Native, Common		3	6	x	x
	Quercus bicolor	Swamp White Oak	dicots	S4	G5				Native, Common		-3	8	x	x
	Quercus macrocarpa	Bur Oak	dicots	S5	G5				Native, Common		3	5	x	x
x	*Quercus palustris*	Swamp Pin Oak	dicots	S4	G5				Native, Common	Yes	-3	9	x	x
*	*Quercus robur*	English Oak	dicots	SNA	GNR						5		x	
	Quercus rubra	Northern Red Oak	dicots	S5	G5				Native, Common		3	6	x	
x	*Quercus velutina*	Black Oak	dicots	S4	G5				Native, Common	Yes	5	8	x	x
*	*Ranunculus acris*	Common Buttercup	dicots	SNA	G5				Introduced, Uncommon		0		x	
x	*Ranunculus hispidus*	Bristly Buttercup	dicots	S3	G5				Native, Historical	Yes	0	8	x	
x	*Ratibida pinnata*	Grey-headed Prairie Coneflower	dicots	S3	G5				Native, Uncommon	Yes	5	9	x	
*	*Reynoutria japonica*	Japanese Knotweed	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Rhamnus cathartica*	European Buckthorn	dicots	SNA	GNR				Introduced, Uncommon		0		x	
	Rhus glabra	Smooth Sumac	dicots	S5	G5				Native, Uncommon		5	7	x	
	Rhus typhina	Staghorn Sumac	dicots	S5	G5				Native, Common		3	1	x	
*	*Ricinus communis*	Castor-bean	dicots	SNA	GNR						3		x	
*	*Robinia pseudoacacia*	Black Locust	dicots	SNA	G5				Introduced, Uncommon		3		x	
*	*Rosa multiflora*	Multiflora Rose	dicots	SNA	GNR				Introduced, Common		3		x	
x	*Rosa setigera*	Climbing Prairie Rose	dicots	S2S3	G5	SC	SC	SC	Native, Common	Yes	3	5	x	
	Rubus flagellaris	Northern Dewberry	dicots	S4	G5				Native, Common		3	4	x	x
	Rubus idaeus	Red Raspberry	dicots	S5	G5						3	2	x	
	Rubus occidentalis	Black Raspberry	dicots	S5	G5				Native, Common		5	2	x	x
	Rubus pubescens	Dwarf Raspberry	dicots	S5	G5				Native, Rare		-3	4	x	
x	*Rudbeckia hirta*	Black-eyed Susan	dicots	S5	G5				Native, Common	Yes	3	0	x	x
	Rudbeckia laciniata	Cut-leaved Coneflower	dicots	S5	G5				Native, Rare		-3	7	x	
*	*Rumex crispus*	Curled Dock	dicots	SNA	GNR				Introduced, Common		0		x	

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	Salix eriocephala	Cottony Willow	dicots	S5	G5				Native, Common		-3	4	x	
	Salix humilis	Prairie Willow	dicots	S5	G5				Native, Rare		3	7	x	
	Salix interior	Sandbar Willow	dicots	S5	G5				Native, Common		-3	1	x	
	Sambucus canadensis	Common Elderberry	dicots	S5	G5				Native, Common		-3	5	x	
	Sambucus racemosa	Red Elderberry	dicots	S5	G5				Native, Rare		3	5	x	
	Sanguinaria canadensis	Bloodroot	dicots	S5	G5				Native, Uncommon		3	5	x	
	Sanicula canadensis	Canada Sanicle	dicots	S4	G5						3	7	x	
	Sanicula marilandica	Maryland Sanicle	dicots	S5	G5				Native, Common		3	5		x
*	*Saponaria officinalis*	Bouncing-bet	dicots	SNA	GNR				Introduced, Common		3		x	
	Sassafras albidum	Sassafras	dicots	S4	G5				Native, Common		3	6	x	x
	Scutellaria lateriflora	Mad-dog Skullcap	dicots	S5	G5				Native, Common		-5	5	x	
*	*Securigera varia*	Purple Crown-vetch	dicots	SNA	GNR				Introduced, Uncommon		5		x	
*	*Senecio vulgaris*	Common Ragwort	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Silene vulgaris*	Bladder Campion	dicots	SNA	GNR				Introduced, Uncommon		5		x	
	Silphium perfoliatum	Cup Plant	dicots	S2	G5				Native, Historical		-3	9	x	
x	*Silphium terebinthinaceum*	Prairie Rosinweed	dicots	S1	G4G5				Native, Rare	Yes	0	10	x	
*	*Sinapis arvensis*	Corn Mustard	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Sisymbrium altissimum*	Tall Tumble Mustard	dicots	SNA	GNR				Introduced, Uncommon		3		x	
	Sium suave	Common Water-parsnip	dicots	S5	G5				Native, Common		-5	4	x	
*	*Solanum carolinense*	Carolina Nightshade	dicots	SNA	G5				Introduced, Uncommon		3		x	
*	*Solanum dulcamara*	Bittersweet Nightshade	dicots	SNA	GNR				Introduced, Common		0		x	
	Solanum emulans	Eastern Black Nightshade	dicots	S5	G5				Native, Common		3	1	x	
	Solidago altissima	Tall Goldenrod	dicots	S5	G5						3	1		x
	Solidago bicolor	White Goldenrod	dicots	S4?	G5				Native, Rare		5	8	x	
	Solidago gigantea	Giant Goldenrod	dicots	S5	G5				Native, Rare		-3	4	x	
	Solidago juncea	Early Goldenrod	dicots	S5	G5				Native, Uncommon		5	3	x	x
	Solidago nemoralis	Grey-stemmed Goldenrod	dicots	S5	G5						5	2	x	
x	*Solidago riddellii*	Riddell's Goldenrod	dicots	S3	G5	SC	SC	SC	Native, Rare	Yes	-5	10	x	
	Solidago rigida	Stiff Goldenrod	dicots	S3	G5						3	7	x	
x	*Solidago rigida ssp. rigida*	Eastern Stiff Goldenrod	dicots	S3	G5T5				Native, Uncommon	Yes	3	7	x	
	Solidago rugosa	Rough-stemmed Goldenrod	dicots	S5	G5				Native, Common		0	4	x	x
*	*Solidago sempervirens*	Seaside Goldenrod	dicots	SNA	G5				Introduced, Uncommon		-3		x	
	Spergularia marina	Saltmarsh Sand-spurrey	dicots	S1	G5				Introduced, Rare		-3		x	
	Spiraea alba	White Meadowsweet	dicots	S5	G5				Native, Common		-3	3	x	x
	Spiraea tomentosa	Steeplebush	dicots	S5	G5				Native, Rare		-3	5	x	
	Stachys hispida	Hispid Hedge-nettle	dicots	S4	G4Q				Native, Common		-3	7	x	
*	*Stellaria media*	Common Chickweed	dicots	SNA	GNR				Introduced, Common		3		x	
x	*Strophostyles helvola*	Trailing Wild Bean	dicots	S4	G5				Native, Common	Yes	0	8	x	
x	*Symphyotrichum dumosum*	Bushy Aster	dicots	S2	G5				Native, Rare	Yes	0	10	x	
	Symphyotrichum ericoides	White Heath Aster	dicots	S5	G5						3	4	x	
	Symphyotrichum laeve	Smooth Aster	dicots	S5	G5						3	7	x	
	Symphyotrichum lanceolatum	Panicled Aster	dicots	S5	G5				Native, Common		-3	3	x	

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	Symphyotrichum lateriflorum	Calico Aster	dicots	S5	G5				Native, Common		0	3	x	
x	*Symphyotrichum novae-angliae*	New England Aster	dicots	S5	G5				Native, Common	Yes	-3	2	x	
x	*Symphyotrichum oolentangiense*	Sky Blue Aster	dicots	S4	G5				Native, Rare	Yes	5	9	x	
	Symphyotrichum pilosum	Old Field Aster	dicots	S5	G5						3		x	
x	*Symphyotrichum praealtum*	Willow-leaved Aster	dicots	S2	G5	THR	THR	THR	Native, Rare	Yes	-3	8	x	x
x	*Symphyotrichum urophyllum*	Arrow-leaved Aster	dicots	S4	G4G5				Native, Common	Yes	5	6	x	
*	*Syringa vulgaris*	Common Lilac	dicots	SNA	GNR				Introduced, Rare		5		x	
	Teucrium canadense	Canada Germander	dicots	S4S5	G5						-3	6	x	
x	*Thalictrum dasycarpum*	Purple Meadow-rue	dicots	S4?	G5				Native, Common	Yes	-3	5	x	
	Thalictrum dioicum	Early Meadow-rue	dicots	S5	G5				Native, Common		3	6	x	
*	*Thlaspi arvense*	Field Pennycress	dicots	SNA	GNR				Introduced, Common		5		x	
	Tilia americana	Basswood	dicots	S5	G5				Native, Common		3	4	x	
	Toxicodendron radicans	Poison Ivy	dicots	S5	G5						0	2	x	x
*	*Tragopogon dubius*	Yellow Goatsbeard	dicots	SNA	GNR				Introduced, Common		5		x	
*?	*Tragopogon porrifolius*	Purple Goatsbeard	dicots	SNA	GNR				Introduced, Uncommon		5		x	
*	*Tragopogon pratensis*	Meadow Goatsbeard	dicots	SNA	GNR				Introduced, Uncommon		5		x	
*	*Trifolium campestre*	Low Hop Clover	dicots	SNA	GNR				Introduced, Uncommon		5		x	
*	*Trifolium fragiferum*	Strawberry Clover	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Trifolium pratense*	Red Clover	dicots	SNA	GNR				Introduced, Uncommon		3		x	
*	*Trifolium repens*	White Clover	dicots	SNA	GNR				Introduced, Uncommon		3		x	
	Triodanis perfoliata	Clasping-leaved Venus' Looking-glass	dicots	S4	G5				Native, Uncommon		3	6	x	
*	*Tussilago farfara*	Coltsfoot	dicots	SNA	GNR				Introduced, Uncommon		3		x	
	Ulmus americana	White Elm	dicots	S5	G4				Native, Common		-3	3	x	x
*	*Ulmus pumila*	Siberian Elm	dicots	SNA	GNR				Introduced, Uncommon		3		x	
	Urtica dioica	Stinging Nettle	dicots	S5	G5						0	2	x	
	Vaccinium pallidum	Pale Blueberry	dicots	S4	G5				Native, Common		5	9	x	
*	*Verbascum blattaria*	Moth Mullein	dicots	SNA	GNR				Introduced, Common		3		x	
*	*Verbascum thapsus*	Common Mullein	dicots	SNA	GNR				Introduced, Common		5		x	
x	*Verbena hastata*	Blue Vervain	dicots	S5	G5				Native, Common	Yes	-3	4	x	
x	*Verbena stricta*	Hoary Vervain	dicots	S4	G5				Native, Rare	Yes	5	7	x	
	Verbena urticifolia	White Vervain	dicots	S5	G5				Native, Common		0	4	x	
	Verbesina alternifolia	Wingstem	dicots	S3	G5				Native, Rare		-3	5	x	
x	*Vernonia gigantea*	Giant Ironweed	dicots	S1?	G5				e, status unknown or not spe	Yes	0	4	x	x
x	*Vernonia missurica*	Missouri Ironweed	dicots	S3?	G4G5				e, status unknown or not spe	Yes	0	4	x	
*	*Veronica persica*	Bird's-eye Speedwell	dicots	SNA	GNR				ɔed, Status unknown or not s		5		x	
x	*Veronicastrum virginicum*	Culver's Root	dicots	S2	G4				Native, Rare	Yes	0	10	x	x
	Viburnum lentago	Nannyberry	dicots	S5	G5				Native, Common		0	4	x	
	Viburnum opulus	Cranberry Viburnum	dicots	S5	G5						-3	5	x	
	Vicia americana	American Vetch	dicots	S5	G5				Native, Rare		3	5	x	
*	*Vicia cracca*	Tufted Vetch	dicots	SNA	GNR				Introduced, Rare		5		x	

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*	*Vicia sativa*	Common Vetch	dicots	SNA	GNR				Introduced, Rare		3		x	
*	*Vicia villosa*	Hairy Vetch	dicots	SNA	G5				Introduced, Common		5		x	
*	*Vinca minor*	Lesser Periwinkle	dicots	SNA	GNR				Introduced, Rare		5		x	
*	*Vincetoxicum rossicum*	European Swallowwort	dicots	SNA	GNR						5		x	
	Viola pubescens	Yellow Violet	dicots	S5	G5				Native, Common		3	5	x	
	Viola sagittata	Arrow-leaved Violet	dicots	S4	G5						0	9	x	
	Viola sororia	Woolly Blue Violet	dicots	S5	G5				Native, Common		0	4	x	
	Vitis aestivalis	Summer Grape	dicots	S4	G5				Native, Uncommon		3	7	x	
	Vitis riparia	Riverbank Grape	dicots	S5	G5				Native, Common		0	0	x	x
	Xanthium strumarium	Rough Cockleburr	dicots	S5	G5				Native, Common		0	2	x	
	Zanthoxylum americanum	Common Prickly-ash	dicots	S5	G5				Native, Common		3	3	x	x
	Zizia aurea	Golden Alexanders	dicots	S5	G5				Native, Rare		0	7	x	
*	*Agrostis capillaris*	Colonial Bentgrass	monocots	SNA	GNR						0		x	
x	*Aletris farinosa*	White Colicroot	monocots	S2	G5	END	END	THR	Native, Rare	Yes	0	10	x	
	Alisma triviale	Northern Water-plantain	monocots	S5	G5				e, status unknown or not spe		-5	1	x	
	Allium canadense	Canada Garlic	monocots	S5	G5				Native, Common		3	8	x	
x	*Andropogon gerardi*	Big Bluestem	monocots	S4	G5				Native, Uncommon	Yes	3	7	x	x
x	*Andropogon virginicus*	Broomsedge Bluestem	monocots	S4	G5				Native, Rare	Yes	3	5	x	
	Arisaema triphyllum	Jack-in-the-pulpit	monocots	S5	G5				Native, Common		-3	5	x	x
x	*Aristida purpurascens*	Arrowfeather Threeawn Grass	monocots	S1	G5				Native, Rare	Yes	5	10	x	
*	*Asparagus officinalis*	Garden Asparagus	monocots	SNA	G5?				Introduced, Common		3		x	
*	*Bromus inermis*	Smooth Brome	monocots	SNA	G5				Introduced, Common		5		x	x
x	*Bromus kalmii*	Kalm's Brome	monocots	S4	G5				Native, Rare	Yes	0	8	x	
*	*Butomus umbellatus*	Flowering-rush	monocots	SNA	G5				Introduced, Common		-5		x	
x	*Calamagrostis canadensis*	Bluejoint Reedgrass	monocots	S5	G5				Native, Common	Yes	-5	4	x	x
	Carex alopecoidea	Foxtail Sedge	monocots	S4	G5				Native, Uncommon		-3	6	x	
x	*Carex annectens*	Yellow-fruited Sedge	monocots	S2	G5				Native, Rare	Yes	-3	6	x	
	Carex aurea	Golden Sedge	monocots	S5	G5				Native, Rare		-3	4	x	
	Carex bebbii	Bebb's Sedge	monocots	S5	G5				Native, Common		-5	3	x	
x	*Carex conoidea*	Field Sedge	monocots	S3	G5				Native, Rare	Yes	-3	9	x	
	Carex cristatella	Crested Sedge	monocots	S5	G5				Native, Common		-3	3	x	
	Carex granularis	Limestone Meadow Sedge	monocots	S5	G5				Native, Common		-3	3	x	
	Carex hystericina	Porcupine Sedge	monocots	S5	G5				Native, Rare		-5	5	x	
	Carex intumescens	Bladder Sedge	monocots	S5	G5				Native, Uncommon		-3	6	x	
	Carex leptonervia	Finely-nerved Sedge	monocots	S5	G5						0	5	x	
	Carex lupulina	Hop Sedge	monocots	S5	G5				Native, Common		-5	6	x	
x	*Carex meadii*	Mead's Sedge	monocots	S2	G4G5				Native, Rare	Yes	0	9	x	
	Carex muehlenbergii	Muhlenberg's Sedge	monocots	S4S5	G5						5	7	x	
	Carex pellita	Woolly Sedge	monocots	S5	G5				Native, Common		-5	2	x	
	Carex pensylvanica	Pennsylvania Sedge	monocots	S5	G5				Native, Common		5	5	x	x
	Carex prairea	Prairie Sedge	monocots	S5	G5				Native, Rare		-3	7	x	
	Carex scoparia	Pointed Broom Sedge	monocots	S5	G5				Native, Rare		-3	5	x	
	Carex sparganioides	Burreed Sedge	monocots	S4S5	G5				Native, Common		3	5	x	
x	*Carex swanii*	Swan's Sedge	monocots	S4	G5				Native, Common	Yes	3	7	x	

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x	*Carex tetanica*	Rigid Sedge	monocots	S3?	G4G5				Native, Rare	Yes	-3	8	x	
	Carex viridula	Greenish Sedge	monocots	S5	G5				Native, Rare		-5	5	x	
	Carex vulpinoidea	Fox Sedge	monocots	S5	G5				Native, Common		-5	3	x	
	Cenchrus longispinus	Long-spined Sandbur	monocots	S4	G5				Native, Uncommon		5	3	x	
*	*Commelina communis*	Asiatic Dayflower	monocots	SNA	G5				Introduced, Rare		0		x	
*	*Convallaria majalis*	European Lily-of-the-valley	monocots	SNA	G5				Introduced, Rare		5		x	
	Corallorhiza odontorhiza	Autumn Coralroot	monocots	S2S3	G5						5	8	x	
	Cyperus bipartitus	Shining Flatsedge	monocots	S5	G5				Native, Uncommon		-3	4	x	
	Cyperus esculentus	Perennial Yellow Flatsedge	monocots	S5	G5				Native, Common		-3	1	x	
	Cyperus lupulinus	Hop Flatsedge	monocots	S4	G5						3	7	x	
	Cyperus odoratus	Rusty Flatsedge	monocots	S4	GNR				Native, Common		-5	4	x	
	Cyperus strigosus	Straw-coloured Flatsedge	monocots	S5	G5				Native, Common		-3	5	x	
	Cypripedium parviflorum var. makasin	Northern Yellow Lady's-slipper	monocots	S4S5	G5T4T5				Native, Rare		0	5	x	
*	*Dactylis glomerata*	Orchard Grass	monocots	SNA	GNR				Introduced, Common		3		x	x
	Danthonia spicata	Poverty Oatgrass	monocots	S5	G5				Native, Common		5	5	x	
	Dichanthelium implicatum	Slender-stemmed Panicgrass	monocots	S5	G5				e, status unknown or not spe		0	3	x	
	Dichanthelium oligosanthes	Few-flowered Panicgrass	monocots	S4	G5						3	7	x	
x	*Dichanthelium praecocius*	Early-branching Panicgrass	monocots	S3	G5?				Native, Rare	Yes	5	8	x	
x	*Dichanthelium sphaerocarpon*	Round-fruited Panicgrass	monocots	S3	G5				Native, Rare	Yes	3	8	x	
x	*Digitaria cognata*	Fall Crabgrass	monocots	S1?	G5				Native, Rare	Yes	5	3	x	
	Dioscorea villosa	Wild Yam	monocots	S4	G4G5				Native, Common		0	5	x	
*	*Echinochloa crus-galli*	Large Barnyard Grass	monocots	SNA	GNR				Introduced, Common		-3		x	
*	*Eleusine indica*	India Goosegrass	monocots	SNA	GNR				Introduced, Uncommon		3		x	
	Elodea canadensis	Canada Waterweed	monocots	S5	G5				Native, Rare		-5	4	x	
x	*Elymus canadensis*	Canada Wildrye	monocots	S5	G5				Native, Rare	Yes	3	8	x	
	Elymus hystrix	Bottlebrush Grass	monocots	S5	G5				Native, Common		5	5	x	
*	*Elymus repens*	Quackgrass	monocots	SNA	GNR				Introduced, Common		3		x	
x	*Eragrostis spectabilis*	Purple Lovegrass	monocots	S4	G5				Native, Rare	Yes	5	6	x	
	Erythronium americanum	Yellow Trout-lily	monocots	S5	G5				Native, Common		5	5	x	
	Festuca rubra	Red Fescue	monocots	S5	G5						3		x	x
	Fimbristylis autumnalis	Slender Fimbristylis	monocots	S4	G5				Native, Rare		-3	9	x	
*	*Galanthus nivalis*	Common Snowdrop	monocots	SNA	GNR						5		x	
	Glyceria striata	Fowl Mannagrass	monocots	S5	G5				Native, Common		-5	3	x	
*	*Hemerocallis fulva*	Orange Daylily	monocots	SNA	GNA				Introduced, Uncommon		5		x	
*	*Holcus lanatus*	Common Velvetgrass	monocots	SNA	GNR				Introduced, Uncommon		3		x	
	Hordeum jubatum	Foxtail Barley	monocots	S5?	G5						0	0	x	
x	*Hypoxis hirsuta*	Eastern Yellow Stargrass	monocots	S2S3	G5				Native, Rare	Yes	0	10	x	
	Iris versicolor	Harlequin Blue Flag	monocots	S5	G5						-5	5	x	x
	Iris virginica	Southern Blue Flag	monocots	S5	G5				Native, Common		-5	5	x	
x	*Juncus acuminatus*	Sharp-fruited Rush	monocots	S3	G5				Native, Rare	Yes	-5	6	x	
x	*Juncus anthelatus*	Greater Poverty Rush	monocots	S1	GNR				Native, Rare	Yes	-3	3	x	
	Juncus articulatus	Jointed Rush	monocots	S5	G5				Native, Rare		-5	5	x	

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x	*Juncus biflorus*	Two-flowered Rush	monocots	S1	G5				Native, Rare	Yes	-3	10	x	
x	*Juncus brachycarpus*	Short-fruited Rush	monocots	S1	G4G5				Native, Rare	Yes	-3	10	x	
	Juncus dudleyi	Dudley's Rush	monocots	S5	G5				Native, Common		-3	1	x	
x	*Juncus greenei*	Greene's Rush	monocots	S3	G5				Native, Rare	Yes	0	9	x	
	Juncus tenuis	Path Rush	monocots	S5	G5				Native, Common		0	0	x	
	Juncus torreyi	Torrey's Rush	monocots	S5	G5				Native, Common		-3	3	x	
	Leersia oryzoides	Rice Cutgrass	monocots	S5	G5				Native, Common		-5	3	x	x
	Leersia virginica	White Cutgrass	monocots	S4	G5				Native, Common		-3	6	x	
	Lemna minor	Small Duckweed	monocots	S5?	G5				Native, Common		-5	5	x	
x	*Lilium michiganense*	Michigan Lily	monocots	S4	G5				Native, Common	Yes	-3	7	x	
x	*Liparis liliifolia*	Purple Twayblade	monocots	S2S3	G5	THR	THR	THR	Native, Rare	Yes	3	8	x	x
	Liparis loeselii	Loesel's Twayblade	monocots	S4S5	G5				Native, Rare		-3	5	x	
*	*Lolium arundinaceum*	Tall Ryegrass	monocots	SNA	GNR				Introduced, Common		3		x	
*	*Lolium perenne*	Perennial Ryegrass	monocots	SNA	GNR				Introduced, Uncommon		3		x	
	Luzula multiflora	Many-flowered Woodrush	monocots	S5	G5						3	6	x	
	Maianthemum racemosum	Large False Solomon's Seal	monocots	S5	G5				Native, Common		3	4	x	x
	Maianthemum stellatum	Star-flowered False Solomon's Seal	monocots	S5	G5				Native, Common		0	6	x	
*	*Miscanthus sacchariflorus*	Amur Silvergrass	monocots	SNA	GNR				Introduced, Rare		5		x	
*	*Muscari botryoides*	Common Grape-hyacinth	monocots	SNA	GNR						5		x	
*	*Ornithogalum umbellatum*	Common Star-of-Bethlehem	monocots	SNA	G3G5				Introduced, Rare		3		x	
*	*Panicum dichotomiflorum*	Fall Panicgrass	monocots	SNA	G5				Introduced, Common		-3		x	
	Panicum flexile	Wiry Panicgrass	monocots	S4	G5				Native, Rare		-3	8	x	
x	*Panicum virgatum*	Old Switch Panicgrass	monocots	S4	G5				Native, Uncommon	Yes	0	6	x	x
x	*Paspalum setaceum*	Slender Paspalum	monocots	S2	G5				Native, Rare	Yes	3	8	x	
	Phalaris arundinacea	Reed Canarygrass	monocots	S5	G5				Native, Common		-3	0	x	
*	*Phleum pratense*	Common Timothy	monocots	SNA	GNR				Introduced, Common		3		x	
	Phragmites australis	Common Reed	monocots	S4?	G5						-3	0	x	
	Platanthera lacera	Ragged Fringed Orchid	monocots	S4	G5				Native, Uncommon		-3	6	x	
	Poa alsodes	Grove Bluegrass	monocots	S4	G4G5						0	7	x	
*	*Poa annua*	Annual Bluegrass	monocots	SNA	GNR				Introduced, Common		3		x	
*	*Poa bulbosa*	Bulbous Bluegrass	monocots	SNA	GNR						3		x	
*	*Poa compressa*	Canada Bluegrass	monocots	SNA	GNR				Native, Common		3		x	
	Potamogeton richardsonii	Richardson's Pondweed	monocots	S5	G5				Native, Rare		-5	5	x	
*	*Puschkinia scilloides*	Striped Squill	monocots	SNA	GNR								x	
	Rhynchospora capitellata	Small-headed Beakrush	monocots	S4	G5				Native, Rare		-5	10	x	
x	*Schizachyrium scoparium*	Little Bluestem	monocots	S4	G5				Native, Uncommon	Yes	3	7	x	x
	Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	monocots	S5	G5				Native, Uncommon		-5	5	x	
*	*Scilla siberica*	Siberian Squill	monocots	SNA	GNR						5		x	
	Scirpus atrovirens	Dark-green Bulrush	monocots	S5	G5				Native, Common		-5	3	x	
	Scirpus hattorianus	Mosquito Bulrush	monocots	S4	G5				Native, Rare		-3	6	x	
	Scirpus pendulus	Hanging Bulrush	monocots	S5	G5				Native, Common		-5	3	x	x
x	*Scleria triglomerata*	Whip Nutrush	monocots	S1	G5				Native, Rare	Yes	0	10	x	
*	*Setaria faberi*	Giant Foxtail	monocots	SNA	GNR				Introduced, Common		3		x	

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*	*Setaria viridis*	Green Foxtail	monocots	SNA	GNR				Introduced, Common		5		x	
x	*Sisyrinchium albidum*	White Blue-eyed-grass	monocots	S1	G5?				Native, Rare	Yes	3	9	x	
	Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass	monocots	S4	G5				Native, Common		0	6	x	
x	*Smilax ecirrata*	Upright Carrionflower	monocots	S3?	G5				Native, Common	Yes	5	6	x	
	Smilax herbacea	Herbaceous Carrionflower	monocots	S4?	G5				Native, Rare		0	5	x	
	Smilax lasioneura	Hairy-nerved Carrionflower	monocots	S4S5	G5				Native, Common		5	5	x	
	Smilax tamnoides	Bristly Greenbriar	monocots	S5	G5				Native, Common		0	6	x	
x	*Sorghastrum nutans*	Yellow Indiangrass	monocots	S4	G5				Native, Rare	Yes	3	8	x	
	Spiranthes incurva	Sphinx Ladies'-tresses	monocots	S5	GNR				Native, Rare		-3	5	x	
	Spiranthes lucida	Shining Ladies'-tresses	monocots	S4	G4				Native, Rare		-3	9	x	
x	*Spiranthes magnicamporum*	Great Plains Ladies'-tresses	monocots	S3?	G3G4				Native, Rare	Yes	-3	8	x	
	Spirodela polyrhiza	Great Duckweed	monocots	S5	G5				Native, Rare		-5	4	x	
x	*Sporobolus compositus*	Rough Dropseed	monocots	S4	G5				Native, Uncommon	Yes	5	2	x	
x	*Sporobolus michauxianus*	Prairie Cordgrass	monocots	S4	G5				Native, Uncommon	Yes	-3	7	x	x
	Symplocarpus foetidus	Eastern Skunk Cabbage	monocots	S5	G5				Native, Rare		-5	7	x	
x	*Tradescantia ohiensis*	Ohio Spiderwort	monocots	S2	G5				Native, Rare	Yes	3	10	x	
*	*Tradescantia virginiana*	Virginia Spiderwort	monocots	SNA	G5						5		x	
*	*Tridens flavus*	Purpletop Tridens	monocots	SNA	G5				Introduced, Rare		5		x	
	Trillium grandiflorum	White Trillium	monocots	S5	G5				Native, Common		3	5	x	
	Typha latifolia	Broad-leaved Cattail	monocots	S5	G5				Native, Uncommon		-5	1	x	
	Uvularia sessilifolia	Sessile-leaved Bellwort	monocots	S4	G5				Native, Rare		3	7	x	
	Vallisneria americana	American Eelgrass	monocots	S5	G5				Native, Rare		-5	6	x	
	Asplenium platyneuron	Ebony Spleenwort	pteridophytes	S4	G5				Native, Rare		3	6	x	
	Athyrium filix-femina	Common Lady Fern	pteridophytes	S5	G5						0	4	x	
	Botrypus virginianus	Rattlesnake Fern	pteridophytes	S5	G5				Native, Common		3	5	x	
	Dryopteris carthusiana	Spinulose Wood Fern	pteridophytes	S5	G5				Native, Common		-3	5	x	
	Equisetum arvense	Field Horsetail	pteridophytes	S5	G5				Native, Common		0	0	x	
	Equisetum hyemale	Common Scouring-rush	pteridophytes	S5	G5				Native, Common		0	2	x	
x	*Equisetum laevigatum*	Smooth Scouring-rush	pteridophytes	S4	G5				Native, Rare	Yes	-3	7	x	
	Matteuccia struthiopteris	Ostrich Fern	pteridophytes	S5	G5				Native, Rare		0	5	x	
	Onoclea sensibilis	Sensitive Fern	pteridophytes	S5	G5				Native, Common		-3	4	x	x
	Osmunda regalis	Royal Fern	pteridophytes	S5	G5				Native, Uncommon		-5	7	x	x
	Osmundastrum cinnamomeum	Cinnamon Fern	pteridophytes	S5	G5				Native, Uncommon		-3	7	x	x
	Pteridium aquilinum	Bracken Fern	pteridophytes	S5	G5				Native, Uncommon		3	2	x	x
	Sceptridium dissectum	Cut-leaved Grapefern	pteridophytes	S4S5	G5				Native, Common		0	6	x	
	Thelypteris palustris	Marsh Fern	pteridophytes	S5	G5				Native, Common		-3	5	x	x

* *indicates the species is a*

x *Tallgrass Indicator Species from the SOFIA database*

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
	Juniperus virginiana	Eastern Red Cedar	conifers		x						
*	*Pinus nigra*	Austrian Pine	conifers		x						
	Pinus strobus	Eastern White Pine	conifers		x						
*	*Pinus sylvestris*	Scots Pine	conifers		x						
*	*Abutilon theophrasti*	Velvetleaf	dicots		x						
	Acalypha rhomboidea	Common Three-seeded Mercury	dicots		x						
	Acer negundo	Manitoba Maple	dicots		x						
	Acer rubrum	Red Maple	dicots		x					x	
	Acer saccharinum	Silver Maple	dicots		x						x
*?	*Achillea millefolium*	Common Yarrow	dicots	x	x						
	Actaea pachypoda	White Baneberry	dicots		x						
*	*Aegopodium podagraria*	Goutweed	dicots		x						
	Agalinis purpurea	Purple False Foxglove	dicots		x	x					
	Agalinis tenuifolia	Slender-leaved False Foxglove	dicots		x						
	Ageratina altissima	White Snakeroot	dicots		x						
	Agrimonia gryposepala	Hooked Agrimony	dicots		x					x	
x	*Agrimonia parviflora*	Swamp Agrimony	dicots		x					x	
	Agrimonia striata	Woodland Agrimony	dicots		x						
*	*Ailanthus altissima*	Tree-of-heaven	dicots		x						
*	*Alliaria petiolata*	Garlic Mustard	dicots		x						
	Ambrosia artemisiifolia	Common Ragweed	dicots		x						
	Ambrosia trifida	Great Ragweed	dicots		x						
	Amelanchier arborea	Downy Serviceberry	dicots		x						
x	*Amphicarpaea bracteata*	American Hog-peanut	dicots		x					x	
x	*Anemonastrum canadense*	Canada Anemone	dicots	x	x						
x	*Anemone cylindrica*	Long-headed Anemone	dicots		x						
	Anemone quinquefolia	Wood Anemone	dicots	x	x						
	Anemone virginiana	Tall Anemone	dicots		x						
x	*Apios americana*	American Groundnut	dicots	x	x						
	Apocynum androsaemifolium	Spreading Dogbane	dicots		x			x		x	
	Apocynum cannabinum	Hemp Dogbane	dicots	x	x						
	Aquilegia canadensis	Red Columbine	dicots	x	x						
*	*Aquilegia vulgaris*	European Columbine	dicots		x						
	Aralia nudicaulis	Wild Sarsaparilla	dicots		x						
*	*Arctium lappa*	Great Burdock	dicots		x						
*	*Arctium minus*	Common Burdock	dicots		x						
*	*Armoracia rusticana*	Horseradish	dicots		x						
	Asarum canadense	Canada Wild-ginger	dicots		x						
x	*Asclepias hirtella*	Tall Green Milkweed	dicots			x					
x	*Asclepias incarnata*	Swamp Milkweed	dicots	x	x						
x	*Asclepias purpurascens*	Purple Milkweed	dicots			x					
x	*Asclepias sullivantii*	Prairie Milkweed	dicots			x					
	Asclepias syriaca	Common Milkweed	dicots		x			x			

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x	*Asclepias tuberosa*	Butterfly Milkweed	dicots	x	x						
x	*Asclepias verticillata*	Whorled Milkweed	dicots		x						
x	*Asclepias viridiflora*	Green Cornet Milkweed	dicots			x					
	Asimina triloba	Pawpaw	dicots			x					
x	*Aureolaria flava*	Smooth Yellow False Foxglove	dicots			x					
x	*Baptisia tinctoria*	Yellow Wild Indigo	dicots			x					
*	*Barbarea vulgaris*	Bitter Wintercress	dicots		x						
*	*Berberis thunbergii*	Japanese Barberry	dicots		x						
*	*Berteroa incana*	Hoary Alyssum	dicots		x						
	Bidens frondosa	Devil's Beggarticks	dicots		x						
	Boehmeria cylindrica	Small-spike False Nettle	dicots		x						
	Calystegia sepium	Hedge False Bindweed	dicots		x						
*	*Campanula rapunculoides*	Creeping Bellflower	dicots	x	x						
	Campsis radicans	Trumpet Creeper	dicots		x						
*	*Capsella bursa-pastoris*	Common Shepherd's Purse	dicots		x						
	Cardamine bulbosa	Bulbous Bittercress	dicots		x						
	Cardamine douglassii	Limestone Bittercress	dicots		x						
*	*Cardamine hirsuta*	Hairy Bittercress	dicots		x						
	Carya cordiformis	Bitternut Hickory	dicots		x						
x	*Carya glabra*	Pignut Hickory	dicots	x	x	x		x		x	
	Carya ovata	Shagbark Hickory	dicots	x	x						
	Castanea dentata	American Chestnut	dicots		x	x					
*	*Catalpa speciosa*	Northern Catalpa	dicots		x						
x	*Ceanothus americanus*	New Jersey Tea	dicots		x						
*	*Celastrus orbiculatus*	Oriental Bittersweet	dicots		x						
	Celastrus scandens	Climbing Bittersweet	dicots		x						
	Celtis occidentalis	Common Hackberry	dicots		x						
*	*Centaurea stoebe*	Spotted Knapweed	dicots	x	x			x			
*	*Centaurium pulchellum*	Branching Centaury	dicots	x	x						
	Cephalanthus occidentalis	Eastern Buttonbush	dicots	x	x						x
	Ceratophyllum demersum	Common Hornwort	dicots		x						
	Cercis canadensis	Eastern Redbud	dicots		x						
	Chelone glabra	White Turtlehead	dicots		x						
	Chimaphila maculata	Spotted Wintergreen	dicots			x	x				
*	*Cichorium intybus*	Wild Chicory	dicots	x	x			x			
	Cicuta maculata	Spotted Water-hemlock	dicots		x						x
	Circaea canadensis	Broad-leaved Enchanter's Nightshade	dicots		x					x	
*	*Cirsium arvense*	Canada Thistle	dicots		x			x			
x	*Cirsium discolor*	Field Thistle	dicots			x					
	Cirsium muticum	Swamp Thistle	dicots		x						
*	*Cirsium vulgare*	Bull Thistle	dicots		x						
	Claytonia virginica	Eastern Spring Beauty	dicots	x	x						
*	*Clematis terniflora*	Sweet Autumn Clematis	dicots		x						
	Clematis virginiana	Virginia Clematis	dicots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
	Collinsonia canadensis	Canada Horsebalm	dicots		x						
x	*Comandra umbellata*	Bastard Toadflax	dicots	x	x						
*	*Convolvulus arvensis*	Field Bindweed	dicots		x						
	Coreopsis lanceolata	Lance-leaved Tickseed	dicots		x						
x	*Coreopsis tripteris*	Tall Tickseed	dicots			x					
	Cornus drummondii	Rough-leaved Dogwood	dicots		x						
	Cornus obliqua	Silky Dogwood	dicots								x
	Cornus racemosa	Grey Dogwood	dicots	x	x					x	x
	Corylus americana	American Hazelnut	dicots	x	x					x	x
	Corylus cornuta	Beaked Hazelnut	dicots		x						
	Crataegus crus-galli	Cockspur Hawthorn	dicots		x						
	Cryptotaenia canadensis	Canada Honewort	dicots		x						
	Cuscuta cephalanthi	Buttonbush Dodder	dicots			x					
*	*Datura stramonium*	Jimsonweed	dicots		x						
*	*Daucus carota*	Wild Carrot	dicots	x	x			x			
x	*Desmodium canadense*	Canada Tick-trefoil	dicots	x	x				x	x	
x	*Desmodium perplexum*	Perplexed Tick-trefoil	dicots		x						
*	*Dianthus armeria*	Deptford Pink	dicots	x	x						
*	*Dipsacus fullonum*	Common Teasel	dicots		x						
	Dirca palustris	Eastern Leatherwood	dicots		x						
	Doellingeria umbellata	Flat-top White Aster	dicots	x	x					x	x
*	*Elaeagnus angustifolia*	Russian Olive	dicots		x						
*	*Elaeagnus umbellata*	Autumn Olive	dicots		x			x			
*	*Eranthis hyemalis*	Winter Aconite	dicots		x						
	Erechtites hieraciifolius	Eastern Burnweed	dicots		x						
	Erigeron annuus	Annual Fleabane	dicots		x						
x	*Erigeron canadensis*	Canada Horseweed	dicots		x						
	Erigeron philadelphicus	Philadelphia Fleabane	dicots		x						
x	*Erigeron strigosus*	Rough Fleabane	dicots		x						
*	*Euonymus alatus*	Winged Euonymus	dicots		x						
*	*Euonymus europaeus*	European Euonymus	dicots		x						
*	*Euonymus fortunei*	Climbing Euonymus	dicots		x						
	Eupatorium perfoliatum	Common Boneset	dicots		x						
*	*Eupatorium serotinum*	Late Boneset	dicots		x						
x	*Euphorbia corollata*	Flowering Spurge	dicots		x			x			
*	*Euphorbia cyparissias*	Cypress Spurge	dicots		x						
*	*Euphorbia maculata*	Spotted Spurge	dicots		x						
x	*Euthamia caroliniana*	Slender Fragrant Goldenrod	dicots			x					
	Euthamia graminifolia	Grass-leaved Goldenrod	dicots		x			x			
	Eutrochium maculatum	Spotted Joe Pye Weed	dicots		x						x
x	*Eutrochium purpureum*	Purple Joe Pye Weed	dicots	x	x						
	Fallopia scandens	Climbing False Buckwheat	dicots		x						
*	*Ficaria verna*	Fig-root Buttercup	dicots		x						
x	*Fragaria virginiana*	Wild Strawberry	dicots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
	Fraxinus americana	White Ash	dicots		x						
	Fraxinus pennsylvanica	Green Ash	dicots		x			x			x
	Fraxinus quadrangulata	Blue Ash	dicots			x					
	Galium aparine	Common Bedstraw	dicots		x						
	Galium asprellum	Rough Bedstraw	dicots							x	
	Galium circaezans	Licorice Bedstraw	dicots		x						
*	*Galium mollugo*	Smooth Bedstraw	dicots		x						
	Galium triflorum	Three-flowered Bedstraw	dicots	x	x						
	Gaylussacia baccata	Black Huckleberry	dicots	x	x						
x	*Gentiana andrewsii*	Andrews' Bottle Gentian	dicots	x	x						
x	*Gentianopsis crinita*	Greater Fringed Gentian	dicots		x						
	Geranium maculatum	Spotted Geranium	dicots	x	x					x	
	Geum canadense	Canada Avens	dicots		x						
	Geum laciniatum	Rough Avens	dicots		x						
*	*Glechoma hederacea*	Ground-ivy	dicots	x	x						
x	*Gleditsia triacanthos*	Honey Locust	dicots		x						
	Gymnocladus dioicus	Kentucky Coffee-tree	dicots			x					
	Hackelia virginiana	Virginia Stickseed	dicots		x						
	Hamamelis virginiana	American Witch-hazel	dicots	x	x					x	
*	*Hedera helix*	English Ivy	dicots	x	x						
x	*Helenium autumnale*	Common Sneezeweed	dicots	x	x						
x	*Helianthus divaricatus*	Woodland Sunflower	dicots		x			x		x	
x	*Helianthus giganteus*	Giant Sunflower	dicots	x	x						
*?	*Helianthus maximiliani*	Maximilian Sunflower	dicots		x						
	Helianthus tuberosus	Jerusalem Artichoke	dicots		x						
	Hepatica americana	Round-lobed Hepatica	dicots		x						
	Heracleum maximum	American Cow Parsnip	dicots	x	x						
*	*Hesperis matronalis*	Dame's Rocket	dicots		x						
*	*Hibiscus trionum*	Flower-of-an-hour	dicots		x						
	Hylodesmum glutinosum	Large Tick-trefoil	dicots		x						
x	*Hypericum gentianoides*	Gentian-leaved St. John's-wort	dicots			x					
	Hypericum mutilum	Dwarf St. John's-wort	dicots		x						
*, x	*Hypericum perforatum*	Common St. John's-wort	dicots	x	x						
	Hypericum punctatum	Spotted St. John's-wort	dicots		x						
	Ilex verticillata	Common Winterberry	dicots		x						
	Impatiens capensis	Spotted Jewelweed	dicots	x	x						
	Juglans nigra	Black Walnut	dicots	x	x						x
*	*Juglans regia*	English Walnut	dicots		x						
x	*Krigia biflora*	Two-flowered Dwarf-dandelion	dicots			x					
	Lactuca biennis	Tall Blue Lettuce	dicots		x						
*	*Lactuca serriola*	Prickly Lettuce	dicots		x						
*	*Lamium amplexicaule*	Common Dead-nettle	dicots		x						
*	*Lamium purpureum*	Purple Dead-nettle	dicots		x						
	Lathyrus palustris	Marsh Vetchling	dicots		x						

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*	*Lathyrus tuberosus*	Tuberous Vetchling	dicots		x						
x	*Lechea mucronata*	Hairy Pinweed	dicots			x					
x	*Lechea pulchella*	Leggett's Pinweed	dicots			x					
*	*Leonurus cardiaca*	Common Motherwort	dicots		x						
*	*Lepidium campestre*	Field Peppergrass	dicots	x	x						
x	*Lespedeza capitata*	Round-headed Bush-clover	dicots	x	x				x		
x	*Lespedeza violacea*	Wand Bush-clover	dicots		x						
x	*Lespedeza virginica*	Slender Bush-clover	dicots			x	x		x		
*	*Leucanthemum vulgare*	Oxeye Daisy	dicots		x						
x	*Liatris spicata*	Dense Blazing-star	dicots			x			x		
*	*Linaria vulgaris*	Butter-and-eggs	dicots		x			x			
	Lindera benzoin	Northern Spicebush	dicots		x						
	Liriodendron tulipifera	Tulip Tree	dicots	x	x						
x	*Lithospermum canescens*	Hoary Puccoon	dicots	x	x	x					
	Lobelia cardinalis	Cardinal Flower	dicots	x	x						
	Lobelia inflata	Indian-tobacco	dicots		x						
	Lobelia siphilitica	Great Blue Lobelia	dicots	x	x						
x	*Lobelia spicata*	Pale-spike Lobelia	dicots	x	x						
	Lonicera dioica	Limber Honeysuckle	dicots		x						
*	*Lonicera japonica*	Japanese Honeysuckle	dicots	x	x						
*	*Lonicera maackii*	Maack's Honeysuckle	dicots		x						
*	*Lonicera morrowii*	Morrow's Honeysuckle	dicots		x						
*	*Lonicera tatarica*	Tatarian Honeysuckle	dicots		x						
*	*Lotus corniculatus*	Garden Bird's-foot Trefoil	dicots		x						
x	*Ludwigia alternifolia*	Bushy Seedbox	dicots			x					
x	*Lupinus perennis*	Sundial Lupine	dicots			x			x		
	Lycopus americanus	American Water-horehound	dicots		x						
*	*Lysimachia arvensis*	Scarlet Pimpernel	dicots		x						
x	*Lysimachia ciliata*	Fringed Yellow Loosestrife	dicots		x						
x	*Lysimachia quadriflora*	Four-flowered Yellow Loosestrife	dicots		x						
x	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife	dicots	x	x						
*	*Lysimachia vulgaris*	Garden Yellow Loosestrife	dicots		x						
x	*Lythrum alatum*	Winged Loosestrife	dicots			x					
*	*Lythrum salicaria*	Purple Loosestrife	dicots		x						
	Malus coronaria	Sweet Crabapple	dicots		x						
*	*Malus pumila*	Common Apple	dicots		x						
*	*Medicago lupulina*	Black Medick	dicots		x						
*	*Medicago sativa*	Alfalfa	dicots		x						
*	*Melilotus albus*	White Sweet-clover	dicots		x						
*	*Melilotus altissimus*	Tall Yellow Sweet-clover	dicots		x						
*	*Melilotus officinalis*	Yellow Sweet-clover	dicots		x						
	Menispermum canadense	Canada Moonseed	dicots	x	x					x	
	Mentha canadensis	Canada Mint	dicots		x						
*	*Mentha spicata*	Spearmint	dicots		x						

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	Mimulus ringens	Square-stemmed Monkeyflower	dicots		x						
	Monarda fistulosa	Wild Bergamot	dicots	x	x						
	Monotropa uniflora	Indian-pipe	dicots		x						
*	*Morus alba*	White Mulberry	dicots		x						
	Morus rubra	Red Mulberry	dicots			x					
x	*Nabalus albus*	White Rattlesnakeroot	dicots		x						
x	*Nabalus racemosus*	Glaucous Rattlesnakeroot	dicots		x						
	Nelumbo lutea	American Lotus	dicots			x					
*	*Nepeta cataria*	Catnip	dicots		x						
	Nymphaea odorata	Fragrant Water-lily	dicots		x						
	Nyssa sylvatica	Black Gum	dicots			x	x				
	Oenothera biennis	Common Evening-primrose	dicots		x						
x	*Oenothera gaura*	Biennial Gaura	dicots			x					
*	*Origanum vulgare*	Wild Marjoram	dicots		x						
	Osmorhiza longistylis	Smooth Sweet Cicely	dicots		x						
	Ostrya virginiana	Eastern Hop-hornbeam	dicots		x						
	Oxalis stricta	Upright Yellow Wood-sorrel	dicots		x						
	Oxybasis glauca	Oak-leaved Goosefoot	dicots		x						
x	*Oxypolis rigidior*	Stiff Cowbane	dicots			x					
	Packera aurea	Golden Groundsel	dicots		x						
	Panax trifolius	Dwarf Ginseng	dicots		x						
	Parthenocissus quinquefolia	Virginia Creeper	dicots	x	x					x	x
*	*Pastinaca sativa*	Wild Parsnip	dicots		x						
	Pedicularis canadensis	Canada Lousewort	dicots		x						
	Pedicularis lanceolata	Swamp Lousewort	dicots		x						
x	*Penstemon digitalis*	Foxglove Beardtongue	dicots	x	x						
x	*Penstemon hirsutus*	Hairy Beardtongue	dicots		x						
	Penthorum sedoides	Ditch Stonecrop	dicots		x						
	Persicaria amphibia	Water Smartweed	dicots		x						
*	*Persicaria maculosa*	Spotted Lady's-thumb	dicots		x						
	Persicaria pensylvanica	Pennsylvania Smartweed	dicots		x						
	Persicaria virginiana	Virginia Smartweed	dicots		x					x	
	Phlox divaricata	Wild Blue Phlox	dicots		x						
	Phryma leptostachya	Lopseed	dicots	x	x					x	
	Physocarpus opulifolius	Eastern Ninebark	dicots		x						
	Phytolacca americana	Common Pokeweed	dicots		x						
	Pilea pumila	Dwarf Clearweed	dicots		x						
*	*Pilosella caespitosa*	Meadow Hawkweed	dicots		x						
*	*Plantago lanceolata*	English Plantain	dicots		x						
*	*Plantago major*	Common Plantain	dicots		x						
	Plantago rugelii	Rugel's Plantain	dicots		x						
	Platanus occidentalis	Sycamore	dicots		x						
	Podophyllum peltatum	May-apple	dicots		x						
x	*Polygala sanguinea*	Blood Milkwort	dicots	x	x	x					

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x	*Polygala verticillata*	Whorled Milkwort	dicots			x					
x	*Polygonum tenue*	Slender Knotweed	dicots			x					
*	*Populus alba*	White Poplar	dicots		x						
	Populus deltoides	Eastern Cottonwood	dicots	x	x						x
	Populus grandidentata	Large-toothed Aspen	dicots		x						
	Populus tremuloides	Trembling Aspen	dicots	x	x						x
*	*Potentilla recta*	Sulphur Cinquefoil	dicots		x						
	Potentilla simplex	Old-field Cinquefoil	dicots		x						
	Proserpinaca palustris	Marsh Mermaidweed	dicots	x	x						
	Prunella vulgaris	Common Self-heal	dicots		x						
	Prunus nigra	Canada Plum	dicots	x	x						
	Prunus serotina	Black Cherry	dicots	x	x					x	
	Prunus virginiana	Chokecherry	dicots		x						
	Pseudognaphalium obtusifolium	Fragrant Cudweed	dicots		x						
x	*Pycnanthemum tenuifolium*	Slender Mountain-mint	dicots			x					
x	*Pycnanthemum verticillatum var. pilosum*	Hairy Mountain-mint	dicots			x					
x	*Pycnanthemum virginianum*	Virginia Mountain-mint	dicots	x	x						
	Quercus alba	White Oak	dicots		x					x	
	Quercus bicolor	Swamp White Oak	dicots		x						x
	Quercus macrocarpa	Bur Oak	dicots		x						x
x	*Quercus palustris*	Swamp Pin Oak	dicots		x						x
*	*Quercus robur*	English Oak	dicots		x						
	Quercus rubra	Northern Red Oak	dicots		x						
x	*Quercus velutina*	Black Oak	dicots		x			x	x	x	
*	*Ranunculus acris*	Common Buttercup	dicots		x						
x	*Ranunculus hispidus*	Bristly Buttercup	dicots		x						
x	*Ratibida pinnata*	Grey-headed Prairie Coneflower	dicots	x	x	x					
*	*Reynoutria japonica*	Japanese Knotweed	dicots	x	x						
*	*Rhamnus cathartica*	European Buckthorn	dicots		x						
	Rhus glabra	Smooth Sumac	dicots		x						
	Rhus typhina	Staghorn Sumac	dicots		x						
*	*Ricinus communis*	Castor-bean	dicots		x						
*	*Robinia pseudoacacia*	Black Locust	dicots		x						
*	*Rosa multiflora*	Multiflora Rose	dicots		x						
x	*Rosa setigera*	Climbing Prairie Rose	dicots			x					
	Rubus flagellaris	Northern Dewberry	dicots		x				x	x	
	Rubus idaeus	Red Raspberry	dicots		x						
	Rubus occidentalis	Black Raspberry	dicots		x					x	x
	Rubus pubescens	Dwarf Raspberry	dicots		x						
x	*Rudbeckia hirta*	Black-eyed Susan	dicots		x			x	x		
	Rudbeckia laciniata	Cut-leaved Coneflower	dicots	x	x						
*	*Rumex crispus*	Curled Dock	dicots		x						

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	Salix eriocephala	Cottony Willow	dicots		x						
	Salix humilis	Prairie Willow	dicots		x						
	Salix interior	Sandbar Willow	dicots		x						
	Sambucus canadensis	Common Elderberry	dicots		x						
	Sambucus racemosa	Red Elderberry	dicots		x						
	Sanguinaria canadensis	Bloodroot	dicots		x						
	Sanicula canadensis	Canada Sanicle	dicots		x						
	Sanicula marilandica	Maryland Sanicle	dicots							x	
*	*Saponaria officinalis*	Bouncing-bet	dicots		x						
	Sassafras albidum	Sassafras	dicots	x	x			x		x	
	Scutellaria lateriflora	Mad-dog Skullcap	dicots		x						
*	*Securigera varia*	Purple Crown-vetch	dicots		x						
*	*Senecio vulgaris*	Common Ragwort	dicots		x						
*	*Silene vulgaris*	Bladder Campion	dicots		x						
	Silphium perfoliatum	Cup Plant	dicots		x						
x	*Silphium terebinthinaceum*	Prairie Rosinweed	dicots			x					
*	*Sinapis arvensis*	Corn Mustard	dicots		x						
*	*Sisymbrium altissimum*	Tall Tumble Mustard	dicots		x						
	Sium suave	Common Water-parsnip	dicots		x						
*	*Solanum carolinense*	Carolina Nightshade	dicots		x						
*	*Solanum dulcamara*	Bittersweet Nightshade	dicots		x						
	Solanum emulans	Eastern Black Nightshade	dicots		x						
	Solidago altissima	Tall Goldenrod	dicots					x			x
	Solidago bicolor	White Goldenrod	dicots		x						
	Solidago gigantea	Giant Goldenrod	dicots		x						
	Solidago juncea	Early Goldenrod	dicots		x				x		
	Solidago nemoralis	Grey-stemmed Goldenrod	dicots		x						
x	*Solidago riddellii*	Riddell's Goldenrod	dicots			x					
	Solidago rigida	Stiff Goldenrod	dicots		x						
x	*Solidago rigida ssp. rigida*	Eastern Stiff Goldenrod	dicots			x					
	Solidago rugosa	Rough-stemmed Goldenrod	dicots		x					x	
*	*Solidago sempervirens*	Seaside Goldenrod	dicots		x						
	Spergularia marina	Saltmarsh Sand-spurrey	dicots			x					
	Spiraea alba	White Meadowsweet	dicots		x						x
	Spiraea tomentosa	Steeplebush	dicots		x						
	Stachys hispida	Hispid Hedge-nettle	dicots		x						
*	*Stellaria media*	Common Chickweed	dicots		x						
x	*Strophostyles helvola*	Trailing Wild Bean	dicots		x						
x	*Symphyotrichum dumosum*	Bushy Aster	dicots			x					
	Symphyotrichum ericoides	White Heath Aster	dicots		x						
	Symphyotrichum laeve	Smooth Aster	dicots		x						
	Symphyotrichum lanceolatum	Panicled Aster	dicots		x						

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	Symphyotrichum lateriflorum	Calico Aster	dicots		x						
x	*Symphyotrichum novae-angliae*	New England Aster	dicots		x						
x	*Symphyotrichum oolentangiense*	Sky Blue Aster	dicots		x						
	Symphyotrichum pilosum	Old Field Aster	dicots		x						
x	*Symphyotrichum praealtum*	Willow-leaved Aster	dicots			x	x				
x	*Symphyotrichum urophyllum*	Arrow-leaved Aster	dicots		x						
*	*Syringa vulgaris*	Common Lilac	dicots		x						
	Teucrium canadense	Canada Germander	dicots		x						
x	*Thalictrum dasycarpum*	Purple Meadow-rue	dicots		x						
	Thalictrum dioicum	Early Meadow-rue	dicots	x	x						
*	*Thlaspi arvense*	Field Pennycress	dicots		x						
	Tilia americana	Basswood	dicots		x						
	Toxicodendron radicans	Poison Ivy	dicots		x			x		x	x
*	*Tragopogon dubius*	Yellow Goatsbeard	dicots		x						
*?	*Tragopogon porrifolius*	Purple Goatsbeard	dicots		x						
*	*Tragopogon pratensis*	Meadow Goatsbeard	dicots		x						
*	*Trifolium campestre*	Low Hop Clover	dicots		x						
*	*Trifolium fragiferum*	Strawberry Clover	dicots		x						
*	*Trifolium pratense*	Red Clover	dicots		x						
*	*Trifolium repens*	White Clover	dicots		x						
	Triodanis perfoliata	Clasping-leaved Venus' Looking-glass	dicots		x						
*	*Tussilago farfara*	Coltsfoot	dicots		x						
	Ulmus americana	White Elm	dicots		x						x
*	*Ulmus pumila*	Siberian Elm	dicots		x						
	Urtica dioica	Stinging Nettle	dicots		x						
	Vaccinium pallidum	Pale Blueberry	dicots		x						
*	*Verbascum blattaria*	Moth Mullein	dicots	x	x						
*	*Verbascum thapsus*	Common Mullein	dicots		x						
x	*Verbena hastata*	Blue Vervain	dicots	x	x						
x	*Verbena stricta*	Hoary Vervain	dicots		x						
	Verbena urticifolia	White Vervain	dicots		x						
	Verbesina alternifolia	Wingstem	dicots			x					
x	*Vernonia gigantea*	Giant Ironweed	dicots			x		x			
x	*Vernonia missurica*	Missouri Ironweed	dicots		x	x					
*	*Veronica persica*	Bird's-eye Speedwell	dicots		x						
x	*Veronicastrum virginicum*	Culver's Root	dicots			x				x	
	Viburnum lentago	Nannyberry	dicots	x	x						
	Viburnum opulus	Cranberry Viburnum	dicots		x						
	Vicia americana	American Vetch	dicots		x						
*	*Vicia cracca*	Tufted Vetch	dicots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
*	*Vicia sativa*	Common Vetch	dicots		x						
*	*Vicia villosa*	Hairy Vetch	dicots		x						
*	*Vinca minor*	Lesser Periwinkle	dicots	x	x						
*	*Vincetoxicum rossicum*	European Swallowwort	dicots		x						
	Viola pubescens	Yellow Violet	dicots	x	x						
	Viola sagittata	Arrow-leaved Violet	dicots		x						
	Viola sororia	Woolly Blue Violet	dicots		x						
	Vitis aestivalis	Summer Grape	dicots	x	x						
	Vitis riparia	Riverbank Grape	dicots		x			x	x	x	x
	Xanthium strumarium	Rough Cockleburr	dicots		x						
	Zanthoxylum americanum	Common Prickly-ash	dicots	x	x					x	
	Zizia aurea	Golden Alexanders	dicots		x						
*	*Agrostis capillaris*	Colonial Bentgrass	monocots		x						
x	*Aletris farinosa*	White Colicroot	monocots	x	x	x					
	Alisma triviale	Northern Water-plantain	monocots		x						
	Allium canadense	Canada Garlic	monocots		x						
x	*Andropogon gerardi*	Big Bluestem	monocots		x			x	x		
x	*Andropogon virginicus*	Broomsedge Bluestem	monocots		x						
	Arisaema triphyllum	Jack-in-the-pulpit	monocots	x	x						x
x	*Aristida purpurascens*	Arrowfeather Threeawn Grass	monocots			x					
*	*Asparagus officinalis*	Garden Asparagus	monocots		x						
*	*Bromus inermis*	Smooth Brome	monocots		x			x			
x	*Bromus kalmii*	Kalm's Brome	monocots		x						
*	*Butomus umbellatus*	Flowering-rush	monocots		x						
x	*Calamagrostis canadensis*	Bluejoint Reedgrass	monocots		x						x
	Carex alopecoidea	Foxtail Sedge	monocots		x						
x	*Carex annectens*	Yellow-fruited Sedge	monocots			x					
	Carex aurea	Golden Sedge	monocots		x						
	Carex bebbii	Bebb's Sedge	monocots		x						
x	*Carex conoidea*	Field Sedge	monocots			x					
	Carex cristatella	Crested Sedge	monocots		x						
	Carex granularis	Limestone Meadow Sedge	monocots		x						
	Carex hystericina	Porcupine Sedge	monocots		x						
	Carex intumescens	Bladder Sedge	monocots		x						
	Carex leptonervia	Finely-nerved Sedge	monocots		x						
	Carex lupulina	Hop Sedge	monocots	x	x						
x	*Carex meadii*	Mead's Sedge	monocots			x					
	Carex muehlenbergii	Muhlenberg's Sedge	monocots		x						
	Carex pellita	Woolly Sedge	monocots		x						
	Carex pensylvanica	Pennsylvania Sedge	monocots		x					x	
	Carex prairea	Prairie Sedge	monocots		x						
	Carex scoparia	Pointed Broom Sedge	monocots		x						
	Carex sparganioides	Burreed Sedge	monocots		x						
x	*Carex swanii*	Swan's Sedge	monocots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
x	*Carex tetanica*	Rigid Sedge	monocots			x					
	Carex viridula	Greenish Sedge	monocots		x						
	Carex vulpinoidea	Fox Sedge	monocots		x						
	Cenchrus longispinus	Long-spined Sandbur	monocots		x						
*	*Commelina communis*	Asiatic Dayflower	monocots		x						
*	*Convallaria majalis*	European Lily-of-the-valley	monocots		x						
	Corallorhiza odontorhiza	Autumn Coralroot	monocots		x						
	Cyperus bipartitus	Shining Flatsedge	monocots		x						
	Cyperus esculentus	Perennial Yellow Flatsedge	monocots		x						
	Cyperus lupulinus	Hop Flatsedge	monocots		x						
	Cyperus odoratus	Rusty Flatsedge	monocots		x						
	Cyperus strigosus	Straw-coloured Flatsedge	monocots		x						
	Cypripedium parviflorum var. makasin	Northern Yellow Lady's-slipper	monocots	x	x						
*	*Dactylis glomerata*	Orchard Grass	monocots		x			x			
	Danthonia spicata	Poverty Oatgrass	monocots	x	x						
	Dichanthelium implicatum	Slender-stemmed Panicgrass	monocots		x						
	Dichanthelium oligosanthes	Few-flowered Panicgrass	monocots		x						
x	*Dichanthelium praecocius*	Early-branching Panicgrass	monocots			x					
x	*Dichanthelium sphaerocarpon*	Round-fruited Panicgrass	monocots			x					
x	*Digitaria cognata*	Fall Crabgrass	monocots		x						
	Dioscorea villosa	Wild Yam	monocots		x						
*	*Echinochloa crus-galli*	Large Barnyard Grass	monocots		x						
*	*Eleusine indica*	India Goosegrass	monocots		x						
	Elodea canadensis	Canada Waterweed	monocots		x						
x	*Elymus canadensis*	Canada Wildrye	monocots		x						
	Elymus hystrix	Bottlebrush Grass	monocots		x						
*	*Elymus repens*	Quackgrass	monocots		x						
x	*Eragrostis spectabilis*	Purple Lovegrass	monocots		x						
	Erythronium americanum	Yellow Trout-lily	monocots	x	x						
	Festuca rubra	Red Fescue	monocots		x			x			
	Fimbristylis autumnalis	Slender Fimbristylis	monocots		x						
*	*Galanthus nivalis*	Common Snowdrop	monocots		x						
	Glyceria striata	Fowl Mannagrass	monocots		x						
*	*Hemerocallis fulva*	Orange Daylily	monocots		x						
*	*Holcus lanatus*	Common Velvetgrass	monocots	x	x						
	Hordeum jubatum	Foxtail Barley	monocots		x						
x	*Hypoxis hirsuta*	Eastern Yellow Stargrass	monocots	x	x	x					
	Iris versicolor	Harlequin Blue Flag	monocots		x						x
	Iris virginica	Southern Blue Flag	monocots		x						
x	*Juncus acuminatus*	Sharp-fruited Rush	monocots			x					
x	*Juncus anthelatus*	Greater Poverty Rush	monocots			x					
	Juncus articulatus	Jointed Rush	monocots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
x	*Juncus biflorus*	Two-flowered Rush	monocots			x					
x	*Juncus brachycarpus*	Short-fruited Rush	monocots			x					
	Juncus dudleyi	Dudley's Rush	monocots		x						
x	*Juncus greenei*	Greene's Rush	monocots			x					
	Juncus tenuis	Path Rush	monocots		x						
	Juncus torreyi	Torrey's Rush	monocots		x						
	Leersia oryzoides	Rice Cutgrass	monocots		x						x
	Leersia virginica	White Cutgrass	monocots		x						
	Lemna minor	Small Duckweed	monocots		x						
x	*Lilium michiganense*	Michigan Lily	monocots	x	x						
x	*Liparis liliifolia*	Purple Twayblade	monocots			x	x				
	Liparis loeselii	Loesel's Twayblade	monocots		x						
*	*Lolium arundinaceum*	Tall Ryegrass	monocots		x						
*	*Lolium perenne*	Perennial Ryegrass	monocots		x						
	Luzula multiflora	Many-flowered Woodrush	monocots	x	x						
	Maianthemum racemosum	Large False Solomon's Seal	monocots	x	x					x	
	Maianthemum stellatum	Star-flowered False Solomon's Seal	monocots	x	x						
*	*Miscanthus sacchariflorus*	Amur Silvergrass	monocots		x						
*	*Muscari botryoides*	Common Grape-hyacinth	monocots		x						
*	*Ornithogalum umbellatum*	Common Star-of-Bethlehem	monocots		x						
*	*Panicum dichotomiflorum*	Fall Panicgrass	monocots		x						
	Panicum flexile	Wiry Panicgrass	monocots		x						
x	*Panicum virgatum*	Old Switch Panicgrass	monocots		x			x			
x	*Paspalum setaceum*	Slender Paspalum	monocots			x					
	Phalaris arundinacea	Reed Canarygrass	monocots		x						
*	*Phleum pratense*	Common Timothy	monocots		x						
	Phragmites australis	Common Reed	monocots		x						
	Platanthera lacera	Ragged Fringed Orchid	monocots		x						
	Poa alsodes	Grove Bluegrass	monocots		x						
*	*Poa annua*	Annual Bluegrass	monocots		x						
*	*Poa bulbosa*	Bulbous Bluegrass	monocots		x						
*	*Poa compressa*	Canada Bluegrass	monocots		x						
	Potamogeton richardsonii	Richardson's Pondweed	monocots		x						
*	*Puschkinia scilloides*	Striped Squill	monocots		x						
	Rhynchospora capitellata	Small-headed Beakrush	monocots		x						
x	*Schizachyrium scoparium*	Little Bluestem	monocots		x				x		
	Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	monocots		x						
*	*Scilla siberica*	Siberian Squill	monocots		x						
	Scirpus atrovirens	Dark-green Bulrush	monocots	x	x						
	Scirpus hattorianus	Mosquito Bulrush	monocots		x						
	Scirpus pendulus	Hanging Bulrush	monocots		x						x
x	*Scleria triglomerata*	Whip Nutrush	monocots			x					
*	*Setaria faberi*	Giant Foxtail	monocots		x						

	Scientific Name	English Name	Narrow Taxon Group	iNaturalist Study Area	iNaturalist BioBlitz Area	NHIC	Incidental	WODM3-2	SVDM1-1	FODM1-3	SWDM1-3
*	*Setaria viridis*	Green Foxtail	monocots		x						
x	*Sisyrinchium albidum*	White Blue-eyed-grass	monocots			x					
	Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass	monocots		x						
x	*Smilax ecirrata*	Upright Carrionflower	monocots			x					
	Smilax herbacea	Herbaceous Carrionflower	monocots		x						
	Smilax lasioneura	Hairy-nerved Carrionflower	monocots		x						
	Smilax tamnoides	Bristly Greenbriar	monocots		x						
x	*Sorghastrum nutans*	Yellow Indiangrass	monocots	x	x						
	Spiranthes incurva	Sphinx Ladies'-tresses	monocots		x						
	Spiranthes lucida	Shining Ladies'-tresses	monocots		x						
x	*Spiranthes magnicamporum*	Great Plains Ladies'-tresses	monocots			x					
	Spirodela polyrhiza	Great Duckweed	monocots		x						
x	*Sporobolus compositus*	Rough Dropseed	monocots		x						
x	*Sporobolus michauxianus*	Prairie Cordgrass	monocots	x	x			x			
	Symplocarpus foetidus	Eastern Skunk Cabbage	monocots	x	x						
x	*Tradescantia ohiensis*	Ohio Spiderwort	monocots			x					
*	*Tradescantia virginiana*	Virginia Spiderwort	monocots	x	x						
*	*Tridens flavus*	Purpletop Tridens	monocots		x						
	Trillium grandiflorum	White Trillium	monocots		x						
	Typha latifolia	Broad-leaved Cattail	monocots		x						
	Uvularia sessilifolia	Sessile-leaved Bellwort	monocots	x	x						
	Vallisneria americana	American Eelgrass	monocots		x						
	Asplenium platyneuron	Ebony Spleenwort	pteridophytes		x						
	Athyrium filix-femina	Common Lady Fern	pteridophytes		x						
	Botrypus virginianus	Rattlesnake Fern	pteridophytes		x						
	Dryopteris carthusiana	Spinulose Wood Fern	pteridophytes		x						
	Equisetum arvense	Field Horsetail	pteridophytes		x						
	Equisetum hyemale	Common Scouring-rush	pteridophytes		x						
x	*Equisetum laevigatum*	Smooth Scouring-rush	pteridophytes		x						
	Matteuccia struthiopteris	Ostrich Fern	pteridophytes		x						
	Onoclea sensibilis	Sensitive Fern	pteridophytes	x	x						x
	Osmunda regalis	Royal Fern	pteridophytes		x						x
	Osmundastrum cinnamomeum	Cinnamon Fern	pteridophytes	x	x				x		
	Pteridium aquilinum	Bracken Fern	pteridophytes	x	x				x		
	Sceptridium dissectum	Cut-leaved Grapefern	pteridophytes		x						
	Thelypteris palustris	Marsh Fern	pteridophytes		x						x

x *indicates the species is a Tallgrass Indicator Species from the SOFIA database*

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	iNaturalist Study Area	iNaturalist BioBlitz Area	eBird Hotspot	OBBA	NHIC	Incidentals	BBS Survey (Table 2)	Comments
	Acanthis flammea	Common Redpoll	S4B	G5				x	x	x					
	Acanthis hornemanni	Hoary Redpoll	SNA	G5					x						
	Accipiter cooperii	Cooper's Hawk	S4	G5	NAR	NAR		x	x	x	x				
	Accipiter gentilis	Northern Goshawk	S4	G5	NAR	NAR				x					
	Accipiter striatus	Sharp-shinned Hawk	S5	G5	NAR	NAR		x	x	x					
	Actitis macularius	Spotted Sandpiper	S5	G5					x	x	x				
	Aegolius acadicus	Northern Saw-whet Owl	S4	G5						x					
	Agelaius phoeniceus	Red-winged Blackbird	S4	G5				x	x	x	x			x	
	Aix sponsa	Wood Duck	S5	G5				x	x	x	x				
	Ammodramus savannarum	Grasshopper Sparrow	S4B	G5	SC	SC	SC			x					
	Anas acuta	Northern Pintail	S5	G5					x						
	Anas americana	American Wigeon	S4	G5						x					
	Anas discors	Blue-winged Teal	S4	G5						x					
	Anas platyrhynchos	Mallard	S5	G5				x	x	x	x				
	Anas rubripes	American Black Duck	S4	G5						x					
	Anas strepera	Gadwall	S4	G5						x					
	Anser albifrons	Greater White-fronted Goose	SNA	G5					x						
	Anthus rubescens	American Pipit	S4	G5						x					
	Antrostomus vociferus	Eastern Whip-poor-will	S4B	G5	THR	THR	THR			x	x				
	Archilochus colubris	Ruby-throated Hummingbird	S5B	G5					x	x	x				
	Ardea alba	Great Egret	S2B	G5					x	x					
	Ardea herodias	Great Blue Heron	S4	G5					x	x					
	Arenaria interpres	Ruddy Turnstone	SNA	G5						x					
	Asio flammeus	Short-eared Owl	S2N,S4B	G5	SC	SC	SC			x					
	Asio otus	Long-eared Owl	S4	G5						x					
	Aythya affinis	Lesser Scaup	S4	G5					x	x					
	Aythya americana	Redhead	S2B,S4N	G5					x	x					
	Aythya collaris	Ring-necked Duck	S5	G5						x					
	Aythya marila	Greater Scaup	S4	G5					x	x					
	Aythya valisineria	Canvasback	S1B,S4N	G5						x					
X	Baeolophus bicolor	Tufted Titmouse	S4	G5				x	x	x	x				Oak savannas. Not restricted to this type, as it also occurs in open woodland and swampland habitats.
	Bombycilla cedrorum	Cedar Waxwing	S5B	G5					x	x	x				
	Botaurus lentiginosus	American Bittern	S4B	G5					x						
	Branta canadensis	Canada Goose	S5	G5				x	x	x	x				
	Branta hutchinsii	Cackling Goose	S4M	G5					x						
	Bubo virginianus	Great Horned Owl	S4	G5				x	x	x	x				
	Bucephala albeola	Bufflehead	S4	G5					x	x					
	Bucephala clangula	Common Goldeneye	S5	G5					x	x					
	Buteo jamaicensis	Red-tailed Hawk	S5	G5	NAR	NAR		x	x	x	x				
	Buteo lagopus	Rough-legged Hawk	S1B,S4N	G5	NAR	NAR				x					
	Buteo lineatus	Red-shouldered Hawk	S4B	G5	NAR	NAR		x	x	x					

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	iNaturalist Study Area	iNaturalist BioBlitz Area	eBird Hotspot	OBBA	NHIC	Incidentals	BBS Survey (Table 2)	Comments
	Buteo platypterus	Broad-winged Hawk	S5B	G5				x	x	x					
	Butorides virescens	Green Heron	S4B	G5				x	x	x	x				
	Calcarius lapponicus	Lapland Longspur	S3B	G5				x	x	x					
	Calidris melanotos	Pectoral Sandpiper	SHB,S5N	G5						x					
	Calidris minutilla	Least Sandpiper	S4B,S5N	G5						x					
	Calidris pusilla	Semipalmated Sandpiper	S3B,S4N	G5						x					
	Cardellina canadensis	Canada Warbler	S4B	G5	THR	SC	THR		x	x					
	Cardellina pusilla	Wilson's Warbler	S4B	G5					x	x					
	Cardinalis cardinalis	Northern Cardinal	S5	G5				x	x	x	x			x	
	Cathartes aura	Turkey Vulture	S5B	G5					x	x	x				
	Catharus fuscescens	Veery	S4B	G5					x	x					
	Catharus guttatus	Hermit Thrush	S5B	G5				x	x	x					
	Catharus minimus	Gray-cheeked Thrush	S4B	G5				x	x	x					
	Catharus ustulatus	Swainson's Thrush	S4B	G5					x	x					
	Certhia americana	Brown Creeper	S5B	G5				x	x	x					
	Chaetura pelagica	Chimney Swift	S4B,S4N	G4G5	THR	THR	THR			x	x				
	Charadrius semipalmatus	Semipalmated Plover	S4B,S4N	G5						x					
	Charadrius vociferus	Killdeer	S5B,S5N	G5				x	x	x	x				
	Chordeiles minor	Common Nighthawk	S4B	G5	SC	SC	THR		x	x	x				
	Chroicocephalus philadelphia	Bonaparte's Gull	S4B,S4N	G5					x	x					
	Circus hudsonius	Northern Harrier	S4B	G5	NAR	NAR			x	x					
	Cistothorus palustris	Marsh Wren	S4B	G5						x					
	Cistothorus platensis	Sedge Wren	S4B	G5	NAR	NAR					x				
	Coccothraustes vespertinus	Evening Grosbeak	S4B	G5	SC				x	x					
	Coccyzus americanus	Yellow-billed Cuckoo	S4B	G5					x	x	x				
	Coccyzus erythropthalmus	Black-billed Cuckoo	S5B	G5					x	x	x				
	Coccyzus sp.	Black/Yellow-billed Cuckoo	N/A	N/A	N/A	N/A	N/A				x				
	Colaptes auratus	Northern Flicker	S4B	G5				x	x	x	x				
X	Colinus virginianus	Northern Bobwhite	S1	G4G5	END	END	END	x	x	x					Almost extirpated in Ontario, with only relatively stable populations on Walpole Isand
*	Columba livia	Rock Pigeon	SNA	G5				x	x	x	x				
	Contopus cooperi	Olive-sided Flycatcher	S4B	G4	SC	SC	THR		x	x					
	Contopus virens	Eastern Wood-pewee	S4B	G5	SC	SC	SC	x	x	x	x		x		
	Corvus brachyrhynchos	American Crow	S5B	G5				x	x	x	x				
	Cyanocitta cristata	Blue Jay	S5	G5				x	x	x	x			x	
	Cygnus buccinator	Trumpeter Swan	S4	G4	NAR	NAR				x					
	Cygnus columbianus	Tundra Swan	S4	G5						x					
*	Cygnus olor	Mute Swan	SNA	G5					x	x					
	Dolichonyx oryzivorus	Bobolink	S4B	G5	THR	THR	THR			x	x				
	Dumetella carolinensis	Gray Catbird	S4B	G5				x	x	x	x		x	x	
	Empidonax alnorum	Alder Flycatcher	S5B	G5						x	x				
	Empidonax flaviventris	Yellow-bellied Flycatcher	S5B	G5					x	x					
	Empidonax minimus	Least Flycatcher	S4B	G5					x	x					

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	Empidonax traillii	Willow Flycatcher	S5B	G5						x	x				
	Eremophila alpestris	Horned Lark	S5B	G5				x	x	x	x				
	Euphagus carolinus	Rusty Blackbird	S4B	G4	SC	NAR	SC	x	x	x					
	Falco columbarius	Merlin	S5B	G5	NAR	NAR			x	x					
	Falco peregrinus	Peregrine Falcon	S3B	G4	NAR	SC	SC		x	x	x				
	Falco sparverius	American Kestrel	S4	G5				x	x	x	x				
	Fulica americana	American Coot	S4B	G5	NAR	NAR				x					
	Gallinago delicata	Wilson's Snipe	S5B	G5						x					
	Gavia immer	Common Loon	S5B,S5N	G5	NAR	NAR		x	x						
	Geothlypis philadelphia	Mourning Warbler	S4B	G5						x	x				
	Geothlypis trichas	Common Yellowthroat	S5B	G5				x	x	x	x				
	Grus canadensis	Sandhill Crane	S5B	G5						x					
*	Haemorhous mexicanus	House Finch	SNA	G5				x	x	x	x				
	Haemorhous purpureus	Purple Finch	S4B	G5				x	x	x					
	Haliaeetus leucocephalus	Bald Eagle	S2N,S4B	G5	NAR	SC			x	x					
	Helmitheros vermivorum	Worm-eating Warbler	SNA	G5					x						
	Hirundo rustica	Barn Swallow	S5B	G5	THR	THR	THR	x	x	x	x	x			
	Hydroprogne caspia	Caspian Tern	S3B	G5	NAR	NAR			x						
	Hylocichla mustelina	Wood Thrush	S4B	G4	THR	SC	THR		x	x	x	x			
X	Icteria virens	Yellow-breasted Chat	S1B	G5	END	END	END				x				
	Icterus galbula	Baltimore Oriole	S4B	G5				x	x	x	x				
	Icterus spurius	Orchard Oriole	S4B	G5					x	x	x				
	Ixobrychus exilis	Least Bittern	S4B	G4G5	THR	THR	THR		x						
	Junco hyemalis	Dark-eyed Junco	S5B	G5				x	x	x					
	Lanius borealis	Northern Shrike	S4	G5						x					
	Larus argentatus	Herring Gull	S5B,S5N	G5					x	x					
	Larus delawarensis	Ring-billed Gull	S5B,S4N	G5				x	x	x					
	Larus glaucoides	Iceland Gull	S4N	G5						x					
	Larus marinus	Great Black-backed Gull	S2B	G5						x					
	Lophodytes cucullatus	Hooded Merganser	S5B,S5N	G5					x	x					
	Loxia curvirostra	Red Crossbill	S4B	G5						x					
	Loxia leucoptera	White-winged Crossbill	S5B	G5						x					
	Megaceryle alcyon	Belted Kingfisher	S4B	G5				x	x	x	x				
	Megascops asio	Eastern Screech-Owl	S4	G5	NAR	NAR			x	x	x				
	Melanerpes carolinus	Red-bellied Woodpecker	S4	G5				x	x	x	x		x		
X	Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	G5	END	SC	THR	x	x	x	x	x			Oak savannas. But not restricted to this type.
	Melanerpes lewis	Lewis's Woodpecker	SNA	G4						x					
	Meleagris gallopavo	Wild Turkey	S5	G5				x	x	x	x				
	Melospiza georgiana	Swamp Sparrow	S5B	G5				x	x	x					
	Melospiza lincolnii	Lincoln's Sparrow	S5B	G5				x	x	x					
	Melospiza melodia	Song Sparrow	S5B	G5				x	x	x	x			x	
	Mergus merganser	Common Merganser	S5B,S5N	G5					x	x					
	Mergus serrator	Red-breasted Merganser	S4B,S5N	G5					x	x					
	Mimus polyglottos	Northern Mockingbird	S4	G5					x	x	x				

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	iNaturalist Study Area	iNaturalist BioBlitz Area	eBird Hotspot	OBBA	NHIC	Incidentals	BBS Survey (Table 2)	Comments
	Mniotilta varia	Black-and-white Warbler	S5B	G5				x	x	x				x	
	Molothrus ater	Brown-headed Cowbird	S4B	G5				x	x	x	x				
	Myiarchus crinitus	Great Crested Flycatcher	S4B	G5				x	x	x	x				
	Nycticorax nycticorax	Black-crowned Night-heron	S3B,S3N	G5					x	x					
	Oporornis agilis	Connecticut Warbler	S4B	G4G5				x	x	x					
	Oreothlypis celata	Orange-crowned Warbler	S4B	G5						x					
	Oreothlypis peregrina	Tennessee Warbler	S5B	G5						x					
	Oreothlypis ruficapilla	Nashville Warbler	S5B	G5						x					
	Oxyura jamaicensis	Ruddy Duck	S4B,S4N	G5						x					
	Pandion haliaetus	Osprey	S5B	G5				x	x	x					
	Parkesia motacilla	Louisiana Waterthrush	S3B	G5	THR	THR	SC		x	x					
	Parkesia noveboracensis	Northern Waterthrush	S5B	G5						x					
*	Passer domesticus	House Sparrow	SNA	G5				x	x	x	x			x	
	Passerculus sandwichensis	Savannah Sparrow	S4B	G5					x	x	x				
	Passerella iliaca	Fox Sparrow	S4B	G5				x	x	x					
	Passerina caerulea	Blue Grosbeak	SNA	G5				x	x	x					
	Passerina cyanea	Indigo Bunting	S4B	G5				x	x	x	x		x	x	
	Petrochelidon pyrrhonota	Cliff Swallow	S4B	G5							x				
	Phalacrocorax auritus	Double-crested Cormorant	S5B	G5	NAR	NAR			x	x					
*	Phasianus colchicus	Ring-necked Pheasant	SNA	G5				x	x	x	x				
	Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B	G5				x	x	x	x				
	Picoides pubescens	Downy Woodpecker	S5	G5						x	x		x	x	
	Picoides villosus	Hairy Woodpecker	S5	G5						x	x		x		
	Pipilo erythrophthalmus	Eastern Towhee	S4B	G5				x	x	x	x				
	Piranga olivacea	Scarlet Tanager	S4B	G5					x	x	x				
	Plectrophenax nivalis	Snow Bunting	SNA	G5				x	x	x					
	Podiceps auritus	Horned Grebe	S1B,S4N	G5	SC	SC	SC		x						
	Podilymbus podiceps	Pied-billed Grebe	S4B,S4N	G5						x					
	Poecile atricapillus	Black-capped Chickadee	S5	G5				x	x	x	x				
	Polioptila caerulea	Blue-gray Gnatcatcher	S4B	G5				x	x		x				
	Pooecetes gramineus	Vesper Sparrow	S4B	G5				x	x	x					
	Porzana carolina	Sora	S4B	G5						x					
	Progne subis	Purple Martin	S3S4B	G5						x					
	Quiscalus quiscula	Common Grackle	S5B	G5				x	x	x	x			x	
	Rallus limicola	Virginia Rail	S5B	G5						x					
	Regulus calendula	Ruby-crowned Kinglet	S4B	G5				x	x	x					
	Regulus satrapa	Golden-crowned Kinglet	S5B	G5				x	x	x					
	Riparia riparia	Bank Swallow	S4B	G5	THR	THR	THR	x	x	x	x				
	Sayornis phoebe	Eastern Phoebe	S5B	G5				x	x	x			x		
	Scolopax minor	American Woodcock	S4B	G5					x	x	x				
	Seiurus aurocapilla	Ovenbird	S4B	G5					x	x	x				
	Setophaga americana	Northern Parula	S4B	G5					x	x					
	Setophaga caerulescens	Black-throated Blue Warbler	S5B	G5				x	x	x					
	Setophaga castanea	Bay-breasted Warbler	S5B	G5				x	x	x					

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	Setophaga cerulea	Cerulean Warbler	S3B	G4	END	THR	END		x	x					
	Setophaga citrina	Hooded Warbler	S4B	G5	NAR	NAR				x	x				
	Setophaga coronata	Yellow-rumped Warbler	S5B	G5				x	x	x					
	Setophaga fusca	Blackburnian Warbler	S5B	G5				x	x	x					
	Setophaga magnolia	Magnolia Warbler	S5B	G5					x	x					
	Setophaga palmarum hypochrysea	Eastern Palm Warbler	S1B	G5TU						x					
	Setophaga pensylvanica	Chestnut-sided Warbler	S5B	G5					x	x	x			x	
	Setophaga petechia	Yellow Warbler	S5B	G5				x	x	x	x			x	
	Setophaga pinus	Pine Warbler	S5B	G5					x						
	Setophaga ruticilla	American Redstart	S5B	G5				x	x	x	x			x	
	Setophaga striata	Blackpoll Warbler	S4B	G5				x	x	x					
	Setophaga tigrina	Cape May Warbler	S5B	G5					x	x					
	Setophaga virens	Black-throated Green Warbler	S5B	G5				x	x	x					
	Sialia sialis	Eastern Bluebird	S5B	G5	NAR	NAR			x	x	x				
	Sitta canadensis	Red-breasted Nuthatch	S5	G5					x						
	Sitta carolinensis	White-breasted Nuthatch	S5	G5				x	x	x	x		x		
	Sphyrapicus varius	Yellow-bellied Sapsucker	S5B	G5				x	x	x					
	Spinus pinus	Pine Siskin	S4B	G5				x	x	x					
	Spinus tristis	American Goldfinch	S5B	G5				x	x	x	x			x	
	Spiza americana	Dickcissel	SNA	G5						x					
	Spizella arborea	American Tree Sparrow	S4B	G5						x					
	Spizella pallida	Clay-colored Sparrow	S4B	G5				x	x						
	Spizella passerina	Chipping Sparrow	S5B	G5					x	x	x				
	Spizella pusilla	Field Sparrow	S4B	G5				x	x	x	x				
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B	G5				x	x	x	x				
	Sterna hirundo	Common Tern	S4B	G5	NAR	NAR				x					
	Sturnella magna	Eastern Meadowlark	S4B	G5	THR	THR	THR	x	x	x	x	x			
*	Sturnus vulgaris	European Starling	SNA	G5				x	x	x	x			x	
	Tachycineta bicolor	Tree Swallow	S4B	G5					x	x	x				
	Thryothorus ludovicianus	Carolina Wren	S4	G5				x	x	x	x			x	
	Toxostoma rufum	Brown Thrasher	S4B	G5				x	x	x	x				
	Tringa flavipes	Lesser Yellowlegs	S4B,S4N	G5						x					
	Tringa melanoleuca	Greater Yellowlegs	S4B,S4N	G5					x	x					
	Tringa solitaria	Solitary Sandpiper	S4B	G5				x	x	x					
	Troglodytes aedon	House Wren	S5B	G5				x	x	x	x		x	x	
	Troglodytes hiemalis	Winter Wren	S5B	G5				x	x	x					
	Turdus migratorius	American Robin	S5B	G5				x	x	x	x			x	
	Tyrannus tyrannus	Eastern Kingbird	S4B	G5					x	x	x				
	Vermivora chrysoptera	Golden-winged Warbler	S4B	G4	THR	SC	THR			x					
	Vermivora cyanoptera	Blue-winged Warbler	S4B	G5				x	x	x	x				
	Vermivora sp.	Brewster's Warbler (hybrid)	N/A	N/A	N/A	N/A	N/A				x				
	Vireo flavifrons	Yellow-throated Vireo	S4B	G5						x	x				

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Vireo gilvus	Warbling Vireo	S5B	G5				x	x	x	x			x	
Vireo griseus	White-eyed Vireo	S2B	G5						x		x			
Vireo olivaceus	Red-eyed Vireo	S5B	G5					x	x	x			x	
Vireo philadelphicus	Philadelphia Vireo	S5B	G5				x	x	x					
Vireo solitarius	Blue-headed Vireo	S5B	G5				x	x	x					
Zenaida macroura	Mourning Dove	S5	G5				x	x	x	x				
Zonotrichia albicollis	White-throated Sparrow	S5B	G5				x	x	x					
Zonotrichia leucophrys	White-crowned Sparrow	S4B	G5					x	x					

x *indicates the species is a Tallgrass Indicator Species from the SOFIA database*

	Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
	Acanthis flammea	Common Redpoll													
	Acanthis hornemanni	Hoary Redpoll													
	Accipiter cooperii	Cooper's Hawk													
	Accipiter gentilis	Northern Goshawk													
	Accipiter striatus	Sharp-shinned Hawk													
	Actitis macularius	Spotted Sandpiper													
	Aegolius acadicus	Northern Saw-whet Owl													
	Agelaius phoeniceus	Red-winged Blackbird	x				x								PO
	Aix sponsa	Wood Duck													
	Ammodramus savannarum	Grasshopper Sparrow													
	Anas acuta	Northern Pintail													
	Anas americana	American Wigeon													
	Anas discors	Blue-winged Teal													
	Anas platyrhynchos	Mallard													
	Anas rubripes	American Black Duck													
	Anas strepera	Gadwall													
	Anser albifrons	Greater White-fronted Goose													
	Anthus rubescens	American Pipit													
	Antrostomus vociferus	Eastern Whip-poor-will													
	Archilochus colubris	Ruby-throated Hummingbird													
	Ardea alba	Great Egret													
	Ardea herodias	Great Blue Heron													
	Arenaria interpres	Ruddy Turnstone													
	Asio flammeus	Short-eared Owl													
	Asio otus	Long-eared Owl													
	Aythya affinis	Lesser Scaup													
	Aythya americana	Redhead													
	Aythya collaris	Ring-necked Duck													
	Aythya marila	Greater Scaup													
	Aythya valisineria	Canvasback													
X	Baeolophus bicolor	Tufted Titmouse													
	Bombycilla cedrorum	Cedar Waxwing													
	Botaurus lentiginosus	American Bittern													
	Branta canadensis	Canada Goose													
	Branta hutchinsii	Cackling Goose													
	Bubo virginianus	Great Horned Owl													
	Bucephala albeola	Bufflehead													
	Bucephala clangula	Common Goldeneye													
	Buteo jamaicensis	Red-tailed Hawk													
	Buteo lagopus	Rough-legged Hawk													
	Buteo lineatus	Red-shouldered Hawk													

	Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
	Buteo platypterus	Broad-winged Hawk													
	Butorides virescens	Green Heron													
	Calcarius lapponicus	Lapland Longspur													
	Calidris melanotos	Pectoral Sandpiper													
	Calidris minutilla	Least Sandpiper													
	Calidris pusilla	Semipalmated Sandpiper													
	Cardellina canadensis	Canada Warbler													
	Cardellina pusilla	Wilson's Warbler													
	Cardinalis cardinalis	Northern Cardinal				x			x	x	x	x			PR
	Cathartes aura	Turkey Vulture													
	Catharus fuscescens	Veery													
	Catharus guttatus	Hermit Thrush													
	Catharus minimus	Gray-cheeked Thrush													
	Catharus ustulatus	Swainson's Thrush													
	Certhia americana	Brown Creeper													
	Chaetura pelagica	Chimney Swift													
	Charadrius semipalmatus	Semipalmated Plover													
	Charadrius vociferus	Killdeer													
	Chordeiles minor	Common Nighthawk													
	Chroicocephalus philadelphia	Bonaparte's Gull													
	Circus hudsonius	Northern Harrier													
	Cistothorus palustris	Marsh Wren													
	Cistothorus platensis	Sedge Wren													
	Coccothraustes vespertinus	Evening Grosbeak													
	Coccyzus americanus	Yellow-billed Cuckoo													
	Coccyzus erythropthalmus	Black-billed Cuckoo													
	Coccyzus sp.	Black/Yellow-billed Cuckoo													
	Colaptes auratus	Northern Flicker													
X	Colinus virginianus	Northern Bobwhite													
*	Columba livia	Rock Pigeon													
	Contopus cooperi	Olive-sided Flycatcher													
	Contopus virens	Eastern Wood-pewee													
	Corvus brachyrhynchos	American Crow													
	Cyanocitta cristata	Blue Jay	x			x	x								PO
	Cygnus buccinator	Trumpeter Swan													
	Cygnus columbianus	Tundra Swan													
*	Cygnus olor	Mute Swan													
	Dolichonyx oryzivorus	Bobolink													
	Dumetella carolinensis	Gray Catbird	x		x	x			x	x	x	x		x	PR
	Empidonax alnorum	Alder Flycatcher													
	Empidonax flaviventris	Yellow-bellied Flycatcher													
	Empidonax minimus	Least Flycatcher													

	Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
	Empidonax traillii	Willow Flycatcher													
	Eremophila alpestris	Horned Lark													
	Euphagus carolinus	Rusty Blackbird													
	Falco columbarius	Merlin													
	Falco peregrinus	Peregrine Falcon													
	Falco sparverius	American Kestrel													
	Fulica americana	American Coot													
	Gallinago delicata	Wilson's Snipe													
	Gavia immer	Common Loon													
	Geothlypis philadelphia	Mourning Warbler													
	Geothlypis trichas	Common Yellowthroat													
	Grus canadensis	Sandhill Crane													
*	Haemorhous mexicanus	House Finch													
	Haemorhous purpureus	Purple Finch													
	Haliaeetus leucocephalus	Bald Eagle													
	Helmitheros vermivorum	Worm-eating Warbler													
	Hirundo rustica	Barn Swallow													
	Hydroprogne caspia	Caspian Tern													
	Hylocichla mustelina	Wood Thrush													
X	Icteria virens	Yellow-breasted Chat													
	Icterus galbula	Baltimore Oriole													
	Icterus spurius	Orchard Oriole													
	Ixobrychus exilis	Least Bittern													
	Junco hyemalis	Dark-eyed Junco													
	Lanius borealis	Northern Shrike													
	Larus argentatus	Herring Gull													
	Larus delawarensis	Ring-billed Gull													
	Larus glaucoides	Iceland Gull													
	Larus marinus	Great Black-backed Gull													
	Lophodytes cucullatus	Hooded Merganser													
	Loxia curvirostra	Red Crossbill													
	Loxia leucoptera	White-winged Crossbill													
	Megaceryle alcyon	Belted Kingfisher													
	Megascops asio	Eastern Screech-Owl													
	Melanerpes carolinus	Red-bellied Woodpecker													O
X	Melanerpes erythrocephalus	Red-headed Woodpecker													
	Melanerpes lewis	Lewis's Woodpecker													
	Meleagris gallopavo	Wild Turkey													
	Melospiza georgiana	Swamp Sparrow													
	Melospiza lincolnii	Lincoln's Sparrow													
	Melospiza melodia	Song Sparrow		x		x									O
	Mergus merganser	Common Merganser													
	Mergus serrator	Red-breasted Merganser													
	Mimus polyglottos	Northern Mockingbird													

	Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
	Mniotilta varia	Black-and-white Warbler				x									O
	Molothrus ater	Brown-headed Cowbird													
	Myiarchus crinitus	Great Crested Flycatcher													
	Nycticorax nycticorax	Black-crowned Night-heron													
	Oporornis agilis	Connecticut Warbler													
	Oreothlypis celata	Orange-crowned Warbler													
	Oreothlypis peregrina	Tennessee Warbler													
	Oreothlypis ruficapilla	Nashville Warbler													
	Oxyura jamaicensis	Ruddy Duck													
	Pandion haliaetus	Osprey													
	Parkesia motacilla	Louisiana Waterthrush													
	Parkesia noveboracensis	Northern Waterthrush													
*	Passer domesticus	House Sparrow	x		x										PR
	Passerculus sandwichensis	Savannah Sparrow													
	Passerella iliaca	Fox Sparrow													
	Passerina caerulea	Blue Grosbeak													
	Passerina cyanea	Indigo Bunting			x	x	x	x	x	x	x	x			PR
	Petrochelidon pyrrhonota	Cliff Swallow													
	Phalacrocorax auritus	Double-crested Cormorant													
*	Phasianus colchicus	Ring-necked Pheasant													
	Pheucticus ludovicianus	Rose-breasted Grosbeak													
	Picoides pubescens	Downy Woodpecker		x								x			PO
	Picoides villosus	Hairy Woodpecker													O
	Pipilo erythrophthalmus	Eastern Towhee													
	Piranga olivacea	Scarlet Tanager													
	Plectrophenax nivalis	Snow Bunting													
	Podiceps auritus	Horned Grebe													
	Podilymbus podiceps	Pied-billed Grebe													
	Poecile atricapillus	Black-capped Chickadee													
	Polioptila caerulea	Blue-gray Gnatcatcher													
	Pooecetes gramineus	Vesper Sparrow													
	Porzana carolina	Sora													
	Progne subis	Purple Martin													
	Quiscalus quiscula	Common Grackle											x		O
	Rallus limicola	Virginia Rail													
	Regulus calendula	Ruby-crowned Kinglet													
	Regulus satrapa	Golden-crowned Kinglet													
	Riparia riparia	Bank Swallow													
	Sayornis phoebe	Eastern Phoebe													O
	Scolopax minor	American Woodcock													
	Seiurus aurocapilla	Ovenbird													
	Setophaga americana	Northern Parula													
	Setophaga caerulescens	Black-throated Blue Warbler													
	Setophaga castanea	Bay-breasted Warbler													

	Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
	Setophaga cerulea	Cerulean Warbler													
	Setophaga citrina	Hooded Warbler													
	Setophaga coronata	Yellow-rumped Warbler													
	Setophaga fusca	Blackburnian Warbler													
	Setophaga magnolia	Magnolia Warbler													
	Setophaga palmarum hypochrysea	Eastern Palm Warbler													
	Setophaga pensylvanica	Chestnut-sided Warbler					x								O
	Setophaga petechia	Yellow Warbler			x	x	x	x		x		x			PR
	Setophaga pinus	Pine Warbler													
	Setophaga ruticilla	American Redstart				x		x	x			x		x	PO
	Setophaga striata	Blackpoll Warbler													
	Setophaga tigrina	Cape May Warbler													
	Setophaga virens	Black-throated Green Warbler													
	Sialia sialis	Eastern Bluebird													
	Sitta canadensis	Red-breasted Nuthatch													
	Sitta carolinensis	White-breasted Nuthatch													O
	Sphyrapicus varius	Yellow-bellied Sapsucker													
	Spinus pinus	Pine Siskin													
	Spinus tristis	American Goldfinch						x							O
	Spiza americana	Dickcissel													
	Spizella arborea	American Tree Sparrow													
	Spizella pallida	Clay-colored Sparrow													
	Spizella passerina	Chipping Sparrow													
	Spizella pusilla	Field Sparrow													
	Stelgidopteryx serripennis	Northern Rough-winged Swallow													
	Sterna hirundo	Common Tern													
	Sturnella magna	Eastern Meadowlark													
*	Sturnus vulgaris	European Starling		x											O
	Tachycineta bicolor	Tree Swallow													
	Thryothorus ludovicianus	Carolina Wren											x	x	PR
	Toxostoma rufum	Brown Thrasher													
	Tringa flavipes	Lesser Yellowlegs													
	Tringa melanoleuca	Greater Yellowlegs													
	Tringa solitaria	Solitary Sandpiper													
	Troglodytes aedon	House Wren					x		x	x	x	x	x	x	C
	Troglodytes hiemalis	Winter Wren													
	Turdus migratorius	American Robin					x								O
	Tyrannus tyrannus	Eastern Kingbird													
	Vermivora chrysoptera	Golden-winged Warbler													
	Vermivora cyanoptera	Blue-winged Warbler													
	Vermivora sp.	Brewster's Warbler (hybrid)													
	Vireo flavifrons	Yellow-throated Vireo													

Scientific Name	English Name	BBS1a	BBS1b	BBS2a	BBS2b	BBS3a	BBS3b	BBS4a	BBS4b	BBS5a	BBS5b	BBS6a	BBS6b	Highest Breeding Evidence
Vireo gilvus	Warbling Vireo						x	x						PO
Vireo griseus	White-eyed Vireo													
Vireo olivaceus	Red-eyed Vireo								x	x		x	x	PR
Vireo philadelphicus	Philadelphia Vireo													
Vireo solitarius	Blue-headed Vireo													
Zenaida macroura	Mourning Dove													
Zonotrichia albicollis	White-throated Sparrow													
Zonotrichia leucophrys	White-crowned Sparrow													

x *indicates the species is a Tallgrass Indicator Species from the SOFIA database*

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	iNaturalist Study Area	iNaturalist BioBlitz Area	Incidental	Bat Surveys	Camera Traps	DOR City Request	Comments
	Blarina brevicauda	Northern Short-tailed Shrew	S5	G5					x					
	Canis latrans	Coyote	S5	G5				x	x			x		
	Castor canadensis	Beaver	S5	G5					x					
	Didelphis virginiana	Virginia Opossum	S4	G5					x			x	x	
	Eptesicus fuscus	Big Brown Bat	S4	G5					x		x			
	Lasionycteris noctivagans	Silver-haired Bat	S4	G3G4							x			
	Lasiurus borealis	Eastern Red Bat	S4	G3G4					x		x			
	Lasiurus cinereus	Hoary Bat	S4	G3G4							x			
	Marmota monax	Groundhog	S5	G5					x			x		
	Mephitis mephitis	Striped Skunk	S5	G5					x			x	x	
	Microtus pennsylvanicus	Meadow Vole	S5	G5					x					
	Myotis lucifugus	Little Brown Bat	S3	G3	END	END	END				x			
	Neovison vison	American Mink	S4	G5					x					
	Odocoileus virginianus	White-tailed Deer	S5	G5				x	x	x		x	x	
	Ondatra zibethicus	Muskrat	S5	G5					x					
	Peromyscus leucopus	White-footed Mouse	S5	G5					x					
	Peromyscus maniculatus	Deer Mouse	S5	G5					x					
	Procyon lotor	Northern Raccoon	S5	G5					x	x		x	x	
	Puma concolor	Cougar	SU	G5	DD	END								PIC info, not a confirmed sighting of a stable population
*	*Rattus norvegicus*	Norway Rat	SNA	G5					x					
*	*Rattus rattus*	Black Rat	SNA	G5					x					
	Sciurus carolinensis	Eastern Gray Squirrel	S5	G5					x			x		
	Sylvilagus floridanus	Eastern Cottontail	S5	G5					x					
	Tamias striatus	Eastern Chipmunk	S5	G5				x	x	x				
	Taxidea taxus jacksoni	American Badger (Southwestern	S1	G5T4	END	END	END							PIC info, not a confirmed sighting of a stable population
	Urocyon cinereoargenteus	Gray Fox	S1	G5	THR	THR	THR							PIC info
	Vulpes vulpes	Red Fox	S5	G5										PIC info

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	ORAA	NHIC	iNaturalist	Choquette and Valliant	Incidental	Location 1	Location 2	Location 3	Location 4	Comments
	Anurans																
	Anaxyrus americanus	American Toad	S5	G5				X		X	X		x		x	x	
	Lithobates catesbeianus	American Bullfrog	S4	G5				X		X							
	Lithobates clamitans	Green Frog	S5	G5				X		X							
	Lithobates pipiens	Northern Leopard Frog	S5	G5	NAR	NAR		X		X							
	Pseudacris crucifer	Spring Peeper	S5	G5				X									Old record from 1986
	Pseudacris triseriata pop. 2	Western Chorus Frog (Carolinian Population)	S4	G5TNR	NAR	NAR		X					x	x	x	x	
	Other Amphibians																
	Necturus maculosus	Mudpuppy	S4	G5	NAR	NAR		X									
	Turtles																
	Chelydra serpentina	Snapping Turtle	S4	G5	SC	SC	SC	X	X	X	X						
	Chrysemys picta marginata	Midland Painted Turtle	S4	G5T5	SC			X	X	X	X	x					
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]								
	Emydoidea blandingii	Blanding's Turtle	S3	G4	END	THR	THR	X	X		X						
	Graptemys geographica	Northern Map Turtle	S3	G5	SC	SC	SC	X	X		X						
	Sternotherus odoratus	Eastern Musk Turtle	S3	G5	SC	SC	SC	X			X						
*	*Trachemys scripta*	Pond Slider	SNA	G5				X		X	X						
	Snakes																
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]								[redacted]
	Nerodia sipedon sipedon	Northern Watersnake	S5	G5T5	NAR	NAR		X									
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]								
X	*Sistrurus catenatus pop. 2*	Massasauga (Carolinian population)	S1	G3TNR	END	END	END		X		X						
	Storeria dekayi	DeKay's Brownsnake	S5	G5	NAR	NAR		X		X	X						
	Storeria occipitomaculata	Red-bellied Snake	S5	G5				X		X	X						
X	*Thamnophis butleri*	Butler's Gartersnake	S2	G4	END	END	END	X	X		X						
	Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5	G5T5				X		X	X						

x *indicates the species is a Tallgrass Indicator Species from the SOFIA database*

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Acalymma vittatum	A Leaf Beetle	SNR	G5							x		
	Acanthocinus pusillus	A Longhorned Beetle	SNR	G5							x		
	Achalarus lyciades	Hoary Edge	S1	G5								x	
	Achyra rantalis	Garden Webworm Moth	SNR	GNR							x		
	Acleris forsskaleana		SNR	GNR							x		
	Acmaeodera pulchella	A Metallic Wood-boring Beetle	SNR	GNR							x		
	Acmaeodera tubulus	A Metallic Wood-boring Beetle	SNR	GNR							x		
	Acrobasis angusella		SNR	GNR							x		
	Acronicta afflicta	Afflicted Dagger Moth	S1?	G5							x		
	Acronicta americana	American Dagger Moth	S5	G5							x		
	Acronicta hasta		S4?	G5							x		
	Acronicta oblinita	Smeared Dagger Moth	S5	G5							x		
	Acronicta superans	Splendid Dagger Moth	S4?	G5							x		
	Actias luna	Luna Moth	S4	G5							x		
	Aeolus mellillus	A Click Beetle	SNR	GNR							x		
	Aeshna constricta	Lance-tipped Darner	S5	G5							x		
	Aeshna umbrosa	Shadow Darner	S5	G5							x		
	Aeshna verticalis	Green-striped Darner	S3	G5					x				
	Aeshna verticalis	Green-striped Darner	S3	G5							x		
	Agallia quadripunctata	Four-spotted Clover Leafhopper	SNR	GNR							x		
	Agalliopsis ancistra		SNR	GNR							x		
	Agapostemon virescens	Bicoloured Sweat Bee	S5	G5							x		
	Aglais milberti	Milbert's Tortoiseshell	S5	G5							x	x	
	Aglossa caprealis		SNR	G5							x		
	Aglossa cuprina	Grease Moth	SNR	G4G5							x		
	Agnorisma badinodis	Pale-banded Dart	SNR	G5							x		
	Agonum cupripenne	Ground Beetle	SNR	G5							x		
	Agonum decorum	Ground Beetle	SNR	G5							x		
*	*Agrilus cyanescens*	A Metallic Wood-boring Beetle	SNA	GNR							x		
	Agriphila vulgivagellus	Vagabond Crambus	SNR	GNR							x		
	Agrotis ipsilon	Ipsilon Dart	S5	G5							x		
	Alaus oculatus	A Click Beetle	SNR	GNR							x		
	Albuna fraxini		SNR	GNR							x		
	Allograpta obliqua		S4	GNR							x		
	Allonemobius maculatus	Larger Spotted Ground Cricket	SU	G5							x		
	Alsophila pometaria	Fall Cankerworm Moth	SNR	G5							x		
	Alypia octomaculata	Eight-spotted Forester Moth	S5	G5							x		
	Amblycorypha oblongifolia	Oblong-winged Katydid	S4	GNR						x	x		
	Amblysellus curtisii		SNR	GNR							x		
	Amorpha juglandis	Walnut Sphinx	S4?	G5							x		
	Amphasia interstitialis	Ground Beetle	SNR	G5							x		
	Amphion floridensis	Nessus Sphinx	S4	G5						x	x		
	Amphipoea americana		S5	G5							x		
	Amphipyra pyramidoides	Copper Underwing	SNR	G5							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Anageshna primordialis		SNR	GNR							x		
	Anania funebris		SNR	GNR							x		
	Anatrytone logan	Delaware Skipper	S4	G5							x	x	
	Anavitrinella pampinaria	Common Gray Moth	S4S5	G5							x		
	Anax junius	Common Green Darner	S5	G5						x	x		
	Anaxipha exigua	Say's Winged Bush Cricket	S4	GNR							x		
	Ancistrocerus antilope		S5?	G5							x		
	Ancistrocerus gazella		SNA	GNR							x		
	Ancyloxypha numitor	Least Skipper	S5	G5							x	x	
	Andrena nubecula	Cloudy-winged Miner Bee	S3S4	GNR							x		
	Andrena vicina	Neighbouring Miner Bee	S5	G5							x		
	Antaeotricha leucillana		SNR	GNR							x		
	Antepione thisoaria	Variable Antepione	SNR	G5							x		
	Antheraea polyphemus	Polyphemus Moth	S5	G5						x	x		
	Anthidium manicatum	Wool Carder Bee	SNA	G5							x		
	Anthophora terminalis	Red-tipped Digger Bee	S5	G5							x		
	Anthrax argyropygus		SH	GNR					x		x		
	Anthrax irroratus	Speckled Coal Bee Fly	S4S5	G5							x		
	Anthrax pluto	Wealthy Coal Bee Fly	SU	GNR							x		
	Anticarsia gemmatalis	Velvetbean Caterpillar Moth	SNA	G5							x		
	Apantesis phalerata	Harnessed Moth	S4?	G5							x		
	Apatelodes torrefacta	Spotted Apatelodes	SNR	G5							x		
*	*Aphrophora alni*	European Alder Spittlebug	SNA	GNR							x		
	Aphrophora quadrinotata	Four-spotted Spittlebug	S4	GNR							x		
	Apis mellifera	European Honey Bee	SNA	GNR							x		
	Apoda y-inversum		S5	G5							x		
	Argia apicalis	Blue-fronted Dancer	S4	G5							x		
	Arigomphus villosipes	Unicorn Clubtail	S3	G5							x		
	Arphia sulphurea	Sulphur-winged Grasshopper	S4	G5							x		
	Ascalapha odorata	Black Witch Moth	SNA	G5							x		
	Asterocampa celtis	Hackberry Emperor	S3	G5							x	x	
	Asterocampa clyton	Tawny Emperor	S3	G5								x	
	Atalopedes campestris	Sachem	SNA	G5							x	x	
	Athetis tarda	The Slowpoke	SNR	G5							x		
	Athysanus argentarius		SNR	GNR							x		
	Atranus pubescens	Ground Beetle	SNR	GNR							x		
	Atteva aurea	Ailanthus Webworm Moth	SNR	G5							x		
	Augochlora pura	Pure Sweat Bee	S5	G5							x		
	Autographa precationis	Common Looper Moth	S5	G5							x		
	Automeris io	Io Moth	S5	G5						x	x		
	Baliosus nervosus	A Leaf Beetle	SNR	G5							x		
	Battus philenor	Pipevine Swallowtail	SNA	G5								x	
	Besma quercivoraria	Oak Besma	SNR	G5							x		
*	*Bitoma crenata*	A Wedge-shaped Beetle	SNA	GNR							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Bittacus strigosus	Thin Hangingfly	SU	GNR						x	x		
	Blastobasis glandulella	Acorn Moth	SNR	GNR							x		
	Blepharida rhois	A Leaf Beetle	SNR	GNR							x		
	Boloria bellona	Meadow Fritillary	S5	G5								x	
	Bombus bimaculatus	Two-spotted Bumble Bee	S5	G5							x		
	Bombus citrinus	Lemon Cuckoo Bumble Bee	S3S4	G4							x		
	Bombus fervidus	Golden Northern Bumble Bee	S3S4	G3G4							x		
	Bombus griseocollis	Brown-belted Bumble Bee	S5	G5							x		
	Bombus impatiens	Common Eastern Bumble Bee	S5	G5				x			x		
	Bombus terricola	Yellow-banded Bumble Bee	S3S5	G3G4	SC	SC				x			
	Bombylius major	Large Bee Fly	S5?	G5							x		
	Brachiacantha ursina	A Ladybird Beetle	SNR	G5							x		
	Brachyleptura rubrica	A Longhorned Beetle	SNR	G5							x		
	Bruchomorpha oculata	A Piglet Bug	SNR	GNR							x		
	Caenurgina erechtea	Forage Looper Moth	S4S5	G5							x		
	Calleida punctata	Ground Beetle	SNR	G5							x		
	Calligrapha bidenticola	A Leaf Beetle	SNR	G5							x		
	Calligrapha multipunctata	A Leaf Beetle	SNR	G5							x		
	Callopistria cordata	Silver-spotted Fern Moth	SNR	G5							x		
	Callosamia promethea	Promethea Moth	S4	G5							x		
	Calomycterus setarius	A Weevil	SNR	GNR							x		
	Calopteron reticulatum	A Net-winged Beetle	SNR	GNR							x		
	Calopteron terminale	A Net-winged Beetle	SNR	GNR							x		
	Calopteryx maculata	Ebony Jewelwing	S5	G5							x		
	Calyptra canadensis	Canadian Owlet	SNR	G5							x		
	Campaea perlata	Pale Beauty Moth	S5	G5							x		
	Camponotus pennsylvanicus	Eastern Black Carpenter Ant	S5	G5							x		
	Camponotus subbarbatus	Lesser Bearded Carpenter Ant	SU	GNR							x		
	Cantura jucunda		SNR	GNR							x		
*	*Cassida rubiginosa*	Thistle Tortoise Beetle	SNA	GNR							x		
	Catocala blandula	Charming Underwing	S5	G5							x		
	Catocala cerogama	Yellow-banded Underwing	S5	G5							x		
	Catocala grynea	Woody Underwing	S5	G5							x		
	Catocala ilia	Ilia Underwing	S5	G5							x		
	Catocala minuta	Little Underwing	SNR	G5							x		
	Catocala palaeogama	Oldwife Underwing	SNR	G5							x		
	Catocala parta	Mother Underwing	S5	G5							x		
	Catocala piatrix	The Penitent	S4	G5						x	x		
	Catocala relicta	White Underwing Moth	S5	G5							x		
	Catocala retecta	Yellow-gray Underwing	SNR	G5							x		
	Catocala serena	Serene Underwing	SH	G5					x				
	Catocala serena	Serene Underwing	SH	G5							x		
	Catocala ultronia	Ultronia Underwing Moth	S5	G5							x		
	Catocala unijuga	Once-married Underwing	S5	G5							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Celastrina neglecta	Summer Azure	S5	G5							x	x	
	Celithemis elisa	Calico Pennant	S5	G5							x		
	Celithemis eponina	Halloween Pennant	S4	G5							x		
	Celypha cespitana		SNR	GNR							x		
	Ceratomia catalpae	Catalpa Sphinx	SNA	G5						x	x		
	Cercyonis pegala	Common Wood-Nymph	S5	G5						x	x	x	
	Cerma cerintha	Tufted Bird-dropping Moth	SNR	G5							x		
	Chalcosyrphus nemorum		S4	GNR							x		
	Chauliognathus pensylvanicus	A Soldier Beetle	SNR	G5							x		
	Chelymorpha cassidea	A Leaf Beetle	SNR	GNR							x		
	Chilocorus stigma	A Ladybird Beetle	SNR	G5							x		
	Chionodes mediofuscella		SNR	GNR							x		
	Chlaenius tricolor	Ground Beetle	SNR	G5							x		
	Chloealtis conspersa	Sprinkled Grasshopper	S4	G5							x		
	Chlorochlamys chloroleucaria	Blackberry Looper Moth	SNR	G5							x		
	Chlosyne nycteis	Silvery Checkerspot	S5	G5							x	x	
	Choristoneura rosaceana	Oblique-banded Leafroller Moth	SNR	G5							x		
	Chortophaga viridifasciata	Green-striped Grasshopper	S4	G5							x		
	Chrysochus auratus	A Leaf Beetle	SNR	G5							x		
	Chrysopa nigricornis	Black-horned Green Lacewing	SU	GNR							x		
	Chrysopa oculata	Golden-eyed Green Lacewing	S5	G5							x		
	Chrysops pikei	Pike's Deer Fly	SU	GNR							x		
	Chrysoteuchia topiarius		SNR	GNR							x		
	Chrysotoxum pubescens		S4	GNR							x		
	Chytolita morbidalis	Morbid Owlet	SNR	G5							x		
	Cicindela duodecimguttata	A Tiger Beetle	S5	G5							x		
	Cicindela formosa	A Tiger Beetle	S4	G5							x		
	Cicindela punctulata	A Tiger Beetle	S5	G5							x		
	Cicindela sexguttata	Six Spotted Tiger Beetle	S5	G5				x		x	x		
	Cisseps fulvicollis	Yellow-collared Scape Moth	SNR	G5							x		
	Clastoptera obtusa	Alder Spittle Bug	S5	G5							x		
	Clastoptera proteus	Dogwood Spittle Bug	S5	G5							x		
	Clepsis clemensiana		SNR	GNR							x		
	Climaciella brunnea	Wasp Mantidfly	S4	GNR							x		
	Clostera albosigma	Sigmoid Prominent Moth	S5	G5							x		
	Clytus ruricola	A Longhorned Beetle	SNR	G5							x		
	Cnaemidophorus rhododactyla		SNR	GNR							x		
*	*Coccinella septempunctata*	Seven-spotted Ladybird Beetle	SNA	GNR							x		
	Coenonympha tullia	Common Ringlet	S5	G5							x		
	Coenonympha tullia	Common Ringlet	S5	G5								x	
	Coleomegilla maculata	Spotted Ladybird Beetle	S5	G5							x		
	Colias eurytheme	Orange Sulphur	S5	G5							x	x	
	Colias philodice	Clouded Sulphur	S5	G5							x	x	
	Colladonus clitellarius	Sadleback Leafhopper	SNR	GNR							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Colletes inaequalis	Common Eastern Plasterer Bee	S5	G5							x		
	Colliuris pensylvanica	Ground Beetle	SNR	GNR							x		
	Conocephalus brevipennis	Short-winged Meadow Katydid	S4	G5							x		
	Conocephalus nigropleurum	Black-sided Meadow Katydid	S3S4	GNR							x		
	Conotrachelus nenuphar	A Weevil	SNR	G5							x		
	Copris fricator	A Scarab Beetle	SNR	GNR							x		
	Coquillettidia perturbans	Cattail Mosquito	S5	G5							x		
	Coryphista meadii	Barberry Geometer	SNR	G5							x		
	Cosmia calami	American Dun-bar	SNR	G5						x	x		
	Cosmotettix delector		SNR	GNR							x		
	Costaconvexa centrostrigaria	Bent-line Carpet	SNR	G5						x	x		
	Crambidia pallida	Pale Lichen Moth	SNR	G5							x		
	Crambus agitatellus		SNR	GNR							x		
	Crambus laqueatellus		SNR	GNR							x		
	Crambus praefectellus		SNR	GNR							x		
	Crambus saltuellus		SNR	GNR							x		
*	*Crioceris asparagi*	Common Asparagus Beetle	SNA	GNR							x		
*	*Crioceris duodecimpunctata*	Spotted Asparagus Beetle	SNA	GNR							x		
	Crocidophora tuberculalis		SNR	GNR							x		
	Cryptocephalus venustus	A Leaf Beetle	SNR	G5							x		
	Ctenicera pyrrhos	A Click Beetle	SNR	GNR							x		
	Ctenucha virginica	Virginia Ctenucha Moth	S5	G5							x		
	Cucujus clavipes	A Flat Bark Beetle	SNR	G5							x		
	Cucullia asteroides	The Asteroid	S4	G5							x		
	Cucullia convexipennis	Brown-bordered Cucullia	S4	G5							x		
	Cupido comyntas	Eastern Tailed Blue	S5	G5						x	x		
	Cupido comyntas	Eastern Tailed Blue	S5	G5								x	
	Cycloneda munda	Immaculate Ladybird Beetle	SNR	G5							x		
	Cycnia tenera	Delicate Cycnia	S4	G5							x		
	Cydia latiferreana		SNR	GNR							x		
	Cydia pomonella	Codling Moth	SNR	GNR							x		
	Cymatodera undulata	A Checkered Beetle	SNR	GNR							x		
	Cyrtepistomus castaneus	A Weevil	SNR	GNR							x		
	Danaus plexippus	Monarch	S2N,S4B	G4	END	SC	SC			x	x	x	
	Darapsa myron	Hog Sphinx	SU	G5							x		
	Dargida diffusa	Wheat Head Armyworm Moth	S5	G5							x		
	Datana integerrima	Walnut Caterpillar Moth	SNR	G5							x		
	Datana perspicua	Spotted Datana	SNR	G5							x		
	Deloyala guttata	A Leaf Beetle	SNR	G5							x		
	Dendroides canadensis	A Fire-colored Beetle	SNR	G5							x		
	Derospidea brevicollis	A Leaf Beetle	SNR	GNR							x		
	Desmia funeralis	Grape Leaffolder Moth	SNR	G5							x		
	Diabrotica cristata	A Leaf Beetle	SNR	GNR							x		
	Diabrotica undecimpunctata	A Leaf Beetle	SNR	G5							x		

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Diapheromera femorata	Northern Walkingstick	S4	G4G5						x	x		
Dichomeris bilobella		SNR	GNR							x		
Dichomeris ochripalpella		SNR	GNR							x		
Dichromorpha viridis	Short-winged Green Grasshopper	S2	G5					x				
Dicromantispa sayi	Say's Mantidfly	SU	GNR							x		
Dicymolomia julianalis		SNR	GNR							x		
Dissosteira carolina	Carolina Grasshopper	S4S5	G5							x		
Dolichovespula arenaria		S4	G5							x		
Dolichovespula maculata		S4	G5							x		
Dorcus parallelus	A Stag Beetle	SNR	GNR							x		
Draeculacephala antica		SNR	GNR							x		
Draeculacephala mollipes		SNR	GNR							x		
Draeculacephala robinsoni		SNR	GNR							x		
Dryocampa rubicunda	Rosy Maple Moth	S5	G5							x		
Dypterygia rozmani	American Bird's-wing Moth	SNR	G5							x		
Dyspteris abortivaria	The Bad-wing	SNR	G5							x		
Dytiscus verticalis	A Predaceous Diving Beetle	SNR	GNR							x		
Eburia quadrigeminata	A Longhorned Beetle	SNR	GNR							x		
Ecdytolopha insiticiana	Locust Twig Borer Moth	SNR	GNR							x		
Elater abruptus	A Click Beetle	SNR	GNR							x		
Elophila icciusalis		SNR	GNR							x		
Elophila obliteralis		SNR	GNR							x		
Emmelina monodactyla		SNR	GNR							x		
Empoasca fabae	Potatoe Leafhopper	SNR	GNR							x		
Enallagma aspersum	Azure Bluet	S3	G5					x		x		
Enallagma basidens	Double-striped Bluet	S3	G5					x				
Enallagma carunculatum	Tule Bluet	S5	G5							x		
Enallagma civile	Familiar Bluet	S5	G5							x		
Enallagma exsulans	Stream Bluet	S5	G5							x		
Enallagma geminatum	Skimming Bluet	S4	G5							x		
Enallagma signatum	Orange Bluet	S4	G5							x		
Enallagma vesperum	Vesper Bluet	S4	G5							x		
Ennomos magnaria	Maple Spanworm Moth	S5	G5							x		
Enoclerus nigripes	A Checkered Beetle	SNR	G5							x		
Epargyreus clarus	Silver-spotted Skipper	S4	G5						x	x	x	
Epiaeschna heros	Swamp Darner	S2S3	G5					x		x		
Epiblema otiosana	Bidens Borer Moth	SNR	GNR							x		
Epicallima argenticinctella		SNR	GNR							x		
Epicauta cinerea	A Blister Beetle	SNR	GNR							x		
Epicauta pensylvanica	A Blister Beetle	SNR	G5							x		
Epicauta vittata	A Blister Beetle	SNR	GNR							x		
Epimecis hortaria	Tulip-tree Beauty	SNR	G5							x		
Epinotia lindana		SNR	GNR							x		
Epitheca cynosura	Common Baskettail	S5	G5							x		

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	Epitheca princeps	Prince Baskettail	S5	G5							x		
	Eristalis dimidiata		S5	G5							x		
	Eristalis flavipes		S5	G5							x		
	Eristalis tenax		SNA	GNR							x		
	Eristalis transversa		S5	G5							x		
x	*Erynnis baptisiae*	Wild Indigo Duskywing	S4	G5						x	x	x	Oak savannas and tallgrass prairie, species is now abundant in a wide variety of disturbed habitats across Southern Ontario
	Erynnis brizo	Sleepy Duskywing	S1	G5								x	
	Erynnis horatius	Horace's Duskywing	SNA	G5							x	x	
	Erynnis icelus	Dreamy Duskywing	S5	G5							x	x	
	Erynnis juvenalis	Juvenal's Duskywing	S5	G5						x	x	x	
	Erynnis lucilius	Columbine Duskywing	S4	G5							x	x	
[redacted]													
	Erythemis simplicicollis	Eastern Pondhawk	S5	G5				x		x	x		
	Erythroneura calycula		SNR	GNR							x		
	Erythroneura elegans		SNR	GNR							x		
	Erythroneura rubra		SNR	GNR							x		
	Erythroneura rubrella		SNR	GNR							x		
	Erythroneura tricincta	Threebanded Grape Leafhopper	SNR	GNR							x		
	Estigmene acrea	Salt Marsh Moth	S5	G5							x		
	Euchaetes egle	Milkweed Tussock Moth	S4?	G5							x		
	Euchlaena serrata	The Saw-wing	SNR	G5							x		
	Euclea delphinii	Spiny Oak-slug Moth	SNR	G5							x		
	Euclidia cuspidea	Toothed Somberwing	S5	G5							x		
	Eucosma ochrocephala		SNR	GNR							x		
	Eucosma ornatula		SNR	GNR							x		
	Eucosma parmatana		SNR	GNR							x		
	Eucosma raracana		SNR	GNR							x		
	Eudeilinia herminiata	Northern Eudeilinea	S4?	G5							x		
	Euderces picipes	A Longhorned Beetle	SNR	G5							x		
	Eudryas grata	Beautiful Wood-nymph	SNR	G5							x		
	Eudryas grata	Beautiful Wood-nymph	SNR	G5						x			
	Eudryas unio	Pearly Wood-nymph	SNR	G5							x		
	Eugonobapta nivosaria	Snowy Geometer	SNR	G5							x		
	Eulogia ochrifrontella		SNR	GNR							x		
	Eumorpha pandorus	Pandorus Sphinx	S4	G5							x		
	Euodynerus foraminatus		S4	GNR						x	x		
	Euparthenos nubilis	Locust Underwing	S4?	G5							x		
	Euphoria inda	A Scarab Beetle	SNR	G5							x		
	Euphydryas phaeton	Baltimore Checkerspot	S4	G5						x	x	x	

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Euphyes bimacula	Two-spotted Skipper	S4	G4								x	
Euphyes conspicua	Black Dash	S3	G4								x	
Euphyes dion	Dion Skipper	S4	G4								x	
Euphyes dukesi	Duke's Skipper	S2	G3								x	
Euphyes vestris	Dun Skipper	S5	G5							x		
Euphyes vestris	Dun Skipper	S5	G5								x	
Euphyia intermediata		SNR	G5							x		
Eupithecia miserulata	Common Eupithecia	SNR	G5							x		
Euptoieta claudia	Variegated Fritillary	SNA	G5							x	x	
Eusarca confusaria	Confused Eusarca	SNR	G5						x	x		
Evacanthus nigramericanus		SNR	GNR							x		
Feltia herilis	Master's Dart Moth	S5	G5							x		
Feltia jaculifera	Dingy Cutworm Moth	S5	G5							x		
Feniseca tarquinius	Harvester	S4	G5								x	
Formica exsectoides	Allegheny Mound Ant	S5	G5							x		
Formica subsericea	Slightly Silky Mound Ant	S5	G5							x		
Fumibotys fumalis		SNR	GNR							x		
Furcula cinerea	Gray Furcula	SNR	G5							x		
Galleria mellonella	Greater Wax Moth	SNA	G5							x		
Gaurotes cyanipennis	A Longhorned Beetle	SNR	G5							x		
Geron calvus	Bald Bee Fly	S3S4	GNR							x		
Glischrochilus fasciatus	A Sap Beetle	SNR	G5							x		
Gluphisia septentrionis	Common Gluphisia	SNR	G5							x		
Gomphurus vastus	Cobra Clubtail	S1	G5					x				
Graphisurus fasciatus	A Longhorned Beetle	SNR	G5							x		
Graphocephala coccinea		SNR	GNR							x		
Gryllus pennsylvanicus	Fall Field Cricket	S5	G5							x		
Gypona melanota		SNR	GNR							x		
Gyponana gladia		SNR	GNR							x		
Gyponana octolineata		SNR	GNR							x		
Haematopis grataria	Chickweed Geometer	SNR	G5						x	x		
Halictus ligatus	Ligated Gregarious Sweat Bee	S5	G5							x		
Halysidota harrisii		SNR	G5							x		
Halysidota tessellaris	Banded Tussock Moth	S5	G5							x		
Haploa clymene	Clymene Moth	SNR	G5							x		
Haploa confusa	Confused Haploa	S5	G5							x		
Haploa lecontei	LeConte's Haploa	S4?	G5				x			x		
Haploa reversa	Reversed Haploa	S1?	G5	END				x				
Harrisimemna trisignata	Harris's Three-spot	S4	G5							x		
Harrisina americana	Grapeleaf Skeletonizer Moth	SNR	G5							x		
Helicoverpa zea	Corn Earworm Moth	SNR	G5							x		
Heliomata cycladata	Common Spring Moth	SNR	G5							x		
Helophilus fasciatus		S5	G5						x	x		
Hemaris diffinis	Snowberry Clearwing Moth	S4S5	G5							x		

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	Hemaris thysbe	Hummingbird Clearwing	S5	G5							x		
	Hemipenthes sinuosa	Sinuous Bee Fly	S3S5	G5							x		
	Hemipenthes webberi	Webber''s Bee Fly	S5?	G5							x		
	Herpetogramma abdominalis		SNR	GNR							x		
	Herpetogramma aeglealis		SNR	GNR						x	x		
	Herpetogramma pertextalis		SNR	GNR							x		
	Hesperia leonardus	Leonard's Skipper	S4	G5								x	
	Hesperophanes pubescens	A Longhorned Beetle	SNR	GNR							x		
	Heterocampa guttivitta	Saddled Prominent	SNR	G5							x		
	Hippodamia parenthesis	A Ladybird Beetle	SNR	G5							x		
*	*Hippodamia variegata*	A Ladybird Beetle	SNA	GNR							x		
	Horisme intestinata	Brown Bark Carpet	SNR	G5							x		
	Hyalophora cecropia	Cecropia Moth	S5	G5							x		
	Hylaeus modestus	Modest Yellow-faced Bee	S5	G5							x		
	Hylephila phyleus	Fiery Skipper	SNA	G5							x	x	
	Hymetta balteata		SNR	GNR							x		
	Hyparpax aurora	Pink Prominent	SNR	G5							x		
	Hypena abalienalis	White-lined Bomolocha	SNR	G5							x		
	Hypena baltimoralis	Baltimore Bomolocha	SNR	G5							x		
	Hypena bijugalis	Dimorphic Bomolocha	SNR	G5							x		
	Hypena manalis	Flowing-line Bomolocha	SNR	G5							x		
	Hypena scabra	Green Cloverworm Moth	SNR	G5							x		
	Hypenodes fractilinea	Broken-line Hypenodes	SNR	G4							x		
	Hyperaspis proba	A Ladybird Beetle	SNR	GNR							x		
	Hypercompe scribonia	Giant Leopard Moth	SNR	G5							x		
	Hyphantria cunea	Fall Webworm Moth	S5	G5							x		
	Hypoprepia fucosa	Painted Lichen Moth	S5	G5							x		
	Hyppa xylinoides	Common Hyppa	SNR	G5							x		
	Hypsopygia costalis	Clover Hayworm Moth	SNA	G5							x		
	Idaea dimidiata		SNR	G5							x		
	Idia aemula	Common Idia	SNR	G5							x		
	Idia americalis	American Idia	SNR	G5							x		
	Ischnura hastata	Citrine Forktail	SNA	G5							x		
	Ischnura posita	Fragile Forktail	S4	G5							x		
	Ischnura verticalis	Eastern Forktail	S5	G5							x		
	Japananus hyalinus		SNR	GNR							x		
	Junonia coenia	Common Buckeye	SNA	G5						x	x	x	
	Kuschelina gibbitarsa	A Leaf Beetle	SNR	GNR							x		
	Labidomera clivicollis	A Leaf Beetle	SNR	G5							x		
	Lacinipolia renigera	Bristly Cutworm Moth	S5	G5							x		
	Latalus sayii		SNR	GNR							x		
	Lebia viridis	Ground Beetle	SNR	G5							x		
	Ledaea perditalis	Lost Owlet	SNR	G5							x		
	Lema daturaphila	A Leaf Beetle	SNR	G5							x		

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	Leptinotarsa decemlineata	A Leaf Beetle	SNR	G5							x		
	Leptomantispa pulchella	Beautiful Mantidfly	SU	GNR							x		
	Lepyronia quadrangularis	Diamond-backed Spittlebug	S5	G5							x		
	Lestes congener	Spotted Spreadwing	S5	G5							x		
	Lestes dryas	Emerald Spreadwing	S5	G5				x		x	x		
	Lestes forcipatus	Sweetflag Spreadwing	S4	G5							x		
	Lestes rectangularis	Slender Spreadwing	S5	G5							x		
	Lethe anthedon	Northern Pearly-Eye	S5	G5							x	x	
	Lethe appalachia	Appalachian Brown	S4	G4							x	x	
	Lethe eurydice	Eyed Brown	S5	G5							x	x	
	Leucania pseudargyria	False Wainscot	S5	G5							x		
	Leucania ursula	Ursula Wainscot	SNR	G5							x		
	Leucanthiza amphicarpeaefoliella		SNR	GNR							x		
	Leuconycta diphteroides	Green Leuconycta	SNR	G5							x		
	Leuconycta lepidula		SNR	G5							x		
	Leucorrhinia intacta	Dot-tailed Whiteface	S5	G5						x	x		
	Libellula incesta	Slaty Skimmer	S4	G5						x	x		
	Libellula luctuosa	Widow Skimmer	S5	G5							x		
	Libellula pulchella	Twelve-spotted Skimmer	S5	G5				x		x	x		
	Libellula semifasciata	Painted Skimmer	S2	G5					x		x		
	Libellula vibrans	Great Blue Skimmer	S1	G5					x				
	Libytheana carinenta	American Snout	SNA	G5							x	x	
	Lichenophanes bicornis	A Bostrichid Powder-post Beetle	SNR	G5							x		
*	*Lilioceris lilii*	A Leaf Beetle	SNA	GNR							x		
	Limenitis archippus	Viceroy	S5	G5						x	x	x	
	Limenitis arthemis astyanax	Red-spotted Purple	S5	G5T5							x	x	
	Limotettix uhleri		SNR	GNR							x		
	Lintneria eremitus	Hermit Sphinx	S5	G4G5							x		
	Lophocampa caryae	Hickory Tussock Moth	SNR	G5						x	x		
	Loxocera ojibwayensis	a rust fly	SNR	GNR							x		
	Lucanus capreolus	A Stag Beetle	SNR	GNR							x		
	Lucidota atra	A Glowworm	SNR	G5							x		
	Lycaena hyllus	Bronze Copper	S5	G5							x	x	
	Lycaena phlaeas	American Copper	S5	G5							x	x	
*	*Lymantria dispar*	Gypsy Moth	SNA	G5						x	x		
	Lytrosis unitaria	Common Lytrosis	SNR	G5							x		
	Maccaffertium luteum	Butter Flat-headed Mayfly	SU	G5							x		
	Maccaffertium modestum	Modest Flat-headed Mayfly	SU	G5							x		
	Maccaffertium pulchellum	Pretty Flat-headed Mayfly	SU	G5							x		
	Machimia tentoriferella	Golden-striped Leaftier Moth	SNR	GNR							x		
	Macrochilo litophora		SNR	GNR							x		
	Macrodactylus subspinosus	A Scarab Beetle	SNR	G5							x		
	Macropsis cinerea		SNR	GNR							x		
	Macropsis osborni		SNR	GNR							x		

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	Macrostemum zebratum	Striped Net-spinning Caddisfly	S4S5	G5							x		
	Madarellus undulatus	A Weevil	SNR	GNR							x		
	Malacosoma americana	Eastern Tent Caterpillar Moth	S5	G5							x		
	Maliattha synochitis	Black-dotted Lithacodia	S4?	G5							x		
	Mallota posticata		S4	GNR							x		
	Mantis religiosa	Praying Mantis	SNA	GNR							x		
	Marimatha nigrofimbria	Black-bordered Lemon Moth	SNR	G5							x		
	Meconema thalassinum	Drumming Katydid	SNA	GNR							x		
	Megachile sculpturalis	Giant Leafcutter Bee	SNA	G5				leafcutter bee			x		
	Megacyllene robiniae	A Longhorned Beetle	SNR	G5						x	x		
	Megalodacne fasciata	A Pleasing Fungus Beetle	SNR	GNR							x		
	Megisto cymela	Little Wood-Satyr	S5	G5				x			x	x	
	Melanchra picta	Zebra Caterpillar Moth	SNR	G5							x		
	Melanoplus bivittatus	Two-striped Grasshopper	S5	G5						x	x		
	Melanoplus confusus	Pasture Grasshopper	S3S4	G5						x	x		
	Melanoplus differentialis	Differential Grasshopper	S3	G5					x				
	Melanoplus punctulatus	Grizzly Grasshopper	S4	G5							x		
	Melanoplus scudderi	Scudder's Short-winged Grasshopper	S1	G5					x				
	Melittia cucurbitae	Squash Vine Borer Moth	SNR	GNR							x		
	Merodon equestris		SNA	GNR							x		
	Meropleon ambifusca		SNR	G3G4							x		
	Mesamia nigridorsum		SNR	GNR							x		
	Metzneria lappella		SNR	GNR							x		
	Microcentrum rhombifolium	Greater Angle-wing Katydid	S4	GNR							x		
	Microcrambus biguttellus		SNR	GNR							x		
	Microcrambus elegans		SNR	GNR							x		
	Microdon globosus		S4	GNR							x		
	Micromus posticus	Posterior Brown Lacewing	SU	GNR							x		
	Mocis texana	Texas Mocis	SNA	G5							x		
	Molorchus bimaculatus	A Longhorned Beetle	SNR	G5							x		
	Monobia quadridens		S2?	GNR							x		
	Mononychus vulpeculus	A Weevil	SNR	GNR							x		
	Mythimna unipuncta	Armyworm Moth	S4	G5							x		
	Nadata gibbosa	White-spotted Prominent Moth	S5	G5							x		
	Nathalis iole	Dainty Sulphur	SNA	G5								x	
	Necrophila americana	A Carrion Beetle	S5	G5							x		
	Nectopsyche exquisita	Exquisite Long-horned Caddisfly	S4S5	G5							x		
	Nematocampa resistaria	Horned Spanworm Moth	SNR	G5							x		
	Neoconocephalus ensiger	Sword-bearing Conehead Katydid	S4	G5						x	x		
	Neocurtilla hexadactyla	Northern Mole Cricket	S2S3	GNR					x				
	Neoxabea bipunctata	Two-spotted Tree Cricket	S4	GNR							x		
	Nicrophorus orbicollis	A Carrion Beetle	S5	G5							x		
	Nicrophorus tomentosus	A Carrion Beetle	S5	G5							x		
*	*Noctua pronuba*	Large Yellow Underwing Moth	SNA	GNR							x		

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Nomophila nearctica		SNR	G5							x		
Norvellina novica		SNR	GNR							x		
Norvellina seminuda		SNR	GNR							x		
Nymphalis antiopa	Mourning Cloak	S5	G5							x	x	
Ocyptamus fuscipennis		S4	GNR							x		
Odontota scapularis	A Leaf Beetle	SNR	G5							x		
Oecanthus nigricornis	Black-horned Tree Cricket	S4	G5							x		
Oecanthus niveus	Narrow-winged Tree Cricket	S3S4	GNR							x		
Oecanthus quadripunctatus	Four-spotted Tree Cricket	S4	G5							x		
Oiceoptoma inaequale	A Carrion Beetle	SNR	GNR							x		
Oligia modica	Black-banded Brocade	SNR	G5							x		
Onthophagus hecate	A Scarab Beetle	SNR	G5							x		
Orchelimum nigripes	Black-legged Meadow Katydid	S4	GNR							x		
Orgyia definita	Definite Tussock Moth	SNR	G5						x	x		
Orgyia leucostigma	White-marked Tussock Moth	S5	G5							x		
Orthonama obstipata	The Gem	SNR	G5							x		
Orthosia hibisci	Speckled Green Fruitworm Moth	S5	G5							x		
Ostrinia penitalis		SNR	GNR							x		
Otiorhynchus sulcatus	A Weevil	SNR	GNR							x		
Pachydiplax longipennis	Blue Dasher	S5	G5						x	x		
Pachyschelus purpureus	A Metallic Wood-boring Beetle	SNR	GNR							x		
Pachysphinx modesta	Big Poplar Sphinx	S5	G5							x		
Palpita magniferalis		SNR	GNR							x		
Palthis angulalis	Dark-spotted Palthis	SNR	G5							x		
Palthis asopialis	Faint-spotted Palthis	SNR	G5							x		
Pandemis limitata	Three-lined Leafroller Moth	SNR	GNR							x		
Panopoda rufimargo	Red-lined Panopoda	SNR	G5						x	x		
Pantala flavescens	Wandering Glider	S4	G5							x		
Pantala hymenaea	Spot-winged Glider	S4	G5							x		
Pantographa limata	Basswood Leafroller Moth	SNR	GNR							x		
Paonias excaecata	Blinded Sphinx	S5	G5							x		
Paonias myops	Small-eyed Sphinx	S5	G5							x		
Papaipema arctivorens		SNR	G5							x		
Papaipema inquaesita		SNR	G5							x		
Papaipema insulidens		SNR	GU							x		
Papaipema nebris	Stalk Borer Moth	SNR	G5							x		
Papaipema necopina	Sunflower Borer Moth	SNR	G4?							x		
Papaipema pterisii		SNR	G5							x		
Papaipema rigida	Rigid Sunflower Borer Moth	SNR	G4G5							x		
Papaipema unimoda		SNR	G5							x		
Papilio cresphontes	Giant Swallowtail	S4	G5						x	x	x	
Papilio glaucus	Eastern Tiger Swallowtail	S5	G5				x			x	x	
Papilio polyxenes	Black Swallowtail	S5	G5						x	x	x	
Papilio troilus	Spicebush Swallowtail	S4	G4?						x	x	x	

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Parallelia bistriaris	Maple Looper Moth	SNR	G5							x		
	Parancistrocerus perennis		S2	GNR					x				
	Parapoynx allionealis		SNR	GNR							x		
	Parapoynx badiusalis		SNR	GNR							x		
	Parapoynx obscuralis		SNR	GNR							x		
	Paraulacizes irrorata		SNR	GNR							x		
	Paraulacizes irrorata		SNR	GNR						x			
	Parrhasius m-album	White-M Hairstreak	SNA	G5							x	x	
	Pelidnota punctata	A Scarab Beetle	SNR	G5							x		
	Penthimia americana		SNR	GNR							x		
	Peridea angulosa	Angulose Prominent	SNR	G5							x		
	Peridroma saucia	Variegated Cutworm Moth	S5	G5							x		
	Perigea xanthioides	Red Groundling	SNR	G5							x		
	Perithemis tenera	Eastern Amberwing	S4	G5						x	x		
	Pero honestaria	Honest Pero	SNR	G5							x		
	Petrophila canadensis		SNR	GNR							x		
	Petrophora subaequaria	Northern Petrophora	SNR	G5							x		
	Phaeoura quernaria	Oak Beauty	SNR	G5							x		
	Phalaenophana pyramusalis	Dark-banded Owlet	SNR	G5							x		
	Phalaenostola larentioides	Black-banded Owlet	SNR	G5							x		
	Phanogomphus graslinellus	Pronghorn Clubtail	S3	G5					x				
	Pheosia rimosa	Black-rimmed Prominent	SNR	G5							x		
*	*Philaenus spumarius*	Meadow Spittlebug	SNA	GNR							x		
	Phoebis sennae	Cloudless Sulphur	SNA	G5								x	
	Pholisora catullus	Common Sootywing	S4	G5							x	x	
	Phyciodes cocyta	Northern Crescent	S5	G5						x	x	x	
	Phyciodes tharos	Pearl Crescent	S4	G5				x		x	x	x	
	Phyllobius oblongus	A Weevil	SNR	GNR							x		
	Phyllodesma americana	Lappet Moth	S5	G5							x		
*	*Pieris rapae*	Cabbage White	SNA	G5							x	x	
	Pilocrocis ramentalis		SNR	GNR							x		
	Plathemis lydia	Common Whitetail	S5	G5						x	x		
	Platylomalus aequalis	A Hister Beetle	SNR	G5							x		
	Platynota idaeusalis	Tufted Apple-bud Moth	SNR	GNR							x		
	Platyptilia carduidactylus		SNR	G5							x		
	Pleuroprucha insulsaria	Common Tan Wave	SNR	G5							x		
	Plusiodonta compressipalpis	Moonseed Moth	SNR	G4							x		
	Poanes hobomok	Hobomok Skipper	S5	G5				x				x	
	Poanes massasoit	Mulberry Wing	S4	G4								x	
	Poanes viator	Broad-winged Skipper	S4	G5							x	x	
	Pococera asperatella		SNR	GNR							x		
	Podabrus brevicollis	A Soldier Beetle	SNR	GNR							x		
	Podabrus flavicollis	A Soldier Beetle	SNR	GNR							x		
	Podabrus rugosulus	A Soldier Beetle	SNR	G5							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Podabrus tomentosus	A Soldier Beetle	SNR	GNR							x		
	Polemius laticornis	A Soldier Beetle	SNR	GNR							x		
	Polistes dominula		SNA	GNR							x		
	Polistes fuscatus		S4	G5							x		
	Polites mystic	Long Dash Skipper	S5	G5							x	x	
	Polites origenes	Crossline Skipper	S4	G4G5							x	x	
	Polites peckius	Peck's Skipper	S5	G5						x	x	x	
	Polites themistocles	Tawny-edged Skipper	S5	G5							x	x	
	Polyamia caperata		SNR	GNR							x		
	Polygonia comma	Eastern Comma	S5	G5						x	x	x	
	Polygonia interrogationis	Question Mark	S5	G5							x	x	
	Polygrammodes flavidalis		SNR	GNR							x		
	Pompeius verna	Little Glassywing	S4	G5				x		x	x	x	
	Ponana rubida		SNR	GNR							x		
	Ponometia candefacta	Olive-shaded Bird-dropping Moth	S4?	G5							x		
	Ponometia erastrioides	Small Bird-dropping Moth	SNR	G5							x		
*	*Popillia japonica*	A Scarab Beetle	SNA	GNR						x	x		
	Prenolepis imparis	Winter Ant	S4	G5							x		
	Prescottia lobata		SNR	GNR							x		
	Prochoerodes lineola	Large Maple Spanworm Moth	S5	G5							x		
	Progomphus obscurus	Common Sanddragon	S1	G5					x				
	Prolimacodes badia	Skiff Moth	SNR	G5							x		
	Protoboarmia porcelaria	Porcelain Gray	SNR	G5							x		
	Protodeltote muscosula	Large Mossy Lithacodia	SNR	G5							x		
	Psenocerus supernotatus	A Longhorned Beetle	SNR	G5							x		
	Pseudeustrotia carneola	Pink-barred Lithacodia	S4	G5							x		
	Pseudeva purpurigera	Straight-lined Looper Moth	SNR	G5							x		
	Pseudogaurotina abdominalis	A Longhorned Beetle	SNR	GNR							x		
	Pseudohermonassa bicarnea	Pink-spotted Dart	S4	G5							x		
	Pseudothyatira cymatophoroides	Tufted Thyatirid	S4S5	G5							x		
	Psorophora ciliata	Large Gold-striped Mosquito	SU	GNR							x		
*	*Psyche casta*	Common Bagworm Moth	SNA	GNR							x		
	Psychomorpha epimenis	Grapevine Epimenis Moth	S4	G5							x		
	Psyllobora vigintimaculata	A Ladybird Beetle	SNR	G5							x		
	Psyrassa unicolor	A Longhorned Beetle	SNR	GNR							x		
	Pterostichus mutus	Ground Beetle	SNR	G5							x		
	Pyralis farinalis	Meal Moth	SNR	GNR							x		
	Pyrausta acrionalis		SNR	G5							x		
	Pyrausta bicoloralis		SNR	GNR							x		
	Pyrausta orphisalis		SNR	GNR							x		
	Pyrausta signatalis		SNR	G5							x		
	Pyrgus communis	Common Checkered Skipper	SNA	G5								x	
	Pyrisitia lisa	Little Yellow	SNA	G5								x	
	Pyropyga decipiens	A Glowworm	SNR	G5							x		

Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
Pyrrharctia isabella	Isabella Tiger Moth	S5	G5						x	x		
Pyrrhia aurantiago	False Foxglove Sun Moth	S1	G3G4	END				x				
Pyrrhia cilisca	Bordered Sallow	SNR	G5							x		
Pyrrhia exprimens	Purple-lined Sallow	SNR	G5							x		
Raphia frater	The Brother	S4S5	G5							x		
Rhingia nasica		S5	G5							x		
Rhyssomatus lineaticollis	A Weevil	SNR	GNR							x		
Ripiphorus fasciatus	A Wedge-shaped Beetle	SNR	GNR							x		
Rivula propinqualis	Spotted Grass Moth	SNR	G5							x		
Roeseliana roeselii	Roesel¿s Shield-backed Katydid	SNA	GNR							x		
Satyrium acadica	Acadian Hairstreak	S4	G5							x	x	
Satyrium calanus	Banded Hairstreak	S4	G5				x			x	x	
Satyrium caryaevorus	Hickory Hairstreak	S4	G4							x	x	
Satyrium edwardsii	Edwards' Hairstreak	S4	G5							x	x	
Satyrium liparops	Striped Hairstreak	S5	G5							x	x	
Satyrium titus	Coral Hairstreak	S5	G5							x	x	
Saucrobotys futilalis		SNR	GNR							x		
Scaphytopius frontalis	Yellowfaced Leafhopper	SNR	GNR							x		
Scarites subterraneus	A Ground Beetle	SNR	GNR							x		
Schinia arcigera	Arcigera Flower Moth	SNR	G5							x		
Schinia florida	Primrose Moth	SNR	G5							x		
Schinia rivulosa	Ragweed Flower Moth	SNR	G5							x		
Schinia trifascia	Three-lined Flower Moth	SNR	G5							x		
Schizura leptinoides	Black-blotched Schizura	SNR	G5							x		
Schizura unicornis	Unicorn Caterpillar Moth	SNR	G5						x	x		
Scoliopteryx libatrix	Herald Moth	S5	G5							x		
Scoparia biplagialis		SNR	GNR							x		
Scopula limboundata	Large Lace-border	SNR	G5							x		
Scudderia furcata	Fork-tailed Bush Katydid	S4	G5							x		
Scudderia septentrionalis	Northern Bush Katydid	S3?	G3?							x		
Sitona hispidulus	A Weevil	SNR	GNR							x		
Smodicum cucujiforme	A Longhorned Beetle	SNR	GNR							x		
Spargaloma sexpunctata	Six-spotted Gray	SNR	G5							x		
Sparganothis sulfureana	Sparganothis Fruitworm Moth	SNR	GNR							x		
Sparnopolius confusus	Aster Bee Fly	S3S4	GNR						x	x		
Speyeria aphrodite	Aphrodite Fritillary	S5	G5								x	
Speyeria cybele	Great Spangled Fritillary	S5	G5							x	x	
Sphaerophoria contigua		S5	G5							x		
Sphecius speciosus	Cicada Killer	S1S2	GNR					x				
Sphecodina abbottii	Abbott's Sphinx	S4	G5							x		
Sphinx kalmiae	Laurel Sphinx	S5	G5							x		
Spilomyia longicornis		S4	GNR							x		
Spilosoma virginica	Virginian Tiger Moth	S5	G5							x		
Spiramater lutra		S5	G5							x		

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
	Spodoptera frugiperda	Fall Armyworm Moth	SNR	G5							x		
	Spodoptera ornithogalli	Yellow-striped Armyworm Moth	SNR	G5							x		
	Spragueia leo	Common Spragueia	SNR	G5							x		
	Stenolophus lineola	Ground Beetle	SNR	GNR							x		
	Stenolophus ochropezus	Ground Beetle	SNR	G5							x		
	Strangalia luteicornis	A Longhorned Beetle	SNR	GNR							x		
	Strymon melinus	Gray Hairstreak	S4	G5								x	
	Sumitrosis inaequalis	A Leaf Beetle	SNR	G5							x		
	Sunira bicolorago	Bicolored Sallow Moth	S5	G5							x		
	Symmerista canicosta		SNR	G5							x		
	Sympetrum obtrusum	White-faced Meadowhawk	S5	G5						x	x		
	Sympetrum rubicundulum	Ruby Meadowhawk	S5	G5						x	x		
	Sympetrum semicinctum	Band-winged Meadowhawk	S4	G5							x		
	Sympetrum vicinum	Autumn Meadowhawk	S5	G5							x		
	Synchlora aerata	Wavy-lined Emerald	SNR	G5							x		
	Systena marginalis	A Leaf Beetle	SNR	GNR							x		
	Tabanus atratus	Mourning Horse Fly	S4	GNR							x		
	Tabanus trimaculatus	Three-spotted Horse Fly	SU	GNR							x		
	Tenodera sinensis	Chinese Mantis	SNA	GNR							x		
	Tetraopes quinquemaculatus	A Longhorned Beetle	SNR	GNR							x		
	Tetraopes tetrophthalmus	A Longhorned Beetle	SNR	G5							x		
	Tettigidea lateralis	Black-sided Pygmy Grasshopper	S4?	G5							x		
	Thorybes bathyllus	Southern Cloudywing	S3	G5								x	
	Thorybes pylades	Northern Cloudywing	S5	G5							x	x	
*	*Thymelicus lineola*	European Skipper	SNA	G5							x	x	
	Thyris maculata	Spotted Thyris	SNR	GNR							x		
	Tolype velleda	Large Tolype	SNR	G5							x		
	Toxomerus geminatus		S5	G5							x		
	Toxomerus marginatus		S5	G5							x		
	Toxomerus politus		S4	GNR							x		
	Tramea carolina	Carolina Saddlebags	SNA	G5							x		
	Tramea lacerata	Black Saddlebags	S4	G5						x	x		
	Trichiotinus affinis	A Scarab Beetle	SNR	G5							x		
	Trichodezia albovittata	White-striped Black	SNR	G5							x		
	Tricholita signata	Signate Quaker	SNR	G5							x		
	Trichordestra legitima	Striped Garden Caterpillar Moth	S5	G5							x		
	Trirhabda canadensis	A Leaf Beetle	SNR	G5							x		
	Tritoma sanguinipennis	A Pleasing Fungus Beetle	SNR	G4G5							x		
	Tylonotus bimaculatus	A Longhorned Beetle	SNR	GNR							x		
	Tylozygus bifidus		SNR	GNR							x		
	Typocerus velutinus	A Longhorned Beetle	SNR	G5							x		
	Udea rubigalis	Celery Leaftier Moth	SNR	G5							x		
	Ululodes quadripunctatus	Four-spotted Owlfly	SU	GNR							x		
	Urbanus proteus	Long-tailed Skipper	SNA	G5								x	

Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Butterfly Atlas	Comments
Urola nivalis		SNR	G5							x		
Vanessa atalanta	Red Admiral	S5	G5						x	x	x	
Vanessa cardui	Painted Lady	S5	G5						x	x	x	
Vanessa virginiensis	American Lady	S5	G5							x	x	
Vespula flavopilosa		S3S4	GNR							x		
Vespula maculifrons		S4	G5							x		
Wallengrenia egeremet	Northern Broken-Dash	S5	G5							x	x	
Xanthogramma flavipes		S4	GNR							x		
Xenotemna pallorana		SNR	GNR							x		
Xenox tigrinus	Tiger Bee Fly	S3S4	GNR							x		
Xestia dolosa	Greater Black-lettered Dart	S5	G5							x		
Xylocopa virginica	Virginia Carpenter Bee	S4S5	G5							x		
Yponomeuta cagnagella	Spindle Ermine Moth	SNA	GNR							x		
Ypsolopha dentella		SNR	GNR							x		
Zale lunata	Lunate Zale	S5	G5							x		
Zanclognatha cruralis	Early Zanclognatha	SNR	G5							x		
Zanclognatha pedipilalis	Grayish Zanclognatha	SNR	G5							x		

x *indicates the species is a Tallgrass Indicator Species from the SOFIA database*

Gastropod List

	Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Comments
*	*Cepaea nemoralis*	Grovesnail	SNA	G5						x		
	Patera pennsylvanica	Proud Globelet	S1	G4	END	END			x			

Spider List

Scientific Name	English Name	S Rank (Provincial)	G Rank (Global)	COSEWIC	ESA	SARA Schedule 1	Incidentals	NHIC	iNat Study Area	iNat BioBlitz Area	Comments
Araneus marmoreus	Marbled Orbweaver	S5	G5						x		
Castianeira trilineata	Toothed Antmimic Corinne Spider	S2S3	G4?						x		
Micrathena sagittata	Arrow-shaped Orbweaver	S3S4	GNR						x		
Pachygnatha autumnalis	Big-eyed Thick Long-jawed Spider	S4S5	GNR						x		
Sphodros niger	Black Purseweb Tarantula	S3	G4G5					x			
Synemosyna formica	Slender Antmimic Jumping Spider	SU	GNR						x		

APPENDIX B

Bat Activity Figures

Table A1. Nightly bat passes at each site.

Detector	Night	Mylu	Myse	Myle	Myotis	Pesu	Labo	HiFspp	Laci	Lano	Epfu	Lano/Epfu	LoFspp	Unknown
Unit_51	6/24/2020	0	0	0	0	0	44	11	0	1	12	3	14	0
Unit_51	6/25/2020	0	0	0	0	0	82	49	0	3	212	6	27	0
Unit_51	6/26/2020	0	0	0	0	0	16	15	0	1	90	5	44	0
Unit_51	6/27/2020	0	0	0	0	0	0	2	0	0	0	0	1	0
Unit_51	6/28/2020	0	0	0	0	0	28	22	0	1	20	1	30	0
Unit_51	6/29/2020	0	0	0	0	0	50	81	0	0	110	3	112	0
Unit_51	6/30/2020	0	0	0	0	0	32	95	0	24	44	26	49	0
Unit_51	7/1/2020	0	0	0	0	0	16	46	0	0	41	1	15	0
Unit_51	7/2/2020	0	0	0	0	0	44	54	0	2	131	4	41	0
Unit_51	7/3/2020	0	0	0	0	0	12	20	0	2	523	17	190	0
Unit_51	7/4/2020	0	0	0	0	0	94	75	0	2	151	7	90	0
Unit_51	7/5/2020	0	0	0	0	0	81	72	0	5	188	11	225	0
Unit_51	7/6/2020	0	0	0	0	0	100	27	0	5	50	7	86	0
Unit_51	7/7/2020	0	0	0	0	0	0	0	0	0	0	0	0	0
Unit_51	7/8/2020	0	0	0	0	0	48	31	0	0	149	2	89	0
Unit_51	7/9/2020	0	0	0	0	0	165	30	0	0	139	0	34	0
Unit_51	7/10/2020	0	0	0	0	0	0	0	0	0	0	0	0	0
Unit_51	7/11/2020	0	0	0	0	0	94	20	0	17	285	19	136	0
Unit_51	7/12/2020	0	0	0	0	0	83	15	0	2	155	4	45	0
Unit_51	7/13/2020	0	0	0	0	0	62	6	0	0	152	8	77	0
Unit_51	7/14/2020	0	0	0	0	0	31	25	0	10	134	9	181	0
Unit_51	7/15/2020	0	0	0	0	0	19	15	0	6	157	2	108	0
Unit_51	7/16/2020	0	0	0	0	0	1	8	0	0	1	1	12	0
Unit_56	6/30/2020	0	0	0	0	0	0	2	1	0	384	10	83	0
Unit_56	7/1/2020	0	0	0	0	0	0	0	2	0	136	3	75	0

Detector	Night	Mylu	Myse	Myle	Myotis	Pesu	Labo	HiFspp	Laci	Lano	Epfu	Lano/Epfu	LoFspp	Unknown
Unit_56	7/2/2020	0	0	0	0	0	3	2	0	0	506	13	88	0
Unit_56	7/3/2020	0	0	0	0	0	0	0	0	0	298	2	54	0
Unit_56	7/4/2020	0	0	0	0	0	0	6	0	1	637	19	217	0
Unit_56	7/5/2020	0	0	0	0	0	2	6	0	0	753	19	61	0
Unit_56	7/6/2020	0	0	0	0	0	1	2	0	0	357	16	94	0
Unit_56	7/7/2020	0	0	0	0	0	1	3	0	0	149	5	169	0
Unit_56	7/8/2020	0	0	0	0	0	1	1	0	0	100	1	19	0
Unit_56	7/9/2020	0	0	0	0	0	0	4	1	0	199	1	59	1
Unit_56	7/10/2020	0	0	0	0	0	0	8	0	0	7	0	12	0
Unit_56	7/11/2020	0	0	0	1	0	1	0	0	0	179	4	51	0
Unit_56	7/12/2020	0	0	0	0	0	1	5	0	0	286	15	77	0
Unit_56	7/13/2020	0	0	0	0	0	3	5	0	0	409	11	17	1
Unit_56	7/14/2020	0	0	0	0	0	7	10	0	0	33	3	47	0
Unit_58	6/23/2020	0	0	0	0	0	1	1	0	2	5	3	9	0
Unit_58	6/24/2020	0	0	0	0	0	1	2	2	1	0	10	14	0
Unit_58	6/25/2020	0	0	0	0	0	0	2	3	0	3	4	16	0
Unit_58	6/26/2020	0	0	0	0	0	0	1	1	0	0	0	5	0
Unit_58	6/27/2020	0	0	0	0	0	7	6	3	0	1	12	31	0
Unit_58	6/28/2020	0	0	0	0	0	1	5	3	0	1	1	27	0
Unit_58	6/29/2020	0	0	0	0	0	1	2	5	0	1	3	24	0
Unit_58	6/30/2020	0	0	0	0	0	3	5	2	0	0	7	36	0
Unit_58	7/1/2020	0	0	0	0	0	5	8	3	0	1	7	30	0
Unit_58	7/2/2020	0	0	0	0	0	3	12	5	0	0	1	47	0
Unit_58	7/3/2020	0	0	0	0	0	0	2	3	0	0	1	14	0
Unit_58	7/4/2020	0	0	0	0	0	0	3	2	0	1	2	16	0

Detector	Night	Mylu	Myse	Myle	Myotis	Pesu	Labo	HiFspp	Laci	Lano	Epfu	Lano/Epfu	LoFspp	Unknown
Unit_58	7/5/2020	0	0	0	0	0	2	9	4	1	3	3	33	0
Unit_58	7/6/2020	0	0	0	0	0	3	3	7	0	0	1	24	0
Unit_58	7/7/2020	0	0	0	0	0	1	1	7	0	6	9	76	1
Unit_58	7/8/2020	0	0	0	0	0	1	12	5	0	0	4	21	0
Unit_58	7/9/2020	0	0	0	0	0	1	4	10	0	0	3	37	0
Unit_58	7/10/2020	0	0	0	0	0	1	0	2	0	0	0	3	0
Unit_58	7/11/2020	0	0	0	0	0	3	5	4	0	1	2	8	0
Unit_58	7/12/2020	0	0	0	0	0	9	12	4	0	6	8	22	0
Unit_58	7/13/2020	0	0	0	0	0	2	7	6	0	1	1	20	0
Unit_58	7/14/2020	0	0	0	0	0	2	7	7	0	0	3	30	0
Unit_65	6/24/2020	0	0	0	0	0	167	77	37	138	93	26	195	0
Unit_65	6/25/2020	0	0	0	0	0	64	66	168	312	313	86	571	2
Unit_65	6/26/2020	0	0	0	0	0	15	10	4	0	15	0	20	0
Unit_65	6/27/2020	0	0	0	0	0	101	57	43	34	174	12	186	1
Unit_65	6/28/2020	0	0	0	0	0	12	22	25	16	88	9	70	0
Unit_65	6/29/2020	0	0	0	0	0	27	21	15	4	145	11	96	0
Unit_65	6/30/2020	0	0	0	0	0	21	20	28	5	150	7	142	0
Unit_65	7/1/2020	0	0	0	0	0	7	16	12	2	86	1	104	0
Unit_65	7/2/2020	0	0	0	0	0	28	39	27	3	96	1	127	0
Unit_65	7/3/2020	0	0	0	0	0	4	10	19	7	171	12	124	0
Unit_65	7/4/2020	0	0	0	0	0	18	34	18	5	29	2	46	0
Unit_65	7/5/2020	0	0	0	0	0	40	53	21	4	60	0	110	0
Unit_65	7/6/2020	0	0	0	0	0	27	38	16	5	48	3	76	0
Unit_65	7/7/2020	0	0	0	0	0	6	26	25	1	136	4	108	0
Unit_65	7/8/2020	0	0	0	0	0	7	15	22	2	39	3	93	0

Detector	Night	Mylu	Myse	Myle	Myotis	Pesu	Labo	HiFspp	Laci	Lano	Epfu	Lano/Epfu	LoFspp	Unknown
Unit_65	7/9/2020	0	0	0	0	0	8	19	33	4	45	2	73	0
Unit_65	7/10/2020	0	0	0	0	0	38	41	7	0	38	1	38	0
Unit_65	7/11/2020	0	0	0	0	0	39	40	19	2	39	3	100	0
Unit_65	7/12/2020	0	0	0	0	0	45	58	19	6	276	3	123	0
Unit_65	7/13/2020	0	0	0	0	0	82	57	14	10	95	5	74	0
Unit_65	7/14/2020	0	0	0	0	0	117	60	18	3	136	5	138	0
Unit_65	7/15/2020	0	0	0	0	0	128	131	14	2	37	2	78	0
Unit_65	7/16/2020	1	0	0	0	0	155	160	9	5	31	2	86	0
Unit_66	6/23/2020	0	0	0	0	0	0	0	0	0	0	1	4	0

Note:
Mylu = little brown myotis (*Myotis lucifugus)*
Myse = Northern myotis (*Myotis septentrionalis*)
Myle = Eastern small-footed myotis (Myotis leibii)
Pesu = tricoloured bat (*Perimyotis subflavus*)
HiFspp = high-frequency species
Epfu = big brown bat (*Eptesicus fuscus*)
Lano = Silver-haired bat (*Lasionycteris noctivagans*)
Laci = hoary bat (*Lasiurus cinereus*)
LoFspp = low-frequency specie

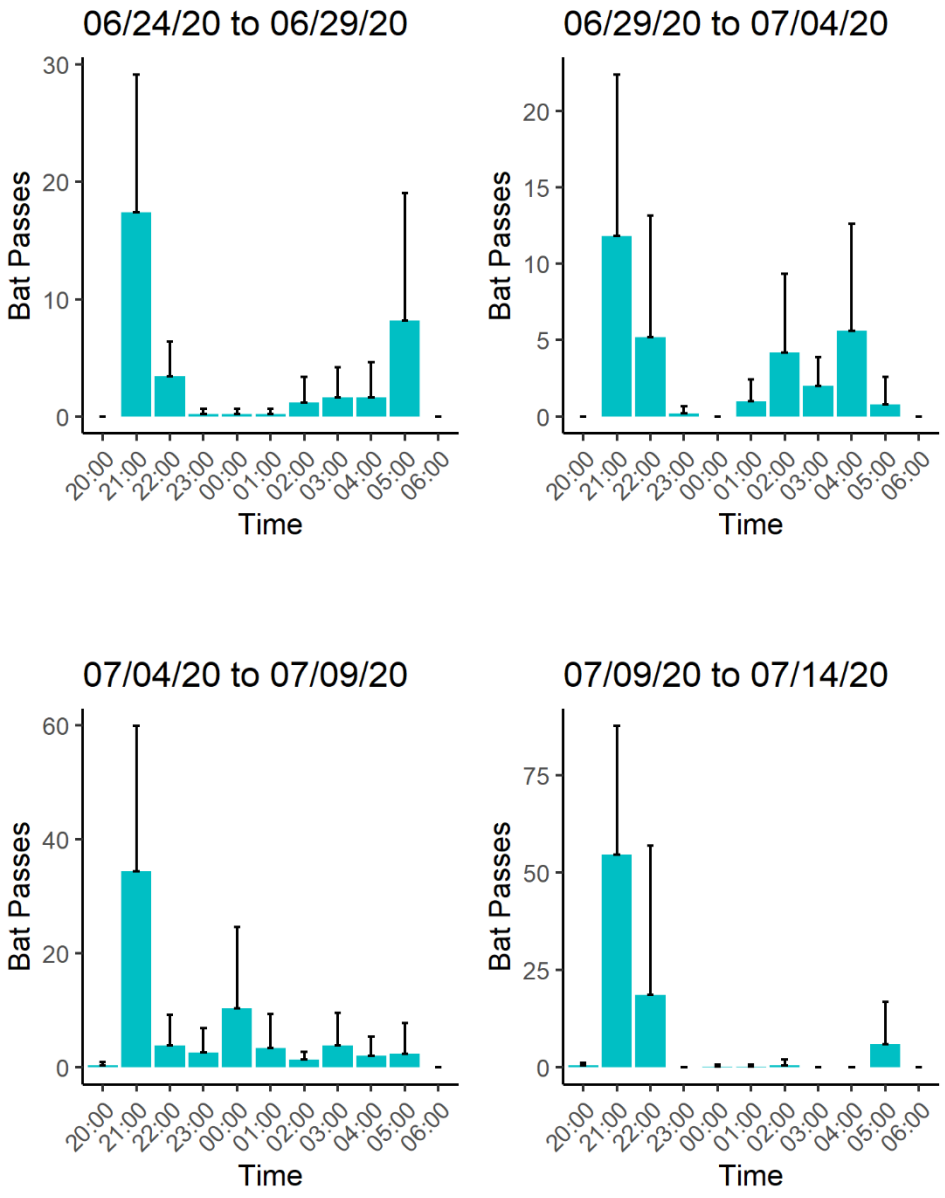

Figure A1. Average (± standard deviation) number of eastern red bat (Lasiurus borealis) passes at Unit 51 during each hour for each 5-day slice of the monitoring period

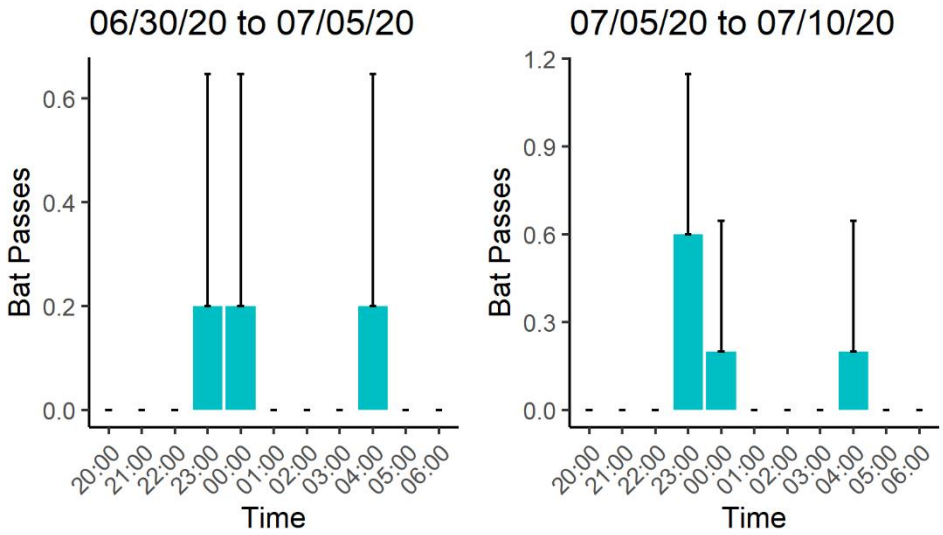

Figure A2. Average (± standard deviation) number of eastern red bat (*Lasiurus borealis*) passes at Unit 56 during each hour for each 5-day slice of the monitoring period.

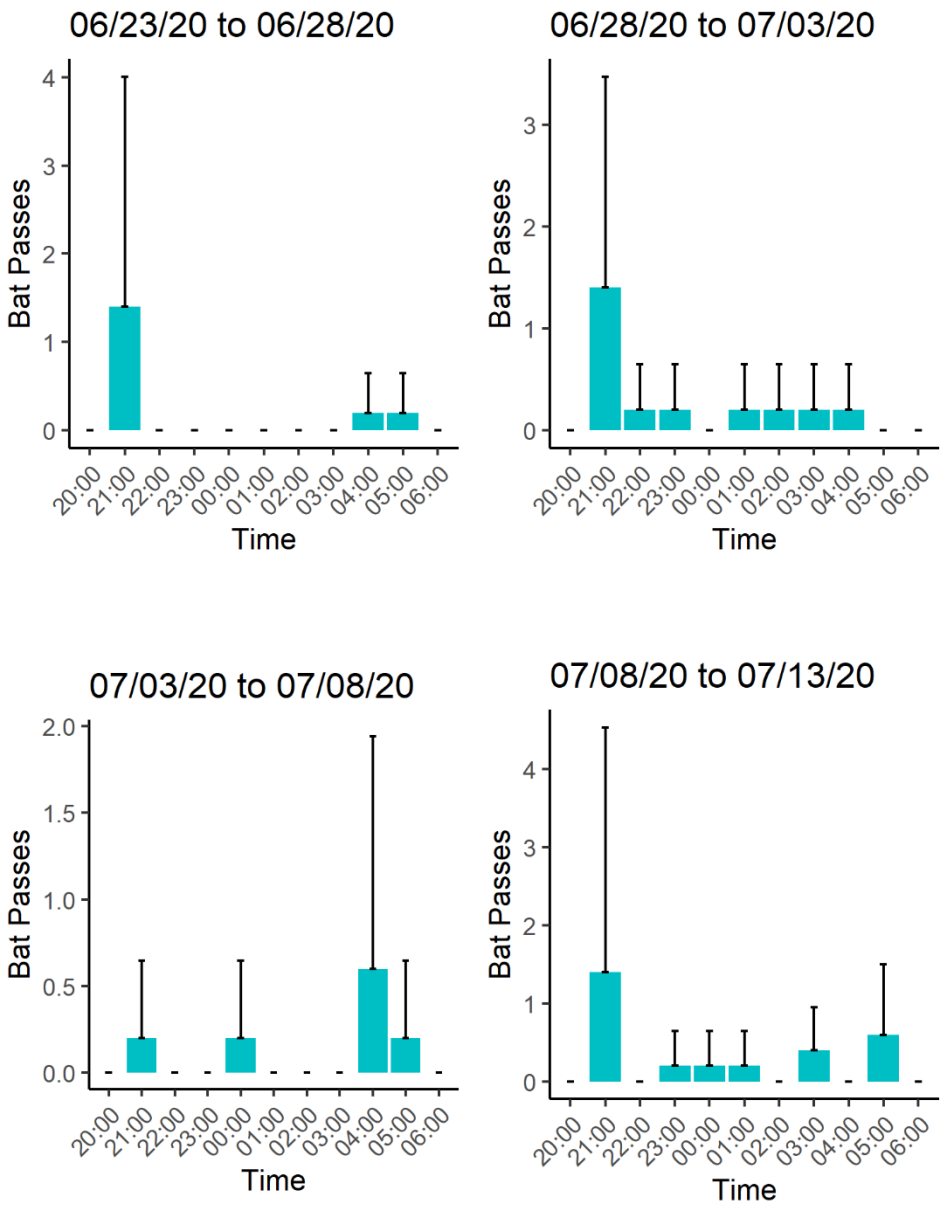

Figure A3. Average (± standard deviation) number of eastern red bat (*Lasiurus borealis*) passes at Unit 58 during each hour for each 5-day slice of the monitoring period

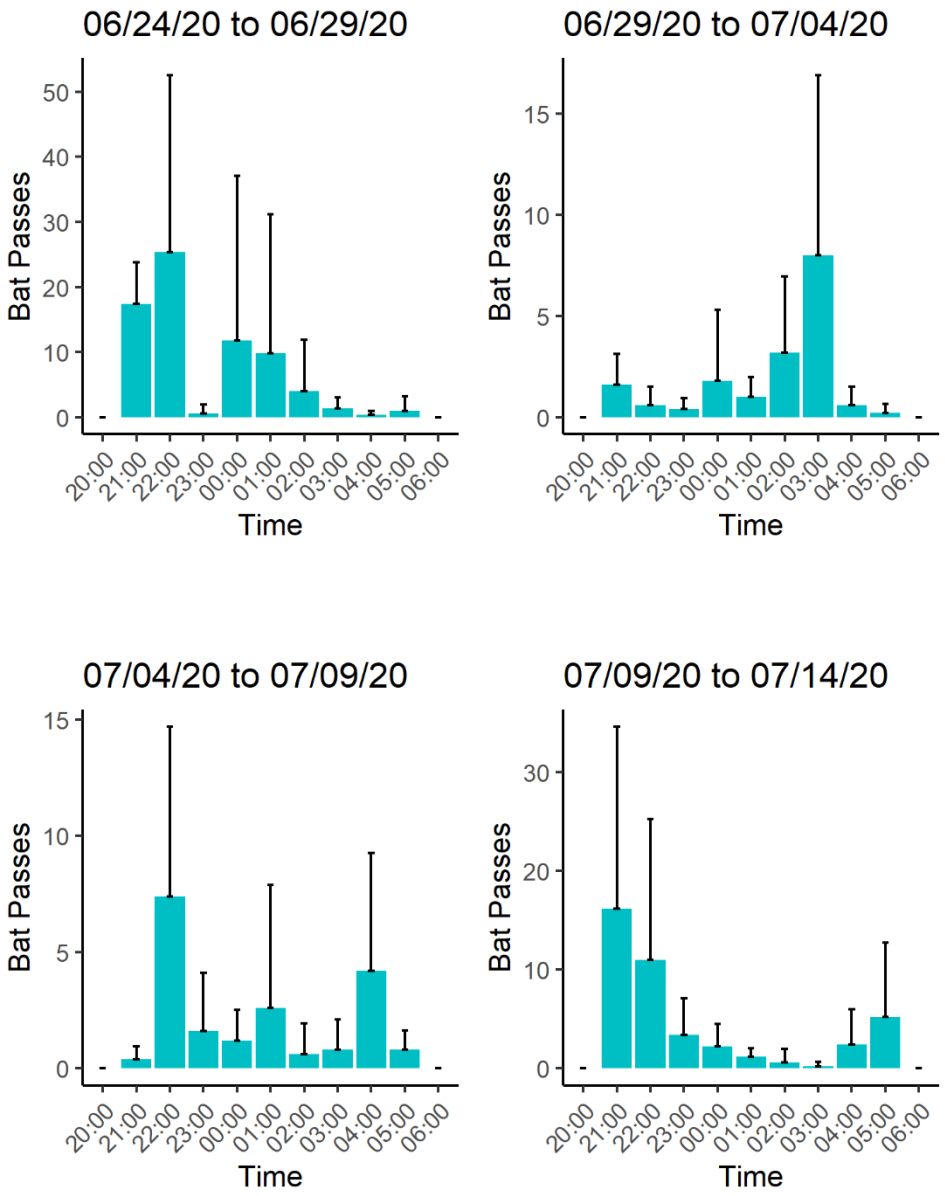

Figure A4. Average (± standard deviation) number of eastern red bat (*Lasiurus borealis*) passes at Unit 65 during each hour for each 5-day slice of the monitoring period

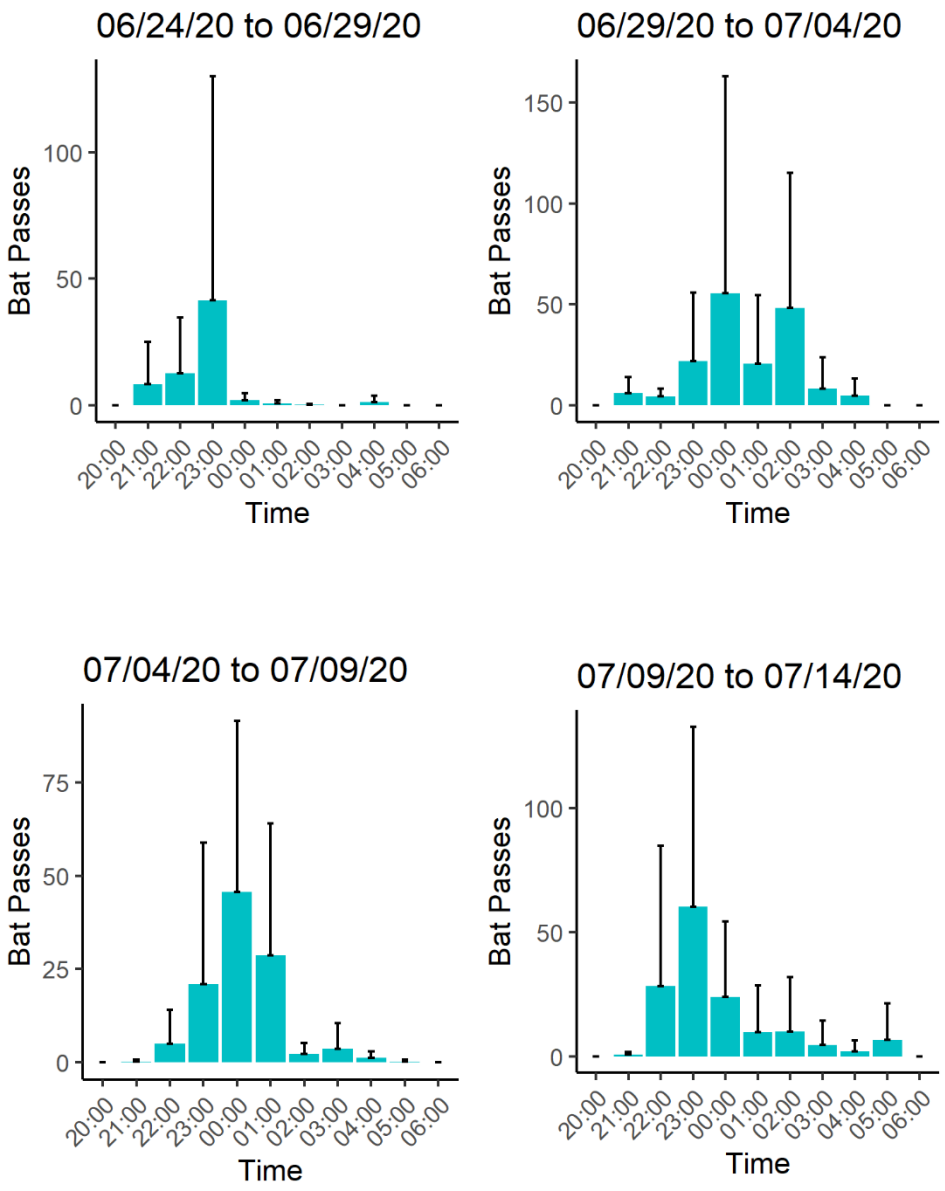

Figure A5. Average (± standard deviation) number of big brown bat (*Eptesicus fuscus*) passes at Unit 51 during each hour for each 5-day slice of the monitoring period.

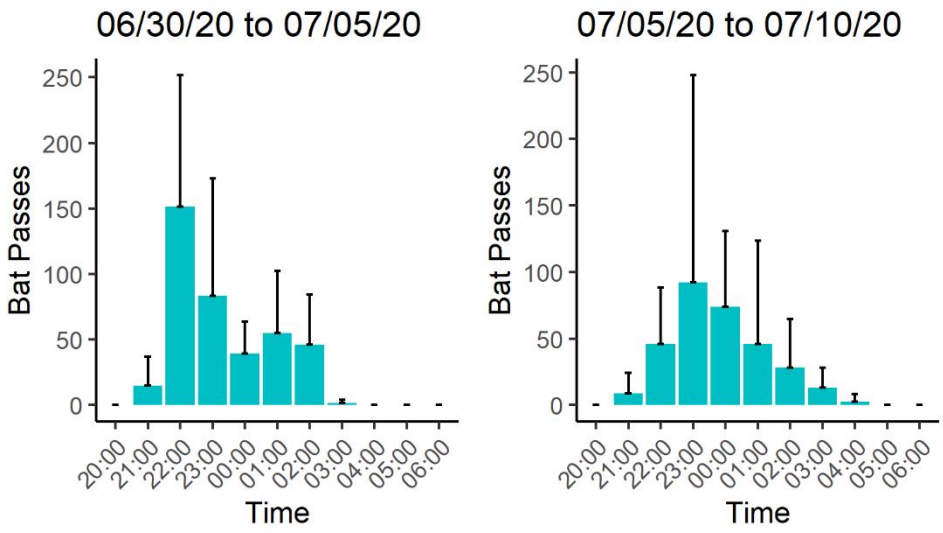

Figure A6. Average (± standard deviation) number of big brown bat (*Eptesicus fuscus*) passes at Unit 56 during each hour for each 5-day slice of the monitoring period.

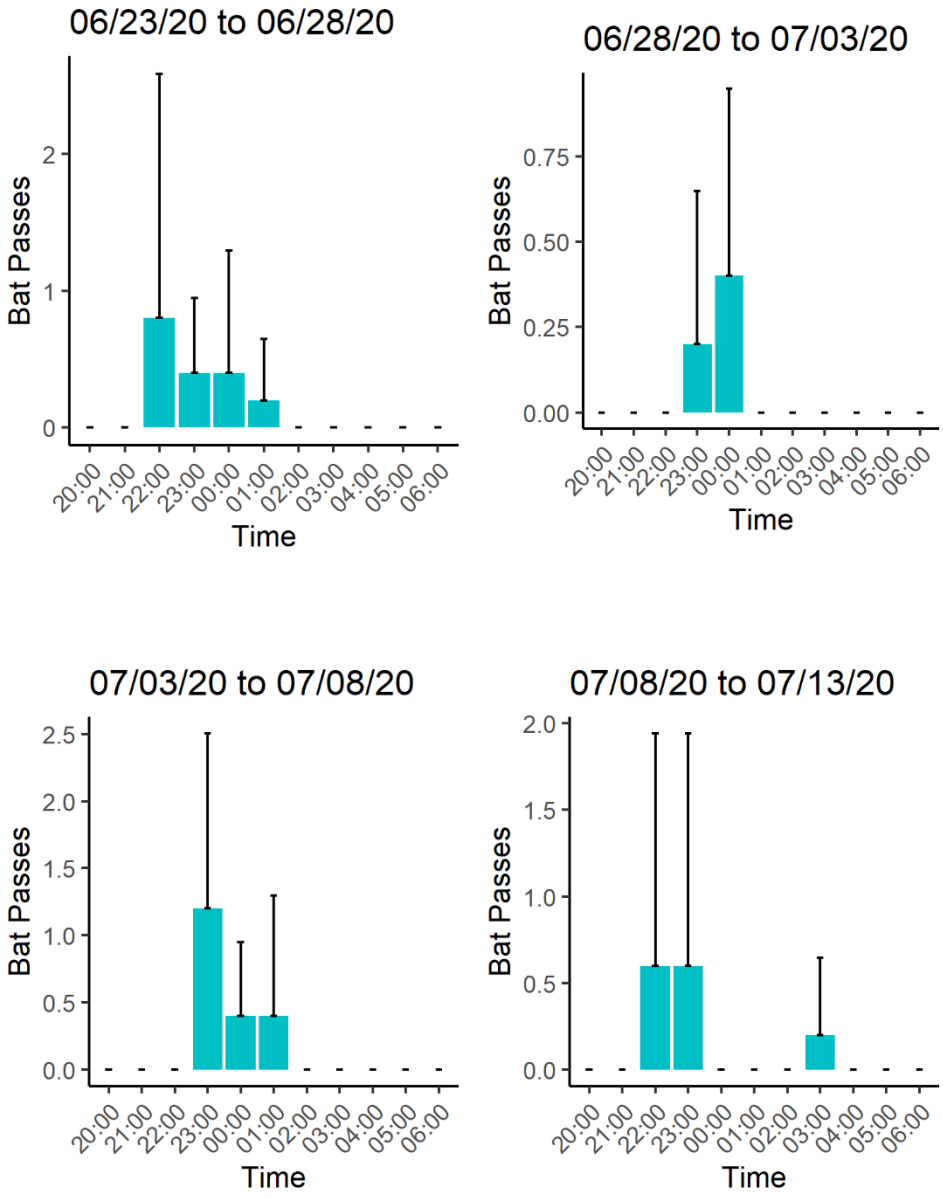

Figure A7. Average (± standard deviation) number of big brown bat (*Eptesicus fuscus*) passes at Unit 58 during each hour for each 5-day slice of the monitoring period.

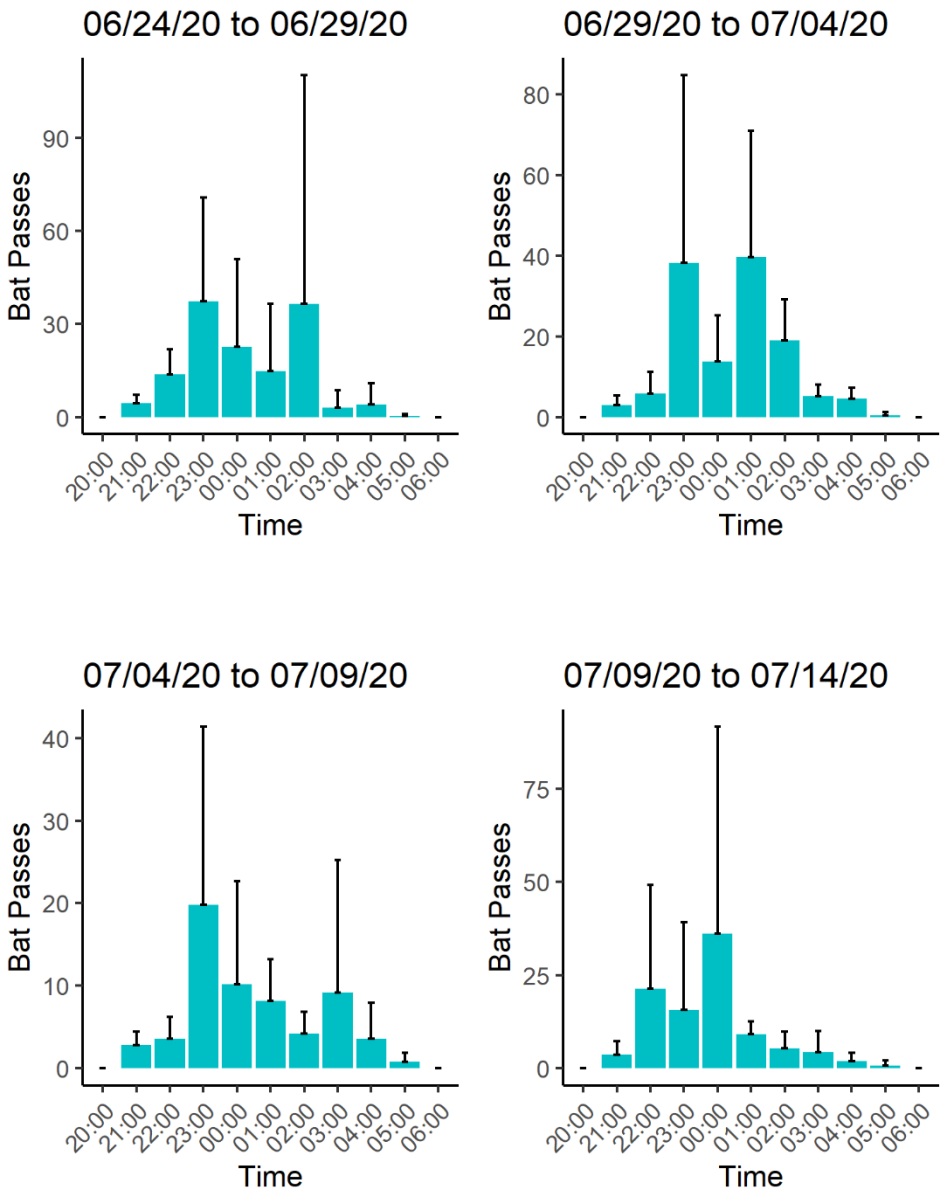

Figure A8. Average (± standard deviation) number of big brown bat (*Eptesicus fuscus*) passes at Unit 65 during each hour for each 5-day slice of the monitoring period.

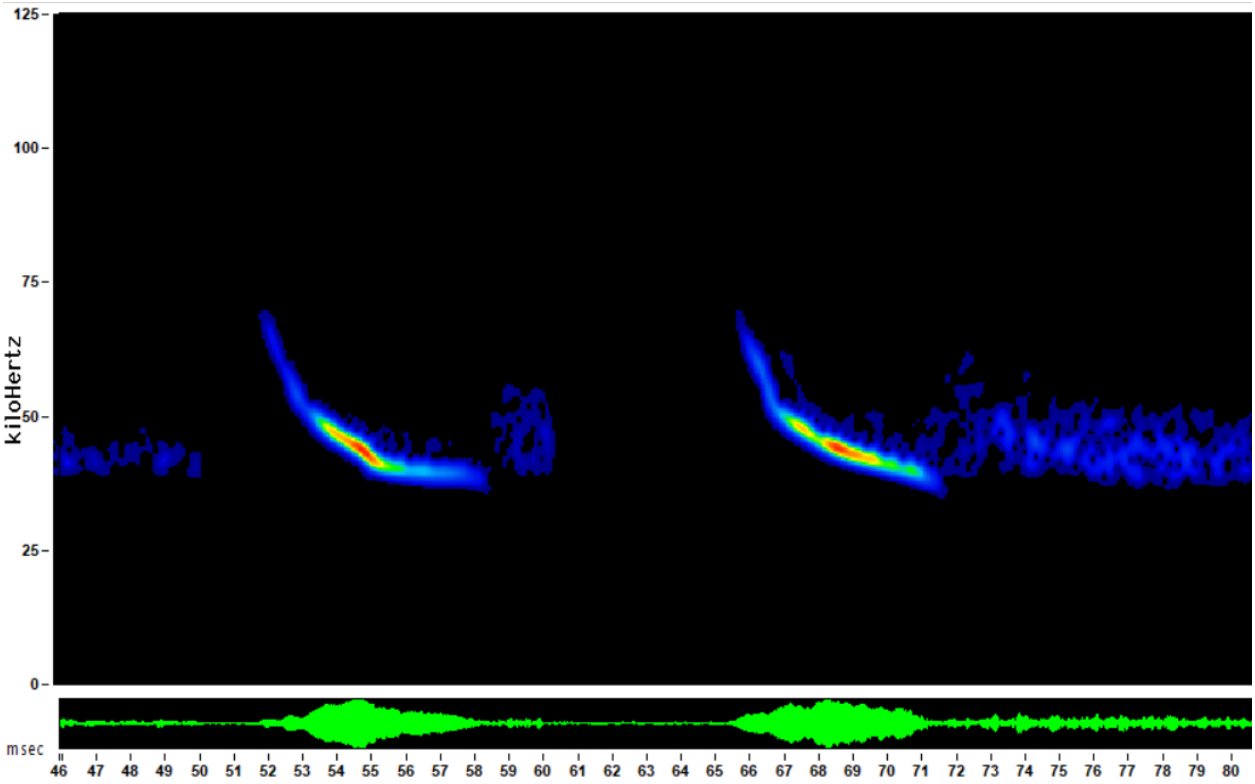

Figure A9. Sonogram of a little brown myotis (*Myotis lucifugus)* echolocation call (in compressed view) recorded at Unit 65 on the night of July 16, 2020.

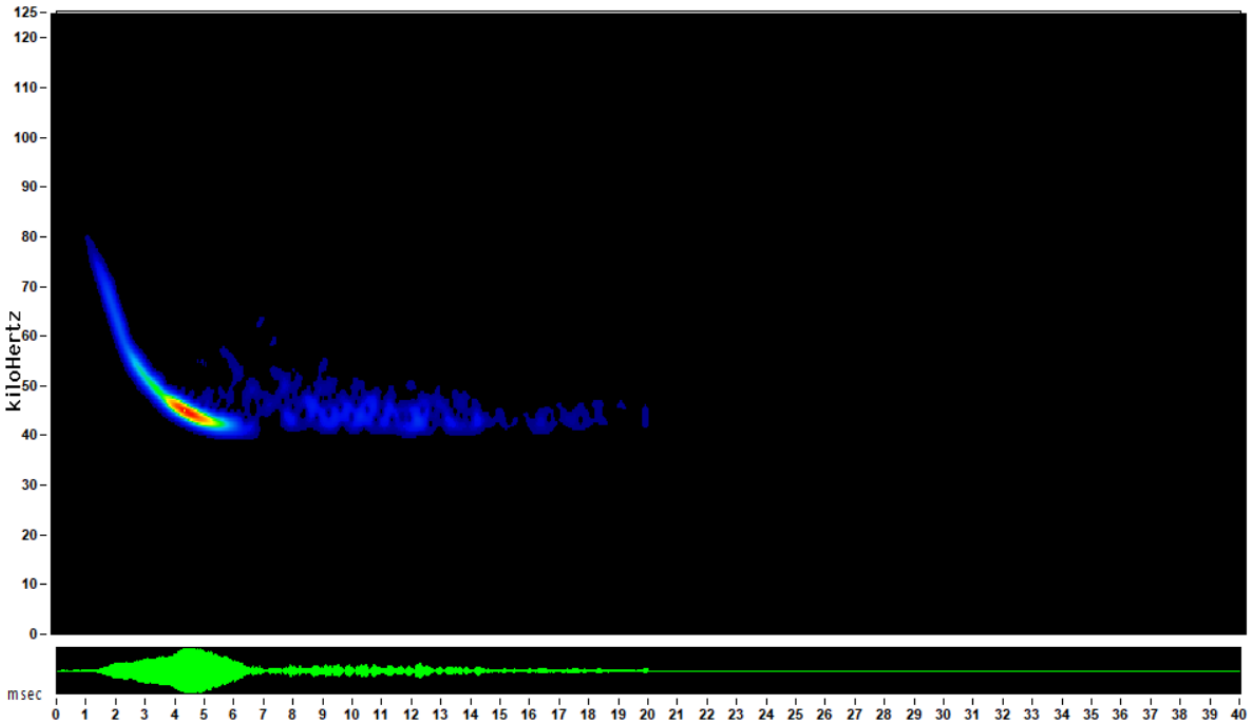

Figure A10. Sonogram of a eastern red bat (*Lasiurus borealis)* echolocation call (in compressed view) recorded at Unit 58 on the night of July 15, 2020.

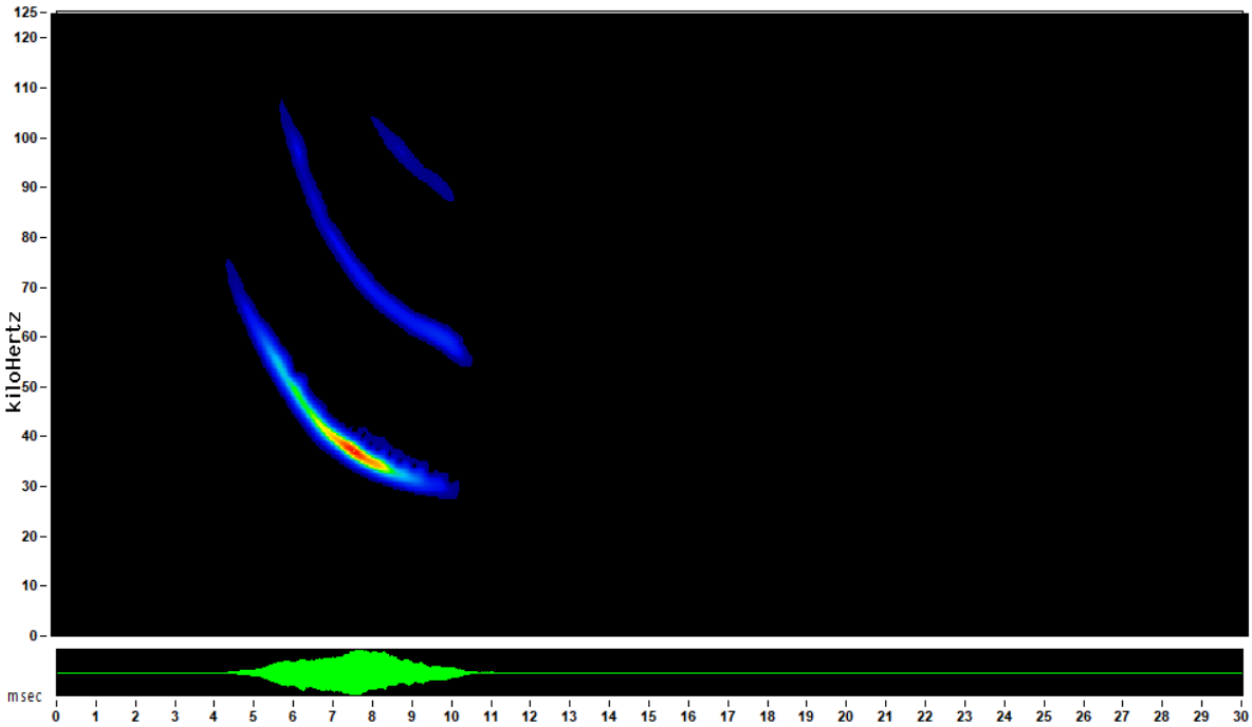

Figure A11. Sonogram of a big brown bat (*Eptesicus fuscus)* echolocation call (in compressed view) recorded at Unit 51 on the night of June 25, 2020.

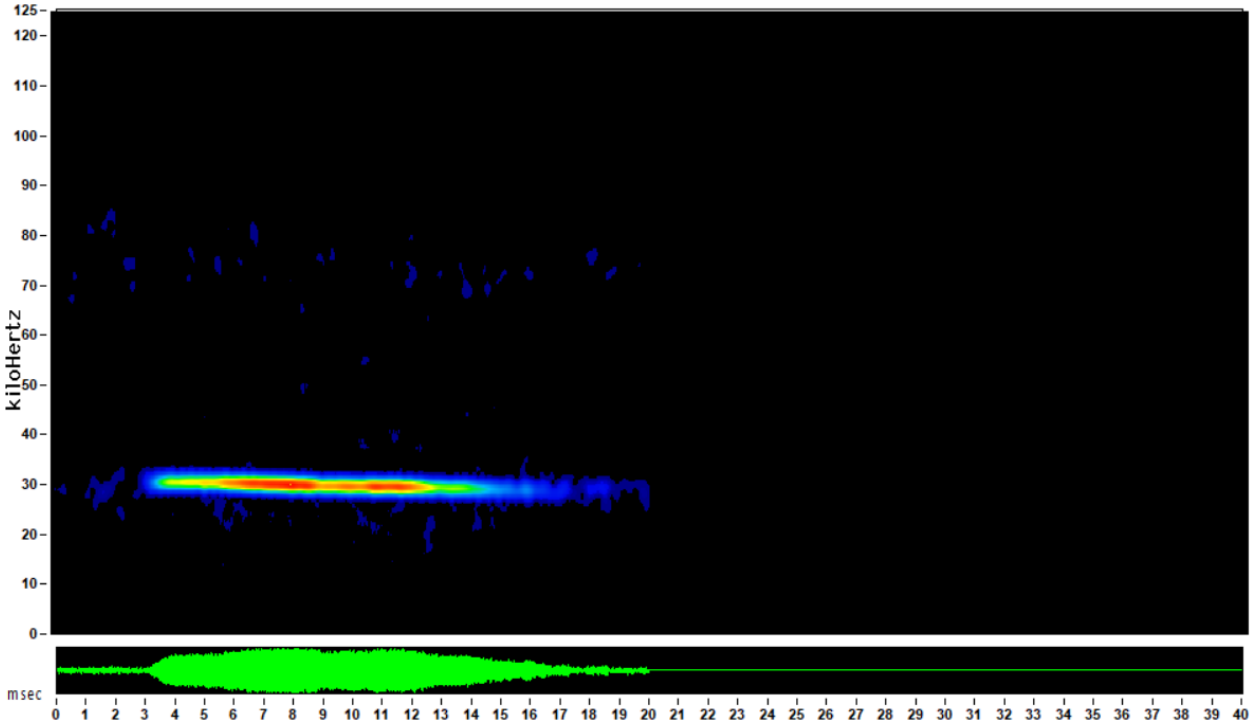

Figure A12. Sonogram of a silver-haired bat (*Lasionycteris noctivagans)* echolocation call (in compressed view) recorded at Unit 56 on the night of July 4, 2020.

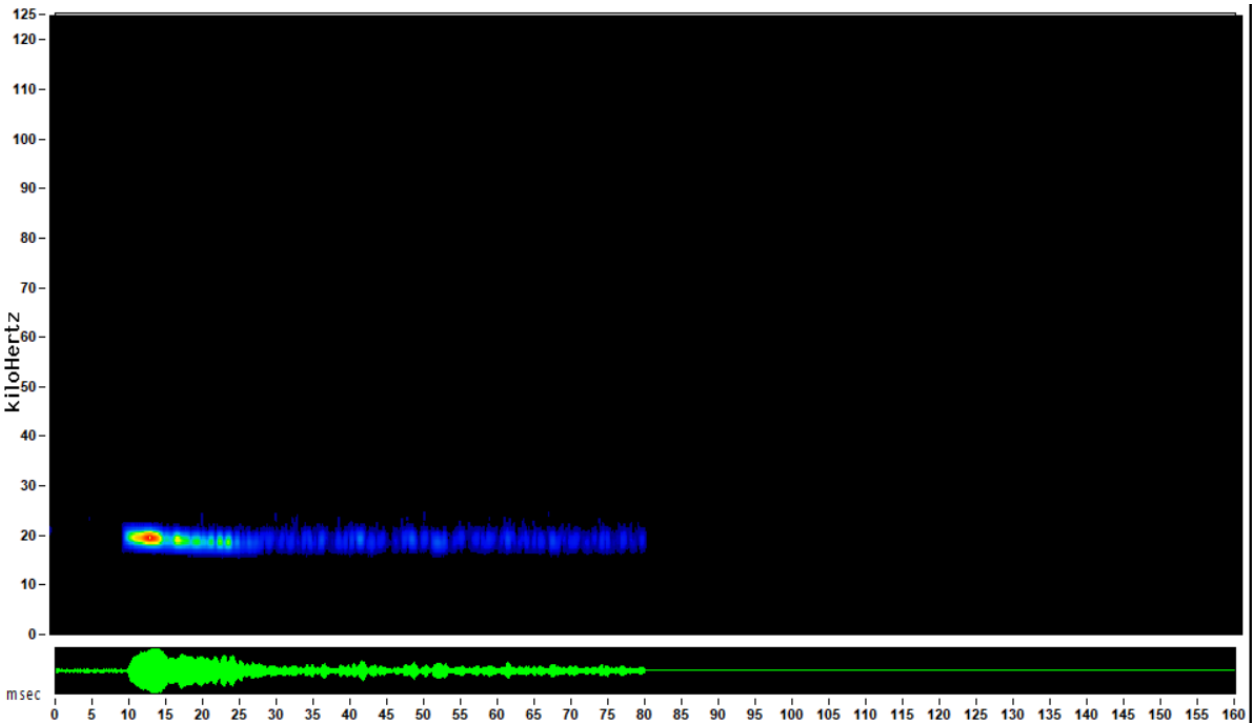

Figure A13. Sonogram of a hoary bat (*Lasiurus cinereus)* echolocation call (in compressed view) recorded at Unit 58 on the night of July 9, 2020.

APPENDIX C

Select Photos from Camera Traps

Photo 1: Camera 5 IM000016, Coyote

Photo 2: Camera 3 IM000071, White-tailed Deer

Photo 3: Camera 5 IM000192, White-tailed Deer

Photo 4: Camera 6 SUNP0109, Eastern Gray Squirrel

Photo 5: Camera 6 SUNP0116, Northern Raccoon kits

Photo 6: Camera 6 SUNP0131, Groundhog

Photo 7: Camera 4 SUNP0156, White-tailed Deer

Photo 8: Camera 7 RCNX0349, Raccoon

Photo 9: Camera 7 RCNX0339, Wild Turkey

Photo 10: Camera 8 RCNX0019, White-tailed Deer

Photo 11: Camera 9 RCNX0531, Raccoon moving under fence

Photo 12: Camera 9 RCNX0712, Coyote moving under fence

Photo 13: Camera 9 RCNX0265, White-tailed Deer

Photo 14: Camera 9 RCNX0117, White-tailed Deer

Photo 15: Camera 10 RCNX0186, Raccoons

Photo 16: Camera 10 RCNX0193, Raccoons fleeing Striped Skunk

APPENDIX D

Species at Risk Screening (Public-facing version is redacted)

WSP completed a screening of SAR to evaluate the probability of occurrence in the Project Area. The probabilities of SAR within the Project Area are based on an assessment of each species' habitat preferences/needs in conjunction with background information and other secondary source information.

Based on the results of field investigations and background and secondary data sources, a list of species protected under the ESA that could potentially occur was generated. For each species, an assessment was made as to the likelihood of habitat occurrence in the Project Area based on the biology of the species and the results of field investigations. Each species was classified into one of five probabilities of occurrence:

- Confirmed: species for which suitable habitat is present in the Project Area and the species was confirmed during field investigations or confirmed in secondary sources (e.g., consultation with MECP).
- High: those species recorded in the vicinity of the Project Area during field surveys or typically within 10 km and recorded in the past 20 years in secondary sources. The preferred habitat is abundant within the Project Area. Species with a high probability of occurrence would be expected to breed within or frequently use the habitats available within the Project Area and would be known to have a high relative abundance within the region (i.e., compared to other regions in Ontario).
- Moderate: species for which suitable habitat is present but limited or uncommon in the Project Area and breeding in the area is rare. However, species with moderate probabilities of occurrence may intermittently use the area for foraging, migration, or movement to other parts of their home range and therefore may have been documented in secondary sources or field surveys.
- Low: those species recorded in the vicinity of the Project Area, but whose preferred habitat does not occur or is extremely limited within the Project Area. These species may intermittently move through the Project Area but are unlikely to become permanent residents. These species have likely not been documented in secondary sources or field surveys, but historical records are possible.
- None: those species whose preferred habitat is completely absent from the Project Area. It is unlikely these species have been documented. However, historical or vagrant records (e.g., a species that is currently outside their wintering and breeding area) may exist.

Note that other SAR may come into the area, or species already occurring in the area may be up-listed at any time. Species that have a moderate or high potential to occur in the Project Area or have been confirmed in the Project Area will be carried forward to the impact assessment.

Five SAR have been confirmed in the Project Area (Table 7 2) while several more have high or moderate probability of occuring: one confirmed species is listed as endangered and four are listed as threatened.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Plants		
Smooth Yellow False Foxglove (*Aureolaria flava*) SARA: Threatened ESA: Threatened S-Rank: S2? Source: NHIC	Smooth Yellow False Foxglove is found in dry, open to semi-open upland oak forests typically with White Oak present, on well-drained soils (Ministry of the Environment, Conservation and Parks, 2022).	**High** – NHIC EOs are directly in Project Area. Suitable habitat occurs in Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
American Chestnut (*Castanea dentata*) SARA: Endangered ESA: Endangered S-Rank: S1S2 Source: NHIC, secondary sources	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils (Ministry of the Environment, Conservation and Parks, 2021a).	**Low** – Individuals have been confirmed elsewhere in Windsor, and suitable habitat could occur in the Project Area. Historically, an individual occurred; however, it has since died. Given low recruitment, in part, as few regenerating sprouts survive until reproductive age due to chestnut blight, it is unlikely more individuals will.
Spotted Wintergreen (*Chimaphila maculata*) SARA: Endangered ESA: Threatened S-Rank: S2 Source: Field Observations, NHIC	Dry, oak pine mixed forest where trees such as Red Oak and White Pine are present. Partial shade is preferred. (Environment Canada, 2015).	**Confirmed** – Individuals have been confirmed in East Study Area and are considered in the constraints analysis.
Blue Ash (*Fraxinus quadrangulata*) SARA: Special Concern ESA: Threatened S-Rank: S2? Source: NHIC	Blue Ash grows in deciduous floodplain forests, and along sandy beaches and on limestone outcrops associated with Lake Erie (Ministry of the Environment, Conservation and Parks, 2021b).	**Low** – limited or no habitat in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Kentucky Coffee-tree (*Gymnocladus dioicus*) SARA: Threatened ESA: Threatened S-Rank: S2 Source: City of Windsor	Kentucky Coffee-tree is found in a variety of habitats, but grows best on moist, rich soil. Consequently, it is often found in floodplains, though it will tolerate shallow rocky or sandy soils. It is shade-intolerant, and therefore grows along the edges of woodlots or relies on canopy openings in forests and woodlots (Ministry of the Environment, Conservation and Parks, 2021c). Kentucky Coffeetree: Kentucky Coffee-tree is frequently planted as an ornamental tree and as a result, it can be difficult to ascertain whether trees are native, planted from native stock, planted cultivars from the United States, or offspring of horticultural specimens that have spread into natural habitat. The MECP must be consulted to determine if these trees are recognized native extant populations. Until then, a radial distance of 20 m around a known observation of Kentucky Coffee-tree is applied. The 20 m distance is applied to each observation, with spatially overlapping areas merged to form larger sites (Ontario Ministry of Natural Resources and Forestry, 2017).	**Low** – there are planted Kentucky Coffee-trees at the south end of the naturalized strip along Ojibway Parkway as well as in the picnic area of Ojibway Park near Matchett Rd. Individuals have not been confirmed in the Project Area.
Slender Bush-clover (*Lespedeza virginica*) SARA: Endangered ESA: Endangered S-Rank: S1 Source: Field Observations, NHIC	Slender bush-clover grows on dry, sandy soil in tallgrass prairies. This plant does not do well in the shade and can be harmed by other plants that compete for light and space. The open and sunny prairie habitat it prefers, depends on natural disturbances, such as fire and drought, which naturally remove many unwanted trees and shrubs (Ministry of the Environment, Conservation and Parks, 2021d).	**Confirmed** – Individuals have been confirmed on-site and are considered in the constraints analysis.
Dense Blazing-star (*Liatris spicata)* SARA: Threatened ESA: Threatened S-Rank: S2 Source: Field Observations, NHIC	Dense Blazing Star grows in moist prairies, grassland savannahs, wet areas between sand dunes, and abandoned fields. This plant does not do well in the shade and is usually found in areas that are kept open and sunny by fire, floods, drought, or grazing (Ministry of the Environment, Conservation and Parks, 2021e).	**Confirmed** – Individuals have been confirmed on-site and are considered in the constraints analysis.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Red Mulberry (*Morus rubra*) SARA: Endangered ESA: Endangered S-Rank: S2 Source: NHIC	The Red Mulberry is rare in Ontario, is often associated with forested valleys and floodplains. Red mulberry grows in moist, forested habitats and on both sandy and limestone-based loamy soils. It is often found in areas where the forest canopy is quite open and allows lots of sunlight to reach the forest floor, but it will tolerate some shade (Ministry of the Environment, Conservation and Parks, 2021f).	**Low** – limited or no habitat in the Project Area.
Climbing Prairie Rose (*Rosa setigera)* SARA: Special Concern ESA: Special Concern S-Rank: S2S3 Source: NHIC	The Climbing Prairie Rose is typically found in open habitats with moist heavy clay to clay-loam soils such as old fields, abandoned agricultural land, as well as prairie remnants and shrub thickets. This rose depends on areas being kept open by periodic fire or other disturbances (Ministry of the Environment, Conservation and Parks, 2014a).	**Moderate** – found elsewhere in Windsor and suitable habitat could occur in the Project Area. Ojibway Nature Center has not documented these species in the East Study Area.
Riddell's Goldenrod (*Solidago riddellii*) SARA: Special Concern ESA: Special Concern S-Rank: S3 Source: NHIC	Riddell's Goldenrod prefers open tallgrass prairie habitat with moist to wet calcium-rich soils. In Ontario, it also occurs in roadside ditches and along railway right-of-ways (Ministry of the Environment, Conservation and Parks, 2021g).	**Moderate** – found elsewhere in Windsor and suitable habitat could occur in the Project Area. Ojibway Nature Center has not documented these species in the East Study Area.
Willow-leaved Aster (*Symphyotrichum praealtum)* SARA: Threatened ESA: Threatened S-Rank: S2 Source: Field Observations, NHIC	In Ontario, Willow-leaved (Willowleaf) Aster is typically found in tallgrass prairies, oak savannas, thickets, meadows, edge of woods and woodland openings. It has also been found along railways, roadsides, abandoned farm fields, and other open, unshaded, anthropogenic habitats (Jones, Recovery strategy for the Willowleaf Aster (Symphyotrichum praealtum) in Ontario. , 2013).	**Confirmed** – Individuals have been confirmed on-site and are considered in the constraints analysis.
White Colicroot (*Aletris farinosa*) SARA: Threatened ESA: Endangered S-Rank: S2 Source: NHIC, secondary sources	Colicroot grows in open, sunny, and moist habitats with sandy or mucky soil, such as prairies and old abandoned fields. It has also been found along roadsides and forest edges. It does not tolerate shade or competition from other plants and appears to do well in areas that are kept open by fire, drought, grazing and other disturbances (Ministry of the Environment, Conservation and Parks, 2021h).	**Moderate** – found elsewhere in Windsor and suitable habitat could occur in the Project Area. Ojibway Nature Center has not documented these species in the East Study Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Purple Twayblade (*Liparis liliifolia*) SARA: Threatened ESA: Threatened S-Rank: S2S3 Source: Field Observations, NHIC	Purple twayblade is found in a variety of habitats including open oak woodland and savannah, mixed deciduous forest, shrub thicket, shrub alvar, deciduous swamp, and even conifer plantations. It will grow in partial shade, but does not like dense shade and depends on natural disturbances, such as storms and fire, to keep its habitat relatively open and sunny (Ministry of the Environment, Conservation and Parks, 2021i)	**Confirmed** – Individuals have been confirmed on-site and are considered in the constraints analysis.
Birds		
Bank Swallow (*Riparia riparia*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable (Falconer, et al., 2016).	**None** – No suitable nesting habitat was observed or is expected to occur.
Barn Swallow (*Hirundo rustica*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: Secondary Sources, NHIC	Barn Swallows have shifted largely to nesting in and on artificial structures, including buildings, bridges, and road culverts. This species prefers various open habitats for foraging including grassy fields, pastures, agricultural crops, and over open water (Heagy, et al., 2014).	**Low** – There are potentially suitable nesting sites on the bridges and buildings nearby the Project Area. However, no suitable nesting habitat was observed in the Project Area.
Bobolink (*Dolichonyx oryzivorus*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources	Bobolink nest primarily in forage crops, hayfields, and associated pastures. Bobolink also occur in wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses, no-till cropland, small-grain fields, reed beds, and irrigated fields in arid regions. The species does not generally occupy fields of row crops such as corn, soybean, and wheat, pastures in valleys with high shrub density, or intensively grazed pastures (McCracken, et al., 2013).	**None** – No available grasslands in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Canada Warbler (*Cardellina canadensis*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: Secondary Sources	Found in a variety of upland and wetland forest types, but it is most abundant in wet, mixed deciduous-coniferous forests with a well-developed shrub layer. Nests are typically located on or near the ground on mossy logs or roots, along stream banks or on hummocks (Committee on the Status of Endangered Wildlife in Canada, 2008).	**Low** – mixed wetlands do not occur in the Project Area. It is unlikely this species is nesting in the Project Area.
Cerulean Warbler (*Setophaga cerulea*) SARA: Endangered ESA: Threatened S-Rank: S3B Source: Secondary Sources	Cerulean Warblers nest in mature deciduous upland or swamp forests having a tall canopy and uneven structure (Cadman, Sutherland, Beck, Lepage, & Couturier, 2007). Territories are often centered around large oak or hickory trees (Barg, Jones, & Robertson, 2005)and generally occur in large forest tracts with interior forest (Cadman, Sutherland, Beck, Lepage, & Couturier, 2007).	**Moderate** – Suitable habitat is present. This species was not observed during field investigations.
Chimney Swift (*Chaetura pelagica)* SARA: Threatened ESA: Threatened S-Rank: S4B,S4N Source: Secondary Sources	Chimney Swifts forage aerially over virtually any habitat. Nesting and roosting take place in a dark sheltered spot with vertical surfaces to cling to. This may include large hollow trees, chimneys, and other structures (Committee on the Status of Endangered Wildlife in Canada, 2007a).	**Low** – Species may be present and may use the Project Area for foraging but was not documented during field surveys.
Common Nighthawk (*Chordeiles minor*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources	Breeding habitat of Common Nighthawk includes a huge variety of open habitats such as clearings, grasslands, open forests, crop fields, and urban areas. In urban areas, gravel rooftops are used. Foraging is aerial over virtually any habitat (Ministry of the Environment, Conservation, and Parks, 2021j).	**Low** – Species may be present and may use the Project Area for foraging. A wide variety of nesting sites may be used, but no nesting sites were observed within the Project Area.
Eastern Meadowlark (*Sturnella magna*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources, NHIC	Eastern Meadowlarks nest in a variety of open grassy habitats, preferring native grasslands, pastures, and savannahs. Larger tracts of grassland are preferred (McCracken, et al., 2013).	**None** – No available grasslands in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Eastern Whip-poor-will (*Antrostomus vociferus*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources, NHIC	An obligate forest breeding bird dependent on open, dry deciduous or mixed forests with little or no underbrush forest. Shade, proximity to open areas for foraging, and sparse ground cover are key elements of habitat chosen. Open habitats such as open wetlands with perches, regenerating forest edges and shrubby pastures for used for foraging (Committee on the Status of Endangered Wildlife in Canada, 2009). Eastern Whip-poor-will breed in wooded habitats with open spaces such as savannah. They may also breed in openings in other types of forests. (Ministry of the Environment, Conservation, and Parks, 2021k).	**Low** – Species may be present and may use the Project Area for foraging. A wide variety of nesting sites may be used, but no nesting sites were observed within the Project Area.
Eastern Wood-Pewee (*Contopus virens*) SARA: Special Concern ESA: Special Concern S-Rank: S4B Source: Secondary Sources	Eastern Wood-Pewee breeding occurs in mature to intermediate-aged forests with an open understory, often being associated with clearings and edges. Migrants may occur in a wide variety of habitats (Committee on the Status of Endangered Wildlife in Canada, 2012).	**High** – Suitable habitat is present. This species was not observed during field investigations. Documented within the Project Area on iNaturalist.
Golden-winged Warbler (*Vermivora chrysoptera*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: Secondary Sources	Golden-winged Warblers are found in areas of early successional scrub surrounded by mature forests. They are found in dry uplands, swamp forests and marshes. Preferred habitat areas include utility right-of-ways, field edges, recently logged areas, beaver marshes and areas which have been burned or intermittently farmed (Committee on the Status of Endangered Wildlife in Canada, 2006a).	**Low** – Species may be present and may use the Project Area for foraging. A wide variety of nesting sites may be used, but no nesting sites were observed within the Project Area.
Grasshopper Sparrow (*Ammodramus savannarum)* SARA: Special Concern ESA: Special Concern S-Rank: S4B Source: Secondary Sources	Grasshopper Sparrows breed in large grasslands, including both human-created pastures and hayfields as well as natural prairies and alvars. Habitats used are typically dry with relatively low and sparse vegetation. Large fields of 5 hectares or more are usually required (Ministry of the Environment, Conservation and Parks, 2016).	**None** – No available grasslands in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Horned Grebe (*Podiceps auritus*) SARA: Special Concern ESA: Special Concern S-Rank: S1B,S4N Source: Secondary Sources	Horned Grebe usually nests in small ponds, marshes and shallow bays that contain areas of open water and emergent vegetation. Nests are usually located within a few metres of open water. This vegetation provides adults with nest materials, concealment, and protection for their young. The Horned Grebe occupies natural habitat more often than man-made reservoirs and artificial ponds (Ministry of the Environment, Conservation and Parks, 2021l).	**None** – No available habitat in the Project Area.
Least Bittern (*Ixobrychus exilis*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: Secondary Sources	Least Bitterns nest in freshwater marshes, with dense tall aquatic vegetation, interspersed with clumps of woody vegetation and open water. They are most regular in marshes that exceed 5 ha in area. Smaller marshes may be used on occasion, but do not sustain populations (James, 1999). Large wetlands, with other wetlands in the area and usually with little urban land use nearby (Ontario Ministry of Natural Resources and Forestry, 2016).	**None** – No available habitat in the Project Area.
Louisiana Waterthrush (*Parkesia motacilla*) SARA: Special Concern ESA: Threatened S-Rank: S3B Source: Secondary Sources	The Louisiana Waterthrush occupies specialized habitat, showing a strong preference for nesting and wintering along pristine, headwater streams and associated wetlands that occur in large tracts of mature forest. Although it prefers running water (especially clear, coldwater streams), it also less frequently inhabits heavily wooded, deciduous swamps having large pools of open water. It is considered to be an area-sensitive forest species and exhibits a preference for older growth woodland (Committee on the Status of Endangered Wildlife in Canada, 2006b).	**Low** - Suitable habitat may be present in wet years, although the area of habitat available is relatively small.
Northern Bobwhite (*Colinus virginianus*) SARA: Endangered ESA: Endangered S-Rank: S1 Source: Secondary Sources	The Northern Bobwhite requires an early successional habitat. Minimally it requires an interspersion of grassland, cropland, and brushy cover. The species is now extremely rare in Ontario (Committee on the Status of Endangered Wildlife in Canada, 2003).	**None** – No available habitat in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Olive-sided Flycatcher (*Contopus cooperi)* SARA: Threatened ESA: Special Concern S-Rank: S4B Source: Secondary Sources	Olive-sided Flycatchers are most often found in open areas containing tall trees or snags for perching. Open areas include forest openings, forest edges, burned forest or open to semi-open mature forest stands. Generally, forest habitat is either coniferous or mixed coniferous (Committee on the Status of Endangered Wildlife in Canada, 2007a)	**None** – No available habitat in the Project Area.
Peregrine Falcon (*Falco peregrinus*) SARA: Special Concern ESA: Special Concern S-Rank: S3B Source: Secondary Sources	Most Peregrine Falcons nest on cliff ledges or crevices, but some will also use tall buildings and bridges near good foraging areas (Committee on the Status of Endangered Wildlife in Canada, 2007b). Habitat for Peregrine Falcons has three scales: a nest site with associated perching sites, a nesting territory, and a home range (Ontario Peregrine Falcon Recovery Team, 2010). Characteristics of urban nests are often similar to those of natural cliff nests in that chosen nest sites are usually on one of the taller buildings in an area and within one block of other tall buildings and a reliable food source. They mostly feed on medium-sized birds such as Rock Pigeon and Ring-billed Gull. Other common prey is the European Starling (Sturnus vulgaris), Blue Jay (Cyanocitta cristata), Baltimore Oriole (Icterus galbula), House Sparrow (Passer domesticus) and Kinglet species (Regulus spp.) (Ontario Peregrine Falcon Recovery Team, 2010).	**None** – No available habitat in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Red-headed Woodpecker (*Melanerpes erythrocephalus*) SARA: Threatened ESA: Endangered S-Rank: S4B Source: Secondary Sources, NHIC Amendments to Ontario Regulation 230/08 (Species at Risk in Ontario List) in response to COSSARO's 2019-2020 Annual Report re-classified this species from Special Concern to Endangered in January 2022	The Red-headed Woodpecker is found in a variety of habitats, including oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, beaver ponds and burned areas. The open areas where this species breeds usually contain a high density of dead trees that can be used for nesting and perching (Ministry of the Environment, Conservation and Parks, 2014b).	**High** – Suitable habitat is present. This species was not observed during field investigations. Documented within the Project Area on iNaturalist
Short-eared Owl (*Asio flammeus*) SARA: Special Concern ESA: Threatened S-Rank: S2N,S4B Source: Secondary Sources	Breeding grounds for Short-eared Owls are comprised of open habitats such as grasslands, arctic tundra, taiga, bogs, marshes, old pastures, and sand-sage. Short-eared Owls prefer open habitats, but it is believed that the primary factor influencing local habitat choice is food abundance (Committee on the Status of Endangered Wildlife in Canada, 2007c).	**None** – likely a migrant that was documented in secondary sources.
Wood Thrush (*Hylocichla mustelina*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: Secondary Sources, NHIC	Wood Thrush breed in mature or second growth deciduous and mixed wood forests. They prefer forests with dense understory and large continuous areas of forest but are not reliant on this. Habitat fragmentation due to human development and over-grazing by White-tailed Deer are the main threats to this species. Prefers fairly large tracts of interior forest, and typically do not nest in sparsely canopied habitats heavily influenced by human activities (COSSARO, 2013a).	**Confirmed** – Suitable habitat is present. This species was not observed during field investigations. Documented in various sources and confirmed breeding by Ojibway Nature Centre.
Yellow-breasted Chat (*Icteria virens)* SARA: Endangered ESA: Endangered S-Rank: S1B Source: Secondary Sources	Yellow-breasted Chat is a specialist of shrublands. Typical Ontario habitat is successional areas (Committee on the Status of Endangered Wildlife in Canada, 2011).	**Low** – This species is now considered very rare in Ontario and was not noted during the field investigations. No shrublands occur in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Amphibians and Reptiles		
Eastern Musk Turtle (*Sternotherus odoratus*) SARA: Special Concern ESA: Special Concern S-Rank: S3 Source: ORAA	The Eastern Musk Turtle is found in a wide variety of waterbodies with little current and soft bottoms (Committee on the Status of Endangered Wildlife in Canada, 2012a). These turtles are highly aquatic and rarely wander far from permanent waters.	**None** – No available habitat in the Project Area.
Snapping Turtle (*Chelydra serpentine*) SARA: Special Concern ESA: Special Concern S-Rank: S4 Source: ORAA	Snapping Turtles prefer slow-moving waters with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays, or river edges and slow streams and wetlands. Individuals can also exist in developed areas (e.g., golf course ponds, irrigation canals); however, it is unlikely that populations persist in such habitats. Snapping Turtles can occur in highly polluted waterways, but environmental contamination is known to limit reproductive success (Ministry of the Environment, Conservation and Parks, 2014c).	**None** – often wander on land and may turn up in temporary ponds; however, there is no available habitat in the Project Area.
Spotted Turtle (*Clemmys guttata*) SARA: Endangered ESA: Endangered S-Rank: S2 Source: Secondary Sources	Spotted turtle is semi-aquatic and prefers ponds, marshes, bogs and even ditches with slow-moving, unpolluted water and an abundant supply of aquatic vegetation. Females dig their nests in sunny locations where there is not a lot of woody vegetation (Ministry of the Environment, Conservation and Parks, 2021m).	**None** – often wander on land and may turn up in temporary ponds; however, there is no available habitat in the Project Area.
Blanding's Turtle (*Emydoidea blandingii*) SARA: Threatened ESA: Threatened S-Rank: S3 Source: Secondary Sources, NHIC	Blanding's Turtles are found in a variety of productive wetlands, occurring primarily in shallow-water habitats- shallow lakes, ponds, and wetlands with mucky bottoms. This species hibernates in the soft bottoms of water bodies. Other habitat features include rocks, logs or substrates in sunny locations that provide basking opportunities. Females nest on various substrates on land, while overwintering occurs underwater in permanent pools (Committee on the Status of Species at Risk in Ontario, 2016).	**None** – No available habitat in the Project Area.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Northern Map Turtle (*Graptemys geographica*) SARA: Special Concern ESA: Special Concern S-Rank: S3 Source: Secondary Sources, NHIC	Inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as emergent rocks and logs) and exposure to the sun for at least part of the day (COSEWIC 2002). Shallow, soft-bottomed habitats are preferred, with wintering occurring in deeper sections (Committee on the Status of Species at Risk in Ontario, 2013b).	**None** - Prefers larger bodies of water such as Lake St. Clair and the Detroit River. There are no permanent water sources within the Project Area, therefore no permanent habitat is present within the Project Area.
Eastern Hog-nosed Snake (*Heterodon platirhinos*) SARA: Threatened ESA: Threatened S-Rank: S3 Source: Secondary Sources	In the Georgian Bay region, Eastern Hog-nosed Snakes prefer open grass, sand, human-impacted and forest habitats over rock, wetland, and aquatic habitats. Eastern Hog-nosed Snakes in shoreline areas often rely on driftwood and other ground cover in beach and beach dune habitats (Committee on the Status of Endangered Wildlife in Canada, 2007d). The Eastern Hog-nosed Snake specializes in hunting and eating toads, and usually only occurs where toads can be found. Eastern Hog-nosed Snakes prefer sandy, well-drained habitats such as beaches and dry forests where they can lay their eggs and hibernate. They use their up-turned snout to dig burrows below the frost line in the sand where eggs are deposited (Ministry of the Environment, Conservation and Parks, 2021n)	**None** – Historically present but no recent records in Ojibway Park.
Eastern Foxsnake (*Carolinian population*) (Pantherophis gloydi pop. 2) SARA: Endangered ESA: Endangered S-Rank: S2 Source: Secondary Sources	Prefers grassland, thicket and marshy habitats with a relatively open canopy and will frequently use anthropogenic features for cover, foraging and hibernation (Eastern Foxsnake Recovery Team, 2010).	**High** – Suitable habitat is present and multiple records occur in Ojibway Park. This species was not observed during field investigations.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Massasauga (Carolinian population) (Sistrurus catenatus pop. 2) SARA: Endangered ESA: Endangered S-Rank: S1 Source: Secondary Sources, NHIC	Generally, occurs in habitats ranging from tallgrass prairie to cedar bogs to shorelines. All habitats require canopies that are not too open, but they also require access to spots where they can get warm enough to effectively digest their food and reproduce. Sufficient moisture is also required for them to survive the winter, so they are often associated with wetlands or small, wet depressions in the terrain (Committee on the Status of Endangered Wildlife in Canada, 2012b).	**Low** – Historically present and present elsewhere but no recent records in Ojibway Park. This species was not observed during field investigations.
Butler's Gartersnake (*Thamnophis butleri*) SARA: Endangered ESA: Endangered S-Rank: S2 Source: Secondary Sources, NHIC	Butler's Gartersnake habitat has been described as "chiefly... open prairie-like areas" with dense grasses, including Tallgrass Prairie, along drainage swales, seasonally dry marshes, or other small bodies of water (Committee on the Status of Endangered Wildlife in Canada, 2010).	**Moderate** – Suitable habitat is present. This species was not observed during field investigations.

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Mammals		
Little Brown Myotis (*Myotis lucifugus*) SARA: Endangered ESA: Endangered S-Rank: S3 Source: AMO	The Little Brown Myotis is widespread throughout the southern half of Canada and is especially associated with humans, often forming nursery colonies in buildings, attics, and other man-made structures. Little Brown Myotis forage over water where their diet consists of aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies. They also feed over forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies (Ministry of the Environment, Conservation and Parks, 2014d). Roosts in tree cavities, including small spaces or crevices found in loose bark, hollow trees, rock faces and human structures such as attics, walls, and bat boxes. Hibernates in caves and abandoned mines during the winter months. Typically forages over water (Ministry of the Environment, Conservation and Parks, 2014d). Maternity roosts are primarily live deciduous trees and males, juveniles, and non-reproductive females can be found in dead trees, on average all trees are over 20 cm DBH (Humphrey & Fotherby, 2019). Maternity sites typically have sufficient protection from predators, an abundance of roosting locations, and adequate solar exposure (Humphrey & Fotherby, 2019).	**Low** – Only two passes were classified as belonging to a SAR, one as a Little Brown Myotis at unit 65 and the other as an unknown myotis species at unit 56. These two passes represented only 0.01% of all bat passes, excluding unknown high-frequency bat passes, suggesting that these recorded SAR were not residents within the Project Area and very rarely forage within the Project Area.
Gray Fox (*Urocyon cinereoargenteus*) SARA: Threatened ESA: Threatened S-Rank: S1 Source: Vet record	Gray Fox lives in deciduous forests and marshes. Gray Fox dens are usually found in dense shrubs close to a water source, but they will also use rocky areas, hollow trees, and underground burrows dug by other animals. This species will live in many types of habitats provided there is sufficient shelter and prey availability (Ministry of the Environment, Conservation and Parks, 2021o).	**Low** – Suitable habitat may be present. This species was not observed during field investigations.
Gastropods		

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Proud Globelet (*Patera pennsylvanica*) SARA: Endangered ESA: Endangered S-Rank: S1 Source: NHIC	Proud Globelet is typically found in wooded hillsides or in ravines. In Ontario, the species has been located in a sandy oak forest and a nearby former light industrial area (Ministry of the Environment, Conservation and Parks, 2021p).	**Low** – Suitable habitat may be present. This species was not observed during field investigations.
Invertebrates		
Monarch (*Danaus plexippus*) SARA: Special Concern ESA: Special Concern S-Rank: S2N,S4B Source: Secondary Source	Monarch is very widely distributed across North America and found in a wide variety of habitats. Populations fluctuate dramatically but have been generally declining likely due to habitat destruction on the hibernation grounds in Mexico, as well as pesticide use and other factors on the vast breeding grounds. Monarchs require milkweeds (Asclepias sp.) to lay their eggs on and will use a variety of other flowers for adult food (Ministry of the Environment, Conservation and Parks, 2014e).	**Moderate** – Several species of milkweed are present in Windsor but may be limited within the Project Area. This species may be found in any habitat with milkweed or nectar-producing flowers.
[redacted]	[redacted]	[redacted]

Species Name, Status (SARA, ESA, S-Rank1), and Data Source	Preferred Habitat	Potential for habitat/species occurrence in Project Site
Yellow-banded Bumble Bee (*Bombus terricola*) SARA: N/A ESA: Special Concern S-Rank: S3S5 Source: Secondary Source	This species is a forage and habitat generalist, able to use a variety of nectaring plants and environmental conditions. The Yellow-banded Bumble Bee has a large range throughout much of Canada and parts of the United States. It can be found in mixed woodlands, particularly for nesting and overwintering, as well as a variety of open habitat such as native grasslands, farmlands, and urban areas. Nest sites are often underground in abandoned rodent burrows or decomposing logs (Ministry of the Environment, Conservation and Parks, 2021q).	**Moderate** – Suitable habitat is present. This species was not observed during field investigations.

Note(s)

1 SARA = Species at Risk Act, 2002 Schedule 1 unless otherwise noted. The protection and/or conservation measures afforded by SARA apply only to species once they are on Schedule 1.

2 ESA = Endangered Species Act, 2007

3 S-Rank = S1 - Extremely rare throughout its range in the province; S2 - Rare throughout its range in the province; S3 - Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 - Secure Species; SX - Extirpated; B - Breeding; N - Non-breeding; ? – Uncertainty

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APPENDIX E

Significant Wildlife Habitat Screening

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Seasonal Concentration Areas					
Waterfowl Stopover and Staging Areas: Terrestrial (Rationale – Habitat important to migrating waterfowl)	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 Plus evidence of annual spring flooding from meltwater or run-off within these Ecosites.	•Fields with sheet water during Spring (mid-March to May) •Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl •Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available •Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. •Reports and other information available from Conservation Authorities •Sites documented through waterfowl planning processes (*e.g.,* EHJV implementation plan) •Field Naturalist Clubs •Ducks Unlimited Canada •Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Any mixed species aggregations of 100 or more individuals required • The flooded field ecosite habitat plus a 100-300m radius, dependent on local site conditions and adjacent land use is the significant wildlife habitat • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates) • SWH MIST Index #7 provides development effects and mitigation measures.	**Not Present** No ponds, marshes, lakes, bays, coastal inlets, watercourses (aquatic), or fields (terrestrial) with evidence of standing water in spring and concentrations of waterfowl.
Waterfowl Stopover and Staging Areas: Aquatic (Rationale – Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district)	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	•Ponds, marshes, lakes, bays, coastal inlets and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify •These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). •Environment Canada •Naturalist clubs often are aware of staging/stopover areas. •OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. •Sites documented through waterfowl planning processes (*e.g.,* EHJV implementation plan) •Ducks Unlimited projects •Element occurrence specification by Nature Serve: http://www.natureserve.org	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in >700 waterfowl use days • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWH MIST Index #7 provides development effects and mitigation measures.	

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
	Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck		•Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area		
Shorebird Migratory Stopover Area (Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.)	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area cxlviii • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects' • SWHMiST Index #8 provides development effects and mitigation measures.	**Not Present** No shorelines of lakes, rivers, wetlands, beach areas, bars, seasonally flooded muddy and un-vegetated habitats.
Raptor Wintering (Rationale: Sites used by multiple species, a high number of individuals and used annually are most significant)	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **Special Concern:** Short-eared Owl Bald Eagle	HAWKS/OWLS: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM, CUT, CUS, CUW. BALD EAGLE Forest Community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors • Raptor wintering (hawk/owl) sites need to be >20 ha with a combination of forest and upland • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle sites have open water and large trees and snags available for roosting INFORMATION SOURCES • OMNRF Ecologist or Biologist • Naturalist clubs	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; one of more Bald Eagles or; at least 10 individuals of the two of the listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #10 and #11 provides development effects and mitigation measures.	**Candidate** Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, and short-eared Owl are documented in secondary sources. Habitat >20 ha with a combination of forest and upland is center southeast around Ojibway Prairie Provincial Nature Reserve.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
		large rivers or adjacent to lakes with open water (hunting area).	• Natural Heritage Information Centre (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities		FOD habitat on-site may be edge of SWH.
Bat Hibernacula (Rationale; Bat hibernacula are rare habitats in all Ontario landscapes.)	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR3 CCA1 CCA2 (Note: buildings are not considered SWH)	•Hibernacula may be found in caves, mine shafts, underground foundations and Karsts •Active mine sites should not be considered as SWH •The locations of Bat Hibernacula are relatively poorly known. INFORMATION SOURCES •OMNRF for possible locations and contact for local experts •Natural Heritage Information Centre (NHIC) Bat Hibernaculum •Ministry of Northern Development and Mines for location of mine shafts. •Clubs that explore caves (*e.g.,* Sierra Club) •University Biology Departments with bat experts.	•All sites with confirmed hibernating bats are SWH •The area includes 200 m radius around the entrance of the hibernaculum for most development types and 1000 m for wind farms •Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" •SWH MIST Index #1 provides development effects and mitigation measures.	**Not Present** No caves, mine shafts, underground formations/foundations, crevices, or Karst observed or reported on in background information. Likewise, MNRF did not report findings.
Bat Maternity Colonies (Rationale: Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.) * Does not exclude the MECP requirements for SAR bats.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD, FOM, SWD, SWM	•Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). •Maternity roosts are not found in caves and mines in Ontario •Maternity colonies located in Mature deciduous or mixed forest stands with >10 large diameter (>25cm dbh) wildlife trees/ha. •Female bats prefer wildlife trees (snags) in early stages if decay, class 1-3 or class 1 or 2 •Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred INFORMATION SOURCES •OMNRF for possible locations and contact for local experts •University Biology Departments with bat experts.	•Maternity colonies with confirmed use by: o>10 Big Brown Bats (EPFU) o>5 adult female Silver-haired (LANO) Bats •The area of habitat includes the entire woodland or a forest stand ELC Ecosite or an Eco element containing the maternity colonies •Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" •SWH MIST Index #12 provides the development effects and mitigation measures.	**Candidate** Big Brown Bat and Silver-haired Bat were reported in the Study Area. Big Brown Bat has the highest bat activity within the Study Area. Study Area represents an important foraging site for Big Brown Bats. Habitat of mature deciduous forest occurs. Wildlife trees were not inventoried as it is assumed there are >10 large diameter (>25cm dbh) wildlife trees/ha.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Turtle Wintering Areas (Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.)	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles: SW, MA, OA and SA; FEO and BOO. Northern Map Turtle: Open water areas such as deeper rivers or streams and lakes with current can also be used as overwintering habitat.	•For most turtles, wintering areas are in the same general areas as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. •Overwintering sites are permanent water bodies, large wetlands and bots or fens with adequate dissolved oxygen. •Manmade ponds such as sewage lagoons or storm water ponds should not be considered SWH. INFORMATION SOURCES •EIS studies carried out by conservation authorities. •Field naturalists clubs. •OMNRF ecologist or biologist •NHIC	•Presence of five overwintering Midland Painted Turtles is significant. •One or more Northern Map Turtle or Snapping Turtle overwintering within a wetland is significant. •The mapped ELC ecosite area with the overwintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are overwintering is the SWH. •Overwintering areas may be identified by searching for congregations (basking areas) of turtles on warm, sunny days during the fall (September to October) or spring (March to May). Congregation of turtles is more common where wintering areas are limited and therefore significant. •SWH MIST Index #28 provides development effects and mitigation measures for turtle wintering habitat.	**Not Present** No Open Water present in Study Area.
Reptile Hibernaculum (Rationale: Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most significant.)	SNAKES Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake SPECIAL CONCERN Milksnake Eastern Ribbonsnake LIZARD SPECIAL CONCERN (Southern Shield population): Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	•For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. •Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line •Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. •Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures. INFORMATION SOURCES •In spring, local residents or landowners may have observed the emergence of snakes on their property (*e.g.,* old dug wells).	Studies confirming: •Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. •Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (*e.g.,* foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) •NOTE: If there are Special Concern Species present, then site is SWH •NOTE: Sites for hibernation possess specific habitat parameters (*e.g.,* temperature, humidity, *etc.*) and consequently are used annually, often by many of the same individuals of a local population (*i.e.,* strong hibernation site fidelity). Other critical life processes (*e.g.,* mating) often take place in close proximity to hibernacula. •The feature in which the hibernacula is located plus a 30 m radius area is the SWH •SWH MIS Index #13 provides development effects and mitigation measures for snake hibernacula. •Presence of any active hibernaculum for skink is significant.	**Candidate** Eastern Gartersnake, Northern Watersnake, Northern Red-bellied Snake, DeKay's Brownsnake documented in secondary sources. The area is well known as habitat for several snake species but not for hibernacula. Bedrock is at a depth of over a meter and no fissured rock or outcrops were documented. However, within the Study area rock piles which appear to be set fairly deep into the ground along a ditch line were documented. Based on other studies in the City snakes hibernate in similar habitat. It is also noted that small mammal burrows and cavities within root structures of large

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
			•Reports and other information available from Conservation Authorities. •Field Naturalist Clubs •University herpetologists •Natural Heritage Information Centre (NHIC) •OMNRF ecologist or biologist may be aware of locations of wintering skinks	•SWHMiST Index #37 provides development effects and mitigation measures for fivelined skink wintering habitat.	trees could be potentially suitable hibernacula.
Colonially Nesting Bird Breeding Habitat: cliff/bank (Rationale: Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.)	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. INFORMATION SOURCES • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas • Bird Studies Canada; http://www.birdscanada.org/birdmon • Field Naturalist Clubs.	Studies confirming: • Presence of 1 or more nesting sites with 8 or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #4 provides development effects and mitigation measures.	**Not Present** Both indicator species documented by various sources. However the habitat does not occur. Additionally no undisturbed exposed soil was found.
Colonially Nesting Bird Breeding Habitat: tree/shrub (Rationale: Large colonies are important to local bird populations, typically sites are only known colony in area and are used annually.)	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. INFORMATION SOURCES • Ontario Breeding Bird Atlas colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Centre (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices • Field Naturalist Clubs.	Studies confirming: • Presence of 5 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15 ha with a colony is the SWH • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST Index #5 provides development effects and mitigation measures.	**Not Present** All indicator species documented in secondary sources and SWD1 habitat present. However the habitat dries and it unlikely to support a heronry. No nests confirmed in the Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Colonially Nesting Bird Breeding Habitat: ground (Rationale: Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.)	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. INFORMATION SOURCES • Ontario Breeding Bird Atlas, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • Natural Heritage Information Centre (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist Clubs	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern • Presence of 5 or more pairs for Brewer's Blackbird • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3 ha with a colony is the SWH • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #6 provides development effects and mitigation measures.	**Not Present** Common Tern, Caspian Tern, Herring Gull, Great Black-backed Gull, and Ring-billed Gull documented in secondary sources. Habitat does not exist in the Study Area.
Migratory Butterfly Stopover Areas (Rationale: Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.)	Painted Lady Red Admiral SPECIAL CONCERN Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: FIELD: CUM, CUT, CUS FOREST: FOC, FOD, FOM, CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	• A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie or Lake Ontario • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes INFORMATION SOURCES • MNRF District Offices • Natural Heritage Information Centre (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days the site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWH MIST Index #16 provides development effects and mitigation measures.	**Not Present** Not within 5km of Lake Erie

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
			• Toronto Entomologists Association • Conservation Authorities		
Landbird Migratory Stopover Areas (Rationale: Sites with a high diversity of species as well as high numbers are most significant.)	All migratory songbirds Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptor species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Woodlots >10 ha in size and within 5 km of Lake Ontario. • If multiple woodlands are located along the shoreline those woodlands <2 km from and Lake Ontario are more significant • Sites have a variety of habitats: forest, grassland and wetland complexes • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and within 5 km of and Lake Ontario are Candidate SWH. INFORMATION SOURCES • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 species and with at least 10 bird species recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant • Studies should be completed during spring (Mar.-May) and fall (Aug.-Oct.) migration using standardized assessment techniques. Evaluation to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #9 provides development effects and mitigation measures.	**Not Present** Not within 5km of Lake Ontario (or Erie)
Deer Winter Congregation Areas (Rationale: Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions.)	White-tailed Deer	All forested Ecosites with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment • Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands • If deer are constrained by snow death refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule • Large woodlots >100 ha and up to 1,500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha • Woodlots with high densities of deer due to artificial feeding are not significant. INFORMATION SOURCES • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF • Studies should be completed during winter (Jan./Feb.) when >20 cm of snow is on the ground using aerial survey techniques, ground road surveys, or a pellet count deer survey If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule • SWH MIST Index #2 provides development effects and mitigation measures	**Not Present** Not delineated by MNRF
Rare Vegetation Communities or Specialized Habitat for Wildlife					
Rare Vegetation Communities					

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Cliffs and Talus Slopes (Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.)		Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT 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.	• Most cliff and talus slopes occur along the Niagara Escarpment INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes • SWH MIST Index #21 provides development effects and mitigation measures	**Not Present**
Sand Barren (Rationale: Sand barrens are rare in Ontario and support rare species. Most sand barrens have been lost due to cottage development and forestry.)		ELC Ecosites: SBO1, SBS1, SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60% Sand barrens typically are exposed sand, generally sparsely vegetated and caused by a lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	• A sand barren area >0.5 ha in size INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #20 provides development effects and mitigation measures	**Not Present**
Alvar (Rationale: Alvars are extremely rare	FIVE ALVAR INDICATOR SPECIES *Carex crawei* *Panicum philadelphicum* *Eleocharis compressa*	ALO1, ALS1, ALT1, FOC1, FOC2, CUM2, CUS2, CUT2-1, CUW2	• An Alvar site >0.5 ha in size • Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie	• Field studies identify that four of the five ALVAR INDICATOR SPECIES at a Candidate Alvar Site is significant • Site must not be dominated by exotic of	**Not Present**

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
habitats in Ecoregion 6E.)	*Scutellaria parvula* *Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 6E	An Alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover	INFORMATION SOURCES • Alvars of Ontario (Federation of Ontario Naturalists, 2000) • Conserving Great Lakes Alvars (Ontario Nature) • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	introduced species (<50% vegetative cover are exotic spp.) • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses • SWH MIST Index #17 provides development effects and mitigation measures	
Old Growth Forest (Rationale: Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 6E.)		Forest Community Series: FOD, FOC, FOM, SWD, SWC, SWM Old Growth Forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a	• Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest INFORMATION SOURCES • OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field	Field studies will determine: • If dominant tree species of the forest are >140 years old, then the area containing these trees is SWH • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH • Determine ELC vegetation types for the forest area containing the old growth characteristics	**Not Present** The forest area is second growth forest due to a history of clearing. Dominant tree species are not older than 140 years.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
		multi-layered canopy and an abundance of snags and downed woody debris.	operations • Municipal forestry departments	• SWH MIST Index #23 provides development effects and mitigation measures	
Savannah (Rationale: Savannahs are extremely rare habitats in Ontario.)		TPS1, TPS2, TPW1, TPW2, CUS2 A Savannah is a tallgrass prairie habitat that has tree cover between 25-60%.	• No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway right-of-ways are not considered SWH INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Field studies confirm: • One or more of the Savannah indicator species listed in Appendix N should be present. Note: savannah plant spp. List from Ecoregion 6E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #18 provides development effects and mitigation measures.	**Confirmed** The site is not in a natural state and non-native species are widespread, however, exotic species are still likely less than 50%. Numerous indicator species by SOFIA were documented in secondary sources. Nine were documented in TPS1-1 on site. From Appendix N in the Technicial Guide two species were confirmed, *Lespedeza virginica* and *Liatris spicata*.
Tallgrass Prairie (Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.)		TPO1, TPO2 A tallgrass prairie has ground cover dominated by prairie grasses. An open tallgrass prairie habitat has <25% tree cover.	• No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway right-of-ways are not considered SWH INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Field studies confirm: • One or more of the Prairie indicator species listed in Appendix N should be present. Note: savannah plant spp. List from Ecoregion 6E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #19 provides development effects and mitigation measures.	**Not Present**
Other Rare Vegetation Communities (Rationale: Plant communities that often contain rare species which depend on the habitat for survival.)		Provincially rare (S1, S2, S3) vegetation communities are listed in Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). Any ELC Ecosite Code that	• ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). • OMNRF/NHIC will have up to date listing for rare vegetation communities. INFORMATION SOURCES • Natural Heritage Information Centre (NHIC)	• Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST Index #37 provides development effects and mitigation measures.	**Confirmed** NHIC lists two types in the grid. Moist - Fresh Black Oak - White Oak Tallgrass Woodland Type (TPW2-1) which occurs outside the Study Area and Moist - Fresh Black Oak Tallgrass Savannah Type (unknown

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
		has a possible ELC Vegetation Type that is provincially rare is candidate SWH. Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	has location information available on their website • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities		code; assumed to be Dry Black Oak Tallgrass Savanna Type is TPS1-1). TPS1-1 occurs in the Study Area. While TPS1-1 is not listed as Rare in Essex according to Appendix M of the Technical Guide it will be considered SWH. Based on Appendix M of the technical guide "Dry Black Oak Deciduous Forest Type FOD1-3" which is FODM1-3 under the second approximation occurs in the Study Area.
Specialized Habitat for Wildlife					
Waterfowl Nesting Area (Rationale: Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant)	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 NOTE Includes adjacency to Provincially Significant Wetlands	• A waterfowl nesting area extends 120 m from a wetland (>0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Upland areas should be at least 120 m wide so that predators such as raccoons, skunks and foxes have difficulty finding nests • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites. INFORMATION SOURCES • Ducks Unlimited staff may know the locations of particularly productive nesting sites • MNRF Wetland Evaluations for indication of significant waterfowl nesting habitat • Reports and other information available from Conservation Authorities	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • A field study confirming waterfowl nesting habitat will determine boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest • SWH MIST Index #25 provides development effects and mitigation measures.	**Not Present** American Black Duck, Northern Pintail, Gadwall, Blue-winged Teal, Wood Duck, Hooded Merganser, Mallard were documented in secondary sources. However suitable upland nesting habitat is not present in the study area.
Bald Eagle and Osprey nesting, foraging and	Osprey	ELC Forest Community Series:	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands,	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle	**Not Present**

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Perching Habitat (Rationale: Nest sites are fairly uncommon in Ecoregion 6E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.)	SPECIAL CONCERN Bald Eagle	FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (*e.g.,* telephone poles and constructed nesting platforms) INFORMATION SOURCES • NHIC compiles all known nesting sites for Bald Eagles in Ontario • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat • Nature Counts, Ontario Nest Records Scheme data. • OMNRF District. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	nests in an area • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with large trees within this area is important • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800 m is dependent on sight lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for > 3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid-August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #26 provides development effects and mitigation measures	Both species were documented in secondary sources. However, the Study Area is likely to far from the river or large open water for nesting by either species. No known nests occur in the Study Area.
Woodland Raptor Nesting Habitat (Rationale: Nest sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.)	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	• All natural or conifer plantation woodland/forest stands >30 ha 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 Cooper's Hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest INFORMATION SOURCES • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented.	Studies confirm: • Presence of one or more active nests from species list is considered significant • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH. The 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest. • Barred Owl – A 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk, – A 100m radius around the nest is the SWH • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by	**Candidate** Northern Goshawk, Cooper's Hawk, Sharp-shinned Hawk, Red-shouldered Hawk, and Broad-winged Hawk documented in secondary sources. Habitat present and continuous within the Study Area. No nests were confirmed

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
			• Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	narrowing down the search area. • SWH MIST Index #27 provides development effects and mitigation measures	
Turtle Nesting Habitat (Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles.)	Midland Painted Turtle SPECIAL CONCERN Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1, FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and is 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. INFORMATION SOURCES • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Centre (NHIC). • Field naturalist clubs.	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles. • One ore more Northern Map Turtles or Snapping Turtles nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30 to 100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30 to 100 m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	**Not Present** Habitat not present
Seeps and Springs (Rationale: Seeps/springs are typical of headwater areas and are often at the source of Coldwater streams.)	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamanders	Seeps/springs are areas where groundwater comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	• Any forested area (with <25% meadow/field/ pasture) within the headwaters of a stream or river system • Seeps and springs are important feeding and drinking areas. Especially in the winter will support a variety of plant and animal species. INFORMATION SOURCES • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOECC. • Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	Field studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of an ELC forest ecosite or an Eco element within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat • SWH MIST Index #30 provides development effects and mitigation measures	**Not Present** None document

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Amphibian Breeding Habitat: Woodland (Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.)	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500 m2 (about 25 m diameter) 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. INFORMATION SOURCES • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or egg masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (Mar.-Jun.) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST Index #14 provides development effects and mitigation measures	**Candidate** Western Chorus Frog documented during field investigations in the Study Area. SWD1-3 meets the habitat criteria of a >500m2 wetland within a woodland. However, can't be confirmed as only one of the listed frog species was documented calling and no salamander species were documented. Secondary sources do not document salamanders.
Amphibian Breeding Habitat: Wetland (Rationale: Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within central Ontario landscapes.)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120 m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (*e.g.,* Bullfrog) may be adjacent to woodlands.	• Wetlands >500m2 (about 25m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators • Bullfrogs require permanent water bodies with abundant emergent vegetation. INFORMATION SOURCES • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3 or; Wetland with confirmed breeding Bullfrogs are significant • The ELC ecosite wetland area and the shoreline are the SWH • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST Index #15 provides development effects and mitigation measures.	**Confirmed** American Toad and Western Chorus Frog were documented calling in the Study Area. SWD1-3 meets habitat criteria (>500m2). Additionally, wetlands at Black Oak Heritage Park are also confirmed to meet habitat criteria and have two species breeding.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
Woodland Area-Sensitive Bird Breeding Habitat (Rationale: Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.)	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren SPECIAL CONCERN Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD	CRITERIA • Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs. old) forest stands or woodlots >30 ha • Interior forest habitat is at least 200 m from forest edge habitat INFORMATION SOURCES • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH • Conduct field investigations in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #34 provides development effects and mitigation measures	**Candidate** All indicator species have been documented in secondary sources. None were documented in Study Area breeding bird surveys. Habitat (FOD and SWD) is approximately 60 years old (based on historical imagery, but not old growth). Habitat is large enough.
Habitats of Species of Conservation Concern					
Marsh Bird Breeding Habitat (Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.)	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan SPECIAL CONCERN Black Tern Yellow Rail	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, FEO1, BOO1 For Green Heron: all SW, MA and CUM1 sites	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water INFORMATION SOURCES • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Centre (NHIC) Records. • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #35 provides development effects and mitigation measures	**Not Present** Habitat not present. Nine Indicator species found in secondary sources
Open Country Bird Breeding Habitat (Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow	CUM1, CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (*i.e.,* no row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should	Field studies confirm: • Presence of nesting or breeding of 2 or more of the listed species • A field with 1 or more breeding Short-eared Owls is to be considered SWH • The area of SWH is the contiguous ELC ecosite field areas	**Not Present** Habitat size not present. Five indicator species documented in secondary sources

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.)	SPECIAL CONCERN Short-eared Owl		have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities	• Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #32 provides development effects and mitigation measures	
Shrub / Early Successional Breeding Bird habitat (Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.)	INDICATOR SPECIES Brown Thrasher Clay-coloured Sparrow COMMON SPECIES Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher SPECIAL CONCERN Yellow-breasted Chat Golden-winged Warbler	CUT1, CUT2, CUS1, CUS2, CUW1, CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	• Large field areas succeeding to shrub and thicket habitats >10 ha in size • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (*i.e.,* no row-cropping, haying or live-stock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities	Field studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #33 provides development effects and mitigation measures	**Not Present** Habitat type not present. Habitat size not present. Eight indicator species documented in secondary sources
Terrestrial Crayfish Habitat (Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.)	Chimney or Digger Crayfish Devil Crayfish or Meadow Crayfish	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SWD, SWT, SWM CUM1 with inclusions of above meadow marsh ecosites can be	• Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well-formed.	Studies confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites • Area of ELC ecosite or an Eco element area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or	**Not Present** Chimneys not present

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
		used by terrestrial crayfish	INFORMATION SOURCES • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF, March, 1998	collection of individuals is very difficult • SWH MIST Index #36 provides development effects and mitigation measures	
Special Concern and Rare Wildlife Species (Rationale: These species are quite rare or have experienced significant population declines in Ontario.)	All Special Concern and Provincially Rare (S1, S2, S3, SH) plant and animal species. Lists of these species are tracked by the NHIC	All plant and animal element occurrences (EOs) within a 1 km or 10 km grid. Older EOs were recorded prior to GPS being available, therefore location information may lack accuracy.	• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. Have little information available about their requirements	Studies confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species *e.g.,* specific nesting habitat or foraging habitat. • SWH MIST Index #37 provides development effects and mitigation measures	**Candidate** Several species documented in secondary sources are Special Concern or Provincially Rare. These species must be documented within the Project Site to confirm presence. **Candidate Species:** Climbing Prairie Rose (*Rosa setigera*) Riddell's Goldenrod (*Solidago riddellii*) Eastern Wood-Pewee (*Contopus virens*) Red-headed Woodpecker (*Melanerpes erythrocephalus*) Wood Thrush (*Hylocichla mustelina*) Monarch (*Danaus plexippus*) Yellow-banded Bumble Bee (*Bombus terricola*)
Animal Movement Corridors					
Amphibian Movement Corridors (Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for these species above	• Movement corridors between breeding habitat and summer habitat • Movement corridors must be determined when amphibian breeding habitat is confirmed as SWH (Amphibian Breeding Habitat, Wetland) INFORMATION SOURCES • MNRF District Office. • Natural Heritage Information Centre (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and	Corridors are mapped from the SWD in all directions. Corridors are 200m wide of woodland habitat and with gaps <20m. The Ojibway Parkway is wider than 20m and therefore movement corridors stop at the parkway.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH
				breeding habitat • SWH MIST Index #40 provides development effects and mitigation measures	

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