APPENDIX F NATURAL HERITAGE ASSESSMENT

Middlesex Centre Master Servicing Plan: Natural Heritage Assessment

FINAL REPORT

June 13, 2024

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Middlesex Centre

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Acronyms / Abbreviations

ANSI	Area of Natural and Scientific Interest
DFO	Fisheries and Oceans Canada
ESA	*Endangered Species Act,* 2007 (Ontario)
LIO	Land Information Ontario
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
OBBA	Ontario Breeding Bird Atlas
OBA	Ontario Butterfly Atlas
OMA	Ontario Moth Atlas
ORAA	Ontario Reptile and Amphibian Atlas
PSW	Provincially Significant Wetland
SAR	Species at Risk
SARA	Species at Risk Act
SARO	Species at Risk in Ontario
SOCC	Species of Conservation Concern

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by Middlesex Centre to carry out a Natural Heritage Assessment (NHA) for the Middlesex Centre Master Servicing Plan (the Project). The Master Servicing Plan meets Schedule B requirements under the Municipal Class EA process.

The Project is planning for future servicing infrastructure development within Middlesex Centre communities and rural areas. The infrastructure includes water and wastewater pipelines, wastewater treatment plants and servicing roads.

The NHA was completed for areas proposed for infrastructure development. These areas are labeled as Project Areas, as shown on **Figure 1, Appendix A**. Much of the Project Areas are located within existing road rights-of-way (ROW), with a few exceptions.

The NHA was conducted for the proposed infrastructure plus 120 m, collectively known as the Study Area (**Figure 1, Appendix A**). The NHA included a desktop review of natural heritage background data and a field investigation. The NHA focused on documenting and describing natural heritage features, vegetation communities, wildlife habitat including species of conservation concern (SOCC), species at risk (SAR) and their habitats, and fish habitat within the Study Area. Study Areas were separated by community where the infrastructure development are proposed: Arva, Ilderton, Kilworth, Komoka and Delaware.

This report provides the methods and results of the NHA and includes a discussion of natural heritage constraints, general mitigation measures and anticipated natural heritage related permit needs for the Project.

2 Desktop Review

2.1 Background Information Sources

Background documents and information sources were consulted to obtain natural heritage designations for the Study Area. The following information sources were reviewed:

- Natural Heritage Information Centre (NHIC) (MNRF 2024a)
- Land Information Ontario (LIO) (MNRF 2024b)
- Middlesex Natural Heritage Systems Study (MNHSS) (Middlesex County 2014)
- Middlesex Centre Official Plan (Middlesex Centre 2023)
- Middlesex County Middlesex Maps (Middlesex County 2024)

Online natural heritage databases, wildlife atlases and SAR mapping were reviewed to identify flora and fauna records for the Study Area. Records of SAR and SOCC, occurrences of amphibians, reptiles, birds and mammals, Provincially Significant Wetlands (PSWs), Areas of Natural and Scientific Interest (ANSIs), and fish and fish habitat data were obtained from the following sources:

- Natural Heritage Information Centre (NHIC) (MNRF 2024a)
- Ontario GeoHub Land Information Ontario (LIO) (MNRF 2024b)
- Species at Risk in Ontario (SARO) List (MECP 2024)
- Species List on Schedule 1 of the Species at Risk Act (SARA) (Government of Canada 2024)
- Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Map (DFO 2024)
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019)
- Ontario Breeding Bird Atlas (OBBA) (Cadman et al. 2007)
- Ontario Butterfly Atlas (OBA) (Toronto Entomologists' Association [TEA] 2024a)
- Ontario Moth Atlas (OMA) (TEA 2024b)
- eBird Online Database (eBird 2024)
- iNaturalist Online Observations (iNaturalist 2024)

Many of the above-listed resources do not provide the exact locations of a species occurrence, with accuracy ranging from 1-km² (e.g., NHIC) to 10-km² (wildlife atlases). As such they are used as an indicator of potential occurrence in the Study Area.

2.2 Results

2.2.1 Natural Heritage Landscape Context

The Study Areas are in the Township of Middlesex Centre and are within Ecoregion 6 E (Ecodistrict 6E-1) and Ecoregion 7E (Ecodistrict 7E-2 and 7E-6). These Ecoregions are part of the Mixedwood Plains Ecozone. The westerly boundary for Ecoregion 6E is positioned through the town of Ilderton. The surrounding landscape of Ilderton is like the landscape described for Ecoregion 7E. Ecoregion 7E is dominated by agriculture (~90%). Natural areas such as deciduous forested woodlots occupy a small portion of the land. Ecoregion 7E has the most diverse flora and fauna in Canada which includes many of Ontario's SAR.

2.2.2 Natural Heritage Designations and Features

Natural heritage designations and features for each Study Area are presented in **Figure 1, Appendix A** and are discussed below. Scientific names for species discussed in this report are provided in **Appendix B** unless otherwise provided in the report.

2.2.2.1 Arva

The Project Area is adjacent to Wooded Areas associated with Medway Creek which are identified as Significant Woodland on the Middlesex Centre Official Plan Schedule B (Middlesex Centre 2023). There are no Provincially Significant Wetlands (PSWs) or Areas of Natural and Scientific Interest (ANSIs) in the Arva Study Area. The Arva Study Area is within the Upper Thames River Conservation Authority (UTRCA) jurisdiction.

2.2.2.2 Ilderton

A portion of the Project Area associated with the wastewater treatment (middle east side of the Study Area) plant overlays a Wooded Area identified as Significant Woodland (Middlesex Centre 2023). There are no PSWs or ANSIs in the Ilderton Study Area. The Ilderton Study Area is within the UTRCA and the St. Clair Region Conservation Authority (SCRCA) jurisdiction.

2.2.2.3 Kilworth

At the south end of the Study Area, a portion of the Project Area overlays the Komoka Park Reserve. The Komoka Park Reserve is designated an ANSI (MNRF 2024a) and a Significant Woodland (Middlesex Centre 2023). At the northern end of the Study Area, the Project Area is adjacent to the Komoka Park Reserve. The Kilworth Study Area is within the UTRCA jurisdiction.

2.2.2.4 Komoka

On the western end of the Study Area, the Project Area is adjacent to a PSW known as the Komoka/South Strathroy Creek Wetland. Other features within the Study Area include the Komoka Park Wetland Complex (a PSW), Komoka Provincial Park, a rare vegetation community (Tallgrass Prairie) (NHIC 2024a), and Wooded Areas which are identified as Significant Woodland by Middlesex Centre [2023]). The Komoka Study Area is within the UTRCA jurisdiction.

2.2.2.5 Delaware

On the northern end of the Study Area, the Project Area intersects with the Komoka Park Reserve (an ANSI), and the Komoka/South Strathroy Creek Wetland PSW, and is adjacent to the Komoka Park Wetland Complex PSW, and the Komoka Provincial Park. The Project Area associated with the wastewater treatment plant is also adjacent to these features. On the southwestern end of the Study Area, the Project Area intersects the Delaware Woodlot (an ANSI, PSW, and Significant Woodland). On the east end of the Study Area, the Project Area intersects the Circle R Ranch PSW and associated Dingman Creek corridor. The Project Area also intersects with other Wooded Areas (Significant Woodland as identified by Middlesex Centre [2023]). A rare wildlife habitat has been identified in the Study Area, a Mixed Wader Nesting Colony (colonial wading bird colony) (MNRF 2024a), (Figure 1-5.5, labelled the Delaware Woodlot). This habitat is located on a historical oxbow of the Thames River in the Delaware Woodlot ANSI/PSW. The Delaware Study Area is within the UTRCA and the Lower Thames Valley Conservation Authority (LTVCA) jurisdiction.

2.2.3 Species of Conservation Concern

Species of Conservation Concern (SOCC) are those species that are provincially rare (S1-S3 ranked species), listed as special concern (SC) on the SARO list, or are listed as special concern, threatened, or endangered on Schedule 1 of the *Species at Risk Act, 2002.* While these species are considered rare or at risk, they are not protected under the *Endangered Species Act, 2007* (ESA). Species that are protected by the ESA are not SOCC; they are considered SAR and discussed Section 2.2.4. Additionally, bat species which are not S1-S3 but have been recently assessed as endangered by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and COSSARO (Committee on the Status of Species at Risk in Ontario) have been included as SOCC.

Status rankings (S-ranks) for wildlife are based on the number of occurrences in Ontario and have the following meanings (OMNR 2000):

- S1: extremely rare; usually 5 or fewer occurrences in the province
- S2: very rare; usually between 5 and 20 occurrences in the province
- S3: rare to uncommon; usually between 20 and 100 occurrences in the province
- S4: common; usually more than 100 occurrences in the province
- S#B: breeding status rank
- S#N: Non-breeding status rank

SOCC identified in the background review as having potential to be present in each Study Area are provided in **Appendix B1**. All the identified SOCC were carried forward to the habitat suitability assessment. A summary of the SOCC and total count identified for each Study Area is provided in Table 1.

Table 1: Summary/Total Count of SOCC Identified for each Study Area

SOCC Group	Arva	Ilderton	Kilworth	Komoka	Delaware
Birds	4	3	10	9	8
Bryophytes	1	0	0	0	0
Fish	2	1	5	2	4
Insects	9	1	5	5	6
Mammals	3	3	4	4	3
Molluscs	0	0	3	2	1
Reptiles	2	2	4	4	4
Plants	2	0	30	31	21
Total Count	23	10	61	55	47

2.2.4 Species at Risk

SAR are those species that are listed as endangered (END) or threatened (THR) under the provincial ESA.

The ESA was created to protect SAR and their habitats. Endangered, threatened, and extirpated species listed on the SARO automatically receive legal protection from harm or harassment. The habitat of a given species is classified as either general habitat protection or regulated habitat protection (i.e., defined under regulation).

SAR identified in the background review as having potential to be present in each Study Area are provided in **Appendix B2**. All the identified SAR were carried forward to the habitat suitability assessment. A summary of the SAR and total count identified for each Study Area is provided in Table 2.

Table 2: Summary/Total Count of SAR Identified for each Study Area

SAR Group	Arva	Ilderton	Kilworth	Komoka	Delaware
Birds	3	3	8	10	5
Bryophytes	0	1	0	0	0
Fish	2	1	7	5	7
Insects	0	0	0	0	0
Mammals	4	4	5	5	5
Molluscs	1	0	4	4	4
Reptiles	1	0	3	4	4
Plants	2	1	7	6	4
Total Count	13	10	34	34	29

2.2.5 Fish Habitat

Mapped watercourses are present in each Study Area, and some of the watercourses are within some Project Areas. Watercourses in each Study Area have been given an identifier (WC-01 through to the number of watercourses in the Study Area) and are shown on each Study Area map (**Figure 1, Appendix A**). The background information for each of these features is discussed for the Study Areas below.

2.2.5.1 Arva

The Project Area intersects with Medway Creek (WC-01) and a tributary to Medway Creek known as McClary Drain (WC-02) (MNRF 2024b). Medway Creek and McClary Drain have cold water thermal regimes (MNRF 2024b). Medway Creek has a diverse fish community (MNRF 2024b) and is mapped as providing critical habitat for aquatic SAR including
(DFO 2024). McClary Drain is mapped as providing critical habitat for
DFO 2024). There are no other fish community data for McClary Drain. McClary Drain is designated as a Class F drain (MNRF 2024b). Class F drains have an intermittent flow and no sensitive fish species present (DFO 2017). There is a second tributary to Medway Creek (WC-03) in the Study Area which is not intersected by the Project Area. This watercourse is unnamed and has an intermittent flow (MNRF 2024b).

2.2.5.2 Ilderton

One watercourse is present in the Ilderton Study Area, known as Ilderton Drain #2 (WC-01), and is also within the Project Area (**Figure 1-2.1, Appendix A**). Ilderton Drain #2 has a coldwater thermal regime (MNRF 2024b) and is a tributary to Oxbow Drain (outside of Study Area). Ilderton Drain #2 is designated a Class F drain. There are no aquatic SAR mapped to occur in the Ilderton Study Area (DFO 2024). There are no fish community data for Ilderton Drain #2.

2.2.5.3 Kilworth

Two mapped unnamed watercourses which are tributaries to the Thames River are in the south end of the Study Area (WC-01, WC-02). There are no additional data for these watercourses. The Thames River (WC-03) and Oxbow Creek (WC-04) are also within the Study Area. Oxbow Creek has a coldwater thermal regime (MNRF 2024b) and is mapped as providing critical habitat for one aquatic SAR, the
(DFO 2024). The Thames River has a warmwater thermal regime (MNRF 2024b). Within the Study Area, the Thames River is mapped as providing critical habitat for
(DFO 2024). In addition, the following aquatic SAR are known to occupy the Thames River within the Kilworth Study Area:

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2.2.5.4 Komoka

Two watercourses are present in the Study Area, the Komoka Drainage Works Drain Number 2 (WC-01) (MNRF 2024b) and the Crow Creek Drain (WC-02). The Project Area is adjacent to the Komoka Drainage Works Drain Number 2. Komoka Drainage Works Drain Number 2 is a municipal drain with an intermittent flow regime. Komoka Drainage Works Drain Number 2 is designated as a Class F drain and is mapped to connect with Crow Creek Drain. The Project Area intersects Crow Creek Drain. Crow Creek Drain has a coldwater thermal regime, a permanent flow and is designated as a Class D drain (MNRF 2024b). Class D drains have permanent flow and sensitive fish species present (DFO 2017). Within the Project Area Crow Creek Drain is mapped as providing habitat for one aquatic SAR, the (DFO 2024). been captured in Crow Creek Drain and the drain is known to provide habitat (MNRF 2024b).

2.2.5.5 Delaware

There are 18 watercourses mapped in the Study Area, of which 16 are intersected by the Project Area. Some watercourses are intersected by the Project Area more than once. As such, there are 20 watercourse crossing identifiers. These watercourses are known as having either intermittent or permanent flow. Many of these watercourses are not named; however, the named watercourses include the Thames River, Dingman Creek, Allison Drain, Biggar Drain, and A & R Drain. Within the Project Area, the Thames River is known to provide critical habitat and habitat for the same aquatic SAR as those listed above for the Kilworth Study Area (DFO 2024). Dingman Creek is mapped as providing critical habitat for Silver Shiner (DFO 2024) and as having a diverse fish community (MNRF 2024b). Allison Drain, Biggar Drain and A & R Drain are tributaries to Dingman Creek and are also mapped as providing habitat for (DFO 2024). Other unnamed drains intersected by the Project Area are also mapped as habitat. Available background information for watercourses in the Delaware Study Area is provided below.

Table 3: Aquatic Background Information for Watercourses in the Delaware Study Area

Watercourse Identifier	Watercourse Name	Background Information (MNRF 2024b)	Mapped Aquatic SAR (DFO 2024)
WC-01	Unnamed	Intermittent flow	No
WC-02	Unnamed	Permanent flow	No
WC-03	Unnamed	Permanent flow	No
WC-04	Unnamed	Tiled/closed	Yes –
WC-05	Unnamed	No available information	No

Watercourse Identifier	Watercourse Name	Background Information (MNRF 2024b)	Mapped Aquatic SAR (DFO 2024)
WC-06	Dingman Creek	Permanent flow. Fish community including Central Stoneroller (*Campostoma anomalum*), Creek Chub (*Luxilus cornutus*), Greenside Darter (*Etheostoma blennioides*), Largemouth Bass (*Micropterus salmoides*), Logperch (*Percina caprodes*), Northern Hog Sucker (*Hypentelium nigricans*), Smallmouth Bass (*Micropterus dolomieu*), Spotfin Shiner (Cyprinella spiloptera), Striped Shiner *(Luxilus chrysocephalus*), White Sucker (*Catostomus commersonii*)	Yes –
WC-07	Allison Drain	Recorded as intermittent and permanent flow, Class F drain, fish community including Common Shiner, Creek Chub (*Semotilus atromaculatus*).	Yes –
WC-08	Biggar Drain	Recorded as intermittent and permanent flow, Class F drain	Yes –
WC-09	Biggar Drain	Recorded as intermittent and permanent flow, Class F drain	Yes –
WC-10	Mennie Drain	Tiled/closed	Yes –
WC-11	Unnamed	Permanent flow	No
WC-12	Unnamed	Permanent flow	No
WC-13	Unnamed	Thompson Drainage Works 1965, intermittent flow	No
WC-14	Unnamed	Forsyth Drain, intermittent flow	No
WC-15	Unnamed	Intermittent flow	No
WC-16	Prior Drain	Intermittent flow	No
WC-17	Dingman Creek	Second intersection with Project Area. See above for details.	Yes –
WC-18	A & R Drain	Permanent flow, Class E drain	Yes –
WC-19	Unnamed	Permanent flow	Yes –
WC-20	Thames River	Permanent flow, fish habitat.	Yes –

3 Field Investigation

Field investigations were completed for the Study Areas from April 2 – April 5, 2024 and on April 18, 2024. Weather conditions from April 2 – 5 were generally overcast, with air temperatures ranging from 4 to 15°C and moderate to high winds. Weather conditions on April 18 were sunny, with air temperatures of 10 to 15°C and moderate wind. The field investigations were completed where land access was permitted and were undertaken primarily from the road ROW, apart from municipally owned lands and private lands where access was permitted. Given that most of the Project Area is within the road ROW, the assessment from the ROW was appropriate to document natural heritage features that may be affected by the Project. Where the Project Area deviated from the ROW, the assessment was completed for those lands, as appropriate.

3.1 Methods

3.1.1 Ecological Land Classification

Ecological Land Classification (ELC) surveys were completed to identify and map natural and anthropogenic vegetation communities in the Study Area. Surveys were completed outside of the growing season, so a complete assessment of vegetation communities was not possible. However, it was possible to document the dominant vegetation forms and species in most cases.

Identification and mapping of vegetation communities follows the protocols of the ELC field guide for Southern Ontario (Lee et al. 1998). Updates to vegetation community names and codes follow the 2008 catalogue of ELC vegetation communities. ELC mapping was completed to the finest level of resolution (Vegetation Type) where possible. Vegetation communities were first identified on aerial imagery and then field confirmed. ELC mapping is used to support the determination of suitable habitat for SOCC and SAR.

3.1.2 Bat Maternity Roost Tree Survey

Trees in the Study Area were assessed for potential suitability as bat maternity roosts. The assessment followed the recommended methods in the MNRF Guelph District *Bat and Bat Habitat Surveys of Treed Habitats* (MNRF 2017) which was based in part on the *Bat and Bat Habitat Guidelines* (MNRF 2011). According to the MNRF Guelph District protocol, the best candidate trees for maternity colonies are likely to contain several characteristics (to be considered a potential treed roost habitat, not all habitat characteristics listed below needed to be present), which include:

- Height – where trees are tallest in the stand
- Diameter – where trees have a large diameter at breast height (DBH)
- Loose/peeling bark – where trees have a large amount of peeling/loose bark
- Cavity height – where cavity height is high on the tree (>10 m high)
- Open canopy – located in an area of open canopy for accessibility in and out of tree
- Decay – where the tree exhibits early stages of decay

3.1.3 Significant Wildlife Habitat Assessment

The MNRF's Significant Wildlife Habitat Technical Guide (SWHTG) (OMNR 2000) describes significant wildlife habitat (SWH) in four categories:

1. Seasonal concentration areas: Seasonal concentration areas are those sites where large numbers of a species gather at one time of the year, or where several species congregate. Only the best examples of these concentration areas are usually designated as SWH.
2. Rare vegetation communities or specialized habitats for wildlife: Rare or specialized habitats are two separate components. Rare habitats are those with vegetation communities that are considered rare in the province. It is assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Specialized habitats are microhabitats that are critical to some wildlife species. Because much of the assessment was from the road, identification of rare vegetation communities in the Study Area could not be accomplished, other than those communities visible from the accessible lands or those communities identified during the desktop review.
3. Habitat for SOCC (excluding habitat for Endangered or Threatened species): There are four types of SOCC: those which are rare, those whose populations are significantly declining, those which have been identified as being at risk from certain common activities and those with relatively large populations in Ontario compared to the remainder of the globe. SOCC are defined for the purposes of this NHA in Section 2.2.3. A habitat assessment for SOCC that have ranges that overlap with the Study Area is in **Appendix C**. The presence or absence of these species would need to be assessed through completion of targeted surveys at the appropriate time of year.
4. Animal movement corridors: Migration corridors are areas that are traditionally used by wildlife to move to one habitat from another. This is usually in response to different seasonal habitat requirements. There is one type of animal movement corridor in Ecoregion 7E: amphibian movement corridors.

Because the majority of the Study Areas are within Ecoregion 7E and the landscape of the Study Area within the small portion of Ecoregion 6E (in Ilderton) is like that observed in the rest of the Ecoregion 7E Study Areas, habitats within the five Study Areas were assessed for candidate SWH, as defined in the 7E Criterion Schedule (MNRF 2015). Wildlife observations and evidence of wildlife (e.g., tracks, burrows, vocalizations) were recorded during the field investigation. Targeted species-use surveys are generally required to determine if candidate features qualify as confirmed SWH. Because targeted species-use surveys were not conducted, identified SWH features were considered candidate, unless they were confirmed through direct observations or background review.

3.1.4 Species at Risk Habitat Suitability Assessment

SAR habitat suitability assessments were completed in the Study Areas concurrently during the field investigation.

These assessments focused on the identification of potential SAR habitat features (e.g., SAR bat maternity roost trees) or occurrences (e.g., butternut). SAR habitat suitability assessments were completed for species protected under the provincial ESA that may occur in the area, including species identified in the NHIC database and Ontario wildlife atlases during the background review process. If encountered, these features were identified, recorded, and assessed for potential use by SAR and species occurrences were observed by sight, sound and/or through distinctive signs (e.g., tracks, scat). The presence or absence of these SAR would need to be assessed through targeted surveys at the appropriate time of year.

3.1.5 Fish Habitat Assessment

The fish habitat assessment characterized potential fish habitat in watercourses in each Study Area. The focus of the fish habitat assessment was to document the presence of water (to determine or confirm the flow regime – permanent, intermittent, tiled) in mapped watercourses and the connectivity between watercourses (connectivity of mapped watercourses to known fish bearing watercourses). This basic assessment allows for understanding of where direct and indirect fish habitat is present within the Study Areas. Watercourses were assessed where access was permitted by walking the shoreline and recording physical habitat characteristics (channel width, wetted width, depth, substrate type, fish observations). Watercourse condition was documented with photographs and general habitat descriptions. Fish community sampling was not conducted during the field investigation.

3.2 Results

3.2.1 Ecological Land Classification and Vegetation

ELC mapping for each Study Area is shown on **Figure 2, Appendix A**. A description of the vegetation community identified in each Study Area is as follows:

3.2.1.1 Arva

The Project Area is predominantly within residential communities, commercial areas, and agricultural land, and adjacent to forests, marsh, swamp, and watercourses. These areas mainly consist of maintained lawns, row crops, perennial cover crop and pasture. A few of the agricultural (OAGM2, OAGM4) communities may provide habitat to grassland birds.

All the ELC vegetation communities identified in the Study Area are common in southern Ontario.

Table 4: ELC Types in the Arva Study Area

ELC Code	ELC Description
Agriculture (AG)	
OAGM1	Annual Row Crops
OAGM2	Perennial Cover Crops
OAGM2/MEMM3	Perennial Cover Crops/ Dry - Fresh Mixed Meadow Ecosite
OAGM2/TAGM5	Perennial Cover Crops/ Fencerow

ELC Code	ELC Description
OAGM4	Open Pasture
OAGM4/CVC	Open Pasture/ Commercial and Institutional
OAGM4/ MAMM1-2	Open Pasture/ Cattail Graminoid Mineral Meadow Marsh Type
TAGM4	Treed Pasture
TAGM5	Fencerow
Aquatic System (AQ)	
OA	Open Aquatic
SA	Shallow Aquatic
Wetland System (WE)	
SWT	Thicket Swamp
SWTM3-3	Slender Willow Mineral Deciduous Thicket Swamp Type
MAM	Meadow Marsh
MAMM2	Forb Mineral Meadow Marsh Ecosite
MAMM3	Mixed Mineral Meadow Marsh Ecosite
Terrestrial System (TE)	
FODM7	Fresh – Moist Lowland Deciduous Forest
FODM7-5/WODM5	Fresh – Moist Black Maple Lowland Deciduous Forest Type/ Fresh - Moist Deciduous Woodland Ecosite
WODM5	Fresh - Moist Deciduous Woodland Ecosite
THDM2	Dry - Fresh Deciduous Shrub Thicket Ecosite
THDM4-1	Native Deciduous Regeneration Thicket Type
THDM5	Fresh - Moist Deciduous Thicket Ecosite
MEFM1	Dry - Fresh Forb Meadow Ecosite
MEGM3-4	Kentucky Blue Grass Graminoid Meadow Type
MEMM3	Dry - Fresh Mixed Meadow Ecosite
MEMM4	Fresh - Moist Mixed Meadow Ecosite
Constructed (CV)	
CVC	Commercial and Institutional
CVC_1	Business Sector
CVI	Transportation and Utilities
CVI_1	Transportation
CVI_3	Sewage and Water Treatment
CVR_2	High Density Residential
CVR_3	Single Family Residential
CVR_4	Rural Property
CVR_4/WOD	Rural Property/Deciduous Woodland

ELC Code	ELC Description
Greenlands (CGL)	
CGL	Green Lands
CGL_1	Golf Course
CGL_2	Parkland

3.2.1.2 Ilderton

Most of the Project Area is within the High-Density Residential community (CVR_2), parkland (CGL_2) and treed meadow (MEGM3/WOD). These areas consist of maintained lawns and large trees. A section of the Project Area is within two deciduous forest communities (FODM7/SA and FODM10-1) which contain potential bat maternity roost trees.

All the ELC vegetation communities identified in the Study Area are common in southern Ontario.

Table 5: ELC Types in the Ilderton Study Area

ELC Code	ELC Description
Agriculture (AG)	
OAGM1	Annual Row Crops
TAGM5	Fencerow
Aquatic System (AQ)	
OA	Open Aquatic
Terrestrial System (TE)	
FODM10-1	Fresh - Moist Sugar Maple / Beech Carolinian Deciduous Forest Type
FODM7	Fresh – Moist Lowland Deciduous Forest
FODM7/SA	Fresh – Moist Lowland Deciduous Forest/ Shallow Water
MEGM3/WOD	Dry - Fresh Graminoid Meadow Ecosite/ Deciduous Woodland – Butternut trees present in this ecosite
MEMM4	Fresh - Moist Mixed Meadow Ecosite
Constructed (CV)	
CVC	Commercial and Institutional
CVI	Transportation and Utilities
CVI_1	Transportation
CVI_3	Sewage and Water Treatment
CVR_1	Low Density Residential
CVR_2	High Density Residential
CVS_2/CVS_1	Health/Education
Greenlands (CGL)	
CGL_2	Parkland
CGL_4	Recreational

3.2.1.3 Kilworth

Most of the Project Area is within the High-Density Residential community (CVR_2). This area consists of maintained lawns and large trees. A section of the Project Area is within one deciduous forest community (FODM7) and along the edge of another forest (FODM5-3) and wooded area (WOD/CVR) which contain potential bat maternity roost trees.

All the ELC vegetation communities identified in the Study Area are common in southern Ontario.

Table 6: ELC Types in the Kilworth Study Area

ELC Code	ELC Description
Aquatic System (AQ)	
OA	Open Aquatic
SA	Shallow Aquatic
Terrestrial System (TE)	
SHT	Treed Shoreline
WOD/CVR	Deciduous Woodland/ Residential
FOCM3	Fresh - Moist Hemlock Coniferous Forest Ecosite
FODM5-3	Dry – Fresh Sugar Maple – Oak Deciduous Forest Type
FODM7	Fresh – Moist Lowland Deciduous Forest
MEGM3	Dry - Fresh Graminoid Meadow Ecosite
Constructed (CV)	
CVC_1	Business Sector
CVI	Transportation and Utilities
CVI_1	Transportation
CVR_2	High Density Residential
Greenlands (CGL)	
CGL_2	Parkland

3.2.1.4 Komoka

The Project Area overlaps numerous land types including agricultural fields, residential, commercial, parkland, meadow, hedgerows, thickets, forests, marsh, and watercourses. A few of the agricultural (OAGM2, OAGM4) and meadow (MEMM1, MEGM3/TAGM5, MEMM3, CVC_4/MEMM3) communities may provide habitat to grassland birds.

A section of the Project Area is along the edge of deciduous forest communities (FOMM4, FODM4-5, FODM7-7/SA and FODM11) which contain potential bat maternity roost trees.

One rare ELC vegetation community was identified in the Study Area: Dry - Fresh Mixed Tallgrass Prairie Ecosite (MEMM1). This community is ranked as S1 and is considered critically imperilled. This community is located adjacent to the Project Area.

Table 7: ELC Types in the Komoka Study Area

ELC Type	Community Description
Agriculture (AG)	
AG	Agriculture
OAGM1	Annual Row Crops
OAGM1/TAGM5	Annual Row Crops/ Fencerow
OAGM1/FODM11	Annual Row Crops/ Naturalized Deciduous Hedge-row Ecosite
OAGM2	Perennial Cover Crops
OAGM3	Specialty Crops
OAGM4	Open Pasture
TAGM1	Coniferous Plantation
TAGM3	Deciduous Plantation
TAGM5	Fencerow
TAGM5/CVR_4/MEGM3	Fencerow/ Rural Property/ Dry - Fresh Graminoid Meadow Ecosite
TAGM5/CVR_1	Fencerow/ Low Density Residential
Aquatic System (AQ)	
OA	Open Aquatic
SA	Shallow Aquatic
Wetland System (WE)	
MASM1-1	Cattail Mineral Shallow Marsh Type
Terrestrial System (TE)	
FODM1-1/CVR_4	Dry – Fresh Red Oak Deciduous Forest Type/ Rural Property
FODM2-4	Dry – Fresh Oak – Hardwood Deciduous Forest Type
FODM4-5	Dry - Fresh Manitoba Maple Deciduous Forest Type
FODM7	Fresh – Moist Lowland Deciduous Forest
FODM7-7	Fresh - Moist Manitoba Maple Lowland Deciduous Forest Type
FODM7-7/SA	Fresh - Moist Manitoba Maple Lowland Deciduous Forest Type/ Shallow Water
FODM11	Naturalized Deciduous Hedge-row Ecosite
FOMM4	Dry – Fresh White Cedar Mixed Forest Ecosite
WOD/ CVR_1	Deciduous Woodland/ Low Density Residential
WODM5-3/TAGM1	Fresh - Moist Manitoba Maple Deciduous Woodland Type/ Coniferous Plantation
THDM4	Dry - Fresh Deciduous Regeneration Thicket Ecosite
THMM1	Dry - Fresh Mixed Regeneration Thicket Ecosite
MEGM3	Dry - Fresh Graminoid Meadow Ecosite
MEGM3/CGL_2	Dry - Fresh Graminoid Meadow Ecosite/ Parkland
MEGM3/CV	Dry - Fresh Graminoid Meadow Ecosite/ Constructed
MEGM3/CVR_4	Dry - Fresh Graminoid Meadow Ecosite/ Rural Property

ELC Type	Community Description
MEGM3/TAGM5	Dry - Fresh Graminoid Meadow Ecosite/ Fencerow
MEMM1	Dry - Fresh Mixed Tallgrass Prairie Ecosite
MEMM3	Dry - Fresh Mixed Meadow Ecosite
MEMM3/CV	Dry - Fresh Mixed Meadow Ecosite/Constructed
MEMM3/CVR_4	Dry - Fresh Mixed Meadow Ecosite/ Rural Property
MEMM3/TAGM4	Dry - Fresh Mixed Meadow Ecosite/ Treed Pasture
MEMM3/TAGM5	Dry - Fresh Mixed Meadow Ecosite/ Fencerow
MEMM3/THDM4-1	Dry - Fresh Mixed Meadow Ecosite/ Native Deciduous Regeneration Thicket Type
Constructed (CV)	
CV	Constructed
CVC	Commercial and Institutional
CVC/CVR	Commercial and Institutional/ Residential
CVC_1	Business Sector
CVC_1/CVR	Business Sector/ Residential
CVC_2	Light Industry
CVC_4	Extraction
CVC_4/MEMM3	Extraction/ Dry - Fresh Mixed Meadow Ecosite
CVI	Transportation and Utilities
CVI_1	Transportation
CVI_3	Sewage and Water Treatment
CVR	Residential
CVR_1	Low Density Residential
CVR_1/CVC	Low Density Residential/ Commercial and Institutional
CVR_2	High Density Residential
CVR_2/CVC	High Density Residential/ Commercial and Institutional
CVR_2/CV	High Density Residential/ Constructed
CVR_4	Rural Property
CVR_4/CVC	Rural Property/ Commercial and Institutional
CVR_4/MEGM3-4	Rural Property/ Kentucky Blue Grass Graminoid Meadow Type
CVR_4/WOD	Rural Property/Deciduous Woodland
CVS_1	Education
CVS_1/MEGM3-4	Education/ Kentucky Blue Grass Graminoid Meadow Type
CVS_2/CVR_2	Health/ High Density Residential
Greenlands (CGL)	
CGL/CVR_1	Green Lands/ Low Density Residential
CGL_1	Golf Course
CGL_2	Parkland

3.2.1.5 Delaware

The Project Area overlaps numerous land types including agricultural fields, residential, commercial, parkland, golf courses, meadow, hedgerows, forests, marsh, swamp, and watercourses. A few of the agricultural (OAGM2, OAGM4) and meadow (MEG, MEGM3) communities may provide habitat to grassland birds.

The Project Area is along the edge of deciduous and mixed forest communities (FOMM3-2, FOMM4/FODM7, FOMM9, FODM6, FODM6-5/SA, FODM7/SA, FODM7-3/SA, FODM7-7, and FOMM4) which contain potential bat maternity roost trees.

One rare ELC vegetation community was identified in the Study Area: Dry - Fresh Mixed Tallgrass Prairie Ecosite (MEMM1). This community is ranked as S1 and is considered critically imperilled. This community is located within the Project Area.

Table 8: ELC Types in the Delaware Study Area

ELC Type	Community Description
Agriculture (AG)	
AG	Agriculture
IAG	Agricultural Infrastructure
OAGM1	Annual Row Crops
OAGM2	Perennial Cover Crops
OAGM2/CVR_4	Perennial Cover Crops/ Rural Property
OAGM4	Open Pasture
OAGM4/IAG	Open Pasture/ Agricultural Infrastructure
TAG	Treed Agriculture
TAGM5/CVR_4	Fencerow/ Rural Property
Aquatic System (AQ)	
OA	Open Aquatic
OA/MAM	Open Aquatic/ Meadow Marsh
SA	Shallow Aquatic
Wetland System (WE)	
MASM1-1/ SWMM5-2	Cattail Mineral Shallow Marsh Type/ Tamarack - Hardwood Mineral Mixed Swamp Type
MAMM1-2	Cattail Graminoid Mineral Meadow Marsh Type
Terrestrial System (TE)	
FOD	Deciduous Forest
FODM4-5	Dry - Fresh Manitoba Maple Deciduous Forest Type
FODM5	Dry – Fresh Sugar Maple Deciduous Forest Ecosite
FODM6	Fresh – Moist Sugar Maple Deciduous Forest Ecosite
FODM6-5/SA	Fresh – Moist Sugar Maple – Hardwood Deciduous Forest Type/ Shallow Water

ELC Type	Community Description
FODM7/SA	Fresh – Moist Lowland Deciduous Forest/ Shallow Water
FODM7-3/SA	Fresh – Moist Willow Lowland Deciduous Forest Type/ Shallow Water
FODM7-7	Fresh - Moist Manitoba Maple Lowland Deciduous Forest Type
FODM7-7/SA	Fresh - Moist Manitoba Maple Lowland Deciduous Forest Type/ Shallow Water
FODM9-5	Fresh – Moist Bitternut Hickory Deciduous Forest Type/ Shallow Water
FODM11	Naturalized Deciduous Hedgerow Ecosite
FOMM2-4	Dry-Fresh White Pine - Early Successional Forest Type
FOMM3-2	Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type
FOMM4	Dry – Fresh White Cedar Mixed Forest Ecosite
FOMM4-3/FODM7	Dry - Fresh White Cedar - Hardwood Mixed Forest Type/ Fresh – Moist Lowland Deciduous Forest Ecosite
FOMM9	Fresh – Moist White Pine – Hardwood Mixed Forest Ecosite
SHT	Treed Shoreline
WOD	Deciduous Woodland
WOD/ CVR_4	Deciduous Woodland/ Rural Property
MEG	Graminoid Meadow
MEG/SA	Graminoid Meadow/ Shallow Water
MEGM3	Dry - Fresh Graminoid Meadow Ecosite
MEGM3/CGL_4	Dry - Fresh Graminoid Meadow Ecosite/ Recreational
MEMM1/TAG	Dry - Fresh Mixed Tallgrass Prairie Ecosite/ Treed Agriculture
MEMM3	Dry - Fresh Mixed Meadow Ecosite
MEMM3/CVR_4	Dry - Fresh Mixed Meadow Ecosite/ Rural Property
MEMM3/TAGM5	Dry - Fresh Mixed Meadow Ecosite/ Fencerow
MEMM3/THDM4-1	Dry - Fresh Mixed Meadow Ecosite/ Native Deciduous Regeneration Thicket Type
Constructed (CV)	
CV	Constructed
CVC	Commercial and Institutional
CVC/TAGM1	Commercial and Institutional/ Coniferous Plantation
CVC_1/MEGM3	Business Sector/ Dry - Fresh Graminoid Meadow Ecosite
CVC_1/CVR	Business Sector/ Residential
CVC_2	Light Industry
CVI	Transportation and Utilities
CVI_1	Transportation
CVI_4	Power Generation
CVR	Residential
CVR/CVC	Residential/ Commercial and Institutional
CVR/CVI_3	Residential/ Sewage and Water Treatment

ELC Type	Community Description
CVR/CVC	Residential/ Commercial and Institutional
CVR/CVC_1	Residential/ Business Sector
CVR/CVI	Residential/ Transportation and Utilities
CVR/IAG	Residential/ Agricultural Infrastructure
CVR_2/MEG	High Density Residential/ Graminoid Meadow
CVR_3	Single Family Residential
CVR_4	Rural Property
CVR_4/SA	Rural Property/ Shallow Water
CVR_4/TAGM5	Rural Property/ Fencerow
CVR_4/WOD	Rural Property/Deciduous Woodland
CVS_1	Education
Greenlands (CGL)	
CGL	Green Lands/
CGL_1	Golf Course
CGL_1/OA	Golf Course/ Open Water
CGL_2	Parkland
CGL_4	Recreational

3.2.2 Bats

There were many trees with features suitable to support bat maternity roost habitat in each Study Area. The locations of suitable bat maternity roost trees are shown on **Figure 3, Appendix A**. Most of the suitable trees were outside of the Project Area, however, some were located within or near the boundary of the Project Area. There are likely additional trees in the Study Areas with suitable bat maternity roost features which have not been identified due to property access restrictions.

As per the Ministry of the Environment, Conservation and Parks (MECP) guidance, any trees that are greater than 10 cm diameter breast height (DBH) are potentially suitable for maternity roost habitat, and as such, if tree removal is required for the Project, bat SAR should be considered.

3.2.3 Significant Wildlife Habitat

Evaluation criteria and the SWH assessment results are presented in **Appendix C1 and C2.** The following candidate and/or confirmed SWH were determined to be present in the Study Areas:

3.2.3.1 Arva

Seasonal Concentration Areas

- Bat Maternity Colonies: Candidate habitat in the FODM7 ecosite
- Turtle Wintering Areas: Candidate habitat in SA (Medway Creek) ecosite

Rare Vegetation Communities and Specialized Habitat for Wildlife

- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: Candidate habitat along Medway Creek
- Amphibian Breeding Habitat (Woodland): Candidate habitat in forested ecosites

Habitat for Species of Conservation Concern

- Terrestrial Crayfish: Candidate habitat in MAMM3 ecosite

Special Concern and Rare Wildlife Species (SOCC and S1 – S3 species)

Candidate habitat for 17 of the 23 SOCC identified in the background review was present in the Study Area which includes the following species:

- Birds: Bald Eagle, Eastern Wood-pewee
- Bryophytes: American Tree Moss
- Fish: Greater Redhorse, Northern Sunfish
- Insects: Brown Scoopwing Moth, Differential Grasshopper, Glorious Habrosyne Moth, Judith´s Underwing Moth, Monarch, Unicorn Clubtail
- Mammals: Silver-haired bat, Eastern Red Bat, Hoary Bat
- Reptiles: Midland Painted Turtle, Snapping Turtle
- Plants: Striped Cream Violet

3.2.3.2 Ilderton

Seasonal Concentration Areas

- Bat Maternity Colonies: Candidate habitat in the FODM10-1 and FODM7/SA ecosites

Rare Vegetation Communities and Specialized Habitat for Wildlife

- Seeps and Springs: Candidate habitat in FODM10-1 ecosite
- Amphibian Breeding Habitat (Woodland): Candidate habitat in forested ecosites

Habitat for Species of Conservation Concern

- No candidate habitat for SOCC as defined in the SWH Criteria Schedules for Ecoregion 7E

Special Concern and Rare Wildlife Species (SOCC and S1 – S3 species)

Candidate habitat for seven (7) of the 10 SOCC identified in the background review was present in the Study Area which includes the following species:

- Birds: Eastern Wood-pewee
- Insects: Monarch
- Mammals: Silver-haired bat, Eastern Red Bat, Hoary Bat
- Reptiles: Midland Painted Turtle, Snapping Turtle

3.2.3.3 Kilworth

Seasonal Concentration Areas

- Bat Maternity Colonies: Candidate habitat in the FODM5-3 and FODM7 ecosites
- Turtle Wintering Areas: Candidate habitat in OA (Thames River)

Rare Vegetation Communities and Specialized Habitat for Wildlife

- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: Candidate habitat along Thames River.
- Turtle Nesting Area: Candidate habitat in SHT ecosite of the Thames River
- Amphibian Breeding Habitat (Woodland): Candidate habitat in forested ecosites

Habitat for Species of Conservation Concern

- No candidate habitat for SOCC as defined in the SWH Criteria Schedules for Ecoregion 7E

Special Concern and Rare Wildlife Species (SOCC and S1 – S3 species)

Candidate habitat for 36 of the 61 SOCC identified in the background review was present in the Study Area which includes the following species:

- Birds: Bald Eagle, Eastern Wood-pewee, Tufted Titmouse, Wood Thrush,
- Fish: Northern Brook Lamprey, Northern Sunfish, River Redhorse, Silver Lamprey, Spotted Sucker
- Insects: Double-striped Bluet, Hackberry Emperor, Monarch, Slender Bluet, Tawny Emperor
- Mammals: Woodland Vole, Silver-haired bat, Eastern Red Bat, Hoary Bat
- Molluscs: Elktoe, Rainbow Mussel
- Reptiles: Eastern Milksnake, Northern Map Turtle, Snapping Turtle
- Plants: Bristly Buttercup, Deer-tongue Panicgrass, Eastern Yellow Stargrass, Green Dragon, Hairy-fruited Sedge, Largebract Tick-trefoil, Lowland Bladder Fern, Round-leaved Tick-trefoil, Scarlet Beebalm, Schweinitz's Sedge, Slim-flowered Muhly, Soft-hairy False Gromwell, Striped Cream Violet

3.2.3.4 Komoka

Seasonal Concentration Areas

- Waterfowl Stopover and Staging Area (Aquatic): Candidate habitat in historic aggregate pit reservoirs and the Komoka Park Wetland Complex
- Bat Maternity Colonies: Candidate habitat in the FODM7-7, FODM2-4, and FODM1-1 ecosites
- Turtle Wintering Areas: Candidate habitat in OA (reservoirs, ponds, and the Komoka Park Wetland Complex), and in SA (Crow Creek Drain)

Rare Vegetation Communities and Specialized Habitat for Wildlife

- Tall-grass Prairies: Candidate tall-grass prairie. Located in the northern end of the Study Area, north of the CN railway (MEMM1 ecosite) (Figure 2-4.0).
- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: Candidate habitat in reservoirs and at the Komoka Park Wetland Complex
- Seeps and Springs**:** Candidate habitat FODM7/SA ecosite at Crow Creek Drain
- Amphibian Breeding Habitat (Woodland): Candidate habitat in forested ecosites
- Amphibian Breeding Habitat (Wetland): Candidate habitat in the OA ecosite associated with the Komoka Park Wetland Complex and reservoirs

Habitat for Species of Conservation Concern

- Marsh Bird Breeding Habitat: Candidate habitat in the OA ecosite associated with the Komoka Park Wetland Complex

Special Concern and Rare Wildlife Species (SOCC and S1 – S3 species)

Candidate habitat for 48 of the 55 SOCC identified in the background review was present in the Study Area which includes the following species:

- Birds: American Coot, Bald Eagle, Blue-winged Teal, Eastern Wood-pewee, Golden-winged Warbler, Grasshopper Sparrow, Tufted Titmouse, Upland Sandpiper, Wood Thrush
- Fish: American Brook Lamprey, Northern Brook Lamprey
- Insects: Double-striped Bluet, Hackberry Emperor, Monarch, Slender Bluet, Tawny Emperor
- Mammals: Woodland Vole, Silver-haired bat, Eastern Red Bat, Hoary Bat
- Molluscs: Elktoe, Mapleleaf Mussel, Rainbow Mussel
- Reptiles: Eastern Milksnake, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle
- Plants: Bristly Buttercup, Cleland's Evening-primrose, Deer-tongue Panicgrass, Early-branching Panicgrass, Eastern Yellow Stargrass, Golden Puccoon, Great Plains Ladies'-tresses, Green Dragon, Grey-headed Prairie Coneflower, Hairy-fruited Sedge, Hoary Puccoon, Hoary Tick-trefoil,

Rigid Sedge, Round-fruited Panicgrass, Round-leaved Tick-trefoil, Scarlet Beebalm, Schweinitz's Sedge, Slim-flowered Muhly, Soft-hairy False Gromwell, Spotted Beebalm, Sundial Lupine

3.2.3.5 Delaware

Seasonal Concentration Areas

- Waterfowl Stopover and Staging Area (Aquatic): Candidate habitat in the Komoka Park Wetland Complex
- Bat Maternity Colonies: Candidate habitat in the FODM7-7, FOMM2-4, FOMM4-3/FODM7, FODM5, FOMM9, FODM7-3/SA, FOMM3-2, FODM7, FODM9-5/SA, FODM6, FODM11, FODM4-5, FOMM4
- Turtle Wintering Areas: Candidate habitat in OA (Thames River, Komoka Park Wetland Complex, dug ponds), SA (Dingman Creek)
- Colonial-Nesting Bird Breeding Habitat (Bank and Cliff): Candidate habitat on the banks of the Thames River within the Study Area.
- Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs): Confirmed Mixed Wader Nesting Colony (colonial wading bird colony). Located on a historic oxbow channel of the Thames River in Delaware, south of Longwoods Road, east of the Thames River and west of Springer Road. Includes the FODM6, FOD and OA ecosites at this location.

Rare Vegetation Communities and Specialized Habitat for Wildlife

- Tall-grass Prairies: Candidate tall-grass prairie – a restored field at the north end of the Study Area, north of Gideon Drive, east of Komoka Road and south of the Thames River. Ecosite MEMM1/TAG (Figure 2-5.7).
- Other Rare Vegetation Communities: Candidate habitat in the FODM9-5 ecosite (Moist Bitternut Hickory Deciduous Forest Type/Shallow Water). S-rank: S3/S4.
- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: Candidate habitat in the Thames River and at the Komoka Park Wetland Complex
- Turtle Nesting Area: Candidate habitat in SHT ecosite of the Thames River
- Seeps and Springs: Candidate habitat in ecosites: FOMM4-3/FODM7, FODM9-5/SA. Confirmed (upwellings observed in FODM5 (part of the MASM1-1/SWMM5-2).
- Amphibian Breeding Habitat (Woodland): Candidate habitat in forested ecosites
- Amphibian Breeding Habitat (Wetland): Candidate habitat in the OA ecosite associated with the Komoka Park Wetland Complex

Habitat for Species of Conservation Concern

- Marsh Bird Breeding Habitat: Candidate habitat in the OA ecosite associated with the Komoka Park Wetland Complex

Special Concern and Rare Wildlife Species (SOCC and S1 – S3 species)

Candidate habitat for 36 of the 47 SOCC identified in the background review was present in the Study Area which includes the following species:

- Birds: American Coot, Bald Eagle, Blue-winged Teal, Common Gallinule, Eastern Wood-pewee, Wood Thrush
- Fish: Northern Sunfish, River Redhorse, Silver Lamprey, Spotted Sucker
- Insects: Double-striped Bluet, Giant Leopard Moth, Hackberry Emperor, Monarch, Slender Bluet, Tawny Emperor
- Mammals: Silver-haired bat, Eastern Red Bat, Hoary Bat
- Molluscs: Mapleleaf Mussel
- Reptiles: Eastern Milksnake, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle
- Plants: Appendage Waterleaf, Broad-leaved Puccoon, Chinese Hemlock-parsley, Crooked-stem Aster, Deer-tongue Panicgrass, Eastern Burning-bush, Green Dragon, Largebract Tick-trefoil, Rigid Sedge, Schreber's Aster, Schweinitz's Sedge, Soft-hairy False Gromwell

3.2.4 Species at Risk Habitat

The results of the SAR habitat suitability assessment for each Study Area are presented in **Appendix D** and are discussed below. The presence or absence of these species would need to be assessed through completion of targeted surveys at the appropriate time of year.

3.2.4.1 Arva

Suitable habitat for 12 of the 13 SAR identified in the background review was present in the Arva Study Area, including the following species:

- Birds: Bobolink, Eastern Meadowlark, Red-headed Woodpecker
- Fish: Black Redhorse, Silver Shiner
- Mammals: Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tricoloured Bat
- Molluscs: Wavy-rayed Lampmussel
- Reptiles: Spiny Softshell
- Plants: Butternut

3.2.4.2 Ilderton

Suitable habitat for 8 of the 11 SAR identified in the background review was present in the Ilderton Study Area, including the following species:

SAR

- Birds: Eastern Meadowlark, Red-headed Woodpecker
- Mammals: Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tricoloured Bat
- Plants: Butternut (present in the Study Area: three Butternut observed in the MEGM3/WOD ecosite)

3.2.4.3 Kilworth

Suitable habitat for 24 of the 34 SAR identified in the background review was present in the Kilworth Study Area, including the following species:

- Birds: Louisiana Waterthrush, Red-headed Woodpecker
- Fish: Black Redhorse, Eastern Sand Darter, Northern Madtom, Pugnose Minnow, Silver Chub, Silver Shiner
- Mammals: Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tricoloured Bat
- Molluscs: Fawnsfoot, Purple Wartyback, Round Hickorynut, Threehorn Wartyback
- Reptiles: Eastern Hog-nosed Snake, Queensnake, Spiny Softshell
- Plants: Black Ash, Blue Ash, Butternut, Eastern Flowering Dogwood, Purple Twayblade

3.2.4.4 Komoka

Suitable habitat for 29 of the 34 SAR identified in the background review was present in the Komoka Study Area, including the following species:

- Birds: Bobolink, Eastern Meadowlark, Henslow's Sparrow, Least Bittern, Red-headed Woodpecker, Yellow-breasted Chat
- Fish: Black Redhorse, Eastern Sand Darter, Pugnose Minnow, Silver Chub, Silver Shiner
- Mammals: American Badger, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tricoloured Bat
- Molluscs: Fawnsfoot, Purple Wartyback, Round Hickorynut, Threehorn Wartyback
- Reptiles: Blanding's Turtle, Eastern Hog-nosed Snake, Queensnake, Spiny Softshell
- Plants: Black Ash, Blue Ash, Butternut, Eastern Flowering Dogwood, Purple Twayblade

3.2.4.5 Delaware

Suitable habitat for 27 of the 29 SAR identified in the background review was present in the Delaware Study Area, including the following species:

- Birds: Bank Swallow, Bobolink, Easter Meadowlark, Least Bittern, Red-headed Woodpecker
- Fish: Black Redhorse, Eastern Sand Darter, Northern Madtom, Pugnose Minnow, Silver Shiner

- Mammals: American Badger, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tricoloured Bat
- Molluscs: Fawnsfoot, Purple Wartyback, Round Hickorynut, Threehorn Wartyback
- Reptiles: Blanding's Turtle, Eastern Hog-nosed Snake, Queensnake, Spiny Softshell
- Plants: Blue Ash, Butternut, Eastern Flowering Dogwood, Red Mulberry

3.2.5 Fish Habitat

Summary descriptions of fish habitat characteristics recorded during the assessment of watercourses in each Study Area are provided below.

3.2.5.1 Arva

Table 9: Fish Habitat Observations for Watercourses in the Arva Study Area

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-01	Medway Creek	Medway Creek had an average 10 m wetted width, and > 1 m depth with coarse substrate.	Confirmed
WC-02	McClary Drain	McClary drain had defined bed and banks with an average 1.2 m wetted width, 30 cm depth and sand, gravel, silt, and cobble substrates. The channel characteristics indicated a permanent flow regime. Minnows were observed in McClary Drain during the assessment. There was a direct connection to Medway Creek with unimpeded fish migration between the two watercourses.	Confirmed
WC-03	Unnamed	Most of the drain was subsurface within a tile drain and there was a permanent fish migration barrier at the discharge point to Medway Creek.	Nil

3.2.5.2 Ilderton

Table 10: Fish Habitat Observations for Watercourses in the Ilderton Study Area

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-01	Ilderton #2 Drain	Ilderton #2 Drain appeared to have permanent flow as indicated by the channel form and morphology. Average depth was 10 cm and wetted width was 3.5 m. Silt substrates were dominant. The watercourse receives input from the wastewater treatment plant and the nearby SWM pond. No fish were observed in the watercourse during the assessment. It is unknown	Candidate

		if the watercourse is connected to the fish bearing watercourse downstream, Oxbow Creek.	

3.2.5.3 Kilworth

Table 11: Fish Habitat Observations for Watercourses in the Kilworth Study Area

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-01	Unnamed	A constructed drain feature that conveys surficial drainage for the residential community. A concrete lined channel that transitions to an open drain with natural channel in the CGL_2 ecosite. Connection to the Thames River.	Candidate: within the CGL_2 ecosite, up to concrete channel.
WC-02	Unnamed	A tile drain. No feature observed.	Nil
WC-03	Thames River	Fish habitat supporting a diverse fish community and aquatic SAR habitat including critical habitat.	Confirmed
WC-04	Oxbow Creek	Fish habitat supporting a diverse fish community and aquatic SAR habitat including critical habitat.	Confirmed

3.2.5.4 Komoka

Table 12: Fish Habitat Observations for Watercourses in the Komoka Study Area

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-01	Komoka Drainage Works Drain #2	A drainage ditch on the south side of the CP rail line and west of Komoka Road. During the assessment a 1.0 m wetted width and 5 cm deep with silt and clay substrate. Tiled underground east of Komoka Road. Unknown if connected to a fish bearing watercourse. Potential to connect with Crow Creek Drain.	Candidate
WC-02	Crow Creek Drain	The channel had an average 4.0 m wetted width and 35 cm depth. Sand, gravel, cobble substrate. Run and riffle channel morphology.	Confirmed

3.2.5.5 Delaware

Table 13: Fish Habitat Observations for Watercourses in the Delaware Study Area

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-01	Unnamed	Flow from south to north. Mostly dry south of Gideon Drive. Catchment basin in channel on south side of Gideon Drive conveying drainage to north of Gideon Drive. On north side of Gideon Drive, a 0.4 m wetted width and 3 cm depth with silt and sand substrate. Headwater drainage feature.	Nil
WC-02	Unnamed	Flowing west on south side of Gideon Drive. An average 1.0 m wetted width and 10 cm depth over gravel and cobble substrate. Connects to WC-03.	Candidate
WC-03	Unnamed	An average 1.0 m wetted width and 5 cm depth. Watercress (*Nasturtium officinale*) was present indicating potential groundwater source. Connected to WC-02.	Candidate
WC-04	Unnamed	There was no feature present east of Carriage Road. Headwater drainage and potential groundwater seep on west side of Carriage Road. Source water for WC-05.	Nil
WC-05	Unnamed	A flowing channel on the west side of the Carriage Road. An Average 0.7 m wetted width and 10 cm depth. Dense watercress vegetation. Channel flows west into a wetland on Circle R Ranch. A dead Largemouth Bass (*Micropterus salmoides*) was observed in the channel. Potential fish migration from stocked ponds or wetlands on the ranch during high flow events.	Candidate
WC-06	Dingman Creek	Average 7 m wetted width, 1.0 m depth. Fish habitat including habitat for aquatic species at risk and critical habitat.	Confirmed
WC-07	Allison Drain	Flowing on both sides of Carriage Road. Flows west to east. An average 2.0 m wetted width and 20 cm depth. Abundant watercress was present.	Confirmed
WC-08	Biggar Drain	Tiled on west side of Carriage Road. Flowing on east side of Carriage Road. Average 0.5 m wetted width and 20 cm depth. Watercress was present. Connected via a culvert to WC-09.	Candidate
WC-09	Biggar Drain	Headwaters to Biggar Drain. Average 1.0 m wetted width and 10 cm depth over sand substrate. Connected to main Biggar Drain via a small culvert, potentially limiting fish use.	Candidate
WC-10	Unnamed	Tiled. No feature.	Nil

Watercourse Identifier	Watercourse Name	Habitat Description	Fish Habitat (Candidate, Confirmed or Nil)
WC-11	Unnamed	A flowing watercourse. Access was not granted to lands where watercourse was located; however, the flowing channel could be observed from a distance.	Candidate
WC-12	Unnamed	A drainage feature, flowing east to west under Springer Road through a small culvert. A 1 m high drop in channel elevation west of Springer Road preventing fish access.	Candidate
WC-13	Unnamed	Tiled. No feature.	Nil
WC-14	Unnamed	Tiled. No feature.	Nil
WC-15	Unnamed	Tiled. No feature.	Nil
WC-16	Prior Drain	Tiled east of Gideon Drive. Standing water in a wide and highly vegetated (algae) channel west of Gideon Drive. Water under culvert. West side average 8.0 m wetted width and 30 cm depth.	Candidate on west side of Gideon Drive.
WC-17	Dingman Creek	Fish habitat including habitat for aquatic species at risk and critical habitat.	Confirmed
WC-18	A & R Drain	Tiled east of Gideon Drive. Water under culvert, connection to open channel west of Gideon Drive. Average 2.0 m wetted width and 30 cm depth.	Candidate
WC-19	Unnamed	Flowing watercourse on both sides of Gideon Drain from east to west. Average 3.0 m wetted width and 30 cm depth over silt substrate.	Candidate
WC-20	Thames River	Fish habitat supporting a diverse fish community and aquatic SAR habitat including critical habitat.	Confirmed

4 Natural Heritage Features

This section provides a summary of natural heritage features that were identified in the Study Areas:

4.1 Arva

Natural Heritage Designations

- Significant Woodland associated with Medway Creek

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Habitat for Terrestrial Crayfish
- Candidate: Habitat for 17 SOCC

Species at Risk Habitat

- Candidate: Habitat for 12 SAR

Fish Habitat

- Confirmed: Medway Creek and McClary Drain

4.2 Ilderton

Natural Heritage Designations

- Significant Woodland to the east of the wastewater treatment plant

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Seeps and Springs habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Habitat for 7 SOCC

Species at Risk Habitat

- Confirmed: Butternut trees

- Candidate: Habitat for 8 SAR

Fish Habitat

- Candidate: Ilderton #2 Drain

4.3 Kilworth

Natural Heritage Designations

- Komoka Park Reserve ANSI
- Significant Woodland

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Turtle Nesting Area
- Candidate: Habitat for 36 SOCC

Species at Risk Habitat

- Candidate: Habitat for 24 SAR

Fish Habitat

- Confirmed: Thames River and Oxbow Creek

4.4 Komoka

Natural Heritage Designations

- Komoka/South Strathroy Creek Wetland PSW
- Komoka Park Wetland Complex PSW
- Tallgrass Prairie
- Significant Woodland

Significant Wildlife Habitat

- Candidate: Waterfowl Stopover and Staging Area (Aquatic)
- Candidate: Bat Maternity Colonies

- Candidate: Turtle Wintering Areas
- Candidate: Tall-grass Prairie
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Seeps and Springs
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Amphibian Breeding Habitat (Wetland)
- Candidate: Marsh Bird Breeding Habitat
- Candidate: Habitat or 48 SOCC
- Candidate: Animal Movement Corridors

Species at Risk Habitat

- Candidate: Habitat for 29 SAR

Fish Habitat

- Confirmed: Crow Creek Drain
- Candidate: Komoka Drainage Works Drain Number 2

4.5 Delaware

Natural Heritage Designations

- Komoka Park Reserve ANSI
- Komoka/South Strathroy Creek Wetland PSW
- Komoka Park Wetland Complex PSW
- Komoka Provincial Park
- Rare wildlife habitat: Mixed Wader Nesting Colony

Significant Wildlife Habitat

- Candidate: Waterfowl Stopover and Staging Area (Aquatic)
- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)
- Confirmed: Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)
- Candidate: Tall-grass Prairies
- Candidate: Other Rare Vegetation Communities

- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Turtle Nesting Area
- Candidate: Seeps and Springs
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Amphibian Breeding Habitat (Wetland)
- Candidate: Marsh Bird Breeding Habitat
- Candidate: Habitat for 36 SOCC
- Candidate: Animal Movement Corridor

Species at Risk Habitat

- Candidate: Habitat for 27 SAR

Fish Habitat

- Confirmed: Thames River, Dingman Creek, Allison Drain
- Candidate: WC-02, WC-03, WC-05, WC-08, WC-09, WC-11, WC-12, WC-16, WC-18, WC-19

Section 6.4 outlines proposed field surveys to assess the presence of SOCC, SWH, SAR and fish habitat. SOCC and SAR presence, SWH designations and fish habitat confirmations can be refined after those surveys are complete.

5 Mitigation Measures

5.1 Design

During site selection and design, the following measures should be considered to reduce the risk of impacts to natural heritage:

Fish and Fish Habitat

- Design the project to avoid the need for in-water work where fish habitat has been identified.
- Design and plan activities and works such that loss of fish habitat or disturbance to fish habitat is reduced to the extent possible.
- Consider construction strategies to avoid in-water work, such as the use of directional drilling for pipeline watercourse crossings.
- If applicable, apply natural channel design principles to design channel relocation.
- Design drainage system to reduce changes in drainage to watercourses that provide fish habitat.
- Design stormwater management measures to reduce effects on watercourses that provide fish habitat to the extent possible.
- Design a rehabilitation/re-vegetation plan for long-term stability of areas disturbed during construction.
- For rock reinforcement below the normal high-water level (if required), use appropriately sized material and install at a similar slope to the existing, maintain a uniform bank/shoreline and maintain a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankfull channel profile.

Wildlife and Terrestrial Habitat

- Limit infrastructure in woodland and wetland areas to the extent possible. Setback infrastructure and work areas from woodlands and wetlands to reduce edge effects.
- Plan to rehabilitate temporary disturbance areas with a native seed mix that is suited to the site conditions.

5.2 Construction

5.2.1 Standard Mitigation Measures

The following standard mitigation measures/best practices are provided to reduce potential impacts to natural heritage features during construction:

- Delineate work areas with tree protection fencing prior to construction to reduce impacts to adjacent natural features.

- Wash, refuel and/or service equipment a minimum of 30 m from surface waters to reduce the risk of deleterious substances from entering surface waters. Check machinery regularly for fluid leaks.
- Develop a clean equipment protocol to reduce the potential for establishment / spread of invasive species.
- Develop a protocol to reduce the potential for spread of the Emerald Ash Borer, including disposing ash trees onsite where possible (either through spreading of wood chips or trees cut and sawed into logs).
- Develop a Spill Management Plan and have it on site for implementation in the event of an accidental spill. Keep an emergency spill kit on site.
- Stabilize and re-vegetate areas of disturbed/exposed soil, as soon as practicably possible with native seed mixes and native woody vegetation.
- Maintain erosion and sediment control measures until the restoration measures have been assessed and determined to be secure and stable.

5.2.2 Erosion and Sediment Control

An erosion and sediment control (ESC) plan should be developed and employed during construction to reduce the risk of erosion and the entry of sediment into surface water and other natural features. Mitigation included in the plan should include the following measures:

- Implement project-specific temporary ESC measures per prior to starting work (e.g., silt fence and/or sediment logs).
- Keep additional ESC materials available on site to provide a contingency supply in the event of an emergency.
- Monitor and maintain erosion and sediment controls, as required. Controls are to be removed only after the soils of the construction area have stabilized and vegetation cover has re-established.
- Stabilize materials requiring stockpiling (fill, topsoil, etc.) and keep a safe distance (> 30 m) from watercourses.

5.2.3 Protection of Migratory Birds

The *Migratory Birds Convention Act, 1994* (MBCA) prohibits the killing or capturing of migratory birds, as well as the damage, destruction, removal, or disturbance of their nests. The Migratory Birds Regulation, 2022 (MBR), further defines when nests of migratory bird species are protected, with special provisions in place for bird species that reuse their nests (e.g., Pileated Woodpecker, Great Blue Heron). Construction timing must consider restrictions imposed by the MBCA. To avoid damaging or disturbing bird nests and contravening the MBCA, the timing of any vegetation clearing should occur outside of the primary nesting period (i.e., the period when the percent of total nesting species is greater than 10% based on Environment Canada's Nesting Calendars and the period for which due diligence mitigation measures are generally recommended).

The primary nesting period (PNP) identified for southern Ontario is April 1 - August 31, although nesting also infrequently occurs outside of this period (Environment Canada 2014). Vegetation removal during this core nesting period is not recommended; however, if required, a nest survey may be carried out by a qualified person in simple habitats such as an urban park, a vacant lot with few possible nest sites, a previously cleared area, or a structure (Government of Canada 2022). If a migratory bird nest is located within the work area at any time, a no-disturbance buffer will be delineated. This buffer will be maintained for the entire duration of the nest activity, which will be determined using periodic checks by a qualified biologist. The radius of the buffer generally varies from 5 m - 60 m depending on the sensitivity of the nesting species. The Project will not resume within the nest buffer until the nest is confirmed to be no longer active.

If large diameter trees will be removed, they should be assessed to determine if there are nest of bird species that reuse their nests (i.e., species listed on Schedule one of the MBR [2022] such as Pileated Woodpecker, Great Blue Heron). If encountered, these nests will require authorization from Environment and Climate Change Canada (ECCC) prior to removal (see Section 6.4).

5.2.4 Wildlife Protection

The following mitigation measures are recommended to avoid impacts to wildlife during Project construction:

- A visual search of the work area will be conducted before work commences each day, particularly for the period when most wildlife is active (generally April 1 to October 31). Visual inspections will locate and avoid snakes, turtles, and other ground dwelling wildlife such as small mammals. Visual searches will include inspection of machinery and equipment left in the work area overnight prior to starting equipment.
- If wildlife is encountered, work at that location will stop, and the animal(s) will be permitted reasonable time to leave the work area on their own.
- Tree removals should be completed outside of the bat maternity roost season (March 15 to September 30).
- Vegetation (tree, shrub, meadow type) removals should be completed outside of the primary nest period for birds (April 1 to August 31).
- Any sediment and erosion control measures, such as fencing or blanket, utilized on the site during construction will avoid products with plastic mesh due to risk of entanglement of snakes or other wildlife.
- Any observations of species at risk should be reported to MECP within 48 hours. Species at risk should not be handled, harassed, or moved in any way, unless they are in immediate danger.
- If wildlife handling and relocation (e.g., amphibians, reptiles) is anticipated during construction such as vegetation clearing or during in-water work, the Contractor must obtain a Wildlife Scientific Collectors Authorization from the MNRF prior to the commencement of work.

- Extra mitigation may be required if the Project encroaches upon sensitive natural heritage features (ANSIs, PSW, etc.). This could include wildlife exclusion fencing. Wildlife exclusion fencing installation details would be specific to the site and the species or animal group(s) which the mitigation is to exclude. The need for exclusion fencing can be determined at detailed design.

5.2.5 Protection of Fish and Fish Habitat

Implementation of the following measures are recommended to protect fish and fish habitat during construction if in-water work is required:

- If in-water work is required, reduce the duration of in-water work to the extent possible.
- Conduct in-water work during periods of low flow to allow work in water to be isolated from flows.
- Schedule in-water work to occur during the applicable in-water work timing window. In-water work timing windows are dependent on the watercourse thermal regime and fish community present in the watercourse. The restricted in-water working timing window for a spring spawning fish community (generally a warmwater thermal regime) is March 15 to July 15 (in-water work permitted from July 16 to March 14). The restricted in-water working timing window for a fall spawning fish community (generally a coldwater thermal regime) is October 1 to May 31 (in-water work permitted from June 1 to September 30). Watercourses with a coldwater thermal regime often also have spring spawning fish communities. In this case, both restricted in-water work timing windows would apply.
- If in-water work is required, develop, and implement a project-specific fish relocation plan to relocate fish from within an in-water work area. The Contractor must obtain a Licence to Collect Fish for Scientific Purposes from the MNRF prior to the commencement of in-water work.
- Screen water intake pipes to prevent entrainment or impingement of fish following the measures as outlined in DFO's Interim Code of Practice for End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2022).
- Where applicable, manage and treat dewatering discharge to reduce the risk of erosion and/or release of sediment-laden or contaminated water to surface waters.

6 Permitting Considerations

6.1 Conservation Authorities

6.1.1 Conservation Authorities Act

Development within the UTRCA, SCRCA and LTVCA regulation limit is subject to the policies outlined in Ontario Regulation 41/24, under the *Conservation Authorities Act.* Regulated areas are present in the Project Areas, associated with wetlands, watercourse, and floodplains. Prior to any new development in regulated areas, including the placement or removal of fill material, grading activities, and the erection of any buildings or structures, and/or the alteration of regulated features, written approval (i.e., a Permit or a Letter of Permission) will be required from the respective conservation authority. Consultation with UTRCA, SCRCA and LTVCA is recommended to determine permitting requirements for the Project.

6.2 Ministry of the Environment, Conservation and Parks

6.2.1 Endangered Species Act, 2007

The provincial ESA prohibits the killing, harming, harassing, capturing, or taking of a living member of a species listed as Threatened, Endangered or Extirpated by the Species at Risk in Ontario (SARO) list (O. Reg 230/08) (S.9), or the damage to habitat of similarly designated species (S.10). An exception is where a permit is issued under S.17(2) of the same act, or the Activity is registered under Ontario Regulation 242/08.

Based on preliminary assessment, impacts to SAR and/or SAR habitat may occur due to the Project. As such, targeted surveys to assess the presence/absence of SAR are recommended for the Study Areas (Section 6.4). Consultation with the MECP, through submission of an Information Gathering Form (IGF) is recommended following the targeted SAR surveys. An IGF is the first step in the review process to determine the potential impact of a Project on SAR or their habitats.

6.3 Fisheries And Oceans Canada

6.3.1 Fisheries Act

The *Fisheries Act* prohibits causing the death of fish and he harmful alteration, disruption, or destruction (HADD) of fish habitat, unless authorized by the Minister of Fisheries, Oceans, and the Canadian Coast Guard. This applies to work being conducted in waters that support fish and fish habitat. The fish and fish habitat protection provisions of the *Fisheries Act* apply to all fish and fish habitat in Canada.

Following guidance and criteria provided on DFO's website regarding mitigation, waterbody types and codes of practice, proponents determine whether their projects in or near water will require review by DFO. In cases where impacts to fish and fish habitat cannot be avoided, proponents submit a Request for Review form to DFO. DFO will review the project to identify the potential risks of the project to the conservation and protection of fish and fish habitat and will work with the proponent to provide advice and guidance on how to comply with the *Fisheries Act*. If the Project can avoid impacts to fish and fish habitat, project approval is not required. If impacts cannot be avoided, proponents must apply for a *Fisheries Act* Authorization, and may be required to develop a habitat offsetting or compensation plan.

Details of the proposed infrastructure location will be assessed to determine the need for review by DFO; however, if in-water work is not proposed, DFO review under the *Fisheries Act* will not likely be required. If the need for in-water work is identified, design details and construction methods will need to be reviewed to determine if the Project should be reviewed by DFO under the *Fisheries Act* through the submission of a Request for Review form.

6.3.2 Species at Risk Act

Aquatic species at risk are regulated on the *Species at Risk Act* (SARA) which is administered by the DFO. Any Project works that may impact federally regulated aquatic SAR habitat will require a review of the Project by the DFO. The review is completed through the submission of a Request for Review form.

6.4 Environment and Climate Change Canada

The MBR (2022) defines when nests of migratory bird species are protected, with special provisions in place for bird species that reuse their nests (e.g., Pileated Woodpecker, Great Blue Heron). If nests with special provisions are encountered (i.e., nest with year-round protection) there is a designated 36-month waiting period where they must be confirmed unoccupied prior to removal. However, there is an option to obtain a permit and waive the 36-month waiting period if the nest is confirmed unoccupied during the previous breeding season. In both cases, a "Nest Notification" is likely required using the ECCC Abandoned Nest Registry system.

6.5 Survey Recommendations

Because most of the Project Area is within the road ROW, impacts to SWH and SOC and SAR habitat are anticipated to be low. However, there are locations of the Project Area which are adjacent to or intersect natural heritage features or candidate SAR and fish habitat. The following surveys are recommended during detailed design for each Study Area:

6.5.1 Arva

- **Birds**: If the Project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR, and identify nests that receive year-round protection by the MBR (2022).

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: If the Project Area will encroach upon the MEMM3 ecosite on the north side of Medway Road, a plant inventory of this feature is recommended.
- **Fish**: If the Project requires in-water work in Medway Creek or McClary Drain, additional fish habitat and fish community assessment (only McClary Drain) is recommended so that data are available for submission of a Request for Review to the DFO.

6.5.2 Ilderton

- **Birds**: A breeding bird survey is recommended in the MEGM3/WOD ecosite if development is to occur in this ecosite, and to determine presence/absence of nests that receive year-round protection by the MBR (2022).
- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: If impacts to the Butternut trees are proposed, a Butternut assessment including genetic analysis will be required of these trees. A plant inventory is recommended in FOD10-1 or FODM7/SA if modifications may occur in this feature.
- **Fish**: A fish habitat and fish community survey will be required in the Ilderton #2 Drain if modifications to this feature are proposed.
- **Feature Encroachment**: If the Project Area (associated with the wastewater treatment plan) requires modification of the FODM10-1 or FODM7/SA (Significant Woodland), a subsequent vegetation inventory, wildlife habitat assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

6.5.3 Kilworth

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the Study Area are proposed.
- **Feature Encroachment**: If the Project Area (south end of Study Area) requires modification of the FODM7 (Komoka Park Reserve ANSI), a subsequent vegetation inventory, wildlife habitat assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

6.5.4 Komoka

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.

- **Birds**: If the Project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the Study Area are proposed.
- **Fish**: If the Project requires in-water work in Crow Creek Drain, an additional fish habitat assessment is recommended so that data are available for submission of a Request for Review to the DFO.

6.5.5 Delaware

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Birds**: If the Project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the Study Area are proposed.
- **Fish**: If the Project requires in-water work in any watercourse identified as Confirmed or Candidate fish habitat or if modification of a watercourse mapped by the DFO as providing aquatic SAR habitat, additional fish habitat assessment is recommended so that data are available for submission of a Request for Review to the DFO.
- **Feature Encroachment**: If the Project Area (south end of Study Area, Figure 3-5.3) requires development within 50 m of the FODM9-5/SA ecosite, a subsequent vegetation inventory, wildlife habitat assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

  If the Project construction is to encroach upon the Delaware Woodlot ANSI (Figure 1-5.5), the Komoka Park Reserve ANSI (Figure 1-5.8), or Significant Woodlands an Environmental Impact Study may be required (full suite of ecological surveys), as per the Middlesex Centre Official Plan.

7 Next Steps

The following steps are recommended as part of detailed design:

- Complete field surveys recommended in Section 6.4. Surveys are recommended to be completed one year prior to Project construction.
- Consultation with MECP once design details and staging plans are available to confirm mitigation measures and determine authorization requirements, if any, for provincially regulated SAR.
- If in-water work is required in any watercourse with confirmed or candidate fish habitat or within a watercourse mapped as providing habitat for aquatic SAR, prepare a Request for Review form, and submit to DFO for review under the *Fisheries Act* and *Species at Risk Act*.

8 Closure

Stantec was retained by the Middlesex Centre to conduct a natural heritage assessment and constraints analysis in support of the Municipal Class Environmental Assessment for the Middlesex Centre Master Servicing Plan.

The natural heritage assessment determined the Project may impact sensitive environments (ANSI, PSW, Significant Woodland), and/or the species and their habitats noted in this assessment. Targeted surveys to document presence/absence of SAR and fish habitat in the Project Area is recommended. These surveys should be completed one year in advance of Project construction.

9 References

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APPENDICES

Appendix A Figures

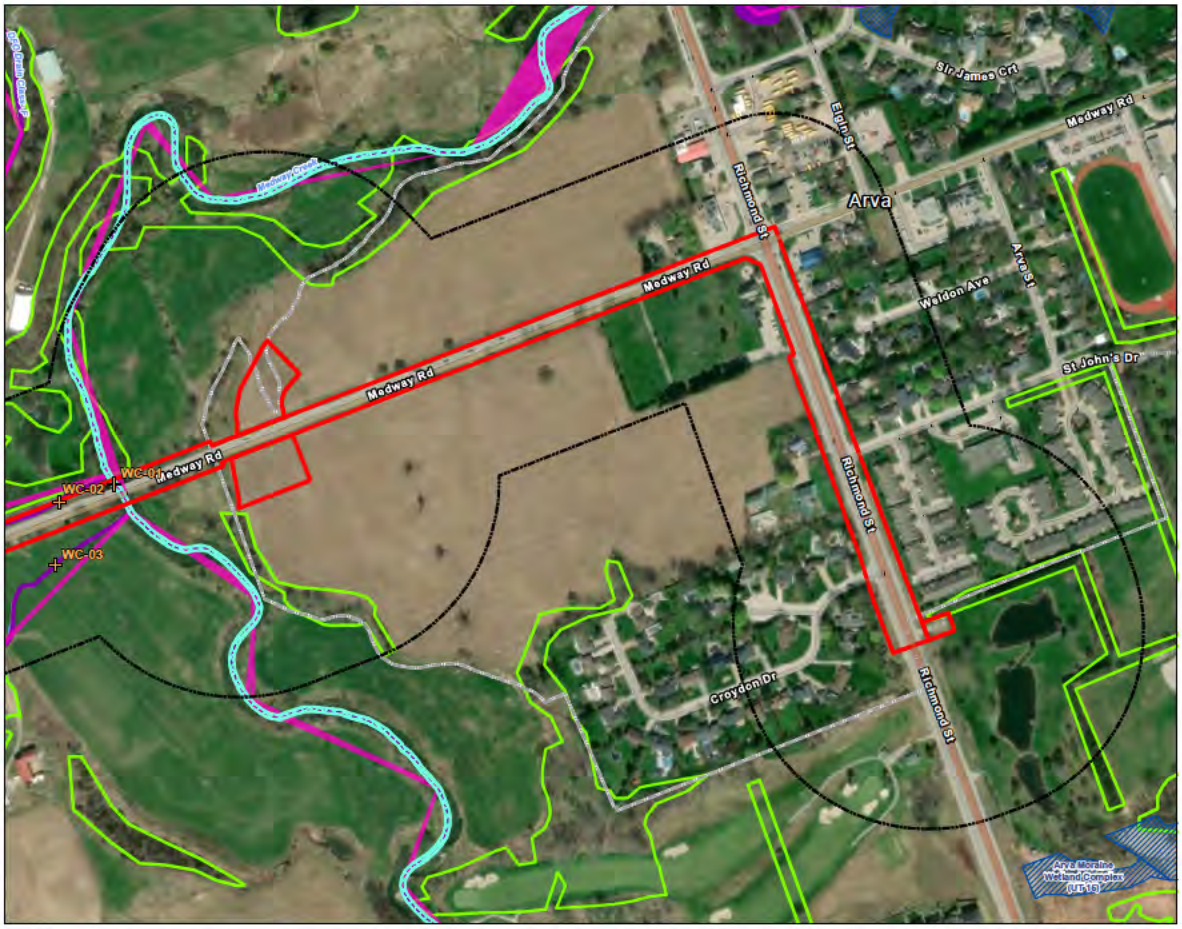


Figure No.
1-1.1

Title
Background Data: Arva

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Arva, Ontario

Prepared by katlang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Wooded Area
- Thermal Regime, Cold
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-1.2

Title
Background Data: Arva

Client/Project

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Arva, Ontario

Prepared by ballang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- Conservation Authority Administrative Boundary
- Wooded Area
- Thermal Regime, Cold
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

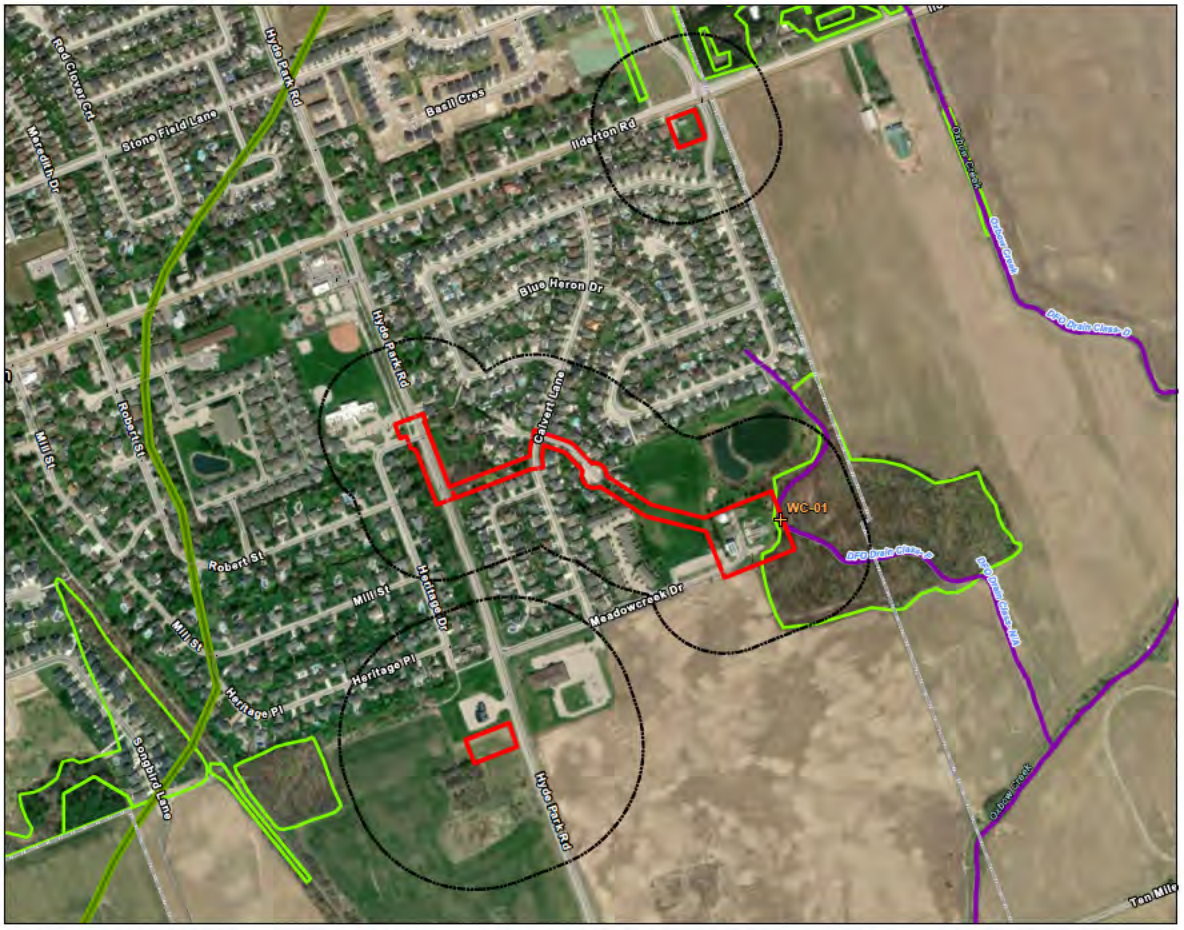


Figure No.
1-2.1

Title
Background Data: Ilderton

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Ilderton, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-3.1

Title
Background Data: Kilworth

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Kilworth, Ontario

Prepared by ballang on 8/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Intermittent)
- Watercourse (Permanent)
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-4.1

Title
Background Data: Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-4.2

Title
Background Data: Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wooded Area

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-4.3

Title
Background Data: Komoka

Client/Project

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by katlang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-4.4

Title
Background Data: Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by katlang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:3,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Provincial Park
- Wooded Area

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-4.5

Title
Background Data: Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

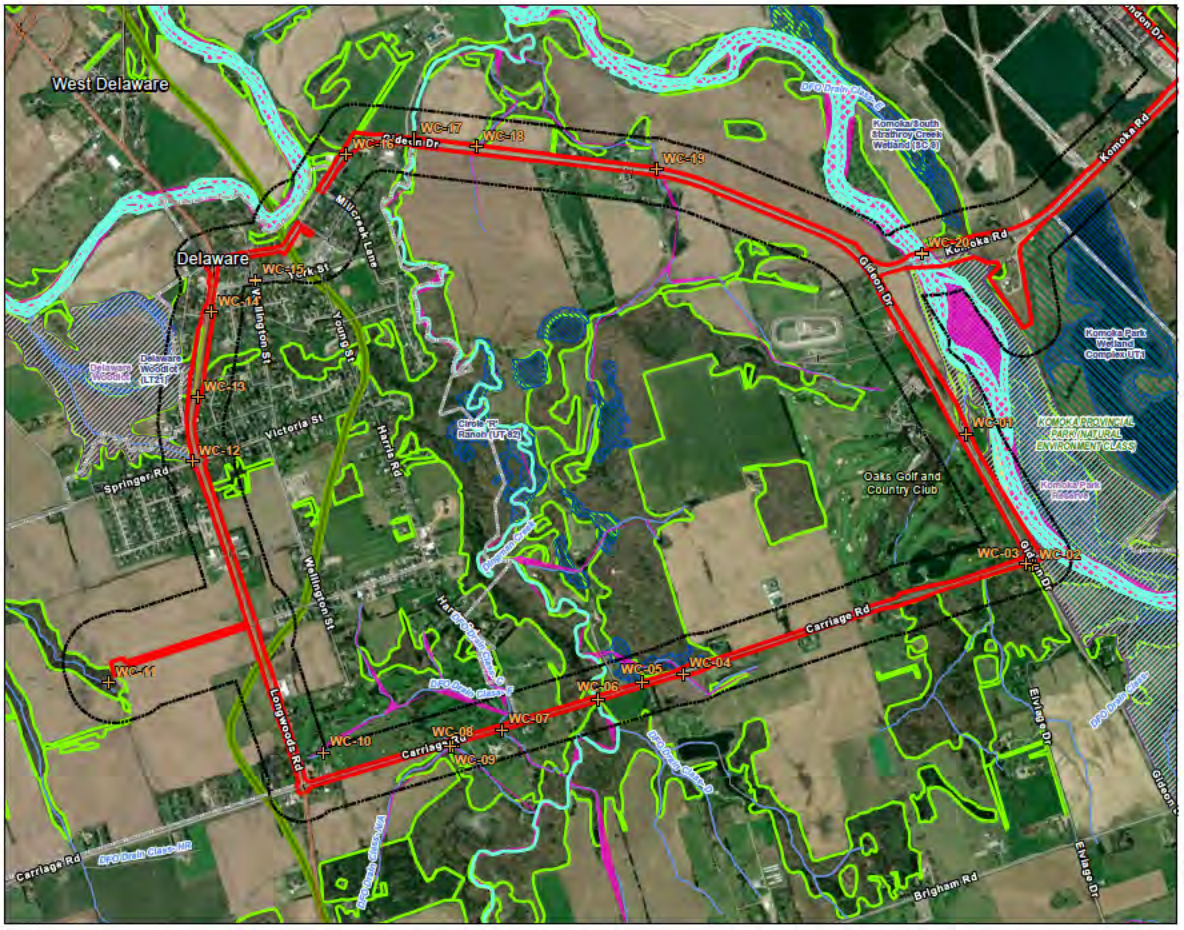


Figure No.
1-5.1

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by ballang on 8/5/2024

0 100 200 300 400 500 600 Meters
(At original document size of 11x17)
1:16,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Intermittent)
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

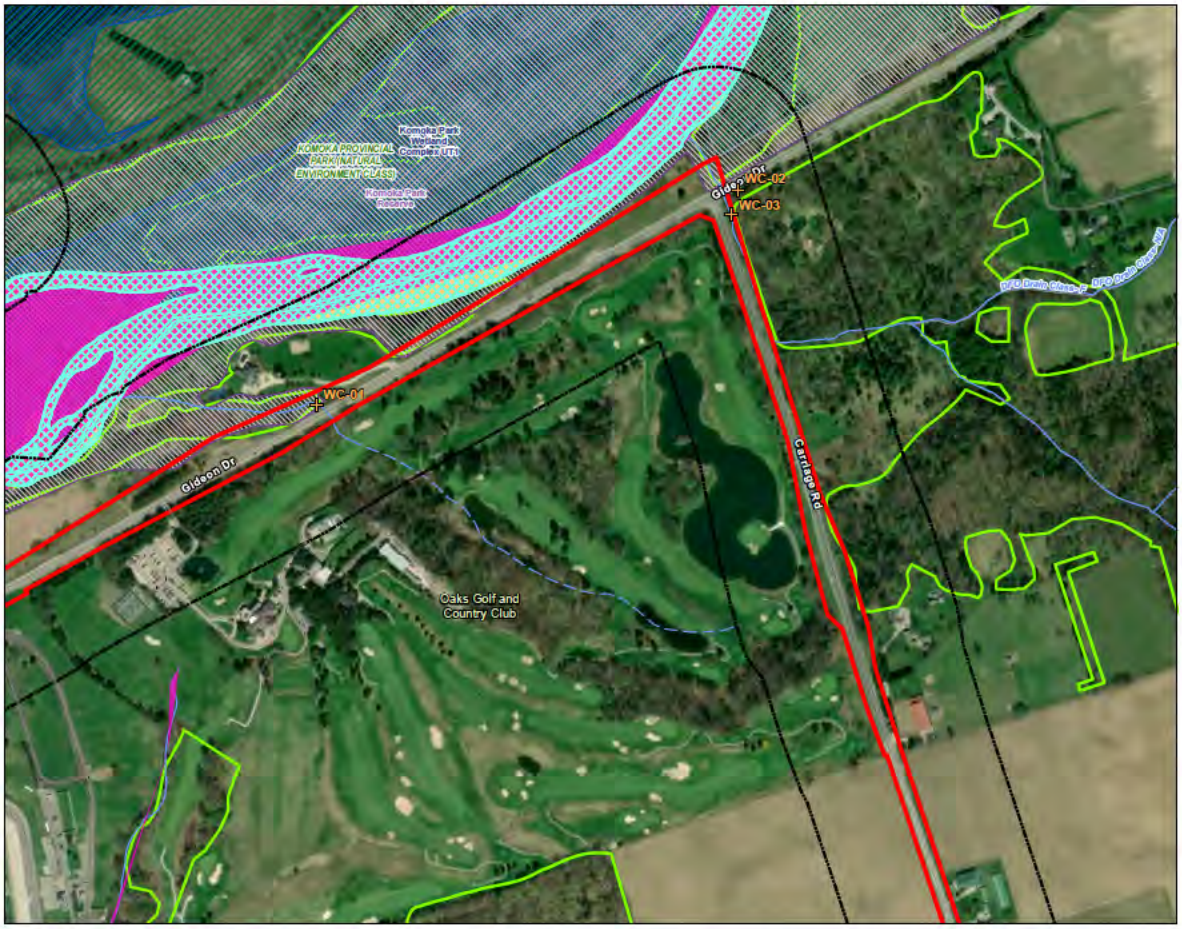


Figure No.
1-5.2

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Intermittent)
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

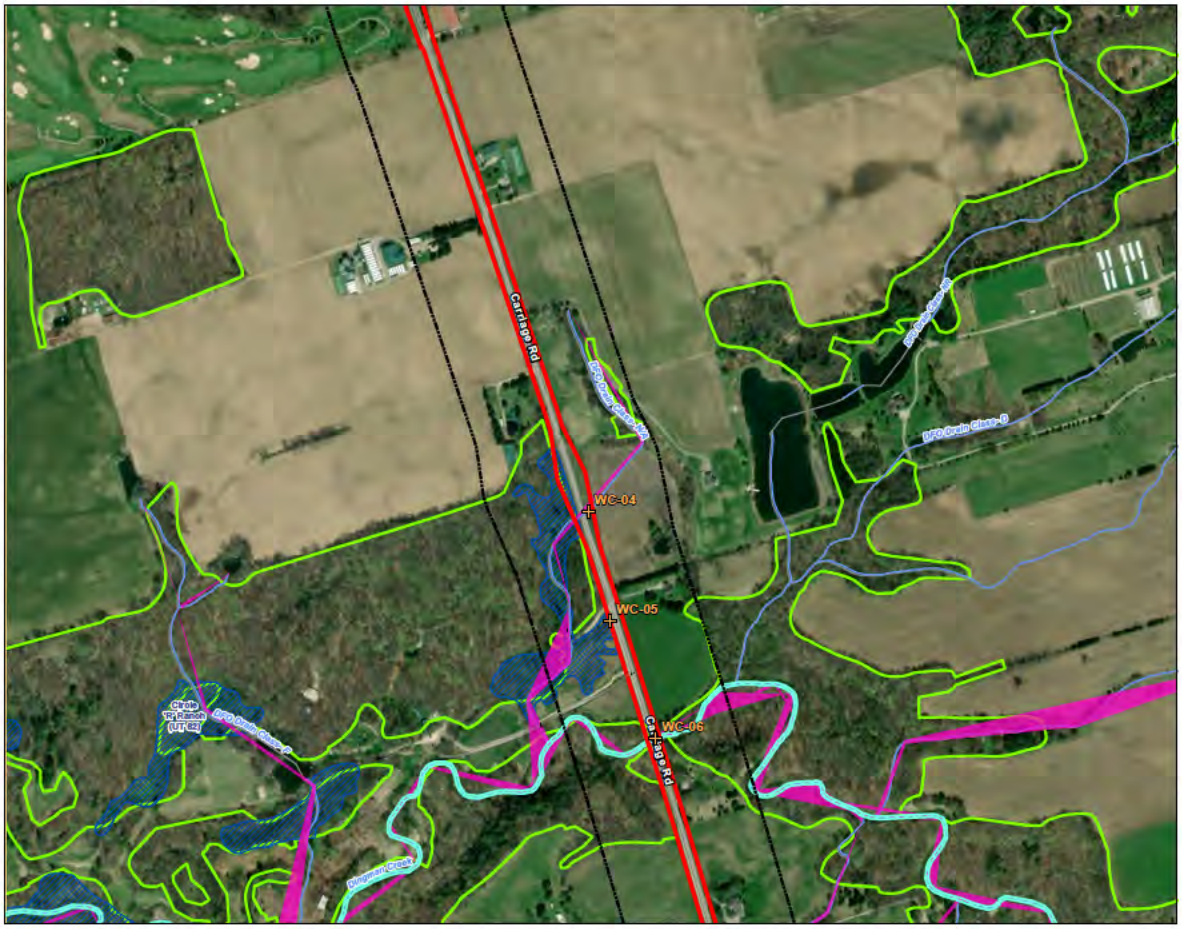


Figure No.
1-5.3

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-5.4

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-5.5

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-5.6

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Intermittent)
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
1-5.7

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by kaitang on 8/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Intermittent)
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

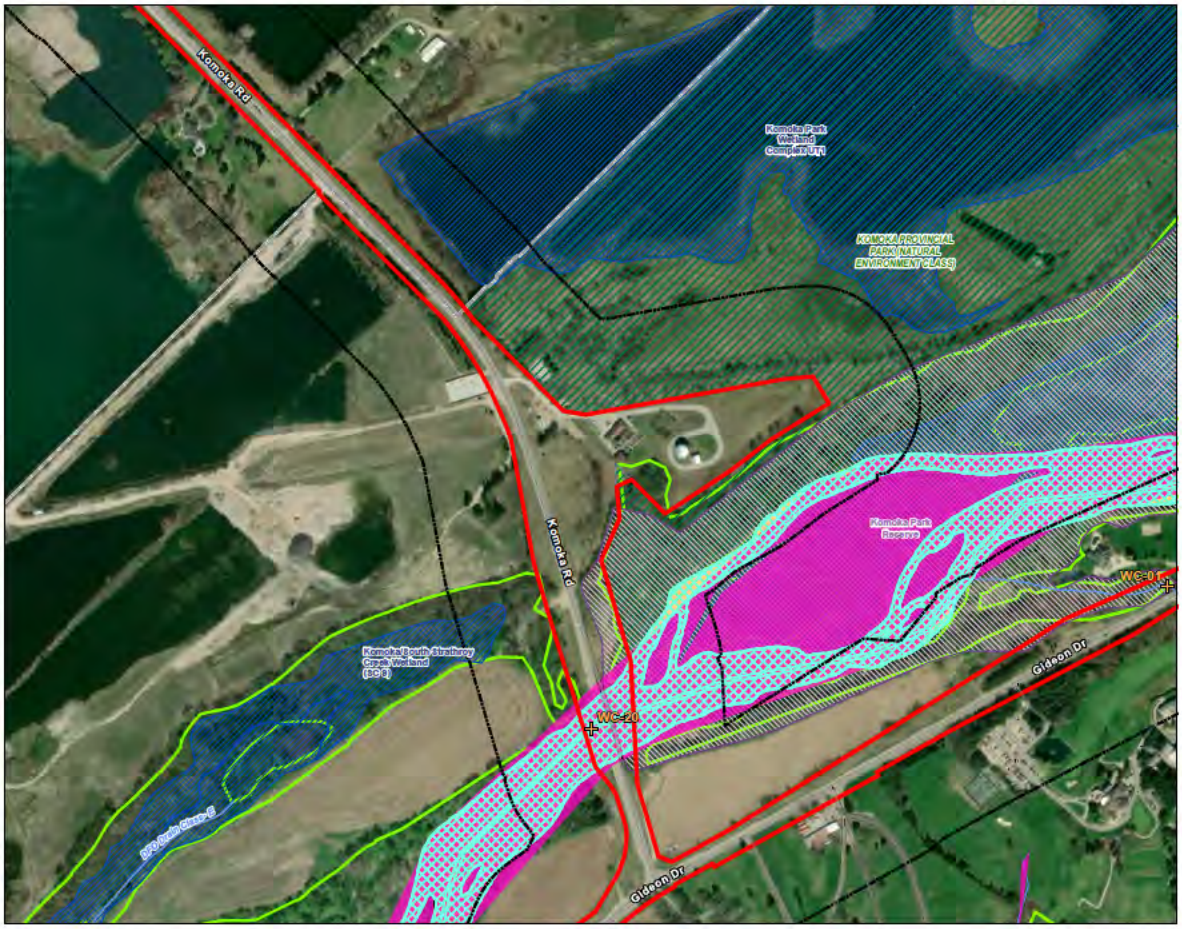


Figure No.
1-5.8

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- ANSI, Life Science
- Wetland, Provincially Significant
- Provincial Park
- Wooded Area
- Thermal Regime, Warm
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

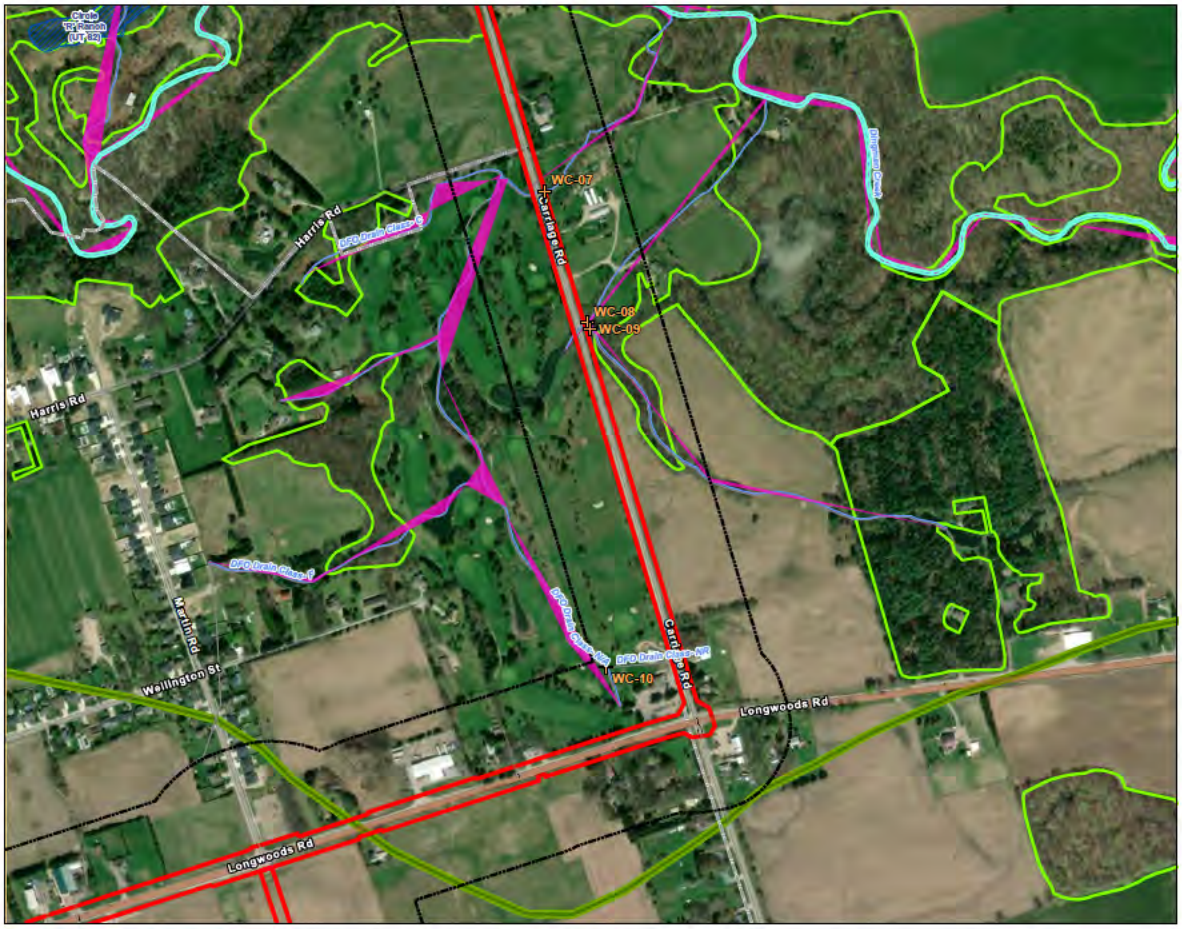


Figure No.
1-5.9

Title
Background Data: Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by katlang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- Settlement Boundary
- Conservation Authority Administrative Boundary
- Wetland, Provincially Significant
- Wooded Area
- Watercourse (Permanent)
- Constructed Drain
- Aquatic Feature

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

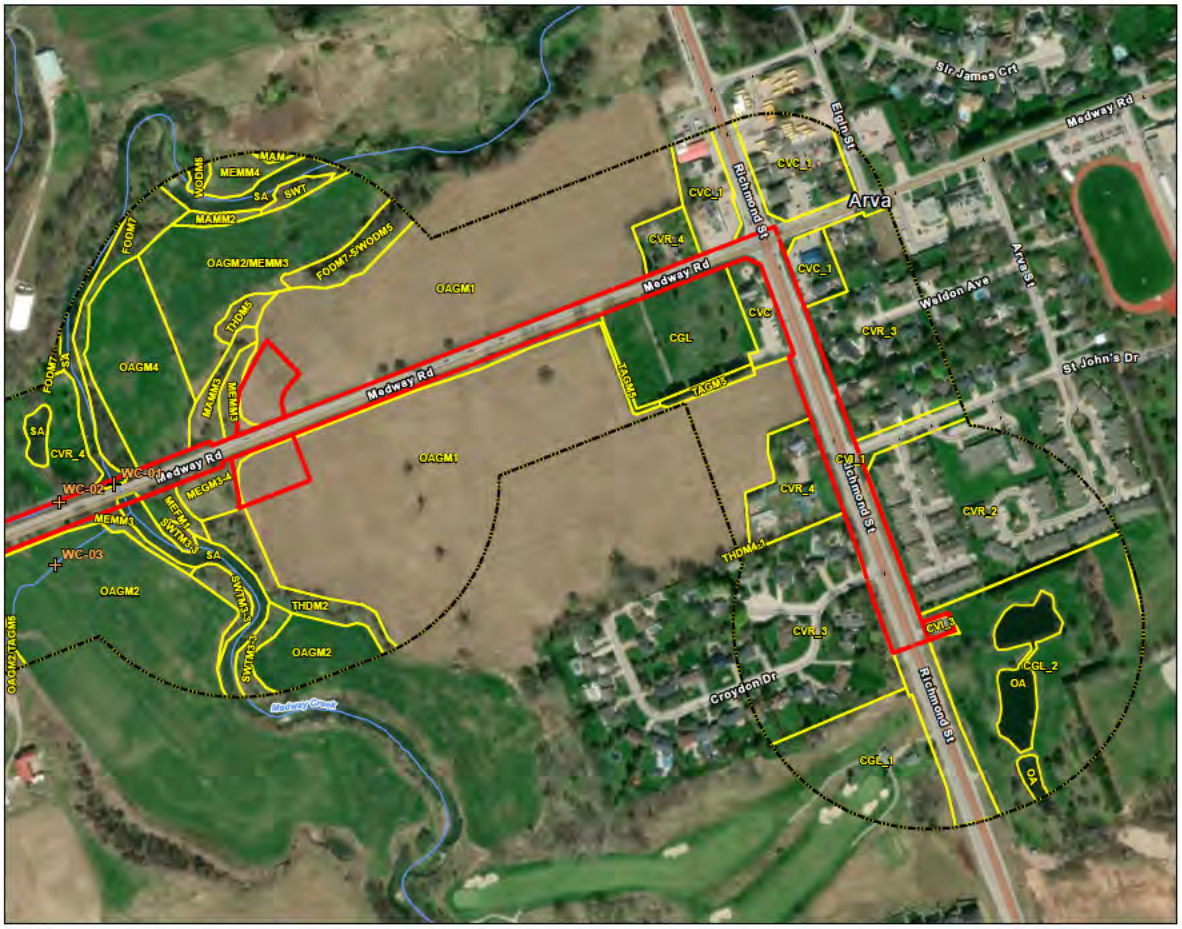


Figure No.
2-1.1

Title
Ecological Land Classification (ELC): Arva

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Arva, Ontario

Prepared by lisiliang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- CGL - Green Lands
- CGL 1 - Golf Course
- CGL 2 - Parkland
- CVC - Commercial and Institutional
- CVC 1 - Business Sector
- CVI 1 - Transportation
- CVI 3 - Sewage and Water Treatment
- CVR 2 - High Density Residential
- CVR 3 - Single Family Residential
- CVR 4 - Rural Property
- FODM7-5 - Fresh – Moist Black Maple Lowland Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- MAM - Meadow Marsh
- MAMM2 - Forb Mineral Meadow Marsh
- MAMM3 - Mixed Mineral Meadow Marsh
- MEGM3-4 - Kentucky Blue Grass Graminoid Meadow
- MEMM3 - Dry - Fresh Mixed Meadow
- MEMM4 - Fresh - Moist Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops
- OAGM4 - Open Pasture
- SA - Shallow Water
- SWTM3-3 - Slender Willow Mineral Deciduous Thicket Swamp
- TAGM5 - Fencerow
- THDM2 - Dry - Fresh Deciduous Shrub Thicket
- THDM4-1 - Native Deciduous Regeneration Thicket
- THDM5 - Fresh - Moist Deciduous Thicket
- WODM5 - Fresh - Moist Deciduous Woodland
- MEFM1 - Goldenrod Forb Meadow

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-1.2

Title
Ecological Land Classification (ELC): Arva

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Arva, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- **CVI** - Transportation and Utilities
- **CVI_1** - Transportation
- **CVR_4** - Rural Property
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water
- **SWTM3-3** - Slender Willow Mineral Deciduous Thicket Swamp
- **TAGM4** - Treed Pasture
- **MEFM1** - Goldenrod Forb Meadow

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-2.1

Title
Ecological Land Classification (ELC): Ilderton

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Ilderton, Ontario

Prepared by lisiliang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- CGL_2 - Parkland
- CGL_4 - Recreational
- CVC - Commercial and Institutional
- CVI - Transportation and Utilities
- CVI_1 - Transportation
- CVI_3 - Sewage and Water Treatment
- CVR_1 - Low Density Residential
- CVR_2 - High Density Residential
- CVS_2 - Health
- FODM10-1 - Fresh - Moist Sugar Maple / Beech Carolinian Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- MEGM3 - Dry - Fresh Graminoid Meadow
- MEMM4 - Fresh - Moist Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- TAGM5 - Fencerow

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-3.1

Title
Ecological Land Classification (ELC): Kilworth

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Kilworth, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- **CGL_2** - Parkland
- **CVC_1** - Business Sector
- **CVI_1** - Transportation
- **CVR_2** - High Density Residential
- **FOCM3** - Fresh - Moist Hemlock Coniferous Forest
- **FODM5-3** - Dry – Fresh Sugar Maple – Oak Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **OA** - Open Water
- **SA** - Shallow Water
- **SHT** - Treed Shoreline
- **WOD** - Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-4.1

Title
Ecological Land Classification (ELC): Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- CGL - Green Lands
- CV - Constructed
- CVC - Commercial and Institutional
- CVC_4 - Extraction
- CVI_1 - Transportation
- CVR - Residential
- CVR_1 - Low Density Residential
- CVR_2 - High Density Residential
- CVR_4 - Rural Property
- FODM11 - Naturalized Deciduous Hedge-row
- FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- MEGM3 - Dry - Fresh Graminoid Meadow
- MEMM3 - Dry - Fresh Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- OAGM4 - Open Pasture
- SA - Shallow Water
- TAGM1 - Coniferous Plantation
- TAGM3 - Deciduous Plantation
- TAGM5 - Fencerow
- THDM4 - Dry - Fresh Deciduous Regeneration Thicket
- THMM1 - Dry - Fresh Mixed Regeneration Thicket
- WOD - Deciduous Woodland
- WODM5-3 - Fresh - Moist Manitoba Maple Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-4.2

Title
Ecological Land Classification (ELC): Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by lisiliang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary

ELC Codes
- **CGL_1** - Golf Course
- **CGL_2** - Parkland
- **CV** - Constructed
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_2** - Light Industry
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **CVS_1** - Education
- **CVS_2** - Health
- **MASM1-1** - Cattail Mineral Shallow Marsh
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **TAGM5** - Fencerow

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

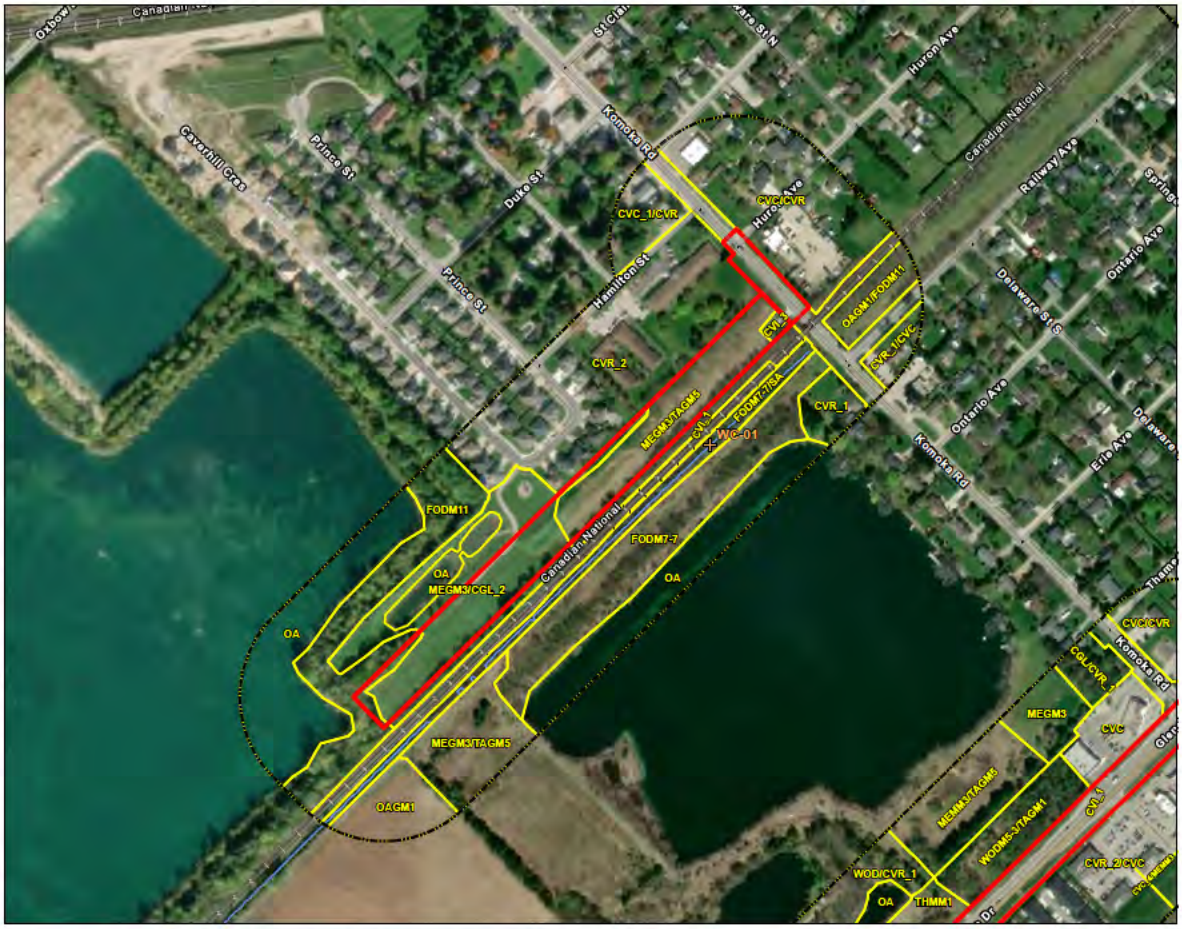


Figure No.
2-4.3

Title
Ecological Land Classification (ELC): Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by lisiang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:4,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- **CGL** - Green Lands
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **THMM1** - Dry - Fresh Mixed Regeneration Thicket
- **WOD** - Deciduous Woodland
- **WODM6-3** - Fresh - Moist Manitoba Maple Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-4.4

Title
Ecological Land Classification (ELC): Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by lisitang on 6/5/2024

N

0 100 Meters
(At original document size of 11x17)
1:3,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary

ELC Codes
- CGL_1 - Golf Course
- CGL_2 - Parkland
- CVC - Commercial and Institutional
- CVI_1 - Transportation
- CVR_1 - Low Density Residential
- CVR_2 - High Density Residential
- CVR_4 - Rural Property
- CVS_1 - Education
- FODM2-4 - Dry – Fresh Oak – Hardwood Deciduous Forest
- MASM1-1 - Cattail Mineral Shallow Marsh
- MEGM3 - Dry - Fresh Graminoid Meadow
- MEMM3 - Dry - Fresh Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- TAGM5 - Fencerow

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

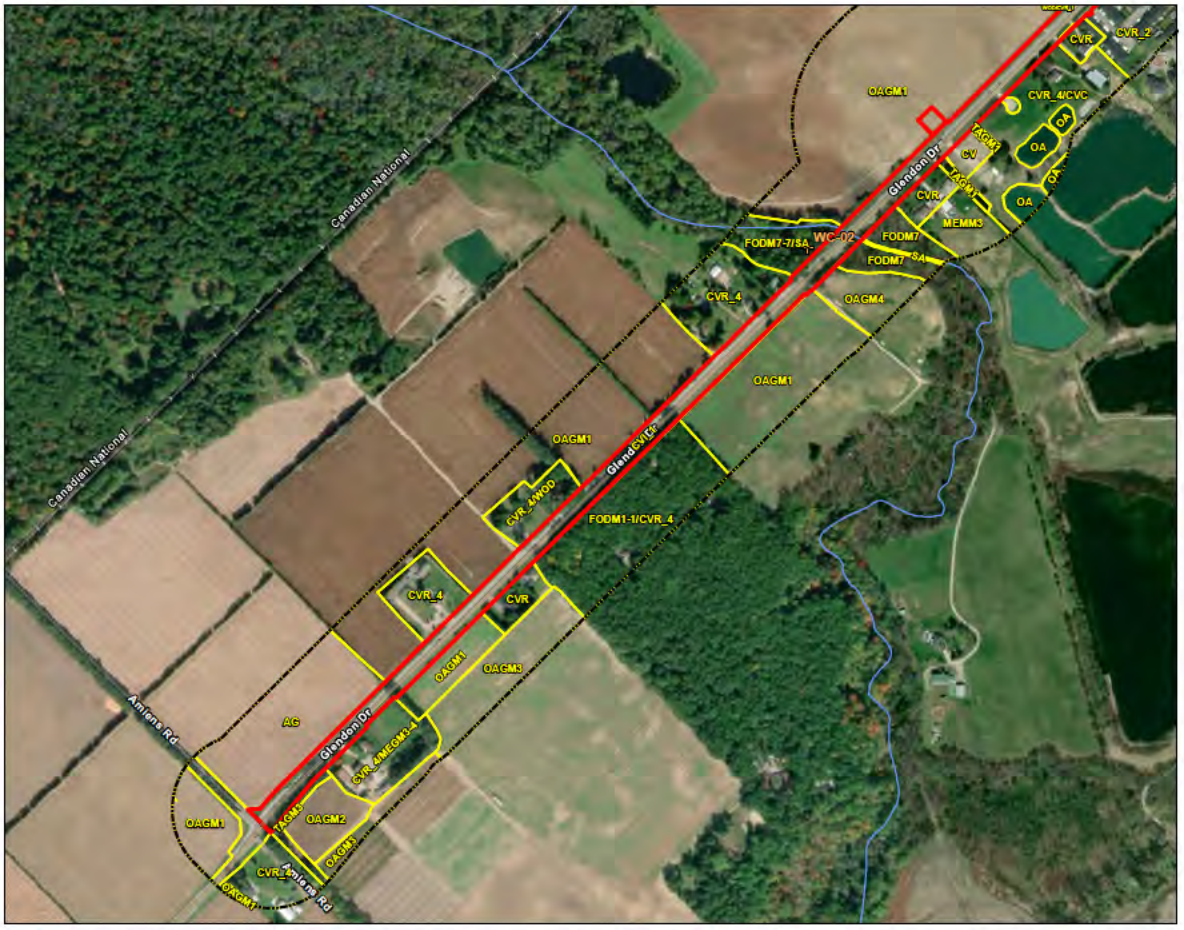


Figure No.
2-4.5

Title
Ecological Land Classification (ELC): Komoka

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Komoka, Ontario

Prepared by ltalbang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CV - Constructed
- CVI_1 - Transportation
- CVR - Residential
- CVR_2 - High Density Residential
- CVR_4 - Rural Property
- FODM1-1 - Dry – Fresh Red Oak Deciduous Forest
- FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- MEMM3 - Dry - Fresh Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops
- OAGM3 - Specialty Crops
- OAGM4 - Open Pasture
- SA - Shallow Water
- TAGM1 - Coniferous Plantation
- TAGM3 - Deciduous Plantation
- WOD - Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

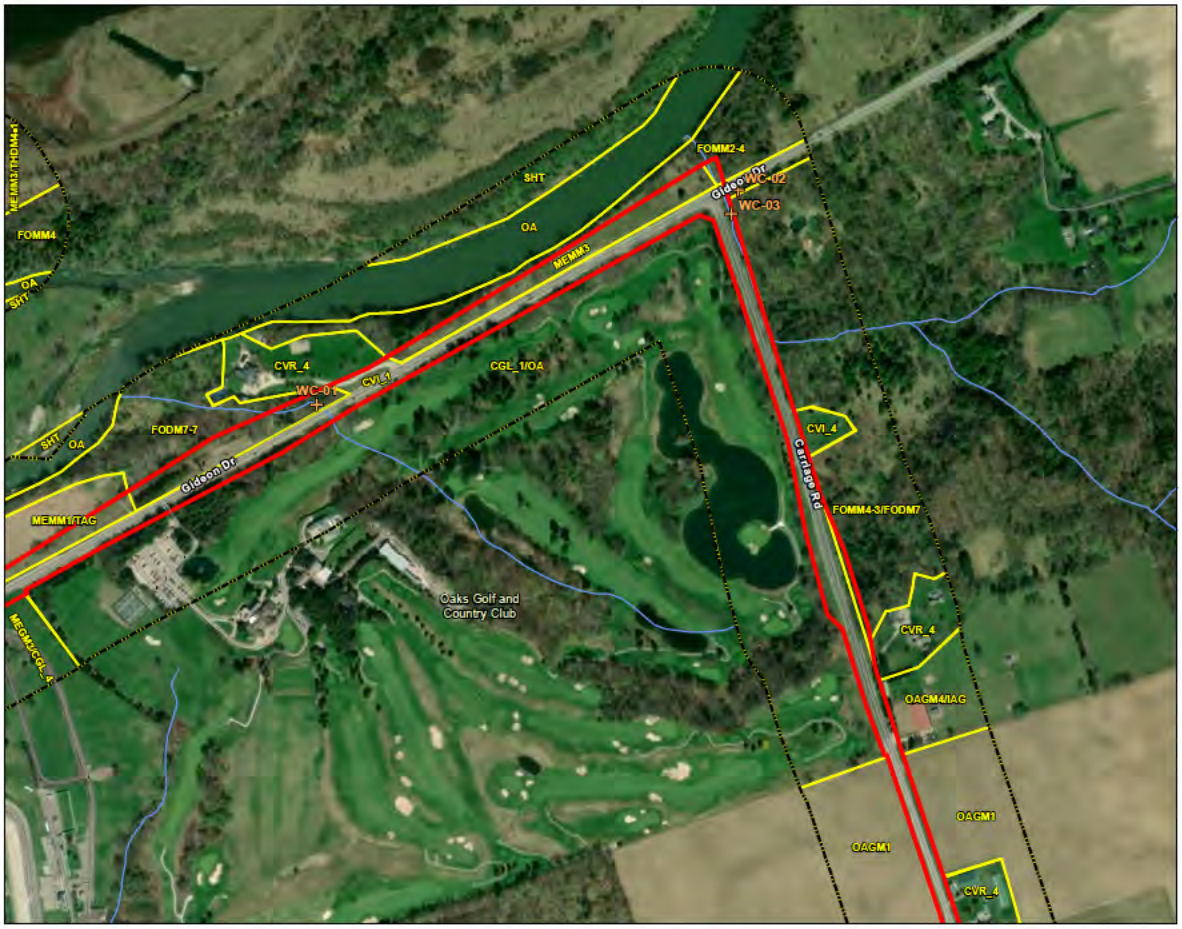


Figure No.

2-5.1

Title

Ecological Land Classification (ELC): Delaware

Client/Project

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Delaware, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters

(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes

- **CGL_1** - Golf Course
- **CVI_1** - Transportation
- **CVI_4** - Power Generation
- **CVR_4** - Rural Property
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FOMM2-4** - Dry-Fresh White Pine - Early Successional Forest
- **FOMM4-3** - Dry - Fresh White Cedar - Hardwood Mixed Forest
- **FOMM4** - Dry – Fresh White Cedar Mixed Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM4** - Open Pasture
- **SHT** - Treed Shoreline

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

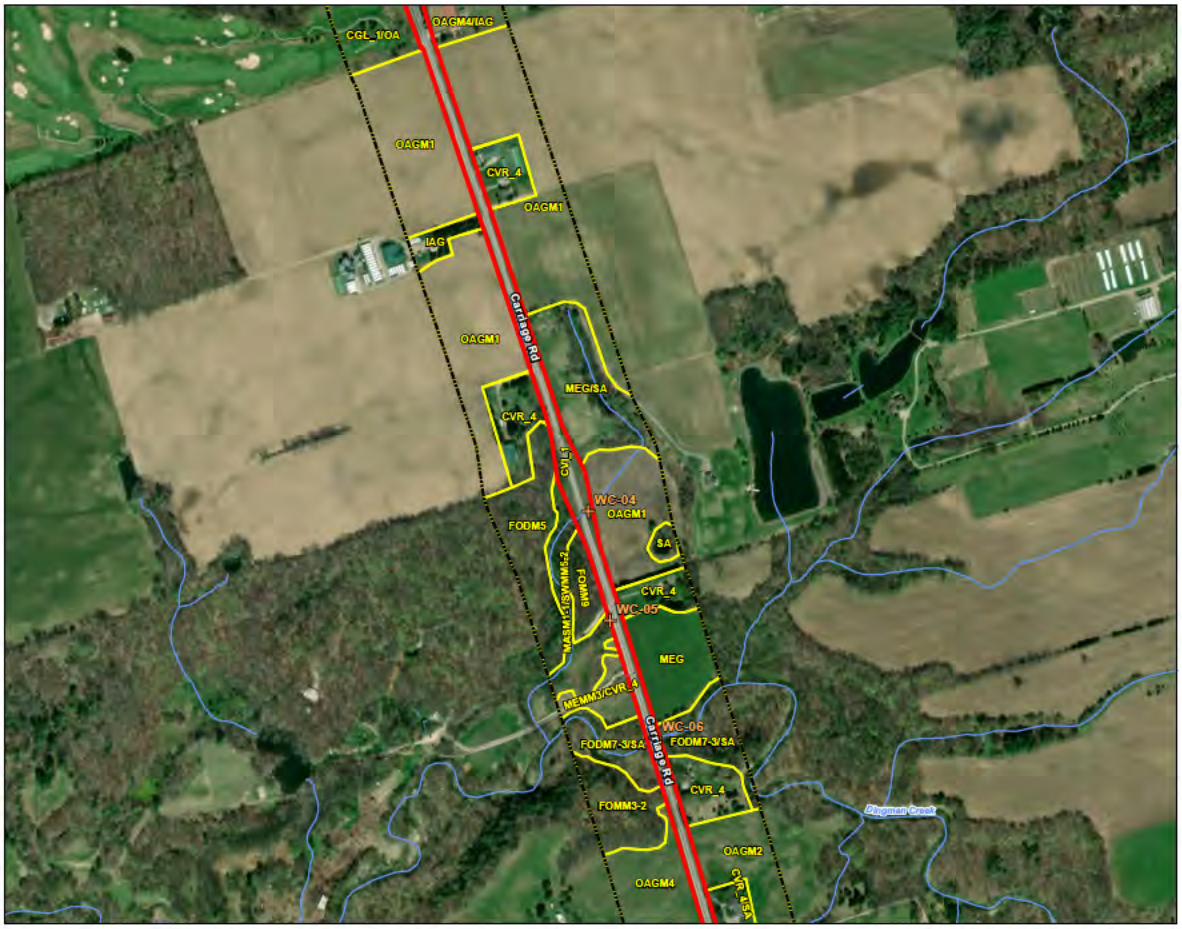


Figure No.
2-5.2

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by lsabang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- **CGL_1** - Golf Course
- **CVI_1** - Transportation
- **CVR_4** - Rural Property
- **FODM5** - Dry – Fresh Sugar Maple Deciduous Forest
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FOMM3-2** - Dry – Fresh Sugar Maple – Hemlock Mixed Forest
- **FOMM9** - Fresh – Moist White Pine – Hardwood Mixed Forest
- **IAG** - Agricultural Infrastructure
- **MASM1-1** - Cattail Mineral Shallow Marsh
- **MEG** - Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-5.3

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by lsidang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CGL_1 - Golf Course
- CV - Constructed
- CVC - Commercial and Institutional
- CVC_1 - Business Sector
- CVC_2 - Light Industry
- CVI_1 - Transportation
- CVI_4 - Power Generation
- CVR - Residential
- CVR_4 - Rural Property
- FODM6 - Fresh – Moist Sugar Maple Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- FODM9-5 - Fresh – Moist Bitternut Hickory Deciduous Forest
- MEGM3 - Dry - Fresh Graminoid Meadow
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-5.4

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by lisiliang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CGL - Green Lands
- CGL_2 - Parkland
- CGL_4 - Recreational
- CVC - Commercial and Institutional
- CVI - Transportation and Utilities
- CVI_1 - Transportation
- CVR - Residential
- CVR_3 - Single Family Residential
- CVR_4 - Rural Property
- CVS_1 - Education
- FOD - Deciduous Forest
- FODM6 - Fresh – Moist Sugar Maple Deciduous Forest
- FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- FODM7 - Fresh – Moist Lowland Deciduous Forest
- MEG - Graminoid Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops
- SHT - Treed Shoreline
- WOD - Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-5.5

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CVC - Commercial and Institutional
- CVI - Transportation and Utilities
- CVI_1 - Transportation
- CVR - Residential
- CVR_2 - High Density Residential
- CVR_4 - Rural Property
- CVS_1 - Education
- FODM7-3 - Fresh – Moist Willow Lowland Deciduous Forest
- FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- MEG - Graminoid Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops
- OAGM4 - Open Pasture
- TAG - Treed Agriculture

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

2-5.6

Title

Ecological Land Classification (ELC): Delaware

Client/Project

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Delaware, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters

(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL_1** - Golf Course
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM4-5** - Dry - Fresh Manitoba Maple Deciduous Forest
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FOMM4** - Dry – Fresh White Cedar Mixed Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **SHT** - Treed Shoreline
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

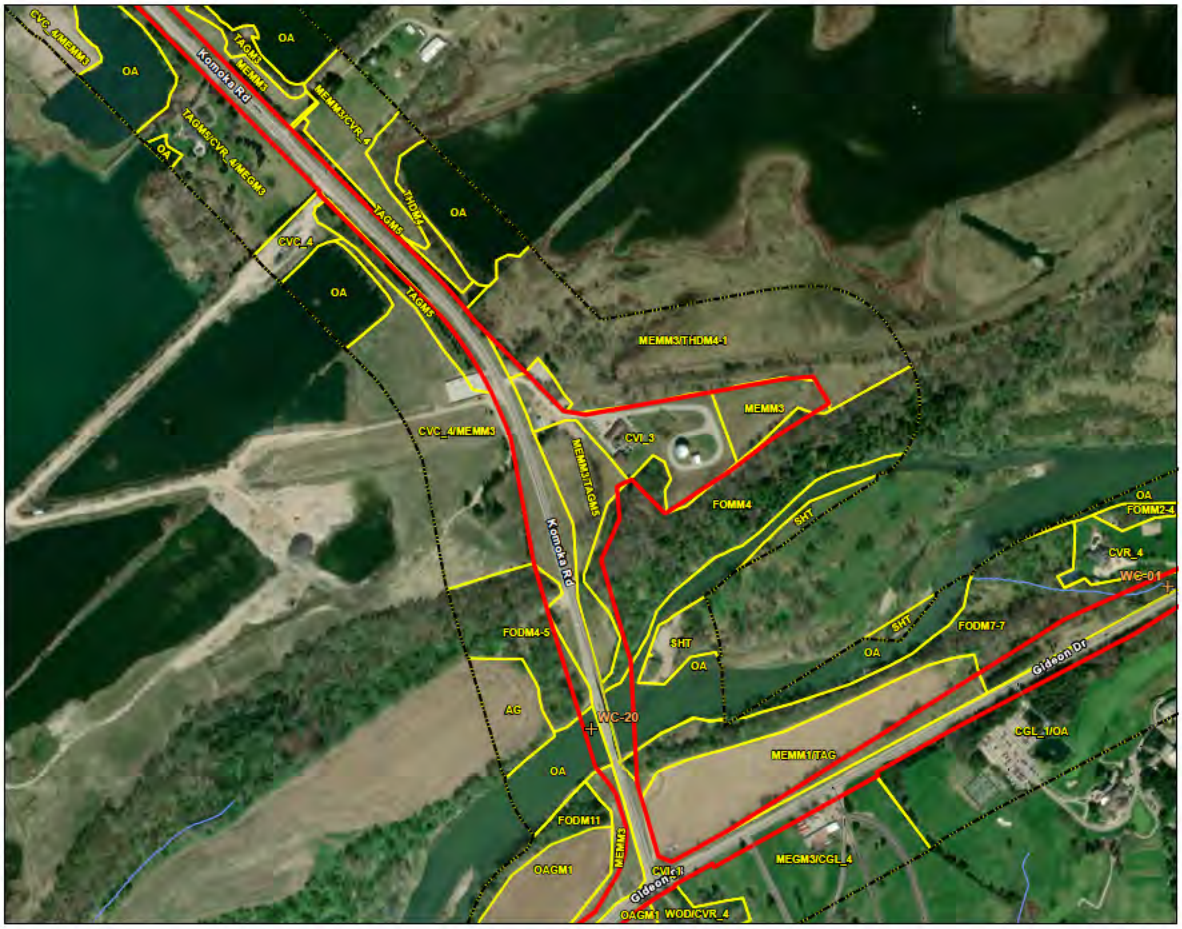


Figure No.
2-5.7

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by lsalang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:5,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CGL_1 - Golf Course
- CVC_4 - Extraction
- CVI_1 - Transportation
- CVI_3 - Sewage and Water Treatment
- CVR_4 - Rural Property
- FODM11 - Naturalized Deciduous Hedge-row
- FODM4-5 - Dry - Fresh Manitoba Maple Deciduous Forest
- FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- FOMM2-4 - Dry-Fresh White Pine - Early Successional Forest
- FOMM4 - Dry – Fresh White Cedar Mixed Forest
- MEGM3 - Dry - Fresh Graminoid Meadow
- MEMM1 - Dry - Fresh Mixed Tallgrass Prairie
- MEMM3 - Dry - Fresh Mixed Meadow
- OA - Open Water
- OAGM1 - Annual Row Crops
- SHT - Treed Shoreline
- TAGM3 - Deciduous Plantation
- TAGM5 - Fencerow
- THDM4 - Dry - Fresh Deciduous Regeneration Thicket
- WOD - Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.
2-5.8

Title
Ecological Land Classification (ELC): Delaware

Client/Project
Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location
Delaware, Ontario

Prepared by ltallang on 6/5/2024

N

0 100 200 Meters
(At original document size of 11x17)
1:6,000

Legend
- Project Area
- Study Area (120m)
- ELC Boundary
- Watercourse
- Aquatic Feature

ELC Codes
- AG - Agriculture
- CGL_1 - Golf Course
- CV - Constructed
- CVC - Commercial and Institutional
- CVC_1 - Business Sector
- CVC_2 - Light Industry
- CVI_1 - Transportation
- CVL_4 - Power Generation
- CVR - Residential
- CVR_4 - Rural Property
- FODM6-5 - Fresh – Moist Sugar Maple – Hardwood Deciduous Forest
- FODM7-3 - Fresh – Moist Willow Lowland Deciduous Forest
- FOMM3-2 - Dry - Fresh Sugar Maple – Hemlock Mixed Forest
- MEGM3 - Dry - Fresh Graminoid Meadow
- OAGM1 - Annual Row Crops
- OAGM2 - Perennial Cover Crops
- OAGM4 - Open Pasture
- SA - Shallow Water

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

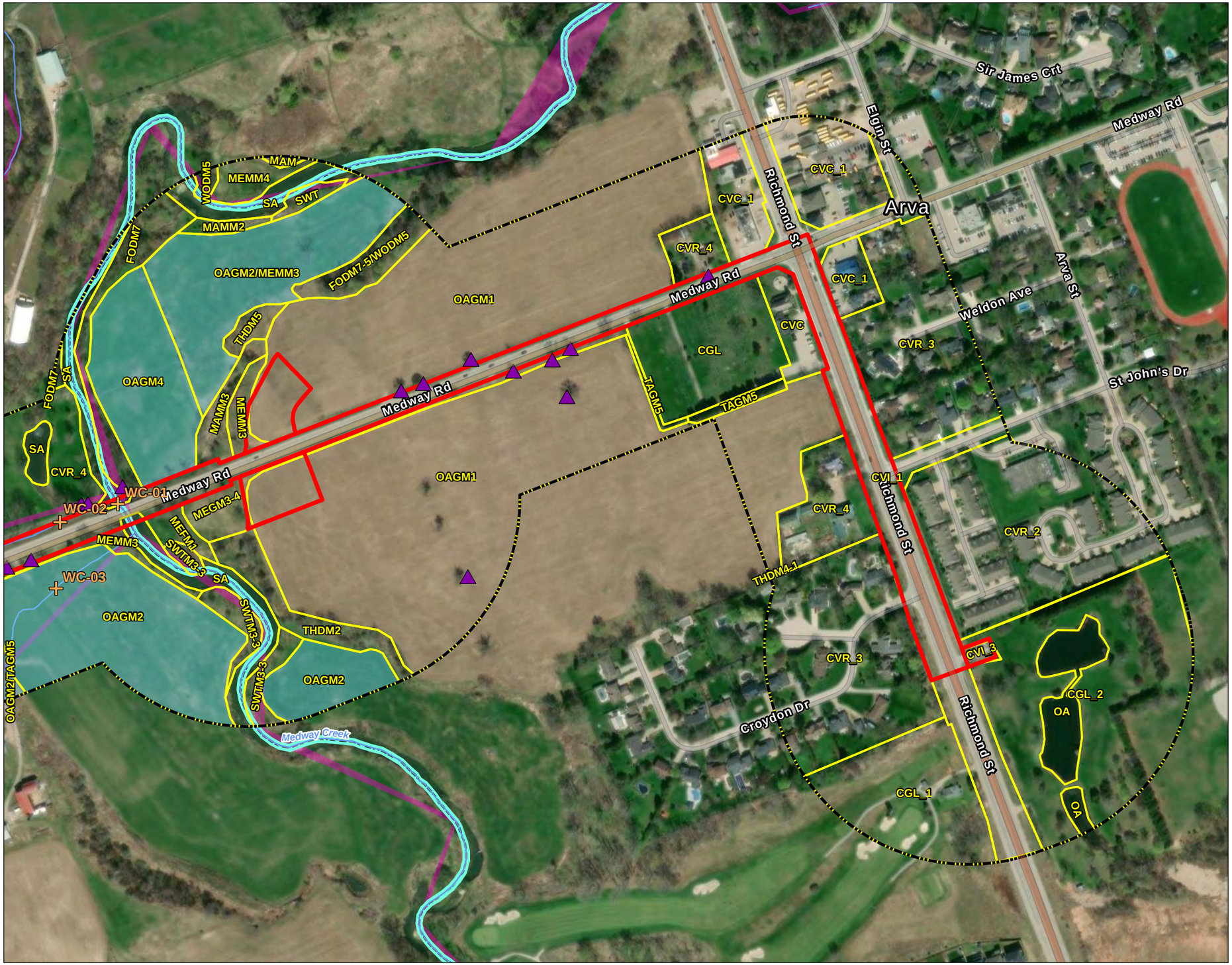


Figure No.

3-1.1

Title

Potential Species at Risk (SAR) Habitat: Arva

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location Prepared by kaitang on 6/5/2024

Arva, Ontario

N

0 100 Meters

(At original document size of 11x17)
1:4,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL** - Green Lands
- **CGL_1** - Golf Course
- **CGL_2** - Parkland
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_2** - High Density Residential
- **CVR_3** - Single Family Residential
- **CVR_4** - Rural Property
- **FODM7-5** - Fresh – Moist Black Maple Lowland Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MAM** - Meadow Marsh
- **MAMM2** - Forb Mineral Meadow Marsh
- **MAMM3** - Mixed Mineral Meadow Marsh
- **MEGM3-4** - Kentucky Blue Gras Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **MEMM4** - Fresh - Moist Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water
- **SWTM3-3** - Slender Willow Mineral Deciduous Thicket Swamp
- **TAGM5** - Fencerow
- **THDM2** - Dry - Fresh Deciduous Shrub Thicket
- **THDM4-1** - Native Deciduous Regeneration Thicket
- **THDM5** - Fresh - Moist Deciduous Thicket
- **WODM5** - Fresh - Moist Deciduous Woodland
- **MEFM1** - Goldenrod Forb Meadow

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

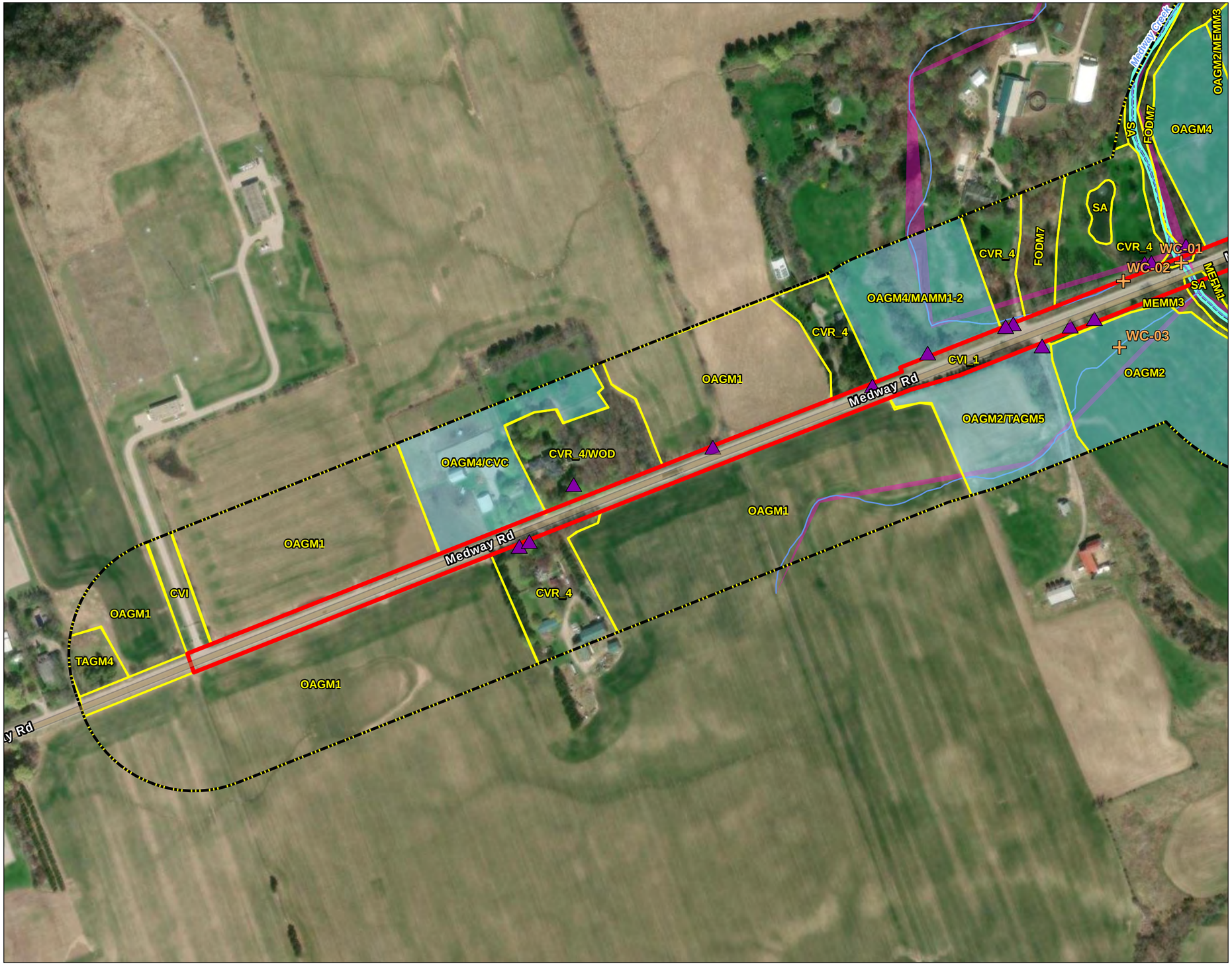


Figure No.

3-1.2

Title

Potential Species at Risk (SAR) Habitat: Arva

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Arva, Ontario

N

0 100 Meters

(At original document size of 11x17)
1:4,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CVI** - Transportation and Utilities
- **CVI_1** - Transportation
- **CVR_4** - Rural Property
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water
- **SWTM3-3** - Slender Willow Mineral Deciduous Thicket Swamp
- **TAGM4** - Treed Pasture
- **MEFM1** - Goldenrod Forb Meadow

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-2.1

Title

Potential Species at Risk (SAR) Habitat: Ilderton

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location Prepared by kaitang on 6/5/2024

Ilderton, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Watercourse
- Butternut Observation
- Potential Black Ash
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL_2** - Parkland
- **CGL_4** - Recreational
- **CVC** - Commercial and Institutional
- **CVI** - Transportation and Utilities
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **CVS_2** - Health
- **FODM10-1** - Fresh - Moist Sugar Maple / Beech Carolinian Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM4** - Fresh - Moist Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **TAGM5** - Fencerow

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

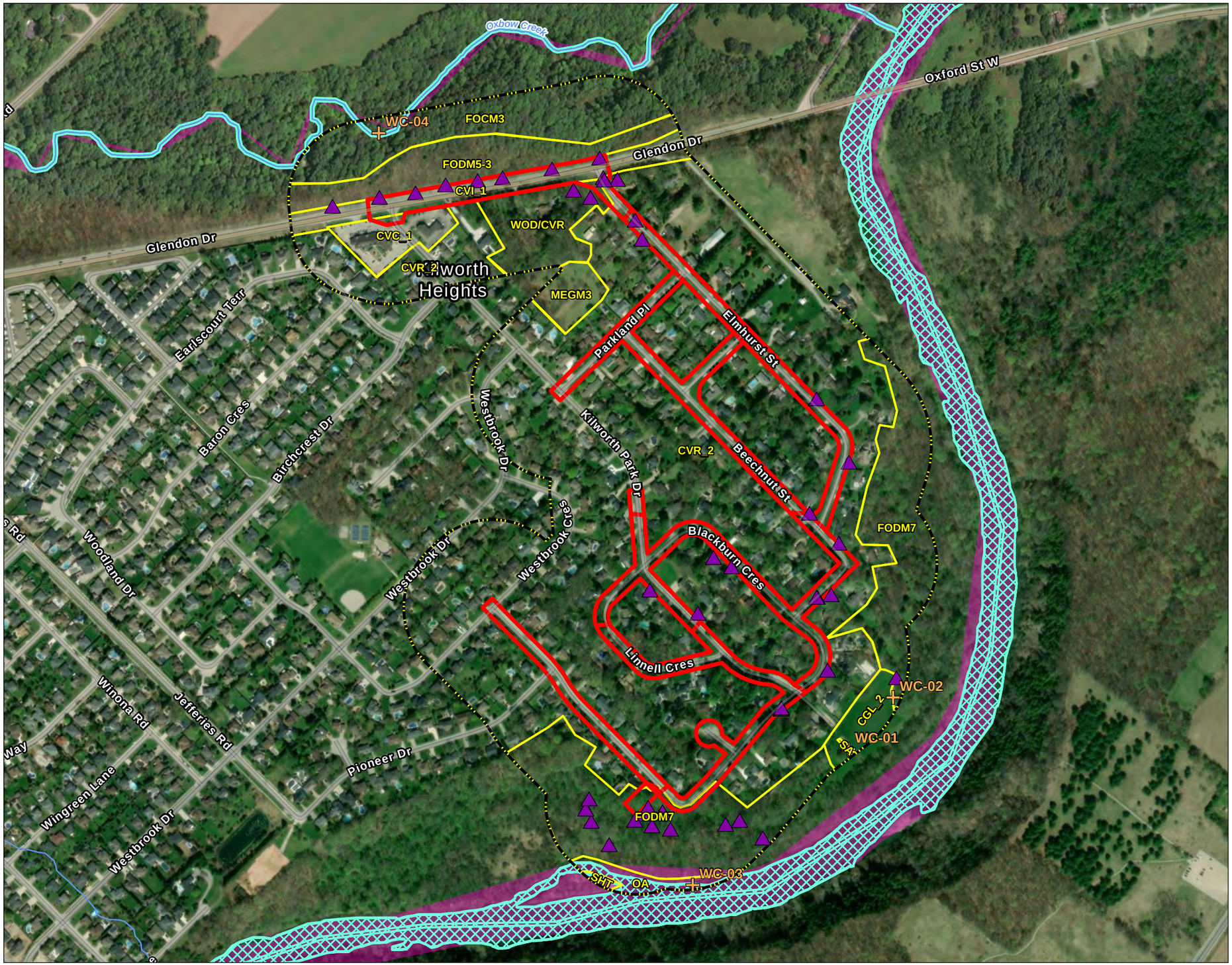


Figure No.

3-3.1

Title

Potential Species at Risk (SAR) Habitat: Kilworth

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location Prepared by kaitang on 6/5/2024

Kilworth, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL_2** - Parkland
- **CVC_1** - Business Sector
- **CVI_1** - Transportation
- **CVR_2** - High Density Residential
- **FOCM3** - Fresh - Moist Hemlock Coniferous Forest
- **FODM5-3** - Dry – Fresh Sugar Maple – Oak Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **OA** - Open Water
- **SA** - Shallow Water
- **SHT** - Treed Shoreline
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-4.1

Title

Potential Species at Risk (SAR) Habitat: Komoka

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location Prepared by kaitang on 6/5/2024

Komoka, Ontario

N

0 100 200 Meters

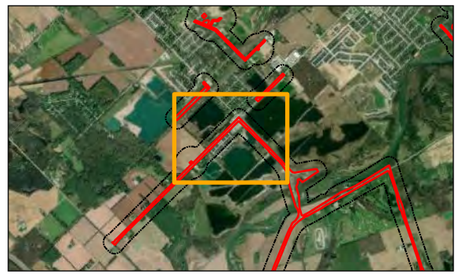
(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL** - Green Lands
- **CV** - Constructed
- **CVC** - Commercial and Institutional
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water
- **TAGM1** - Coniferous Plantation
- **TAGM3** - Deciduous Plantation
- **TAGM5** - Fencerow
- **THDM4** - Dry - Fresh Deciduous Regeneration Thicket
- **THMM1** - Dry - Fresh Mixed Regeneration Thicket
- **WOD** - Deciduous Woodland
- **WODM5-3** - Fresh - Moist Manitoba Maple Deciduous Woodland



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-4.2

Title

Potential Species at Risk (SAR) Habitat: Komoka

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Komoka, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters

(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Potential SAR Bat Roost

ELC Codes

- **CGL_1** - Golf Course
- **CGL_2** - Parkland
- **CV** - Constructed
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_2** - Light Industry
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **CVS_1** - Education
- **CVS_2** - Health
- **MASM1-1** - Cattail Mineral Shallow Marsh
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **TAGM5** - Fencerow

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-4.3

Title

Potential Species at Risk (SAR) Habitat: Komoka

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Komoka, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 Meters

(At original document size of 11x17)
1:4,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL** - Green Lands
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **THMM1** - Dry - Fresh Mixed Regeneration Thicket
- **WOD** - Deciduous Woodland
- **WODM5-3** - Fresh - Moist Manitoba Maple Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-4.4

Title

Potential Species at Risk (SAR) Habitat: Komoka

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Komoka, Ontario

N

0 100 Meters

(At original document size of 11x17)
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Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bat Roost

ELC Codes

- **CGL_1** - Golf Course
- **CGL_2** - Parkland
- **CVC** - Commercial and Institutional
- **CVI_1** - Transportation
- **CVR_1** - Low Density Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **CVS_1** - Education
- **FODM2-4** - Dry – Fresh Oak – Hardwood Deciduous Forest
- **MASM1-1** - Cattail Mineral Shallow Marsh
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **TAGM5** - Fencerow

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-4.5

Title

Potential Species at Risk (SAR) Habitat: Komoka

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Komoka, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CV** - Constructed
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **FODM1-1** - Dry – Fresh Red Oak Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM3** - Specialty Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water
- **TAGM1** - Coniferous Plantation
- **TAGM3** - Deciduous Plantation
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-5.1

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
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Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

CGL_1 - Golf Course
CVI_1 - Transportation
CVI_4 - Power Generation
CVR_4 - Rural Property
FODM7-7 - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
FOMM2-4 - Dry-Fresh White Pine - Early Successional Forest
FOMM4-3 - Dry - Fresh White Cedar - Hardwood Mixed Forest
FOMM4 - Dry – Fresh White Cedar Mixed Forest
MEGM3 - Dry - Fresh Graminoid Meadow
MEMM1 - Dry - Fresh Mixed Tallgrass Prairie
MEMM3 - Dry - Fresh Mixed Meadow
OA - Open Water
OAGM1 - Annual Row Crops
OAGM4 - Open Pasture
SHT - Treed Shoreline

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

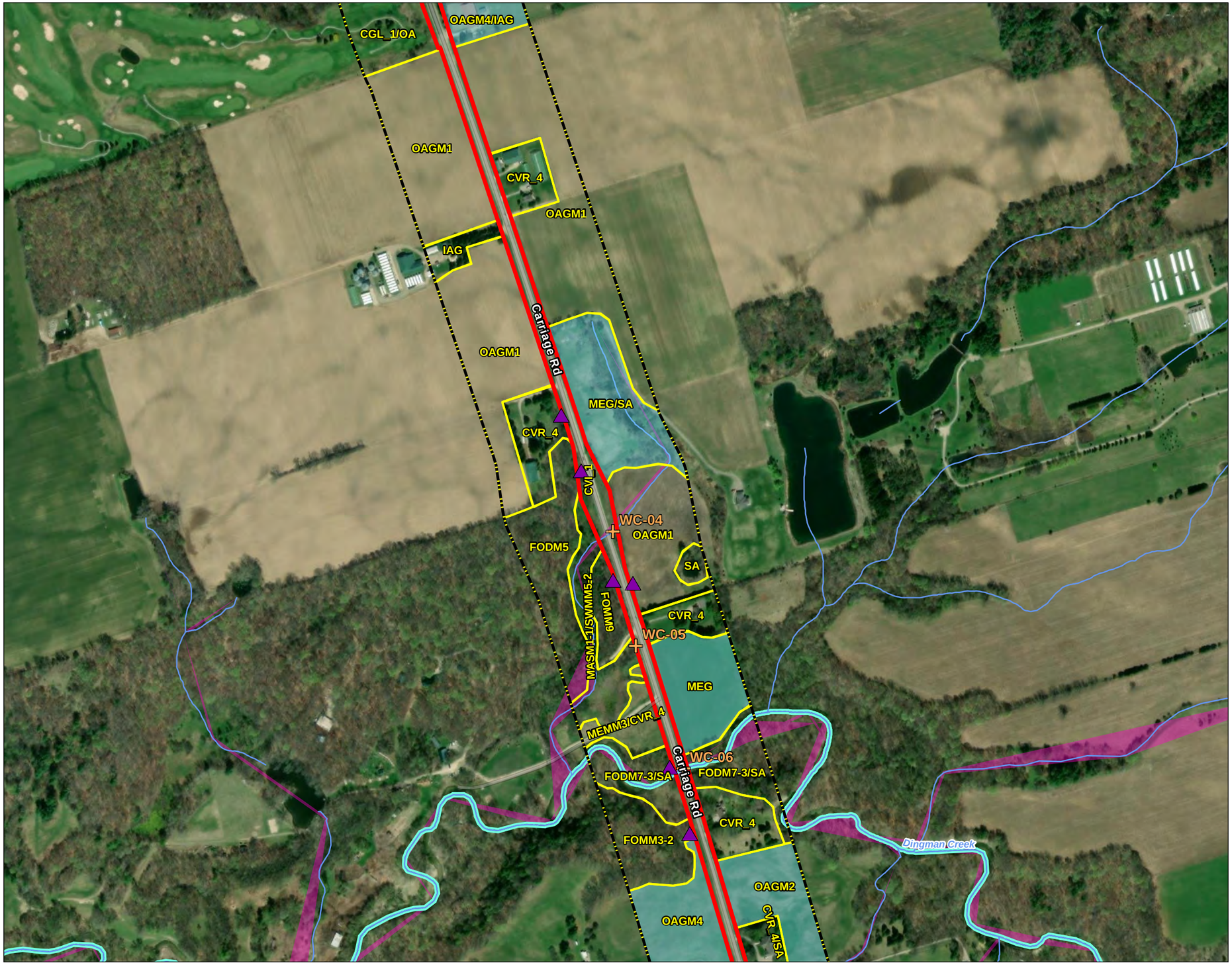


Figure No.

3-5.2

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

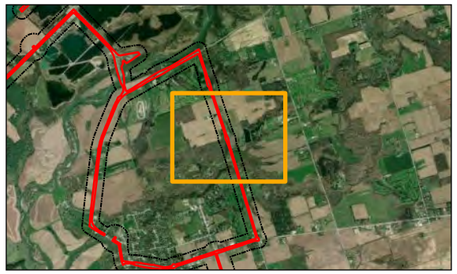
(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **CGL_1** - Golf Course
- **CVI_1** - Transportation
- **CVR_4** - Rural Property
- **FODM5** - Dry – Fresh Sugar Maple Deciduous Forest
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FOMM3-2** - Dry – Fresh Sugar Maple – Hemlock Mixed Forest
- **FOMM9** - Fresh – Moist White Pine – Hardwood Mixed Forest
- **IAG** - Agricultural Infrastructure
- **MASM1-1** - Cattail Mineral Shallow Marsh
- **MEG** - Graminoid Meadow
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-5.3

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Delaware, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters

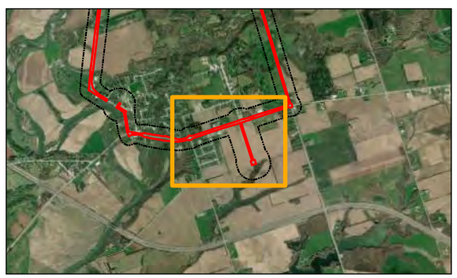
(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL_1** - Golf Course
- **CV** - Constructed
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_2** - Light Industry
- **CVI_1** - Transportation
- **CVI_4** - Power Generation
- **CVR** - Residential
- **CVR_4** - Rural Property
- **FODM6** - Fresh – Moist Sugar Maple Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **FODM9-5** - Fresh – Moist Bitternut Hickory Deciduous Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops



Notes

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2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-5.4

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL** - Green Lands
- **CGL_2** - Parkland
- **CGL_4** - Recreational
- **CVC** - Commercial and Institutional
- **CVI** - Transportation and Utilities
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_3** - Single Family Residential
- **CVR_4** - Rural Property
- **CVS_1** - Education
- **FOD** - Deciduous Forest
- **FODM6** - Fresh – Moist Sugar Maple Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FODM7** - Fresh – Moist Lowland Deciduous Forest
- **MEG** - Graminoid Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **SHT** - Treed Shoreline
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-5.5

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project 165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Delaware, Ontario

Prepared by kaitang on 6/5/2024

N

0 100 200 Meters

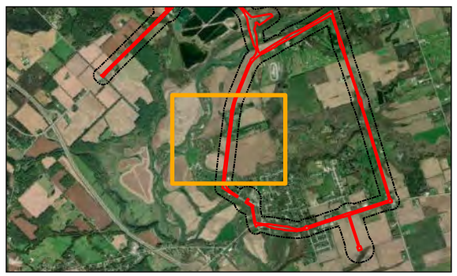
(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CVC** - Commercial and Institutional
- **CVI** - Transportation and Utilities
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **CVS_1** - Education
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **MEG** - Graminoid Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **TAG** - Treed Agriculture



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Figure No.

3-5.6

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL_1** - Golf Course
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVR** - Residential
- **CVR_2** - High Density Residential
- **CVR_4** - Rural Property
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM4-5** - Dry - Fresh Manitoba Maple Deciduous Forest
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FOMM4** - Dry – Fresh White Cedar Mixed Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **SHT** - Treed Shoreline
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

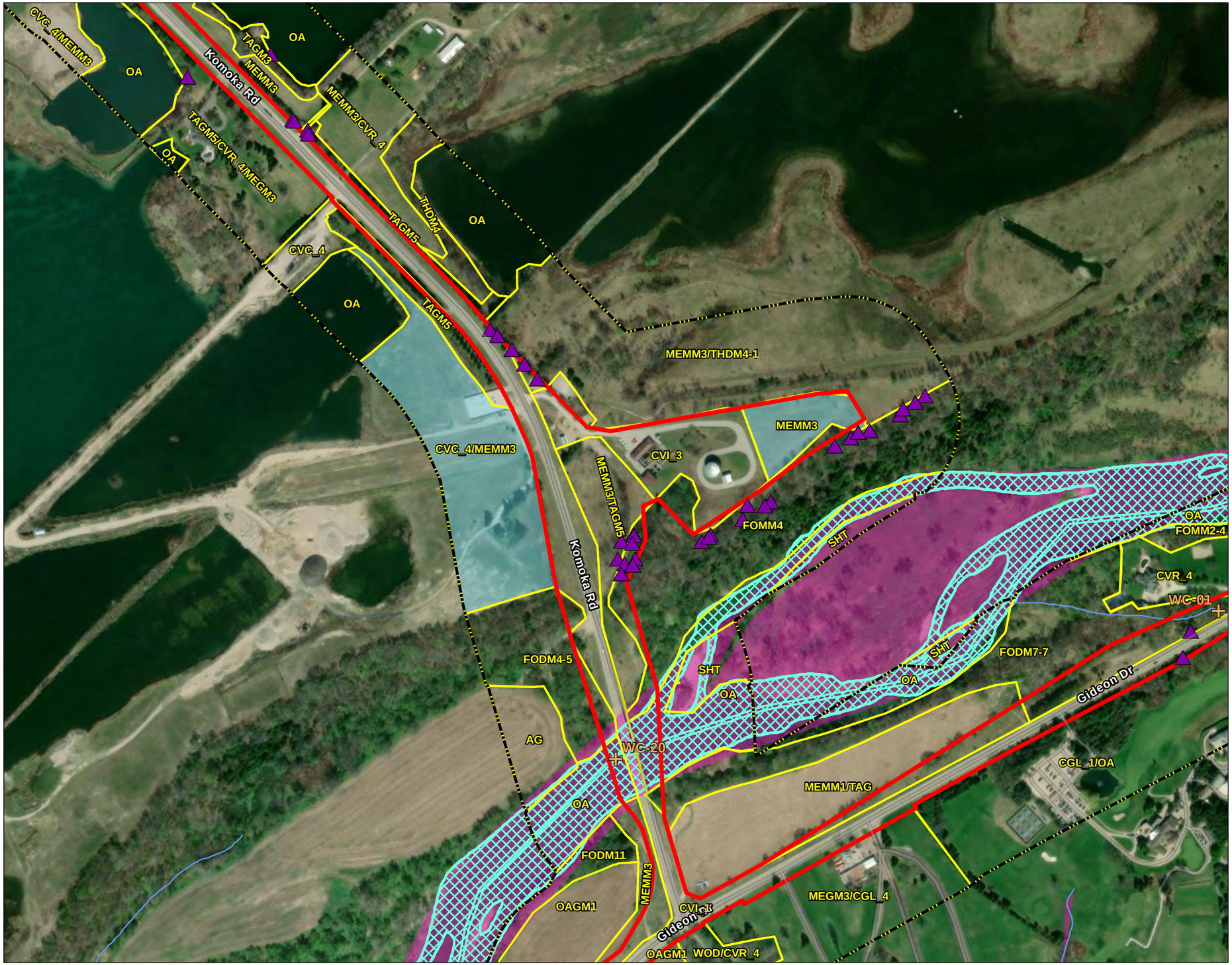


Figure No.

3-5.7

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

(At original document size of 11x17)
1:5,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL_1** - Golf Course
- **CVC_4** - Extraction
- **CVI_1** - Transportation
- **CVI_3** - Sewage and Water Treatment
- **CVR_4** - Rural Property
- **FODM11** - Naturalized Deciduous Hedge-row
- **FODM4-5** - Dry - Fresh Manitoba Maple Deciduous Forest
- **FODM7-7** - Fresh - Moist Manitoba Maple Lowland Deciduous Forest
- **FOMM2-4** - Dry-Fresh White Pine - Early Successional Forest
- **FOMM4** - Dry – Fresh White Cedar Mixed Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **MEMM1** - Dry - Fresh Mixed Tallgrass Prairie
- **MEMM3** - Dry - Fresh Mixed Meadow
- **OA** - Open Water
- **OAGM1** - Annual Row Crops
- **SHT** - Treed Shoreline
- **TAGM3** - Deciduous Plantation
- **TAGM5** - Fencerow
- **THDM4** - Dry - Fresh Deciduous Regeneration Thicket
- **WOD** - Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

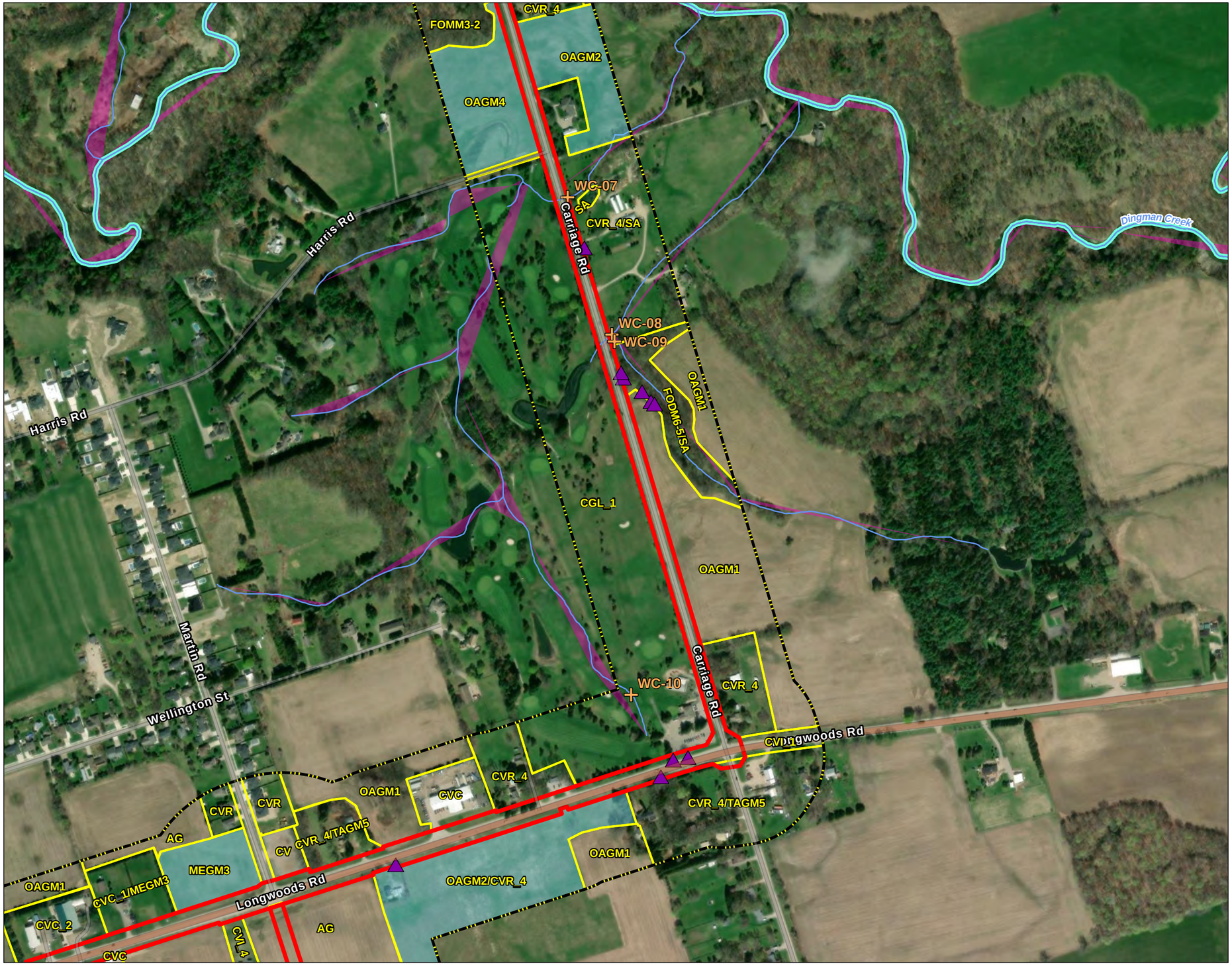


Figure No.

3-5.8

Title

Potential Species at Risk (SAR) Habitat: Delaware

Client/Project

165630236

Municipality Of Middlesex Centre
Middlesex Centre Master Servicing Plan

Project Location

Prepared by kaitang on 6/5/2024

Delaware, Ontario

N

0 100 200 Meters

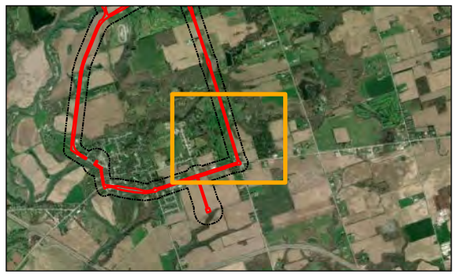
(At original document size of 11x17)
1:6,000

Legend

- Project Area
- Study Area (120m)
- ELC Boundary
- Potential SAR Bird Habitat
- Aquatic SAR Critical Habitat (DFO 2024)
- Aquatic SAR Habitat (DFO 2024)
- Watercourse
- Potential SAR Bat Roost
- Aquatic Feature

ELC Codes

- **AG** - Agriculture
- **CGL_1** - Golf Course
- **CV** - Constructed
- **CVC** - Commercial and Institutional
- **CVC_1** - Business Sector
- **CVC_2** - Light Industry
- **CVI_1** - Transportation
- **CVI_4** - Power Generation
- **CVR** - Residential
- **CVR_4** - Rural Property
- **FODM6-5** - Fresh – Moist Sugar Maple – Hardwood Deciduous Forest
- **FODM7-3** - Fresh – Moist Willow Lowland Deciduous Forest
- **FOMM3-2** - Dry – Fresh Sugar Maple – Hemlock Mixed Forest
- **MEGM3** - Dry - Fresh Graminoid Meadow
- **OAGM1** - Annual Row Crops
- **OAGM2** - Perennial Cover Crops
- **OAGM4** - Open Pasture
- **SA** - Shallow Water



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Earthstar Geographics, Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, NRCan, Parks Canada, Maxar

Stantec

Appendix B Desktop Background Review

Appendix B.1 Species of Conservation Concern

Appendix B1-A: Species of Conservation Concern Identified in the Desktop Review as Potentially Present in the Arva Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	S4	SC	N/A	NAR
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC
Tufted Titmouse	*Baeolophus bicolor*	S3	N/A	N/A	N/A
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
Bryophytes					
American Tree Moss	*Climacium americanum*	S3	N/A	N/A	N/A
Fishes					
Greater Redhorse	*Moxostoma valenciennesi*	S3	N/A	N/A	N/A
Northern Sunfish	*Lepomis peltastes*	S3	SC	SC	SC
Insects					
a longhorned beetle	*Dorcaschema alternatum*	SH	N/A	N/A	N/A
Brown Scoopwing Moth	*Calledapteryx dryopterata*	S3S4	N/A	N/A	N/A
Differential Grasshopper	*Melanoplus differentialis*	S3	N/A	N/A	N/A
Glorious Habrosyne Moth	*Habrosyne gloriosa*	S3S4	N/A	N/A	N/A
Judith´s Underwing Moth	*Catocala judith*	S2S3	N/A	N/A	N/A
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END
Northern Bush Katydid	*Scudderia septentrionalis*	S3?	N/A	N/A	N/A
Pale-veined Isturgia Moth	*Isturgia dislocaria*	S3	N/A	N/A	N/A
Unicorn Clubtail	*Arigomphus villosipes*	S3	N/A	N/A	N/A
Mammals					
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END
Reptiles					
Midland Painted Turtle	*Chrysemys picta marginata*	S4	N/A	SC	SC
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	SC
Plants					
Rigid Sedge	*Carex tetanica*	S3?	N/A	N/A	N/A
Striped Cream Violet	*Viola striata*	S3	N/A	N/A	N/A

Appendix B1-B: Species of Conservation Concern Identified in the Desktop Review as Potentially Present in the Ilderton Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not listed	SC
Tufted Titmouse	*Baeolophus bicolor*	S3	Not listed	Not listed	Not listed
Fishes					
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes pop. 2*	S3	SC	SC	SC
Insects					
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END
Mammals					
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END
Reptiles					
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not listed	SC

Appendix B1-C: Species of Conservation Concern Identified in the Desktop Review as Potentially Present in the Kilworth Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed
Common Gallinule	*Gallinula galeata*	S3B	Not Listed	Not Listed	Not Listed
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC
Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed
Upland Sandpiper	*Bartramia longicauda*	S2B	Not Listed	Not Listed	Not Listed
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
Fishes					
Northern Brook Lamprey	*Ichthyomyzon fossor*	S3	SC	Not Listed	SC
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes pop. 2*	S3	SC	SC	SC
River Redhorse	*Moxostoma carinatum*	S2	SC	SC	SC
Silver Lamprey (Great Lakes - Upper St. Lawrence populations)	*Ichthyomyzon unicuspis pop. 1*	S3	SC	SC	SC
Spotted Sucker	*Minytrema melanops*	S2	SC	SC	SC
Insects					
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed
Mammals					
Woodland Vole	*Microtus pinetorum*	S3?	SC	SC	SC
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END
Molluscs					
Elktoe	*Alasmidonta marginata*	S3	Not Listed	Not Listed	Not Listed
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC
Rainbow Mussel	*Cambarunio iris*	S1	SC	SC	SC
Reptiles					
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC
Plants					
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed
Cleland's Evening-primrose	*Oenothera clelandii*	S1	Not Listed	Not Listed	END
Commons' Panicgrass	*Dichanthelium commonsianum*	SH	Not Listed	Not Listed	Not Listed
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed
Early-branching Panicgrass	*Dichanthelium praecocius*	S3	Not Listed	Not Listed	Not Listed
Eastern False Rue-anemone	*Enemion biternatum*	S2	SC	THR	SC
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed
Erect Knotweed	*Polygonum erectum*	SH	Not Listed	Not Listed	Not Listed
False Tomentose Balsam Groundsel	*Packera paupercula var. pseudotomentosa*	S2S3	Not Listed	Not Listed	Not Listed
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC
Grey-headed Prairie Coneflower	*Ratibida pinnata*	S3	Not Listed	Not Listed	Not Listed
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed
Heart-leaved Alexanders	*Zizia aptera*	S1	Not Listed	Not Listed	Not Listed
Hoary Puccoon	*Lithospermum canescens*	S3	Not Listed	Not Listed	Not Listed
Hoary Tick-trefoil	*Desmodium canescens*	S2	Not Listed	Not Listed	Not Listed
Largebract Tick-trefoil	*Desmodium cuspidatum*	S3	Not Listed	Not Listed	Not Listed
Lowland Bladder Fern	*Cystopteris protrusa*	S2S3	Not Listed	Not Listed	Not Listed
Pinedrops	*Pterospora andromedea*	S2	Not Listed	Not Listed	Not Listed
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed
Scarlet Beebalm	*Monarda didyma*	S3	Not Listed	Not Listed	Not Listed
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed
Sharp-fruited Rush	*Juncus acuminatus*	S3	Not Listed	Not Listed	Not Listed
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed
Spotted Beebalm	*Monarda punctata*	S1	Not Listed	Not Listed	Not Listed
Striped Cream Violet	*Viola striata*	S3	Not Listed	Not Listed	Not Listed
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC

Appendix B1-D: Species of Conservation Concern Identified in the Desktop Review as Potentially Present in the Komoka Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status
Birds					
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC
Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed
Upland Sandpiper	*Bartramia longicauda*	S2B	Not Listed	Not Listed	Not Listed
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
Fishes					
American Brook Lamprey	*Lethenteron appendix*	S3	Not Listed	Not Listed	Not Listed
Northern Brook Lamprey	*Ichthyomyzon fossor*	S3	SC	Not Listed	SC
Insects					
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed
Mammals					
Woodland Vole	*Microtus pinetorum*	S3?	SC	SC	SC
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END
Molluscs					
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC
Rainbow Mussel	*Cambarunio iris*	S1	SC	SC	SC
Reptiles					
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC
Plants					
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	SC	THR
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed
Cleland's Evening-primrose	*Oenothera clelandii*	S1	Not Listed	Not Listed	END
Commons' Panicgrass	*Dichanthelium commonsianum*	SH	Not Listed	Not Listed	Not Listed
Creeping Draba	*Tomostima reptans*	S2S3	Not Listed	Not Listed	Not Listed
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed
Early-branching Panicgrass	*Dichanthelium praecocius*	S3	Not Listed	Not Listed	Not Listed
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed
Erect Knotweed	*Polygonum erectum*	SH	Not Listed	Not Listed	Not Listed
False Tomentose Balsam Groundsel	*Packera paupercula var. pseudotomentosa*	S2S3	Not Listed	Not Listed	Not Listed
Golden Puccoon	*Lithospermum caroliniense*	S3	Not Listed	Not Listed	Not Listed
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC
Grey-headed Prairie Coneflower	*Ratibida pinnata*	S3	Not Listed	Not Listed	Not Listed
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed
Heart-leaved Alexanders	*Zizia aptera*	S1	Not Listed	Not Listed	Not Listed
Hoary Puccoon	*Lithospermum canescens*	S3	Not Listed	Not Listed	Not Listed
Hoary Tick-trefoil	*Desmodium canescens*	S2	Not Listed	Not Listed	Not Listed
Illinois Tick-trefoil	*Desmodium illinoense*	S1	EXP	EXP	EXP

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status
Pinedrops	*Pterospora andromedea*	S2	Not Listed	Not Listed	Not Listed
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed
Round-fruited Panicgrass	*Dichanthelium sphaerocarpon*	S3	Not Listed	Not Listed	Not Listed
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed
Scarlet Beebalm	*Monarda didyma*	S3	Not Listed	Not Listed	Not Listed
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed
Sharp-fruited Rush	*Juncus acuminatus*	S3	Not Listed	Not Listed	Not Listed
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed
Spotted Beebalm	*Monarda punctata*	S1	Not Listed	Not Listed	Not Listed
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC

Appendix B1-E: Species of Conservation Concern Identified in the Desktop Review as Potentially Present in the Delaware Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed
Common Gallinule	*Gallinula galeata*	S3B	Not Listed	Not Listed	Not Listed
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
Fishes					
Northern Sunfish	*Lepomis peltastes pop. 2*	S3	SC	SC	SC
River Redhorse	*Moxostoma carinatum*	S2	SC	SC	SC
Silver Lamprey	*Ichthyomyzon unicuspis pop. 1*	S3	SC	SC	SC
Spotted Sucker	*Minytrema melanops*	S2	SC	SC	SC
Insects					
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed
Giant Leopard Moth	*Hypercompe scribonia*	S3S4	Not Listed	Not Listed	Not Listed
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed
Mammals					
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END
Molluscs					
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC
Reptiles					
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC
Plants					
Appendage Waterleaf	*Hydrophyllum appendiculatum*	S2	Not Listed	Not Listed	Not Listed
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed
Broad-leaved Puccoon	*Lithospermum latifolium*	S2S3	Not Listed	Not Listed	Not Listed
Chinese Hemlock-parsley	*Conioselinum chinense*	S2	Not Listed	Not Listed	Not Listed
Crooked-stem Aster	*Symphyotrichum prenanthoides*	S2?	SC	SC	SC
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed
Eastern Burning-bush	*Euonymus atropurpureus*	S3	Not Listed	Not Listed	Not Listed
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed
Largebract Tick-trefoil	*Desmodium cuspidatum*	S3	Not Listed	Not Listed	Not Listed
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed
Schreber's Aster	*Eurybia schreberi*	S2	Not Listed	Not Listed	Not Listed
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	S1	Not Listed	Not Listed	Not Listed

Appendix B.2 Species at Risk

Appendix B2-A: Species at Risk Identified in the Desktop Review as Potentially Present in the Arva Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status
Birds					
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	THR
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
Fishes					
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR
Mammals					
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END
Molluscs					
Wavy-rayed Lampmussel	*Lampsilis fasciola*	S2	THR	SC	SC
Reptiles					
Spiny Softshell	*Apalone spinifera*	S2	END	END	END
Plants					
Butternut	*Juglans cinerea*	S2?	END	END	END
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR

Appendix B2-B: Species at Risk Identified in the Desktop Review as Potentially Present in the Ilderton Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	SC	SC
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
Bryophytes					
Spoon-leaved Moss	*Bryoandersonia illecebra*	S2	THR	THR	THR
Fishes					
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Mammals					
Eastern Small-footed Myot	*Myotis leibii*	S2S3	END	Not Listed	Not Listed
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END
Plants					
Butternut	*Juglans cinerea*	S2?	END	END	END

Appendix B2-C: Species at Risk Identified in the Desktop Review as Potentially Present in the Kilworth Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC
Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR
Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	THR	SC
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR
Louisiana Waterthrush	*Parkesia motacilla*	S2B	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
Fishes					
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Eastern Sand Darter - Southwestern Ontario population	*Ammocrypta pellucida*	S2	THR	THR	THR
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR
Northern Madtom	*Noturus stigmosus*	S1	END	END	END
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR
Silver Chub	*Macrhybopsis storeriana*	S2	THR	SC	END
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR
Mammals					
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END
Molluscs					
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR
Reptiles					
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR
Queensnake	*Regina septemvittata*	S2	END	END	END
Spiny Softshell	*Apalone spinifera*	S2	END	END	END
Plants					
Black Ash	*Fraxinus nigra*	S4	END	Not Listed	THR
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	SC	THR
Butternut	*Juglans cinerea*	S2?	END	END	END
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END
Hairy Valerian	*Valeriana edulis ssp. ciliata*	S1	THR	END	END
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR
Smooth Yellow False Foxglove	*Aureolaria flava*	S2?	THR	THR	THR

Appendix B2-D: Species ar Risk Identified in the Desktop Review as Potentially Present in the Komoka Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status
Birds					
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC
Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR
Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	THR	SC
Henslow's Sparrow	*Centronyx henslowii*	S1B	END	END	END
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR
Louisiana Waterthrush	*Parkesia motacilla*	S2B	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
Yellow-breasted Chat	*Icteria virens*	S1B	END	Not Listed	END
Fishes					
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Eastern Sand Darter - Southwestern Ontario population	*Ammocrypta pellucida*	S2	THR	THR	THR
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR
Mammals					
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END
Molluscs					
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR
Reptiles					
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	Not Listed	END
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR
Queensnake	*Regina septemvittata*	S2	END	END	END
Spiny Softshell	*Apalone spinifera*	S2	END	END	END
Plants					
Black Ash	*Fraxinus nigra*	S4	END	Not Listed	THR
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	SC	THR
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END
Hairy Valerian	*Valeriana edulis ssp. ciliata*	S1	THR	END	END
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR

Appendix B2-E: Species at Risk Identified in the Desktop Review as Potentially Present in the Delaware Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status
Birds					
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
Fishes					
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Eastern Sand Darter	*Ammocrypta pellucida*	S2	THR	THR	THR
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR
Northern Madtom	*Noturus stigmosus*	S1	END	END	END
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR
Silver Chub	*Macrhybopsis storeriana*	S2	THR	SC	END
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR
Mammals					
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END
Molluscs					
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR
Reptiles					
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	END	END
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR
Queensnake	*Regina septemvittata*	S2	END	END	END
Spiny Softshell	*Apalone spinifera*	S2	END	END	END
Plants					
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	THR	THR
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END
Red Mulberry	*Morus rubra*	S2	END	END	END

Appendix C Significant Wildlife Habitat Assessment

Appendix C.1 Significant Wildlife Habitat Assessment

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water or utilized by tundra swans during spring (mid-March to May), or annual spring melt water flooding found in any of the following Community Types: Meadow (CUM1), Thicket (CUT1). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless used by Tundra swans in the Long Point, Rondeau, Lake St. Clair, Grand Bend and Point Pelee Areas.	ELC assessment was used to assess features within the Study Area that may support waterfowl stopover and staging areas (terrestrial).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. The combined area of the ELC ecosites and a 100 m radius area is the SWH. Sewage treatment ponds and storm water ponds do not qualify as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify.	ELC assessment was used to assess features within the Study Area that may support waterfowl stopover and staging areas (aquatic).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: Candidate habitat **Delaware**: Candidate habitat
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of amour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), Beach/Bar (BB), or Sand Dune (SD).	ELC assessment was used to assess features within the Study Area that may support migratory shorebirds.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (CUM), Thicket (CUT), Savannah (CUS), Woodland (CUW) (<60% cover) that are >20 ha and provide roosting, foraging and resting habitats for wintering raptors. Upland habitat (CUM, CUT, CUS, CUW), must represent at least 15 ha of the 20 ha minimum size.	ELC assessment was used to assess features within the Study Area that may support wintering raptors.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC assessment was used to assess features within the Study Area that may support bat hibernacula.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Either of the following Community Types: Deciduous Forest (FOD) or Mixed Forest (FOM), that have>10/ha wildlife trees >25 cm diameter at breast height (dbh). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. Northern Myotis prefer contiguous tracts of older forest cover for foraging and roosting in snags and trees. 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.	ELC assessment was used to assess features within the Study Area that may support bat maternity colonies.	**Arva**: Candidate habitat **Ilderton**: Candidate habitat **Kilworth**: Candidate habitat **Komoka**: Candidate habitat **Delaware**: Candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Turtle Wintering Areas	Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO). Northern Map turtle- open water areas such as deeper rivers or streams and lakes can also be used as over-wintering habitat. Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen.	ELC assessment was used to assess features within the Study Area that may support areas of permanent standing water but not deep enough to freeze.	**Arva**: Candidate habitat **Ilderton**: Candidate habitat **Kilworth**: Candidate habitat **Komoka**: Candidate habitat **Delaware**: Candidate habitat
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys and wildlife assessments were used to assess features within the Study Area that may support snake hibernacula.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (CUM), Thicket (CUT), Bluff (BL), Cliff (CL). Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil, or aggregate stockpiles.	ELC assessment was used to assess features within the Study Area that may support colonial bird breeding habitat.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: Candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	Does not include a licensed/permitted Mineral Aggregate Operation.		
Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM), Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	ELC assessment was used to assess features within the Study Area that may support colonial bird breeding habitat (Trees/Shrubs).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: Confirmed
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM), Thicket (CUT), Savannah (CUS).	ELC assessment was used to assess features within the Study Area that may support colonial bird breeding habitat (Ground).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Erie or Ontario. A combination of ELC communities, one from each land class is required: Field (CUM, CUT, CUS) and Forest (FOC, FOM, FOD, CUP). Minimum of 10 ha in size with a combination of field and forest habitat present.	ELC assessment was used to assess features within the Study Area that may support migratory butterfly stopover areas.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD). Woodlots must be >5 ha in size and within 5 km of Lake Ontario or Lake Erie – woodlands within 2 km of Lake Ontario and Lake Erie are more significant.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support landbird migratory stopover areas.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Deer Winter Congregation Areas	Woodlots typically > 100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50 ha.) All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD. Conifer plantations much smaller than 50 ha may also be used.	No studies required as the MNR determines this habitat.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Rare Vegetation Communities			
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT. Most cliff and talus slopes occur along the Niagara Escarpment.	ELC assessment was used to assess features within the Study Area that would be considered cliffs or talus slopes.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC assessment was used to assess features within the Study Area that would be considered to be sand barrens.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Alvars	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. Any of the following Community Types: ALO1(Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland). An Alvar site > 0.5 ha in size.	ELC assessment was used to assess features within the Study Area that would be considered to be alvar communities.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. No minimum size criteria t in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest). Forests greater than 120 years old and with no historical forestry management was the main criteria when surveying for old-growth forests.	ELC assessment was used to assess features within the Study Area that would be considered to be old-growth forest communities.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In Ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC assessment was used to assess features within the Study Area that would be considered to be savannah communities.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Tall-grass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In Ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite) [includes MEMM1 and MEMM2 in the 2008 ELC catalogue].	ELC assessment was used to assess features within the Study Area that would be considered to be tall-grass communities.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: Candidate **Delaware**: Candidate –
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG.	ELC assessment was used to assess features within the Study Area that would be considered to be other rare vegetation communities.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: Candidate habitat
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4. Note: includes adjacency to Provincially Significant Wetlands.	ELC assessment was used to assess features within the Study Area that may support nesting waterfowl. Habitats adjacent to wetlands without standing water were not considered candidate SWH.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands.	ELC surveys and Woodland Assessments were used to assess features within the Study Area that may support nesting, foraging, and perching habitat for large raptors.	**Arva**: Candidate habitat a **Ilderton**: No candidate habitat **Kilworth**: Candidate habitat r **Komoka**: Candidate habitat **Delaware**: Candidate habitat
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	ELC surveys, Woodland Assessments and GIS analysis were used to assess features within the Study Area that may support nesting habitat for woodland raptors.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, BOO1, FEO1 Best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support turtle nesting areas.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: Candidate habitat **Komoka**: No candidate habitat **Delaware**: Candidate habitat
Seeps and Springs	Seeps/Springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system	ELC surveys and GIS analysis were used to assess features within the Study Area that may support Seeps and Springs.	**Arva**: No candidate habitat **Ilderton**: Candidate habitat **Kilworth**: No candidate habitat **Komoka**: **Delaware**: Candidate habitat
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat	ELC assessment was used to assess features within the Study Area that may support woodland breeding amphibians.	**Arva**: Candidate habitat **Ilderton**: Candidate habitat **Kilworth**: Candidate habitat **Komoka**: Candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
			Delaware:
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m^2 (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of 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.	ELC assessment was used to identify wetland habitat features within the Study Area including those that may support bullfrogs (i.e., natural open aquatic and marsh habitats greater than 1 ha in size).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: Candidate habitat **Delaware**: Candidate habitat
Habitat for Species of Conservation Concern (*Not including Endangered or Threatened Species*)			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM) Community Types.	ELC assessment was used to identify marshes with shallow water and emergent vegetation that may support marsh breeding birds.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: Candidate habitat **Delaware**: Candidate habitat

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Woodland Area-sensitive Bird Breeding Habitat	Habitats >30ha where interior forest is present (at least 200 m from the forest edge); typically, >60 years old. These include any of the following Community Types: Forest (FO), Treed Swamp (SW)	ELC surveys and GIS analysis were used to determine whether woodlots that occurred within the Study Area that were >30 ha with interior habitat present (>200 m from edge).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (CUM).	ELC surveys and GIS analysis were used to identify grassland communities within the Study Area that may support area-sensitive breeding birds.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Shrub/Early Successional Bird Breeding Habitat	Oldfield areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (CUT), Savannahs (CUS), or Woodlands (CUW).	ELC surveys and GIS analysis were used to identify large CUT, CUS or CUW communities that may support shrub/early successional breeding birds.	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3. Construct burrows in marshes, mudflats, meadows Can be found far from water	ELC assessment was used to identify shallow marsh and meadow marsh communities that occurred within the Study Area.	**Arva**: Candidate habitat i **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: No candidate habitat **Delaware**: No candidate habitat
Special Concern and Rare Wildlife Species (i.e. all special concern and S1-S3 species)			
Habitat suitability assessment for species of conservation concern for each Study Area are provided in Appendix C2.			

Appendix C1 Significant Wildlife Habitat Assessment in the Arva, Ilderton, Kilworth, Komoka and Delaware Study Areas

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Animal Movement Corridors			
Amphibian Movement Corridor	Corridors may be found in all ecosites associated with water. Determined based on identifying significant amphibian breeding habitat (wetland).	Identified after Amphibian Breeding Habitat - Wetland is confirmed. Movement corridors should be considered when amphibian breeding habitat is confirmed as SWH from Amphibian Breeding Habitat (Wetland).	**Arva**: No candidate habitat **Ilderton**: No candidate habitat **Kilworth**: No candidate habitat **Komoka**: Candidate **Delaware**: Candidate

Appendix C.2 Species of Conservation Concern Habitat Assessment

Appendix C2-A: Species of Conservation Concern Habitat Assessment for the Arva Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bald Eagle	*Haliaeetus leucocephalus*	S4	SC	N/A	NAR	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005). This species has experienced a relatively recent and substantial increase in population as well as an expansion in range following a decline during the mid-20th century (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC	The Eastern Wood-pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Tufted Titmouse	*Baeolophus bicolor*	S3	N/A	N/A	N/A	The Tufted Titmouse frequently uses tall, open, oak-dominated forest with a heavy layer of grasses and forbs. It prefers woodlands with large mast producing trees such as pin oak and American beech. The range of pin oak in Ontario is closely associated with the range of tufted titmouse in Ontario (Cadman et al, 2007).	No	**Habitat Not Present.** Pin oak does not occur in or near the study area and other oak trees only occur sporadically in the study area.
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR	The Wood Thrush inhabits a variety of woodland habitat ranging from small (3 ha) and isolated patches to large and contiguous tracts. Forests with tall trees and a thick understory are requirements for occupancy (Cadman et al, 2007).	No	**Habitat Not Present.** Woodlands and forest in the study area are small (<3 ha) and linear.
Bryophytes								
American Tree Moss	*Climacium americanum*	S3	N/A	N/A	N/A	In Ontario *Climacium americanum* is primarily found in moist shaded sites, on limestone substrates. Found south of the Canadian Shield, especially along the Niagara Escarpment (NHIC 2024).	Yes	**Suitable Habitat Present.**
Fishes								
Greater Redhorse	*Moxostoma valenciennesi*	S3	N/A	N/A	N/A	Moderate to swift current riffles, runs and pools of medium to large rivers with clear water and substrates of gravel, cobble or boulders; lakes (Eakins 2024).	Yes	**Suitable Habitat Present**
Northern Sunfish	*Lepomis peltastes*	S3	SC	SC	SC	In Ontario, the Northern Sunfish lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds, with sandy banks or rocky bottoms. Northern Sunfish prefer to be near aquatic vegetation where they can avoid strong currents. During the breeding season, males guard their nests which are made by digging saucer like depressions in gravel or cobble substrates. It eats mostly aquatic insect larvae and algae, but is known for feeding at the water's surface more frequently than other sunfish (MECP 2024).	Yes	**Suitable Habitat Present**
Insects								
a longhorned beetle	*Dorcaschema alternatum*	SH	N/A	N/A	N/A	There is a single ON record from an unknown location sometime before 1920. Larvae feed upon the dead or dying branches of mulberry and osage orange (NHIC 2024).	No	**itable Habitat Not Prese**

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Brown Scoopwing Moth	*Calledapteryx dryopterata*	S3S4	N/A	N/A	N/A	Woodlands, edge habitat with host plants (*Viburnum spp.*) (ISU 2024)	Yes	**Suitable Habitat Present.**
Differential Grasshopper	*Melanoplus differentialis*	S3	N/A	N/A	N/A	Restricted to southwestern Ontario where it can be locally extremely abundant in late summer and fall. It appears to prefer moist meadows and areas adjacent to bodies of water (NHIC 2024).	Yes	**Suitable Habitat Present**
Glorious Habrosyne Moth	*Habrosyne gloriosa*	S3S4	N/A	N/A	N/A	Woodlands, edge habitat with host plants (blackberry - *Rubus* spp. and ninebark - *Physocarpus*) (ISU 2024)	Yes	**Suitable Habitat Present.**
Judith's Underwing Moth	*Catocala judith*	S2S3	N/A	N/A	N/A	Woodlands, edge habitat with host plants (*Carya* spp. and *Juglans* spp.) (ISU 2024)	Yes	**Suitable Habitat Present.**
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END	In Canada, breeding habitat is confined to milkweed plants (*Asclepias* spp.) (COSEWIC 2016).	Yes	**Suitable Habitat Present.**
Northern Bush Katydid	*Scudderia septentrionalis*	S3?	N/A	N/A	N/A	Widespread but apparently rather locally distributed in southern Ontario, usually occurring in deciduous and mixed forest/woodland, most often in association with oak and white pine (NHIC 2024).	No	**Suitable Habitat Not Present.** Woodlands and forest in the study area are not dominated by oak and pine.
Pale-veined Isturgia Moth	*Isturgia dislocaria*	S3	N/A	N/A	N/A	Grassy meadows with host plant (hackberry) (ISU 2024).	Yes	**Suitable Habitat Present.**
Unicorn Clubtail	*Arigomphus villosipes*	S3	N/A	N/A	N/A	A highly local species restricted in Canada to southern ON where it is known from fewer than 80 occurrences. Much of these sites are ponds in heavily urbanized areas, the long-term viability of which are questionable. The species seems, however, to be able to tolerate degraded urban habitats (NHIC 2024).	Yes	**Suitable Habitat Present.**
Mammals								
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END	A species not well documented in Ontario, widely distributed but relatively scarce. Threats and trends poorly known although its utilization of trees as roosting sites and maternity colonies suggest that it could be sensitive to forestry practices that eliminate such trees (NHIC 2024).	Yes	**Suitable Habitat Present.**
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END	Red Bats have been observed feeding near or above tree top level over streams, lakes, and rivers and over riparian, flood plain and hill forest. They also forage in towns under streetlights and 100 to 200 m above streams, ponds, pastures and forests. During the summer days Red Bats roost in the foliage of trees, singly or as a family of mother and young. These bats usually hang by one foot from the petioles of leaves, or occasionally from twigs or branches. In this position the bats are well concealed and they resemble dead leaves. The bats prefer deciduous trees, particularly American Elm (Gerson 1984).	Yes	**Suitable Habitat Present.**
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END	The Hoary Bat is most often observed foraging over glades or lakes in forested areas.During the summer days, the Hoary Bat roosts among the foliage of coniferous or deciduous trees. Roost sites are open from below, but well covered above and usually at the edges of clearings. This species prefers coniferous regions, but also inhabits the more southern deciduous forests, or shaded village streets (Gerson 1984).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Reptiles								
Midland Painted Turtle	*Chrysemys picta marginata*	S4	N/A	SC	SC	Midland Painted Turtles frequent shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites. These turtles occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, bogs, creeks, rivers, and lakes. Females nest in organic, sandy, or gravelly soils in open habitats with high sun exposure, such as forest clearings, meadows, shorelines, fields, lawns, and road shoulders. Nest sites are typically within 200 metres of a water body but may be as far as 600 metres away from water. Midland Painted Turtles will use human-made aquatic habitats, such as agricultural and stormwater retention ponds. Adult Painted Turtles overwinter at the bottom of water bodies or submerged along undercut banks. Hatchlings may remain in their nest cavity and overwinter underground there or emerge and travel to wetlands to overwinter aquatically (ORAA 2023).	Yes	**Suitable Habitat Present.**
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Rigid Sedge	*Carex tetanica*	S3?	N/A	N/A	N/A	Fens, sedge meadows, shores, interdunal swales, wet depressions in prairies, occasionally on limestone pavements, rarely in drier sites; a plant of calcareous soils (Michigan Flora Online 2024).	No	**Habitat Not Present in Study Area.**
Striped Cream Violet	*Viola striata*	S3	N/A	N/A	N/A	Rich deciduous forests, thickets by streams, occasionally in swamps. Sometimes somewhat weedy in habit (MECP 2024).	Yes	**Suitable Habitat Present.**

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Appendix C2-B: Species of Conservation Concern Habitat Assessment for the Ilderton Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC	The Eastern Wood-pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not listed	SC	The Grasshopper Sparrow prefers drier sparsely vegetated grasslands, particularly rough or unimproved pastures, at least 30 ha in size (Cadman et al, 2007).	No	**Habitat Not Present.** Appropriate sized meadows not present in the study area.
Tufted Titmouse	*Baeolophus bicolor*	S3	Not listed	Not listed	Not listed	The Tufted Titmouse frequently uses tall, open, oak-dominated forest with a heavy layer of grasses and forbs. It prefers woodlands with large mast producing trees such as pin oak and American beech. The range of pin oak in Ontario is closely associated with the range of tufted titmouse in Ontario (Cadman et al, 2007).	No	**Habitat Not Present.** Pin oak does not occur in or near the study area and other oak trees only occur sporadically in the study area.
Fishes								
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes pop. 2*	S3	SC	SC	SC	In Ontario, the Northern Sunfish lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds, with sandy banks or rocky bottoms. Northern Sunfish prefer to be near aquatic vegetation where they can avoid strong currents. During the breeding season, males guard their nests which are made by digging saucer like depressions in gravel or cobble substrates. It eats mostly aquatic insect larvae and algae, but is known for feeding at the water's surface more frequently than other sunfish (MECP 2024).	No	**Habitat Not Present.** No rivers or large creeks present in the study area. No natural ponds in study area. Only SWM ponds.
Insects								
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END	In Canada, breeding habitat is confined to milkweed plants (*Asclepias* spp.) (COSEWIC 2016).	Yes	**Suitable Habitat Present.**
Mammals								
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END	A species not well documented in Ontario, widely distributed but relatively scarce. Threats and trends poorly known although its utilization of trees as roosting sites and maternity colonies suggest that it could be sensitive to forestry practices that eliminate such trees (NHIC 2024).	Yes	**Suitable Habitat Present.**
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END	Red Bats have been observed feeding near or above tree top level over streams, lakes, and rivers and over riparian, flood plain and hill forest. They also forage in towns under streetlights and 100 to 200 m above streams, ponds, pastures and forests. Roosting Habitat During the summer days Red Bats roost in the foliage of trees, singly or as a family of mother and young. These bats usually hang by one foot from the petioles of leaves, or occasionally from twigs or branches. In this position the bats are well concealed and they resemble dead leaves. The bats prefer deciduous trees, particularly American Elm (Gerson 1984).	Yes	**Suitable Habitat Present.**
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END	The Hoary Bat is most often observed foraging over glades or lakes in forested areas.During the summer days, the Hoary Bat roosts among the foliage of coniferous or deciduous trees. Roost sites are open from below, but well covered above and usually at the edges of clearings. This species prefers coniferous regions, but also inhabits the more southern deciduous forests, or shaded village streets (Gerson 1984).	Yes	**Suitable Habitat Present.**
Reptiles								

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Midland Painted Turtle	*Chrysemys picta marginata*	S4	N/A	SC	SC	Midland Painted Turtles frequent shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites. These turtles occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, bogs, creeks, rivers, and lakes. Females nest in organic, sandy, or gravelly soils in open habitats with high sun exposure, such as forest clearings, meadows, shorelines, fields, lawns, and road shoulders. Nest sites are typically within 200 metres of a water body but may be as far as 600 metres away from water. Midland Painted Turtles will use human-made aquatic habitats, such as agricultural and stormwater retention ponds. Adult Painted Turtles overwinter at the bottom of water bodies or submerged along undercut banks. Hatchlings may remain in their nest cavity and overwinter underground there or emerge and travel to wetlands to overwinter aquatically (ORAA 2023).	Yes	**Suitable Habitat Present.**
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not listed	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								

References

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Appendix C2-C: Species of Conservation Concern Habitat Assessment for the Kilworth Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR	The American Coot breeds in deep-water wetlands where robust, emergent vegetation (i.e. cattails) and open-water remain throughout the breeeding season. Preferred sites are hemi-marshes, those with a roughly 50:50 ration of open water and vegetation (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable wetlands not present in study area.
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005). This species has experienced a relatively recent and substantial increase in population as well as an expansion in range following a decline during the mid-20th century (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed	The Blue-winged Teal nests in open areas with well-developed grassy cover such as meadows or farm fields surrounding shallow, rich wetlands dominated by cattails (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable wetlands not present in study area.
Common Gallinule	*Gallinula galeata*	S3B	Not Listed	Not Listed	Not Listed	The Common Gallinule prefers relatively large, permanent marshes having a more or less equal interspersion of open water and tall emergent vegetation (frequently cattails). It prefers water depths ranging from 15 to 120cm. Floating vegetation is usually a prominent feature of their habitat , muskrats are usually present (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable wetlands not present in study area.
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC	The Eastern Wood-Pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR	The Golden-winged Warbler breeds in successional scrub habitats surrounded by forests that are used for foraging and song posts (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable early successional habitat not present in the study area.
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC	The Grasshopper Sparrow prefers drier sparsely vegetated grasslands, particularly rough or unimproved pastures, at least 30 ha in size (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable grassland habitat not present in the study area.
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed	The Tufted Titmouse frequently uses tall, open, oak-dominated forest with a heavy layer of grasses and forbs. It prefers woodlands with large mast producing trees such as pin oak and American beech. The range of pin oak in Ontario is closely associated with the range of tufted titmouse in Ontario (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Upland Sandpiper	*Bartramia longicauda*	S2B	Not Listed	Not Listed	Not Listed	The Upland Sandpiper in Ontario prefers unused pastures, old fields with scattered hawthorns, hayfields and airports (Cadman et al, 2007).	No	**Habitat Not Present.** Suitable grassland and early successional habitat not present in the study area.
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR	The Wood Thrush inhabits a variety of woodland habitat ranging from small (3 ha) and isolated patches to large and contiguous tracts. Forests with tall trees and a thick understory are requirements for occupancy (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
Northern Brook Lamprey	*Ichthyomyzon fossor*	S3	SC	Not Listed	SC	The Northern Brook Lamprey inhabits clear, cool water streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June (MECP 2024).	Yes	**Suitable Habitat Present.** May occur in Oxbow Creek and the Thames River in the study area.
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes pop. 2*	S3	SC	SC	SC	In Ontario, the Northern Sunfish lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds, with sandy banks or rocky bottoms. Northern Sunfish prefer to be near aquatic vegetation where they can avoid strong currents. During the breeding season, males guard their nests which are made by digging saucer like depressions in gravel or cobble substrates. It eats mostly aquatic insect larvae and algae, but is known for feeding at the water's surface more frequently than other sunfish (MECP 2024).	Yes	**Suitable Habitat Present.**
River Redhorse	*Moxostoma carinatum*	S2	SC	SC	SC	The River Redhorse inhabits medium to large-size rivers that have substantial flows. In May and June, adults migrate from deeper, slower moving pools and run habitats to shallow riffle-run habitats having coarse substrate and moderate to swift flow (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Lamprey (Great Lakes - Upper St. Lawrence populations)	*Ichthyomyzon unicuspis pop. 1*	S3	SC	SC	SC	Silver Lampreys require clear water so they can find fish hosts, relatively clean stream beds of sand and organic debris for larvae to live in, and unrestricted migration routes for spawning. Their use of different kinds of habitat throughout their lives (rivers for spawning and early development, and lakes for adults) makes them vulnerable to changes in their environment (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Spotted Sucker	*Minytrema melanops*	S2	SC	SC	SC	The Spotted Sucker usually inhabits clear creeks and small to moderate sized rivers with sand, gravel or hard-clay bottoms, usually free of silt. However, in Ontario it has frequently been found in turbid habitats. In late spring and early summer, Spotted suckers move to rocky riffle areas of streams to breed (MECP 2024).	Yes	**Suitable Habitat Present.**
Insects								
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed	The Double-striped Bluet (Enallagma basidens) is found around ponds, especially artificial ponds including pit and quarry sites, but also along rivers (Catling and Brownell, 2000).	Yes	**Suitable Habitat Present.**
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed	The Hackberry Emperor is considered common at Long Point and Point Pelee where it's food source, hackberry, is abundant (Layberry, 1998). Adults can be found flying in open woodlands and roadsides where hackberry is present (Holmes et al., 1991).	Yes	**Suitable Habitat Present.**
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END	In Canada, breeding habitat is confined to milkweed plants (*Asclepias* spp.) (COSEWIC 2016).	Yes	**Suitable Habitat Present.**
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed	Permanent ponds, lakes, often near woodlands (ISU 2024).	Yes	**Suitable Habitat Present.**
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed	A woodland species that only occurs in southwestern Ontario and regularly at Point Pelee and Pelee Island never straying far from the larval foodplant; hackberry (Layberry, 1998).	Yes	**Suitable Habitat Present.**
Mammals								
Woodland Vole	*Microtus pinetorum*	S3?	SC	SC	SC	In Ontario, the Woodland Vole lives in mature deciduous forest in the Carolinian region where there is a deep litter layer that allows it to burrow (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END	A species not well documented in Ontario, widely distributed but relatively scarce. Threats and trends poorly known although its utilization of trees as roosting sites and maternity colonies suggest that it could be sensitive to forestry practices that eliminate such trees (NHIC 2024).	Yes	**Suitable Habitat Present.**
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END	Red Bats have been observed feeding near or above tree top level over streams, lakes, and rivers and over riparian, flood plain and hill forest. They also forage in towns under streetlights and 100 to 200 m above streams, ponds, pastures and forests. Roosting Habitat During the summer days Red Bats roost in the foliage of trees, singly or as a family of mother and young. These bats usually hang by one foot from the petioles of leaves, or occasionally from twigs or branches. In this position the bats are well concealed and they resemble dead leaves. The bats prefer deciduous trees, particularly American Elm (Gerson 1984).	Yes	**Suitable Habitat Present.**
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END	The Hoary Bat is most often observed foraging over glades or lakes in forested areas.During the summer days, the Hoary Bat roosts among the foliage of coniferous or deciduous trees. Roost sites are open from below, but well covered above and usually at the edges of clearings. This species prefers coniferous regions, but also inhabits the more southern deciduous forests, or shaded village streets Gerson 1984).	Yes	**Suitable Habitat Present.**
Molluscs								
Elktoe	*Alasmidonta marginata*	S3	Not Listed	Not Listed	Not Listed	Small streams to medium sized rivers in gravel or mixed sand and gravel and gravel in riffles (Metcalfe-Smith et al. 2005).	Yes	**Suitable Habitat Present.**
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC	The Mapleleaf is usually found in medium to large rivers with slow to moderate currents and firmly packed sand, gravel, or clay and mud bottoms. It also lives in lakes and reservoirs. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Mapleleaf is the Channel catfish, Presence of the fish host is one of the key features determining whether the body of water can support a healthy mussel population (MECP 2024).	Yes	**Suitable Habitat Present.**
Rainbow Mussel	*Cambarunio iris*	S1	SC	SC	SC	The Rainbow Mussel prefers small to medium-sized rivers with a moderate to strong current and sand, rocky, or gravel bottoms. It is found in or near riffle areas and along the edges of vegetation in water less than one metre deep. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. The Rainbow mussel uses a variety of fish hosts in Ontario, including Striped shiner, Smallmouth bass, Largemouth bass, Green sunfish, Greenside darter, Rainbow darter, and Yellow perch (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC	The Eastern Milksnake tends to use open habitats such as meadows, fields, rocky outcrops, and forest edges. Natural nest sites include decaying logs, rock cover, and the burrows of small mammals. Piles of vegetation such as compost heaps, haystacks, and wood chip piles are also used as egg-laying sites. The Eastern Milksnake overwinters underground in mammal burrows, rock crevices, and the foundations of old buildings. This species may be locally common in rural areas, especially around farmland adjacent to forested areas, barns, and scrap piles where these snakes have sufficient cover and an abundance of rodent prey. They are relatively tolerant of habitat fragmentation and can occur in large urban parks (ORAA 2023a).	Yes	**Suitable Habitat Present.**
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC	Midland Painted Turtles frequent shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites, These turtles occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, bogs, creeks, rivers, and lakes. Females nest in organic, sandy, or gravelly soils in open habitats with high sun exposure, such as forest clearings, meadows, shorelines, fields, lawns, and road shoulders. Nest sites are typically within 200 metres of a water body but may be as far as 600 metres away from water. Midland Painted Turtles will use human-made aquatic habitats, such as agricultural and stormwater retention ponds. Adult Painted Turtles overwinter at the bottom of water bodies or submerged along undercut banks. Hatchlings may remain in their nest cavity and overwinter underground there or emerge and travel to wetlands to overwinter aquatically (ORAA 2023b).	No	**Suitable Habitat Present.**
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled (MECP 2024).	Yes	**Suitable Habitat Present**
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed	Rare and local in dry, open, upland deciduous woods in southern Ontario, primarily in the Carolinian Zone (NHIC 2024).	Yes	**Suitable Habitat Present.**
Cleland's Evening-primrose	*Oenothera clelandii*	S1	Not Listed	Not Listed	END	Sandy roadsides, fields, and railroads; plains and dry savanna (oak, sassafras), generally in sunny somewhat disturbed areas with bare, sandy soils (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** This habitat is not present in the study area.
Commons' Panicgrass	*Dichanthelium commonsianum*	SH	Not Listed	Not Listed	Not Listed	Sand barrens, low dunes, open oak and pine forests, shores (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Sand barrens and dunes not present in the study area.
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed	Usually in moist and often sandy ground: floodplains and thickets on stream banks; aspen forests, borders, and clearings; marshy ground, ditches, etc (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Early-branching Panicgrass	*Dichanthelium praecocius*	S3	Not Listed	Not Listed	Not Listed	Dry open, usually sandy ground; prairies, open oak savannas, borders and fields (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Open sandy habitat not present in the study area.
Eastern False Rue-anemone	*Enemion biternatum*	S2	SC	THR	SC	Eastern False Rue-anemone grows in deciduous forests and thickets with rich, moist soil, often in valleys, floodplains and ravine bottoms. This species is frequently found close to watercourses within mature forests with lots of maple and beech trees. It prefers partial sun or somewhat shady conditions (MECP 2024).	No	**Suitable Habitat Not Present.** The floodplain forest next to the Thames River in the study area does not contain an abundance of maple and beech trees.
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed	Sandy open ground and oak forests, more often in fens, moist to wet meadows, swamp borders, and shores (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.** May occur in the FODM5-3 community on the north side of Glendon Drive in the study area.
Erect Knotweed	*Polygonum erectum*	SH	Not Listed	Not Listed	Not Listed	Disturbed open areas. Recorded from about a dozen sites historically in southern Ontario, though not seen at any sites in the province in more than 25 years (NHIC 2024).	No	**Suitable Habitat Not Present.** Unlikely to be present.
False Tomentose Balsam Groundsel	*Packera paupercula var. pseudotomentosa*	S2S3	Not Listed	Not Listed	Not Listed	Generally a calciphile of moist sandy or gravelly (limestone) shores, fens, cedar swamps, thin soil over limestone (alvar); also in dry jack pine, aspen, and oak savanna (especially in moist areas); meadows and marshy ground (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Alvars, fens and oak savanna not present in the study area.

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed	Wet calcareous meadows, fens, moist to dryish prairies and prairie-like habitats, in calcareous soils (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Prairie remnants and fens not present in the study area.
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC	The Green Dragon grows in somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees (MECP 2024).	Yes	**Suitable Habitat Present.**
Grey-headed Prairie Coneflower	*Ratibida pinnata*	S3	Not Listed	Not Listed	Not Listed	Occurs in or near prairie remnants (including nearby roadsides and fencerows), at margins of swamps, and in dry open ground. This species is frequently included in tallgrass prairie installations and occurences may be a result of escaping from prairie plantings along roads and fields (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Prairie remnants not present in the study area.
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed	Occurs in open, wet deciduous forests on floodplains, river banks, and floodplain marshes and meadows; tightly associated with larger rivers and their tributaries (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Heart-leaved Alexanders	*Zizia aptera*	S1	Not Listed	Not Listed	Not Listed	Very rare and local, on dry shaded bluffs and gravelly openings and ridges (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Only known historically from Middlesex County.
Hoary Puccoon	*Lithospermum canescens*	S3	Not Listed	Not Listed	Not Listed	Sandy prairie remnants; openings in oak and jack pine savanna; edges of forests, roads, and railroads (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Prairie remnants and savanna habitat not present in the study area.
Hoary Tick-trefoil	*Desmodium canescens*	S2	Not Listed	Not Listed	Not Listed	Moist to dry sandy open ground (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Open sandy ground not present in the study area.
Largebract Tick-trefoil	*Desmodium cuspidatum*	S3	Not Listed	Not Listed	Not Listed	Oak and oak-hickory forests, borders and clearings, thickets and river banks (MECP 2024).	Yes	**Suitable Habitat Present.**
Lowland Bladder Fern	*Cystopteris protrusa*	S2S3	Not Listed	Not Listed	Not Listed	Rich moist forests, often bottomlands along rivers and streams, but occasionally on seepy slopes; apparently never on rock (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Pinedrops	*Pterospora andromedea*	S2	Not Listed	Not Listed	Not Listed	Quite rare and local, not to be relied upon to appear every year; always in habitats with conifers (especially pines but also hemlock, spruce, fir, white-cedar), in dryish, usually sandy or rocky soil, often with common juniper and sometimes aspen or birch. Most frequent in open woods near the shores of the Great Lakes, much less common inland (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Study area is not near the Great Lakes coast.
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed	Fens, sedge meadows, shores, interdunal swales, wet depressions in prairies, occasionally on limestone pavements, rarely in drier sites; a plant of calcareous soils (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.**
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed	Oak forests (sometimes with hickory or pine); dry thickets and openings (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Scarlet Beebalm	*Monarda didyma*	S3	Not Listed	Not Listed	Not Listed	Rich forests on banks and floodplains. Popular plant used in horticulture. Can spread from cultivation (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.** [illegible] river in the study area.
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed	Rather local, a species of calcareous soils occurring in springheads, springy seeps, and springy ground along cold spring-fed rivers and brooks, in mixed or coniferous cover; sometimes in the open (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Sharp-fruited Rush	*Juncus acuminatus*	S3	Not Listed	Not Listed	Not Listed	Moist, often sandy, sunny ground (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.**
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed	Usually found on forested dunes, hillsides, and river banks, whether in oak or beech-maple forests (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed	Woods, fields, thickets, alvars; often on floodplains. Mainly in southwestern Ontario, north to the Maitland River valley, but historically east to Belleville, Hastings County (NHIC 2024).	Yes	**Suitable Habitat Present.**
Spotted Beebalm	*Monarda punctata*	S1	Not Listed	Not Listed	Not Listed	Sand dunes, sandy fields and relic prairies, oak and pine savanna; also along roadsides, railroads, and disturbed places; seems to do well with some disturbance (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.**
Striped Cream Violet	*Viola striata*	S3	Not Listed	Not Listed	Not Listed	Rich deciduous forests, thickets by streams, occasionally in swamps. Sometimes somewhat weedy in habit (MECP 2024).	Yes	**Suitable Habitat Present.** [illegible] in the study area.
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed	Dry usually sandy ground, ranging from prairies and open barrens or clearings to savannas of oak, jack pine, and/or aspen (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Open, dry sandy habitats that would favour lupine not present in the study area.
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC	This species prefers open sunny areas in wet, calcium-rich meadows or shoreline fens. In Ontario, it grows along river banks and in wetlands near Lake Huron (MECP 2024).	No	**Suitable Habitat Not Present.** This type of habitat is not present in the study area.

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Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential

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Appendix C2-D: Species of Conservation Concern Habitat Assessment for the Komoka Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR	The American Coot breeds in deep-water wetlands where robust, emergent vegetation (i.e. cattails) and open-water remain throughout the breeeding season. Preferred sites are hemi-marshes, those with a roughly 50:50 ration of open water and vegetation (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005). This species has experienced a relatively recent and substantial increase in population as well as an expansion in range following a decline during the mid-20th century (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed	The Blue-winged Teal nests in open areas with well-developed grassy cover such as meadows or farm fields surrounding shallow, rich wetlands dominated by cattails (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC	The Eastern Wood-pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR	The Golden-winged Warbler breeds in successional scrub habitats surrounded by forests that are used for foraging and song posts (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC	The Grasshopper Sparrow prefers drier sparsely vegetated grasslands, particularly rough or unimproved pastures, at least 30 ha in size (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed	The Tufted Titmouse frequently uses tall, open, oak-dominated forest with a heavy layer of grasses and forbs. It prefers woodlands with large mast producing trees such as pin oak and American beech. The range of pin oak in Ontario is closely associated with the range of tufted titmouse in Ontario (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Upland Sandpiper	*Bartramia longicauda*	S2B	Not Listed	Not Listed	Not Listed	The Upland Sandpiper in Ontario prefers unused pastures, old fields with scattered hawthorns, hayfields and airports (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR	The Wood Thrush inhabits a variety of woodland habitat ranging from small (3 ha) and isolated patches to large and contiguous tracts. Forests with tall trees and a thick understory are requirements for occupancy (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
American Brook Lamprey	*Lethenteron appendix*	S3	Not Listed	Not Listed	Not Listed	American Brook Lamprey adults live in gravel/sand riffles and runs of creeks and small- to medium-sized rivers with strong flow and clear waters; ammocoetes in sandy or silty pools; preferred water temperature range 9-12°C (Eakins 2024).	Yes	**Suitable Habitat Present.**
Northern Brook Lamprey	*Ichthyomyzon fossor*	S3	SC	Not Listed	SC	The Northern Brook Lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June (MECP 2024).	Yes	**Suitable Habitat Present.**
Insects								
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed	The Double-striped Bluet (Enallagma basidens) is found around ponds, especially artificial ponds including pit and quarry sites, but also along rivers (Catling and Brownell, 2000).	Yes	**Suitable Habitat Present.**
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed	The Hackberry Emperor is considered common at Long Point and Point Pelee where it's food source, hackberry, is abundant (Layberry, 1998). Adults can be found flying in open woodlands and roadsides where hackberry is present (Holmes et al., 1991).	Yes	**Suitable Habitat Present.**
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END	In Canada, breeding habitat is confined to milkweed plants (*Asclepias* spp.) (COSEWIC 2016).	Yes	**Suitable Habitat Present.**
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed	Permanent ponds, lakes, often near woodlands (ISU 2024).	Yes	**Suitable Habitat Present.**
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed	A woodland species that only occurs in southwestern Ontario and regularly at Point Pelee and Pelee Island never straying far from the larval foodplant; hackberry (Layberry, 1998).	Yes	**Suitable Habitat Present.**
Mammals								

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Woodland Vole	*Microtus pinetorum*	S3?	SC	SC	SC	In Ontario, the Woodland Vole lives in mature deciduous forest in the Carolinian region where there is a deep litter layer that allows it to burrow (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END	A species not well documented in Ontario, widely distributed but relatively scarce. Threats and trends poorly known although its utilization of trees as roosting sites and maternity colonies suggest that it could be sensitive to forestry practices that eliminate such trees (NHIC 2024).	Yes	**Suitable Habitat Present.**
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END	Red Bats have been observed feeding near or above tree top level over streams, lakes, and rivers and over riparian, flood plain and hill forest. They also forage in towns under streetlights and 100 to 200 m above streams, ponds, pastures and forests. Roosting Habitat During the summer days Red Bats roost in the foliage of trees, singly or as a family of mother and young. These bats usually hang by one foot from the petioles of leaves, or occasionally from twigs or branches. In this position the bats are well concealed and they resemble dead leaves. The bats prefer deciduous trees, particularly American Elm (Gerson 1984).	Yes	**Suitable Habitat Present.**
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END	The Hoary Bat is most often observed foraging over glades or lakes in forested areas.During the summer days, the Hoary Bat roosts among the foliage of coniferous or deciduous trees. Roost sites are open from below, but well covered above and usually at the edges of clearings. This species prefers coniferous regions, but also inhabits the more southern deciduous forests, or shaded village streets Gerson 1984).	Yes	**Suitable Habitat Present.**
Molluscs								
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC	The Mapleleaf is usually found in medium to large rivers with slow to moderate currents and firmly packed sand, gravel, or clay and mud bottoms. It also lives in lakes and reservoirs. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Mapleleaf is the Channel catfish. Presence of the fish host is one of the key features determining whether the body of water can support a healthy mussel population (MECP 2024).	Yes	**Suitable Habitat Present.**
Rainbow Mussel	*Cambarunio iris*	S1	SC	SC	SC	The Rainbow Mussel prefers small to medium-sized rivers with a moderate to strong current and sand, rocky, or gravel bottoms. It is found in or near riffle areas and along the edges of vegetation in water less than one metre deep. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. The Rainbow mussel uses a variety of fish hosts in Ontario, including Striped shiner, Smallmouth bass, Largemouth bass, Green sunfish, Greenside darter, Rainbow darter, and Yellow perch (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC	The Eastern Milksnake tends to use open habitats such as meadows, fields, rocky outcrops, and forest edges. Natural nest sites include decaying logs, rock cover, and the burrows of small mammals. Piles of vegetation such as compost heaps, haystacks, and wood chip piles are also used as egg-laying sites. The Eastern Milksnake overwinters underground in mammal burrows, rock crevices, and the foundations of old buildings. This species may be locally common in rural areas, especially around farmland adjacent to forested areas, barns, and scrap piles where these snakes have sufficient cover and an abundance of rodent prey. They are relatively tolerant of habitat fragmentation and can occur in large urban parks (ORAA 2023a).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC	Midland Painted Turtles frequent shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites. These turtles occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, bogs, creeks, rivers, and lakes. Females nest in organic, sandy, or gravelly soils in open habitats with high sun exposure, such as forest clearings, meadows, shorelines, fields, lawns, and road shoulders. Nest sites are typically within 200 metres of a water body but may be as far as 600 metres away from water. Midland Painted Turtles will use human-made aquatic habitats, such as agricultural and stormwater retention ponds. Adult Painted Turtles overwinter at the bottom of water bodies or submerged along undercut banks. Hatchlings may remain in their nest cavity and overwinter underground there or emerge and travel to wetlands to overwinter aquatically (ORAA 2023b).	Yes	**Suitable Habitat Present.**
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled (MECP 2024).	Yes	**Suitable Habitat Present.**
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed	Rare and local in dry, open, upland deciduous woods in southern Ontario, primarily in the Carolinian Zone (NHIC 2024).	Yes	**Suitable Habitat Present.**
Cleland's Evening-primrose	*Oenothera clelandii*	S1	Not Listed	Not Listed	END	Sandy roadsides, fields, and railroads; plains and dry savanna (oak, sassafras), generally in sunny somewhat disturbed areas with bare, sandy soils (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Commons' Panicgrass	*Dichanthelium commonsianum*	SH	Not Listed	Not Listed	Not Listed	Sand barrens, low dunes, open oak and pine forests, shores (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Sand barrens and dunes not present in the study area and unlikely to be present based on historical status.
Creeping Draba	*Tomostima reptans*	S2S3	Not Listed	Not Listed	Not Listed	Dry sandy open areas and alvar pavements in southern Ontario, south of the Precambrian Shield. 50-70% of Ontario populations are on alvars. Occasionally weedy in dry, often sandy, open areas (NHIC 2024).	No	**Suitable Habitat Not Present.** Alvars not present in the study area.
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed	Usually in moist and often sandy ground: floodplains and thickets on stream banks; aspen forests, borders, and clearings; marshy ground, ditches, etc (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Early-branching Panicgrass	*Dichanthelium praecocius*	S3	Not Listed	Not Listed	Not Listed	Dry open, usually sandy ground; prairies, open oak savannas, borders and fields (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed	Sandy open ground and oak forests, more often in fens, moist to wet meadows, swamp borders, and shores (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Erect Knotweed	*Polygonum erectum*	SH	Not Listed	Not Listed	Not Listed	Disturbed open areas. Recorded from about a dozen sites historically in southern Ontario, though not seen at any sites in the province in more than 25 years (NHIC 2024).	No	**Suitable Habitat Not Present.** Unlikely to be present.
False Tomentose Balsam Groundsel	*Packera paupercula var. pseudotomentosa*	S2S3	Not Listed	Not Listed	Not Listed	Generally a calciphile of moist sandy or gravelly (limestone) shores, fens, cedar swamps, thin soil over limestone (alvar); also in dry jack pine, aspen, and oak savanna (especially in moist areas); meadows and marshy ground (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Alvars, fens and oak savanna not present in the study area.
Golden Puccoon	*Lithospermum caroliniense*	S3	Not Listed	Not Listed	Not Listed	Characteristic of sand dunes and shores; also in oak and pine (especially jack pine) savanna, often with Juniperus; sandy barrens and ridges, and sandy prairie remnants (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed	Wet calcareous meadows, fens, moist to dryish prairies and prairie-like habitats, in calcareous soils (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC	The Green Dragon grows in somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Grey-headed Prairie Coneflower	*Ratibida pinnata*	S3	Not Listed	Not Listed	Not Listed	Occurs in or near prairie remnants (including nearby roadsides and fencerows), at margins of swamps, and in dry open ground. This species is frequently included in tallgrass prairie installations and occurences may be a result of escaping from prairie plantings along roads and fields (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed	Occurs in open, wet deciduous forests on floodplains, river banks, and floodplain marshes and meadows; tightly associated with larger rivers and their tributaries (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Heart-leaved Alexanders	*Zizia aptera*	S1	Not Listed	Not Listed	Not Listed	Very rare and local, on dry shaded bluffs and gravelly openings and ridges (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Only known historically from Middlesex County.
Hoary Puccoon	*Lithospermum canescens*	S3	Not Listed	Not Listed	Not Listed	Sandy prairie remnants; openings in oak and jack pine savanna; edges of forests, roads, and railroads (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Hoary Tick-trefoil	*Desmodium canescens*	S2	Not Listed	Not Listed	Not Listed	Moist to dry sandy open ground (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Pinedrops	*Pterospora andromedea*	S2	Not Listed	Not Listed	Not Listed	Quite rare and local, not to be relied upon to appear every year; always in habitats with conifers (especially pines but also hemlock, spruce, fir, white-cedar), in dryish, usually sandy or rocky soil, often with common juniper and sometimes aspen or birch. Most frequent in open woods near the shores of the Great Lakes, much less common inland (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Study area is not near the Great Lakes coast.
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed	Fens, sedge meadows, shores, interdunal swales, wet depressions in prairies, occasionally on limestone pavements, rarely in drier sites; a plant of calcareous soils (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Round-fruited Panicgrass	*Dichanthelium sphaerocarpon*	S3	Not Listed	Not Listed	Not Listed	Dry open sandy ground, fields, and sandy forests (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed	Oak forests (sometimes with hickory or pine); dry thickets and openings (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Scarlet Beebalm	*Monarda didyma*	S3	Not Listed	Not Listed	Not Listed	Rich forests on banks and floodplains. Popular plant used in horticulture. Can spread from cultivation (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed	Rather local, a species of calcareous soils occurring in springheads, springy seeps, and springy ground along cold spring-fed rivers and brooks, in mixed or coniferous cover; sometimes in the open (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Sharp-fruited Rush	*Juncus acuminatus*	S3	Not Listed	Not Listed	Not Listed	Moist, often sandy, sunny ground (Michigan Flora Online 2024).	No	**Suitable Habitat Present.**
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed	Usually found on forested dunes, hillsides, and river banks, whether in oak or beech-maple forests (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed	Woods, fields, thickets, alvars; often on floodplains. Mainly in southwestern Ontario, north to the Maitland River valley, but historically east to Belleville, Hastings County (NHIC 2024).	Yes	**Suitable Habitat Present.**
Spotted Beebalm	*Monarda punctata*	S1	Not Listed	Not Listed	Not Listed	Sand dunes, sandy fields and relic prairies, oak and pine savanna; also along roadsides, railroads, and disturbed places; seems to do well with some disturbance (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed	Dry usually sandy ground, ranging from prairies and open barrens or clearings to savannas of oak, jack pine, and/or aspen (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC	This species prefers open sunny areas in wet, calcium-rich meadows or shoreline fens. In Ontario, it grows along river banks and in wetlands near Lake Huron (MECP 2024).	No	**Suitable Habitat Not Present.** This type of habitat is not present in the study area.

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Appendix C2-E: Species of Conservation Concern Habitat Assessment for the Delware Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
American Coot	*Fulica americana*	S3B,S4N	NAR	Not Listed	NAR	The American Coot breeds in deep-water wetlands where robust, emergent vegetation (i.e. cattails) and open-water remain throughout the breeeding season. Preferred sites are hemi-marshes, those with a roughly 50:50 ration of open water and vegetation (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Bald Eagle	*Haliaeetus leucocephalus*	S4	NAR	Not Listed	NAR	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005). This species has experienced a relatively recent and substantial increase in population as well as an expansion in range following a decline during the mid-20th century (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Blue-winged Teal	*Spatula discors*	S3B,S4M	Not Listed	Not Listed	Not Listed	The Blue-winged Teal nests in open areas with well-developed grassy cover such as meadows or farm fields surrounding shallow, rich wetlands dominated by cattails (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Common Gallinule	*Gallinula galeata*	S3B	Not Listed	Not Listed	Not Listed	The Common Gallinule prefers relatively large, permanent marshes having a more or less equal interspersion of open water and tall emergent vegetation (frequently cattails). It prefers water depths ranging from 15 to 120cm. Floating vegetation is usually a prominent feature of their habitat , muskrats are usually present (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Eastern Wood-pewee	*Contopus virens*	S4B	SC	SC	SC	The Eastern Wood-pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	Not Listed	SC	The Grasshopper Sparrow prefers drier sparsely vegetated grasslands, particularly rough or unimproved pastures, at least 30 ha in size (Cadman et al, 2007).	No	**Suitable Habitat Present.**
Tufted Titmouse	*Baeolophus bicolor*	S3	Not Listed	Not Listed	Not Listed	The Tufted Titmouse frequently uses tall, open, oak-dominated forest with a heavy layer of grasses and forbs. It prefers woodlands with large mast producing trees such as pin oak and American beech. The range of pin oak in Ontario is closely associated with the range of tufted titmouse in Ontario (Cadman et al, 2007).	No	**Habitat Not Present.** Pin oak does not occur in or near the study area and other oak trees only occur sporadically in the study area.
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR	The Wood Thrush inhabits a variety of woodland habitat ranging from small (3 ha) and isolated patches to large and contiguous tracts. Forests with tall trees and a thick understory are requirements for occupancy (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
Northern Sunfish	*Lepomis peltastes pop. 2*	S3	SC	SC	SC	In Ontario, the Northern Sunfish lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds, with sandy banks or rocky bottoms. Northern Sunfish prefer to be near aquatic vegetation where they can avoid strong currents. During the breeding season, males guard their nests which are made by digging saucer like depressions in gravel or cobble substrates. It eats mostly aquatic insect larvae and algae, but is known for feeding at the water's surface more frequently than other sunfish (MECP 2024).	Yes	**Suitable Habitat Present.**
River Redhorse	*Moxostoma carinatum*	S2	SC	SC	SC	The River Redhorse inhabits medium to large-size rivers that have substantial flows. In May and June, adults migrate from deeper, slower moving pools and run habitats to shallow riffle-run habitats having coarse substrate and moderate to swift flow (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Lamprey	*Ichthyomyzon unicuspis pop. 1*	S3	SC	SC	SC	Silver Lampreys require clear water so they can find fish hosts, relatively clean stream beds of sand and organic debris for larvae to live in, and unrestricted migration routes for spawning. Their use of different kinds of habitat throughout their lives (rivers for spawning and early development, and lakes for adults) makes them	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Spotted Sucker	*Minytrema melanops*	S2	SC	SC	SC	The Spotted Sucker usually inhabits clear creeks and small to moderate sized rivers with sand, gravel or hard-clay bottoms, usually free of silt. However, in Ontario it has frequently been found in turbid habitats. In late spring and early summer, Spotted suckers move to rocky riffle areas of streams to breed (MECP 2024).	Yes	**Suitable Habitat Present.**
Insects								
Double-striped Bluet	*Enallagma basidens*	S3	Not Listed	Not Listed	Not Listed	The Double-striped Bluet (Enallagma basidens) is found around ponds, especially artificial ponds including pit and quarry sites, but also along rivers (Catling and Brownell, 2000).	Yes	**Suitable Habitat Present.**
Giant Leopard Moth	*Hypercompe scribonia*	S3S4	Not Listed	Not Listed	Not Listed	Found where hostplants grow including cherry (*Prunus* spp.), maple (*Acer* spp.), sunflower (*Helianthus* spp.), violet (*Viola* spp.) and willow (*Salix* spp.).	Yes	**Suitable Habitat Present.**
Hackberry Emperor	*Asterocampa celtis*	S3	Not Listed	Not Listed	Not Listed	The Hackberry Emperor is considered common at Long Point and Point Pelee where it's food source, hackberry, is abundant (Layberry, 1998). Adults can be found flying in open woodlands and roadsides where hackberry is present (Holmes et al., 1991).	Yes	**Suitable Habitat Present.**
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	END	In Canada, breeding habitat is confined to milkweed plants (*Asclepias* spp.) (COSEWIC 2016).	Yes	**Suitable Habitat Present.**
Slender Bluet	*Enallagma traviatum*	S2S3	Not Listed	Not Listed	Not Listed	Permanent ponds, lakes, often near woodlands (ISU 2024).	Yes	**Suitable Habitat Present.**
Tawny Emperor	*Asterocampa clyton*	S3	Not Listed	Not Listed	Not Listed	A woodland species that only occurs in southwestern Ontario and regularly at Point Pelee and Pelee Island never straying far from the larval foodplant; hackberry (Layberry, 1998).	Yes	**Suitable Habitat Present.**
Mammals								
Silver-haired Bat	*Lasionycteris noctivagans*	S4	Not Listed	Not Listed	END	A species not well documented in Ontario, widely distributed but relatively scarce. Threats and trends poorly known although its utilization of trees as roosting sites and maternity colonies suggest that it could be sensitive to forestry practices that eliminate such trees (NHIC 2024).	Yes	**Suitable Habitat Present.**
Eastern Red Bat	*Lasiurus borealis*	S4	Not Listed	Not Listed	END	Red Bats have been observed feeding near or above tree top level over streams, lakes, and rivers and over riparian, flood plain and hill forest. They also forage in towns under streetlights and 100 to 200 m above streams, ponds, pastures and forests. Roosting Habitat During the summer days Red Bats roost in the foliage of trees, singly or as a family of mother and young. These bats usually hang by one foot from the petioles of leaves, or occasionally from twigs or branches. In this position the bats are well concealed and they resemble dead leaves. The bats prefer deciduous trees, particularly American Elm (Gerson 1984).	Yes	**Suitable Habitat Present.**
Hoary Bat	*Lasiurus cinereus*	S4	Not Listed	Not Listed	END	The Hoary Bat is most often observed foraging over glades or lakes in forested areas.During the summer days, the Hoary Bat roosts among the foliage of coniferous or deciduous trees. Roost sites are open from below, but well covered above and usually at the edges of clearings. This species prefers coniferous regions, but also inhabits the more southern deciduous forests, or shaded village streets (Gerson 1984).	Yes	**Suitable Habitat Present.**
Molluscs								
Mapleleaf Mussel	*Quadrula quadrula*	S2	SC	Not Listed	SC	The Mapleleaf is usually found in medium to large rivers with slow to moderate currents and firmly packed sand, gravel, or clay and mud bottoms. It also lives in lakes and reservoirs. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Mapleleaf is the Channel catfish. Presence of the fish host is one of the key features determining whether the body of water can support a healthy mussel population (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Eastern Milksnake	*Lampropeltis triangulum*	S4	NAR	SC	SC	The Eastern Milksnake tends to use open habitats such as meadows, fields, rocky outcrops, and forest edges. Natural nest sites include decaying logs, rock cover, and the burrows of small mammals. Piles of vegetation such as compost heaps, haystacks, and wood chip piles are also used as egg-laying sites. The Eastern Milksnake overwinters underground in mammal burrows, rock crevices, and the foundations of old buildings. This species may be locally common in rural areas, especially around farmland adjacent to forested areas, barns, and scrap piles where these snakes have sufficient cover and an abundance of rodent prey. They are relatively tolerant of habitat fragmentation and can occur in large urban parks (ORAA 2023a).	Yes	**Suitable Habitat Present.**
Midland Painted Turtle	*Chrysemys picta marginata*	S4	Not Listed	SC	SC	Midland Painted Turtles frequent shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites. These turtles occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, bogs, creeks, rivers, and lakes. Females nest in organic, sandy, or gravelly soils in open habitats with high sun exposure, such as forest clearings, meadows, shorelines, fields, lawns, and road shoulders. Nest sites are typically within 200 metres of a water body but may be as far as 600 metres away from water. Midland Painted Turtles will use human-made aquatic habitats, such as agricultural and stormwater retention ponds. Adult Painted Turtles overwinter at the bottom of water bodies or submerged along undercut banks. Hatchlings may remain in their nest cavity and overwinter underground there or emerge and travel to wetlands to overwinter aquatically (ORAA 2023b).	Yes	**Suitable Habitat Present.**
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled (MECP 2024).	Yes	**Suitable Habitat Present.**
Snapping Turtle	*Chelydra serpentina*	S4	SC	Not Listed	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Appendage Waterleaf	*Hydrophyllum appendiculatum*	S2	Not Listed	Not Listed	Not Listed	Rich deciduous forests (beech, maple, etc.), especially in moist areas and ravines, blooming in late spring (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Bristly Buttercup	*Ranunculus hispidus*	S3	Not Listed	Not Listed	Not Listed	Rare and local in dry, open, upland deciduous woods in southern Ontario, primarily in the Carolinian Zone (NHIC 2024).	No	**Suitable Habitat Not Present.** Dry, open woods not present in the study area.
Broad-leaved Puccoon	*Lithospermum latifolium*	S2S3	Not Listed	Not Listed	Not Listed	Shaded river banks and forested floodplains; borders of forests; not often collected in the past half-century, but perhaps overlooked (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Chinese Hemlock-parsley	*Conioselinum chinense*	S2	Not Listed	Not Listed	Not Listed	Swamps with deciduous trees, cedar, tamarack; springy river banks, stream borders and springs. Usually in places were seepage is coming to the surface (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Crooked-stem Aster	*Symphyotrichum prenanthoides*	S2?	SC	SC	SC	Crooked-stem Aster grows in rich, sandy soil at the edge of forests or in sunny openings within forests. It also grows in wet areas along the banks of rivers and streams, and is sometimes found along roadsides (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Deer-tongue Panicgrass	*Dichanthelium clandestinum*	S2	Not Listed	Not Listed	Not Listed	Usually in moist and often sandy ground: floodplains and thickets on stream banks; aspen forests, borders, and clearings; marshy ground, ditches, etc (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Eastern Burning-bush	*Euonymus atropurpureus*	S3	Not Listed	Not Listed	Not Listed	Riverbanks and floodplain forests (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Eastern Yellow Stargrass	*Hypoxis hirsuta*	S2S3	Not Listed	Not Listed	Not Listed	Sandy open ground and oak forests, more often in fens, moist to wet meadows, swamp borders, and shores (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Dry oak forests not present in the study area.
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	S3?	Not Listed	Not Listed	Not Listed	Wet calcareous meadows, fens, moist to dryish prairies and prairie-like habitats, in calcareous soils (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** This type of habitat is present north of the study area (e.g. Komoka Feed Mill Prairie, around Komoka ponds), but it is not present in the study area.
Green Dragon	*Arisaema dracontium*	S3	SC	Not Listed	SC	The Green Dragon grows in somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees (MECP 2024).	Yes	**Suitable Habitat Present.**
Hairy-fruited Sedge	*Carex trichocarpa*	S3	Not Listed	Not Listed	Not Listed	Occurs in open, wet deciduous forests on floodplains, river banks, and floodplain marshes and meadows; tightly associated with larger rivers and their tributaries (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Largebract Tick-trefoil	*Desmodium cuspidatum*	S3	Not Listed	Not Listed	Not Listed	Oak and oak-hickory forests, borders and clearings, thickets and river banks (Michigan Flora Online 2024).	Yes	**Suitable Habitat Not Present.** May occur along the banks of the Thames River in the study area.
Rigid Sedge	*Carex tetanica*	S3?	Not Listed	Not Listed	Not Listed	Fens, sedge meadows, shores, interdunal swales, wet depressions in prairies, occasionally on limestone pavements, rarely in drier sites; a plant of calcareous soils (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Round-leaved Tick-trefoil	*Desmodium rotundifolium*	S2	Not Listed	Not Listed	Not Listed	Oak forests (sometimes with hickory or pine); dry thickets and openings (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Dry oak forests not present in the study area.
Schreber's Aster	*Eurybia schreberi*	S2	Not Listed	Not Listed	Not Listed	Rare and local in rich deciduous woods in the Carolinian Zone (NHIC 2024).	Yes	**Suitable Habitat Present.**
Schweinitz's Sedge	*Carex schweinitzii*	S3	Not Listed	Not Listed	Not Listed	Rather local, a species of calcareous soils occurring in springheads, springy seeps, and springy ground along cold spring-fed rivers and brooks, in mixed or coniferous cover; sometimes in the open (Michigan Flora Online 2024).	Yes	**Suitable Habitat Present.**
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	Not Listed	Not Listed	Not Listed	Usually found on forested dunes, hillsides, and river banks, whether in oak or beech-maple forests (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Dry sandy dune habitat not present in the study area.
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	Not Listed	Not Listed	Not Listed	Woods, fields, thickets, alvars; often on floodplains. Mainly in southwestern Ontario, north to the Maitland River valley, but historically east to Belleville, Hastings County (NHIC 2024).	Yes	**Suitable Habitat Present.**
Sundial Lupine	*Lupinus perennis*	S2S3	Not Listed	Not Listed	Not Listed	Dry usually sandy ground, ranging from prairies and open barrens or clearings to savannas of oak, jack pine, and/or aspen (Michigan Flora Online 2024).	No	**Suitable Habitat Not Present.** Dry sandy habitats that would favour lupine not present in the study area.
Tuberous Indian-plantain	*Arnoglossum plantagineum*	S2	SC	SC	SC	This species prefers open sunny areas in wet, calcium-rich meadows or shoreline fens. In Ontario, it grows along river banks and in wetlands near Lake Huron (MECP 2024).	No	**Suitable Habitat Not Present.** This type of habitat is not present in the study area.
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	S1	Not Listed	Not Listed	Not Listed	Dry to moist open sites and associated with acidic sandy soil in southern Ontario (NHIC 2024).	No	**Suitable Habitat Not Present.** This type of habitat is not present in the study area.

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Appendix D Species at Risk Habitat Assessment

Appendix D-A: Species at Risk Habitat Assessment for the Arva Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	THR	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010).	Yes	**Suitable Habitat Present.**
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR	Meadows, hayfields and pastures; also, other open habitat types including mown lawn (COSEWIC 2011). Prefers large (~5 ha), low-lying wet grasslands with abundant litter (COSEWIC 2011).	Yes	**Suitable Habitat Present.**
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END	The Red-headed Woodpecker breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries, and many private woodlands. Large, dead, weather trees with large dead branches are important habitat components (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR	In Ontario, the Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools. Adults feed on crustaceans and aquatic insects, while the young fish feed on plankton (MECP 2024).	Yes	**Suitable Habitat Present**
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR	Silver shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles (MECP 2024).	Yes	**Suitable Habitat Present**
Mammals								
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same	Yes	**Suitable Habitat Present.**
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing (MECP 2024).	Yes	**Suitable Habitat Present.**
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END	Northern Myotis is a forest dependent bat found throughout much of Southern Ontario (MECP 2021). Feeds within cluttered forest environments (MECP 2021). These bats hibernate from October or November to March or April, most often in caves or abandoned mines (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a	Yes	**Suitable Habitat Present.**
Molluscs								
Wavy-rayed Lampmussel	*Lampsilis fasciola*	S2	THR	SC	SC	The Wavy-rayed lampmussel is usually found in small to medium rivers with clear water. It lives in shallow riffle areas with clean gravel or sand bottoms. Like all mussels, this species filters water to find food, such as bacteria and algae. Mussel larvae are parasitic and must attach to a fish host, where they consume nutrients from the fish body until they transform into juvenile mussels and drop off. The Wavy-rayed lampmussel's fish hosts are the Largemouth bass and Smallmouth bass. The presence of fish hosts is one of the key features for an area to support a healthy mussel population (MECP 2024).	Yes	**Suitable Habitat Present**
Reptiles								
Spiny Softshell	*Apalone spinifera*	S2	END	END	END	Spiny softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Butternut	*Juglans cinerea*	S2?	END	END	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MECP 2024).	Yes	**Suitable Habitat Present.**
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR	In Ontario, 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 (MECP 2024).	No	**Habitat Not Present in Study Area.**

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Appendix D-B: Species at Risk Habitat Assessment for the Ilderton Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	SC	SC	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010).	No	**Habitat Not Present.** Hayfields and pastures not present in the study area.
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR	Meadows, hayfields and pastures; also, other open habitat types including mown lawn (COSEWIC 2011). Prefers large (~5 ha), low-lying wet grasslands with abundant litter (COSEWIC 2011).	Yes	**Suitable Habitat Present.**
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END	The Red-headed Woodpecker breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries, and many private woodlands. Large, dead, weather trees with large dead branches are important habitat components (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Bryophytes								
Spoon-leaved Moss	*Bryoandersonia illecebra*	S2	THR	THR	THR	Spoon-leaved moss grows in a range of habitat types but most Canadian populations are located on soil in low-lying areas that are seasonally flooded under trees or shrub thickets. It is often found in close proximity to a species of moss called narrow-leaved wetland plume moss, which is associated with swamps, marshes, and wet meadows (MECP 2024).	No	**Habitat Not Present.** Bottomland forests / swamps not present in the study area.
Fishes								
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR	In Ontario, the Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools. Adults feed on crustaceans and aquatic insects, while the young fish feed on plankton (MECP 2024).	No	**Habitat Not Present.** No rivers or large creeks present in the study area.
Mammals								
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed	In the spring and summer, eastern small-footed bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year (MECP 2024).	Yes	**Suitable Habitat Present.**
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing (MECP 2024).	Yes	**Suitable Habitat Present.**
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END	Northern Myotis is a forest dependent bat found throughout much of Southern Ontario (MECP 2021). Feeds within cluttered forest environments (MECP 2021). These bats hibernate from October or November to March or April, most often in caves or abandoned mines (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Butternut	*Juglans cinerea*	S2?	END	END	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MECP 2024).	Yes	**Confirmed occurence in**

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Appendix D-C: Species at Risk Habitat Assessment for the Kilworth Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs (MECP 2024).	No	**Habitat is Not Present in the Study Area.**
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010).	No	**Habitat Not Present.** Hayfields and pastures not present in the study area.
Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END	In Ontario and the United States, the main threat to this warbler is habitat loss from degrading and fragmenting forests, since it requires relatively large tracts of forest (MECP 2024).	No	**Habitat Not Present.** Suitable large tracts of undegraded forest not present in study area.
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR	Meadows, hayfields and pastures; also, other open habitat types including mown lawn (COSEWIC 2011). Prefers large (~5 ha), low-lying wet grasslands with abundant litter (COSEWIC 2011).	No	**Habitat Not Present.** Hayfields, pastures and appropriate sized meadows not present in the study area.
Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	THR	SC	Whip-poor-will favour open woodlands with frequent clearings. Its preferred nesting sites contain shaded leaf litter or pine needles and generally occur along wooded edges or in clearings without any herbaceous growth (Cadman et al. 2007).	No	**Habitat Not Present.** Suitable open woodlands with frequent clearings not present in study area.
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR	The Least Bittern is most frequently found in marshes of at least 5 ha, but may occasionally also occupy smaller marshes (e.g. cattail stands) along creeks and farm ponds (Cadman et al. 2007).	No	**Habitat Not Present.** Suitable wetlands not present in study area.
Louisiana Waterthrush	*Parkesia motacilla*	S2B	THR	THR	THR	The Louisiana Waterthrush favours mature deciduous and mixed forests with a strong eastern hemlock component in deeply incised ravines. It may also occupy large flooded tracts of mature, deciduous swamp forest (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END	The Red-headed Woodpecker breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries, and many private woodlands. Large, dead, weather trees with large dead branches are important habitat components (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR	In Ontario, the Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools. Adults feed on crustaceans and aquatic insects, while the young fish feed on plankton (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Sand Darter - Southwestern Ontario population	*Ammocrypta pellucida*	S2	THR	THR	THR	The Eastern Sand Darter prefers shallow habitats in lakes, streams, and rivers with clean, sandy bottoms (MECP 2024).	Yes	**Suitable Habitat Present.**
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR	The Lake Sturgeon lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents (MECP 2024).	No	**Habitat Not Present.** No natural lakes or deep rivers present in the study area.

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Northern Madtom	*Noturus stigmosus*	S1	END	END	END	The Northern Madtom usually lives in large creeks and rivers with a moderate to swift current, and a sand, gravel, or mud bottom. However, in Ontario, this fish has also been captured in the deeper waters of Lake St. Clair and the Detroit River. It prefers clean, unpolluted water but can tolerate slightly muddy water. Adults eat aquatic insects, crustaceans, and smaller fish. During the summer breeding season, Northern madtoms normally build nests under large flat rocks and logs (MECP 2024).	Yes	**Suitable Habitat Present.**
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR	The Pugnose Minnow prefers coastal wetlands, and slow-moving rivers and streams with clear, warm water, little or no current, and abundant vegetation (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Chub	*Macrhybopsis storeriana*	S2	THR	SC	END	Throughout most of its North American range, Silver Chub prefers medium to large rivers with substantial current and silt, sand or gravel bottoms, but in Ontario it is only found in the Great Lakes. It is usually found in depths between seven and 12 metres, and is believed to spawn in May and June in open water areas. It feeds on aquatic insect larvae, crustaceans and molluscs, including Zebra mussels (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR	Silver Shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles (MECP 2024).	Yes	**Suitable Habitat Present.**
Mammals								
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END	In Ontario, badgers are found in a variety of habitats, such as tall grass prairie, sand barrens and farmland. These habitats provide badgers with small prey, including groundhogs, rabbits and small rodents (MECP 2024).	No	**Habitat Not Present.** Suitable mix of grassland, sand barren and rural habitat not present in the study area.
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year (MECP 2024).	Yes	**Suitable Habitat Present.**
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing (MECP 2024).	Yes	**Suitable Habitat Present.**
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END	Northern Myotis is a forest dependent bat found throughout much of Southern Ontario (MECP 2021). Feeds within cluttered forest environments (MECP 2021). These bats hibernate from October or November to March or April, most often in caves or abandoned mines (MECP 2024).	Yes	**Suitable Habitat Present.**
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group (MECP 2024).	Yes	**Suitable Habitat Present.**

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Molluscs								
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END	The Fawnsfoot inhabits medium and large rivers with moderate to slow flowing water. It usually inhabits shallow waters (one to five metres deep) with gravel, sand or muddy bottom (MECP 2024).	Yes	**Suitable Habitat Present.**
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR	Purple Wartyback can be found in small to large rivers with different types of substrates, including cobble, gravel, mixed gravel and sand. The rivers they occur in typically have moderate to swift currents (MECP 2024).	Yes	**Suitable Habitat Present.**
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END	In Ontario, the Round Hickorynut is mainly found in rivers with clay, sand, or gravel bottoms. It also lives in shallow areas of lakes with firm sand. It prefers moderately fast moving water.The fish hosts of the Round hickorynut in Canada have not been confirmed but may include the Greenside darter and the Eastern sand darter, which is also a species at risk (MECP 2024).	Yes	**Suitable Habitat Present.**
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR	This mussel is found in large rivers with moderate current and stable gravel, sand and mud bottoms. It burrows in the riverbed to filter-feed. Likely host fish are the common shiner and longnose dace (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR	Uses a variety of forested and open habitats. Well-drained soil, loose or sandy soil, open vegetative cover such as open woods, brushland or forest edge. Roads are often a barrier to movement unless suitable habitat is contiguous on both sides of a road (COSEWIC 2021).	Yes	**Suitable Habitat Present.**
Queensnake	*Regina septemvittata*	S2	END	END	END	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock (MECP 2024).	Yes	**Suitable Habitat Present.**
Spiny Softshell	*Apalone spinifera*	S2	END	END	END	Spiny softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Black Ash	*Fraxinus nigra*	S4	END	Not Listed	THR	Black Ash is predominantly a wetland species found in swamps, floodplains and fens (MECP 2024).	Yes	**Suitable Habitat Present.**
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	SC	THR	In Ontario, Blue Ash grows in deciduous floodplain forests, and along sandy beaches and on limestone outcrops associated with Lake Erie (MECP 2024).	Yes	**Suitable Habitat Present.**
Butternut	*Juglans cinerea*	S2?	END	END	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END	Eastern Flowering Dogwood grows under taller trees in mid-age to mature deciduous or mixed forests. It most commonly grows on floodplains, slopes, bluffs and in ravines, and is also sometimes found along roadsides and fencerows (MECP 2024).	Yes	**Suitable Habitat Present.**
Hairy Valerian	*Valeriana edulis ssp. ciliata*	S1	THR	END	END	Hairy Valerian is typically found on wet and moderately wet prairies and fens, but it can also occur on drier sites such as hillsides and bluffs with groundwater flow. It occurs in full sun or light shade and is sometimes associated with calcium-rich sites (MECP 2024).	No	**Habitat Not Present.** Prairie remnants and fens not present in the study area.

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR	In Ontario, 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 (MECP 2024).	Yes	**Suitable Habitat Present.**
Smooth Yellow False Foxglove	*Aureolaria flava*	S2?	THR	THR	THR	Oak openings, sandy oak and oak-hickory savanna, with jack pine and aspen often present, forest borders and clearings (MECP 2024).	No	**Habitat Not Present.** Oak savanna not present in the study area.

References

Cadman, M. D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Conada, Ontario Field Ornithologists, Ontario . Ministry of natural resources, and Ontario Nature, Toronto, xxii + 134pp

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COSEWIC. 2021. COSEWIC assessment and status report on the Eastern Hog-nosed Snake *Heterodon platirhinos* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 45 pp.

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MECP. 2024. Species at Risk List. Retrieved May 1, 2024, from https://www.ontario.ca/page/species-risk-ontario

Appendix D-D: Species at Risk Habitat Assessment for the Komoka Study Area

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs (MECP 2024).	No	**Habitat is Not Present in the Study Area.**
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010).	Yes	**Suitable Habitat Present.**
Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END	In Ontario and the United States, the main threat to this warbler is habitat loss from degrading and fragmenting forests, since it requires relatively large tracts of forest (MECP 2024).	No	**Habitat Not Present.** Large tracts of forest not present in the study area.
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR	Meadows, hayfields and pastures; also, other open habitat types including mown lawn (COSEWIC 2011). Prefers large (~5 ha), low-lying wet grasslands with abundant litter (COSEWIC 2011).	Yes	**Suitable Habitat Present.**
Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	THR	SC	Whip-poor-will favour open woodlands with frequent clearings. Its preferred nesting sites contain shaded leaf litter or pine needles and generally occur along wooded edges or in clearings without any herbaceous growth (Cadman et al. 2007).	No	**Habitat Not Present.** Open woodlands with frequent clearings are not present in the study area.
Henslow's Sparrow	*Centronyx henslowii*	S1B	END	END	END	The Henslow's Sparrow nests in wet meadows, sedge marshes, regenerating old fields, hayfields and lightly used pasture. More specifically it requires large, open, usually moist to wet, often flat fields with a high graminoid to forb/shrub ratio. Vegetation must be dense and over 30cm tall (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR	The Least Bittern is most frequently found in marshes of at least 5 ha, but may occasionally also occupy smaller marhses (e.g. cattail stands) along creeks and farm ponds (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Louisiana Waterthrush	*Parkesia motacilla*	S2B	THR	THR	THR	The Louisiana Waterthrush favours mature deciduous and mixed forests with a strong eastern hemlock component in deeply incised ravines. It may also occupy large flooded tracts of mature, deciduous swamp forest (Cadman et al, 2007).	No	**Habitat Not Present.** Forests with a strong component of eastern hemlock not present in the study area.
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END	The Red-headed Woodpecker breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries, and many private woodlands. Large, dead, weather trees with large dead branches are important habitat components (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Yellow-breasted Chat	*Icteria virens*	S1B	END	Not Listed	END	The Yellow-breasted Chat breeds in scrubby, early succesional habitats. In Ontario, it utilizes regenerating old fields, forest edges, railway and hydro right-of-ways and young coniferous reforestations. It may occasionally occupy willow-ash-elm thickets bordering wetlands. Dense tangles of grape vine and raspbery are important features for breeding sites (Cadman et al, 2007).	Yes	**Suitable Habitat Present.** Various habitats within the study area are suitable.
Fishes								
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR	In Ontario, the Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools. Adults feed on crustaceans and aquatic insects, while the young fish feed on plankton (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Sand Darter - Southwestern Ontario population	*Ammocrypta pellucida*	S2	THR	THR	THR	The Eastern Sand Darter prefers shallow habitats in lakes, streams, and rivers with clean, sandy bottoms (MECP 2024).	Yes	**Suitable Habitat Present.**
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR	The Lake Sturgeon lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents (MECP 2024).	No	**Habitat Not Present.** No natural lakes or deep rivers present in the study area.

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR	The Pugnose Minnow prefers coastal wetlands, and slow-moving rivers and streams with clear, warm water, little or no current, and abundant vegetation (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR	Silver Shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles (MECP 2024).	Yes	**Suitable Habitat Present.**
Mammals								
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END	In Ontario, badgers are found in a variety of habitats, such as tall grass prairie, sand barrens and farmland. These habitats provide badgers with small prey, including groundhogs, rabbits and small rodents (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year (MECP 2024).	Yes	**Suitable Habitat Present.**
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing (MECP 2024).	Yes	**Suitable Habitat Present.**
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END	Northern Myotis is a forest dependent bat found throughout much of Southern Ontario (MECP 2021). Feeds within cluttered forest environments (MECP 2021). These bats hibernate from October or November to March or April, most often in caves or abandoned mines (MECP 2024).	Yes	**Suitable Habitat Present.**
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group (MECP 2024).	Yes	**Suitable Habitat Present.**
Molluscs								
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END	The Fawnsfoot inhabits medium and large rivers with moderate to slow flowing water. It usually inhabits shallow waters (one to five metres deep) with gravel, sand or muddy bottom (MECP 2024).	Yes	**Suitable Habitat Present.**
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR	Purple Wartyback can be found in small to large rivers with different types of substrates, including cobble, gravel, mixed gravel and sand. The rivers they occur in typically have moderate to swift currents (MECP 2024).	Yes	**Suitable Habitat Present.**
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END	In Ontario, the Round Hickorynut is mainly found in rivers with clay, sand, or gravel bottoms. It also lives in shallow areas of lakes with firm sand. It prefers moderately fast moving water.The fish hosts of the Round hickorynut in Canada have not been confirmed but may include the Greenside darter and the Eastern sand darter, which is also a species at risk (MECP 2024).	Yes	**Suitable Habitat Present.**
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR	This mussel is found in large rivers with moderate current and stable gravel, sand and mud bottoms. It burrows in the riverbed to filter-feed. Likely host fish are the common shiner and longnose dace (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								

Common Name	Scientific Name	S-Rank	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	Not Listed	END	Blanding's Turtles live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. It is not unusual, though, to find them hundreds of metres from the nearest water body, especially while they are searching for a mate or traveling to a nesting site. Blanding's Turtles hibernate in the mud at the bottom of permanent water bodies from late October until the end of April (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR	Uses a variety of forested and open habitats. Well-drained soil, loose or sandy soil, open vegetative cover such as open woods, brushland or forest edge. Roads are often a barrier to movement unless suitable habitat is contiguous on both sides of a road (COSEWIC 2021),	Yes	**Suitable Habitat Present.**
Queensnake	*Regina septemvittata*	S2	END	END	END	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock (MECP 2024).	Yes	**Suitable Habitat Present.**
Spiny Softshell	*Apalone spinifera*	S2	END	END	END	Spiny Softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Black Ash	*Fraxinus nigra*	S4	END	Not Listed	THR	Black Ash is predominantly a wetland species found in swamps, floodplains and fens (MECP 2024).	Yes	**Suitable Habitat Present.**
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	SC	THR	In Ontario, Blue Ash grows in deciduous floodplain forests, and along sandy beaches and on limestone outcrops associated with Lake Erie (MECP 2024).	Yes	**Suitable Habitat Present.**
Butternut	*Juglans cinerea*	S2?	END	END	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END	Eastern Flowering Dogwood grows under taller trees in mid-age to mature deciduous or mixed forests. It most commonly grows on floodplains, slopes, bluffs and in ravines, and is also sometimes found along roadsides and fencerows (MECP 2024).	Yes	**Suitable Habitat Present.**
Hairy Valerian	*Valeriana edulis ssp. ciliata*	S1	THR	END	END	Hairy Valerian is typically found on wet and moderately wet prairies and fens, but it can also occur on drier sites such as hillsides and bluffs with groundwater flow. It occurs in full sun or light shade and is sometimes associated with calcium-rich sites (MECP 2024).	No	**Habitat Not Present,** May occur in prairie remnants of the Komoka Feed Mill Prairie in the study area.
Purple Twayblade	*Liparis liliifolia*	S2S3	THR	THR	THR	In Ontario, 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 (MECP 2024).	Yes	**Suitable Habitat Present.**

References

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Appendix D-E: Species at Risk Habitat Assessment for the Delware Study Area

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Birds								
Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs (MECP 2024).	Yes	**Suitable Habitat Present.**
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	SC	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2010).	Yes	**Suitable Habitat Present.**
Eastern Meadowlark	*Sturnella magna*	S4B,S3N	THR	THR	THR	Meadows, hayfields and pastures; also, other open habitat types including mown lawn (COSEWIC 2011). Prefers large (~5 ha), low-lying wet grasslands with abundant litter (COSEWIC 2011).	Yes	**Suitable Habitat Present.**
Least Bittern	*Ixobrychus exilis*	S4B	THR	THR	THR	The Least Bittern is most frequently found in marshes of at least 5 ha, but may occasionally also occupy smaller marhses (e.g. cattail stands) along creeks and farm ponds (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END	The Red-headed Woodpecker breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries, and many private woodlands. Large, dead, weather trees with large dead branches are important habitat components (Cadman et al, 2007).	Yes	**Suitable Habitat Present.**
Fishes								
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR	In Ontario, the Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools. Adults feed on crustaceans and aquatic insects, while the young fish feed on plankton (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Sand Darter – Southwestern Ontario population	*Ammocrypta pellucida*	S2	THR	THR	THR	The Eastern Sand Darter prefers shallow habitats in lakes, streams, and rivers with clean, sandy bottoms (MECP 2024).	Yes	**Suitable Habitat Present.**
Lake Sturgeon (Great Lakes – Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	Not Listed	THR	The Lake Sturgeon lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents (MECP 2024).	No	**Suitable Habitat Not Present.** No natural lakes or deep rivers present in the study area.
Northern Madtom	*Noturus stigmosus*	S1	END	END	END	The Northern Madtom usually lives in large creeks and rivers with a moderate to swift current, and a sand, gravel, or mud bottom. However, in Ontario, this fish has also been captured in the deeper waters of Lake St. Clair and the Detroit River. It prefers clean, unpolluted water but can tolerate slightly muddy water. Adults eat aquatic insects, crustaceans, and smaller fish. During the summer breeding season, Northern madtoms normally build nests under large flat rocks and logs (MECP 2024).	Yes	**Suitable Habitat Present.**
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR	The Pugnose Minnow prefers coastal wetlands, and slow-moving rivers and streams with clear, warm water, little or no current, and abundant vegetation (MECP 2024).	Yes	**Suitable Habitat Present.**
Silver Chub	*Macrhybopsis storeriana*	S2	THR	SC	END	Throughout most of its North American range, Silver Chub prefers medium to large rivers with substantial current and silt, sand or gravel bottoms, but in Ontario it is only found in the Great Lakes. It is usually found in depths between seven and 12 metres, and is believed to spawn in May and June in open water areas. It feeds on aquatic insect larvae, crustaceans and molluscs, including Zebra mussels (MECP 2024).	No	**Suitable Habitat Not Present.** Study area outside of the Great Lakes.

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Silver Shiner	*Notropis photogenis*	S2S3	THR	THR	THR	Silver Shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles (MECP 2024).	Yes	**Suitable Habitat Present.**
Mammals								
American Badger (Southwestern Ontario population)	*Taxidea taxus jacksoni*	S1	END	END	END	In Ontario, badgers are found in a variety of habitats, such as tall grass prairie, sand barrens and farmland. These habitats provide badgers with small prey, including groundhogs, rabbits and small rodents (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not Listed	Not Listed	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year (MECP 2024).	Yes	**Suitable Habitat Present.**
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing (MECP 2024).	Yes	**Suitable Habitat Present.**
Northern Myotis	*Myotis septentrionalis*	S3	END	END	END	Northern Myotis is a forest dependent bat found throughout much of Southern Ontario (MECP 2021). Feeds within cluttered forest environments (MECP 2021). These bats hibernate from October or November to March or April, most often in caves or abandoned mines (MECP 2024).	Yes	**Suitable Habitat Present.**
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group (MECP 2024).	Yes	**Suitable Habitat Present.**
Molluscs								
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END	The Fawnsfoot inhabits medium and large rivers with moderate to slow flowing water. It usually inhabits shallow waters (one to five metres deep) with gravel, sand or muddy bottom (MECP 2024).	Yes	**Suitable Habitat Present.**
Purple Wartyback	*Cyclonaias tuberculata*	S2	THR	Not Listed	THR	Purple Wartyback can be found in small to large rivers with different types of substrates, including cobble, gravel, mixed gravel and sand. The rivers they occur in typically have moderate to swift currents (MECP 2024).	Yes	**Suitable Habitat Present.**
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END	In Ontario, the Round Hickorynut is mainly found in rivers with clay, sand, or gravel bottoms. It also lives in shallow areas of lakes with firm sand. It prefers moderately fast moving water.The fish hosts of the Round hickorynut in Canada have not been confirmed but may include the Greenside darter and the Eastern sand darter, which is also a species at risk (MECP 2024).	Yes	**Suitable Habitat Present.**
Threehorn Wartyback	*Obliquaria reflexa*	S1	THR	THR	THR	This mussel is found in large rivers with moderate current and stable gravel, sand and mud bottoms. It burrows in the riverbed to filter-feed. Likely host fish are the common shiner and longnose dace (MECP 2024).	Yes	**Suitable Habitat Present.**
Reptiles								

Common Name	Scientific Name	S-RANK	SARO Status	SARA Status	COSEWIC Status	Preferred Habitat Characteristics	Habitat Present in the Study Area	Habitat Potential
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	END	END	Blanding's Turtles live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. It is not unusual, though, to find them hundreds of metres from the nearest water body, especially while they are searching for a mate or traveling to a nesting site. Blanding's Turtles hibernate in the mud at the bottom of permanent water bodies from late October until the end of April (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR	Uses a variety of forested and open habitats. Well-drained soil, loose or sandy soil, open vegetative cover such as open woods, brushland or forest edge, Roads are often a barrier to movement unless suitable habitat is contiguous on both sides of a road (COSEWIC 2021),	Yes	**Suitable Habitat Present.**
Queensnake	*Regina septemvittata*	S2	END	END	END	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock (MECP 2024).	Yes	**Suitable Habitat Present.**
Spiny Softshell	*Apalone spinifera*	S2	END	END	END	Spiny softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them (MECP 2024).	Yes	**Suitable Habitat Present.**
Plants								
Blue Ash	*Fraxinus quadrangulata*	S2?	THR	THR	THR	In Ontario, Blue Ash grows in deciduous floodplain forests, and along sandy beaches and on limestone outcrops associated with Lake Erie (MECP 2024).	Yes	**Suitable Habitat Present.**
Butternut	*Juglans cinerea*	S2?	END	END	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MECP 2024).	Yes	**Suitable Habitat Present.**
Eastern Flowering Dogwood	*Cornus florida*	S2?	END	END	END	Eastern Flowering Dogwood grows under taller trees in mid-age to mature deciduous or mixed forests. It most commonly grows on floodplains, slopes, bluffs and in ravines, and is also sometimes found along roadsides and fencerows	Yes	**Suitable Habitat Present.**
Red Mulberry	*Morus rubra*	S2	END	END	END	In Ontario, 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 (MECP 2024).	Yes	**Suitable Habitat Present.**

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