DRAFT

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

ENVIRONMENTAL IMPACT STUDY
ADELAIDE WASTEWATER TREATMENT PLANT
LONDON, ONTARIO

Prepared for:
THE CITY OF LONDON

Prepared by:
MATRIX SOLUTIONS INC.

Version 0.2
November 2021
Guelph, Ontario

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ENVIRONMENTAL IMPACT STUDY

ADELAIDE WASTEWATER TREATMENT PLANT

CITY OF LONDON

Prepared for City of London, November 2021

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VERSION CONTROL

Version	Date	Issue Type	Filename	Description
V0.1	19-Oct-2021	Draft	32667-531 Greenway and Adelaide EIS R 2021-10-20 draft V0.1.docx	Issued to client for review
V0.2	26-Nov-2021	Draft revised	32667-531 Adelaide EIS R 2021-11-26 draft V0.2.docx	Report split into two; revisions issued to client

EXECUTIVE SUMMARY

The City of London retained Matrix Solutions Inc. to complete two Municipal Class Environmental Assessments (EA) to address climate change resiliency measures at the Greenway Wastewater Treatment Centre (WWTC) and Adelaide Wastewater Treatment Plant (WWTP). The two facilities have been identified as vulnerable to severe flooding and the EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

This report will focus on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP discussed in a separate report. The purpose of the Environmental Impact Study (EIS) was to define and record the natural heritage features, discuss implications and constraints to the proposed short list of alternatives, and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives for Adelaide WWTP recommended developing a berm with varying entrance protection.

Matrix combined information from the ecological field studies with relevant information from background reviews to identify significant features within the Adelaide WWTP study area. The results indicated several natural heritage features, which included:

- significant woodlands
- wetlands (unevaluated)
- candidate significant wildlife habitat
- candidate and confirmed species at risk (SAR)
- fish and fish habitat

The most significant ecological functions identified within the Adelaide WWTP study area include the significant woodland located to the south of the WWTP. A confirmed avian SAR (Chimney swift) was observed flying over the study area but does not have confirmed nesting sites within the study area; therefore, it is not anticipated to be directly impacted during construction activities.

The major undertakings of the flood mitigation alternatives at the Adelaide WWTP include the creation of a berm that would encapsulate the northern, western, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property, which largely includes a parking lot. The north and east portions of the study area, where the berm and raised entrance are to be erected, are already disturbed (parking lot and manicured lawn) and will include minimal vegetation removal. The majority of the natural heritage features within the site are located along the west and south side of the property. It has been recommended within the mitigation measures that the construction of the berm should not impede with the significant woodland located directly south of the proposed berm. Tree protection fencing for this area should be located outside of the dripline to keep the significant woodland intact and to minimize impact. Along the western side of the proposed berm there will be some vegetation removal, which is

located within 25 m of a stormwater outfall that outlets into the Thames River. Mitigation measures have been recommended to protect this outfall and the Thames River from erosion, sedimentation, and spills. Any trees removed should be replaced at a 3:1 ratio, which will result in a long-term, net benefit for the area once the trees and vegetation reach maturity.

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1 INTRODUCTION

The City of London (the City) retained Matrix Solutions Inc. to complete two Municipal Class Environmental Assessments (EAs) to address climate change resiliency measures at the Greenway Wastewater Treatment Centre (WWTC) and Adelaide Wastewater Treatment Plants (WWTP) in London, Ontario. The two facilities have been identified as vulnerable to severe flooding, and the EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

One component of the EA process is the completion of an Environmental Impact Study (EIS) to define and record the natural heritage features, discuss implications and constraints to the proposed short list of alternative designs and recommend mitigation measures to offset any potential negative impacts to protected features.

This report will focus on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP discussed in a separate report.

1.1 Study Area

The study area includes the fenced in area of the WWTP and the 50 m surrounding the facility.

The Adelaide WWTP is located at 1153 Adelaide Street North #0B1 (Figure 2). Adelaide is approximately 300 m from the Thames River. It is bounded to the north by the North London Athletic Fields, to the south and east by residential and commercial lands, and to the southwest by an undeveloped natural area.

1.2 Study Objectives

The objective of the EIS is to define and record the natural heritage features within each facilities study area, discuss implications and constraints to the proposed short list of alternative designs and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives recommends developing a berm with varying entrance protections for the Adelaide WWTP.

This EIS document was completed to meet the objectives and criteria as defined within the approved Terms of Reference (Appendix A) as well as applicable federal, provincial, and municipal policies and guidelines as defined in Section 2.

Easting (m)

479400 479550 479700 479850 480000 480150

Northing (m)

4762800 4762650 4762500 4762350 4762200

- Adelaide Wastewater Treatment Plant Study Area
- Adelaide Wastewater Treatment Plant Study Area (50m Buffer)
- Highway
- Road

1:3,000 metres

30 0 30 60

NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Study Area

Date:	Project:	Submitter:	Reviewer:
November 2021	32667	K. Reis	R. Leppington

Figure 1

I:\City of London\32667\Figures And Tables\EA\2021\Report\EIS_Reporting\Adelaide\Figure 1-Adelaide _Study_Area.mxd - Tabbed_L - 25-Nov-21, 06:04 PM - mwright - TID005

2 REGULATORY FRAMEWORK

This section provides an overview of key federal, provincial, and local environmental legislation, policies, and regulations that are directly applicable/relevant to the Adelaide study area. This policy framework provides guidance on the protection of natural heritage features and the evaluation of significance. Features identified within the study area were evaluated against relevant federal, provincial, and municipal planning policies applicable to the local site context, to determine natural heritage constraints and recommend appropriate mitigation measures to minimize risks of negative impacts to the environment.

2.1 Federal Legislation

2.1.1 Species at Risk Act

Species classified as extirpated, endangered, and threatened in Schedule 1 of the *Species at Risk Act* (SARA) are protected under the provisions of SARA. This includes protection to the species and their critical habitat. Critical habitat is defined as those habitats necessary for the survival or recovery of a listed species, as identified in the recovery strategy or in an action plan for the species. While SARA applies to species on federal land, such as Canadian oceans and waterways, national parks, national wildlife areas, some migratory bird sanctuaries, and First Nations reserve lands, it also applies to species at risk (SAR) migratory birds protected under the *Migratory Birds Convention Act* (MBCA) and fish, anywhere they occur. Therefore, SARA only applies to SAR migratory birds, fish, and mussels for this project.

General prohibitions (does not apply to Special Concern species except for provisions related to EAs, in which case, all Schedule 1 species apply) that apply:

- kill, harm, harass, capture, or take an individual of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated (Section 32[1] of SARA)
- possess, collect, buy, sell, or trade an individual, or any part or derivative of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated (Section 32[2] of SARA)
- damage or destroy the residence (e.g., nest or den) of one or more individuals of a species listed in Schedule 1 of SARA as Endangered or Threatened, or that an activity is listed as Extirpated, if a recovery strategy has recommended the reintroduction of the Extirpated species (Section 33 of SARA)

Destruction of critical habitat of any listed Endangered species or of any listed Threatened species if the following apply:

- the critical habitat is on federal land, in the exclusive economic zone of Canada, or on the continental shelf of Canada

- the listed species is an aquatic species
- the listed species is a species of migratory birds protected by the MBCA (Section 58[1] of SARA)

General habitat (necessary for the species survival and recovery) (S.80) by Emergency Order only:

- applies to all species, including aquatic and migratory birds on federal land or Exclusion Economic Zone (relates to the sea)
- migratory birds on non-federal lands or Exclusion Economic Zone (relates to the sea)
- all species, except aquatic and migratory birds, on non-federal lands or Exclusion Economic Zone (relates to the sea)

2.1.2 Fisheries Act

The *Fisheries Act* outlines the framework for the management and regulation of fisheries and the conservation and protection of fish and fish habitat within the fishing zones of Canada, all waters in the territorial sea of Canada, and all internal waters of Canada. The most recent revision to the *Fisheries Act* restricts activities that cause "death of fish, other than by fishing" as well as the "harmful alteration, disruption, or destruction of fish habitat (HADD; Government of Canada 2019)" and the release of substances that are known or suspected to be deleterious to fish or fish habitat.

Proposed works that are anticipated to directly or indirectly result in negative impacts to fish and fish habitat as described in the *Fisheries Act* will require a review by Fisheries and Oceans Canada (DFO) to determine whether the proposed activities may be permitted under the *Fisheries Act*. If so, the project may require an authorization or ministry approval under the *Fisheries Act* (DFO 2021a).

2.1.3 Migratory Birds Convention Act

The MBCA and associated regulations, including the Migratory Birds Regulations protect certain native species of migratory birds and their nests and eggs. Any migratory bird species that meets all three of the following criteria is protected under the MBCA:

- birds referred to in Article 1 of the Migratory Birds Convention, as amended under the 1995 Protocol, either directly by species name, directly by the listing of their family, or indirectly by interpretation of the original convention
- species that are native or naturally occurring in Canada:
    - A native migratory bird is one that is present entirely as a result of natural biological or ecological processes.

- Species known to have regularly occurred in Canada. Although species that occur frequently (i.e., “accidentals”) and that meet criteria 1 and 2 are not included on this list, they continue to be considered as having protection under the MBCA any time they occur in Canadian territory.

General prohibitions under the MBCA and associated regulations protect migratory birds, their nests, and eggs and prohibit the deposit of harmful substances in waters and areas frequented by them. It also prohibits deposition of harmful substances that have the potential to enter waters where they occur. The associated regulations also include an additional prohibition against the incidental take, which is defined as “the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs.”

Environment and Climate Change Canada (ECCC) administers the MBCA and its associated regulations. Compliance with the MBCA and associated regulations is best achieved through a due diligence approach based on the consideration of avoidance guidelines on the ECCC website. Any vegetation removals would need to be completed outside of the breeding bird season for Zone C2 (April 10 to August 15) to avoid disturbing active nests of migratory birds protected under the MBCA (Government of Canada 2021).

2.2 Provincial Legislation, Policies, and Guidelines

2.2.1 Endangered Species Act

The *Endangered Species Act* (ESA) provides for the conservation and protection of fauna and flora species within the Province of Ontario that are at risk of extinction. Section 9(1) of the ESA prohibits the killing, harming, harassment, capture, taking, possession, transport, collection, buying, selling, leasing, trading, or offering to buy, sell, lease, or trade species listed as extirpated, endangered, or threatened on the Species at Risk in Ontario (SARO) list. Section 10(1) of the ESA prohibits damaging or destroying habitat of endangered or threatened species on the SARO list and may apply to extirpated species through special regulations. General habitat protection applies to all endangered and threatened species. Species-specific habitat protection is also given to those species with regulated habitat, as identified in Ontario Regulation 242/08. Species designated as special concern are not given species or habitat protection under the ESA; however, this designation aids in identification of significant wildlife habitat (SWH) at the municipal level.

Should an ESA protected species be encountered, impacts to the species or its habitat must be avoided or mitigated. Strategies to avoid contravention of the ESA include avoidance (e.g., through design modifications or timing of works), adherence to an applicable Notice of Activity, or by obtaining an Overall Benefit Permit.

2.2.2 Provincial Policy Statement

The Provincial Policy Statement, 2020 (PPS; MMAH 2020) provides policy direction related to land use planning and development in Ontario. The updated PPS, issued under Section 3 of the *Planning Act*, came into effect May 1, 2020, and applies to planning decisions made on or after that date. The PPS

addresses the need to protect natural heritage features to ensure Ontario's long-term prosperity, environmental health, and social well-being.

Section 2.1 of the PPS provides direction to regional and local municipalities regarding planning policies for the protection and management of natural heritage features and resources. The natural heritage policies that are relevant to this project state (MMAH 2020):

2.1.1 Natural features and areas shall be protected for the long term.

2.1.2 The diversity and connectivity of natural features in an area, and the long term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.3 Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

2.1.4 Development and site alteration shall not be permitted in: a) significant wetlands in Ecoregions 5E, 6E and 7E; and b) significant coastal wetlands.

2.1.5 Development and site alteration shall not be permitted in:

a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
d) significant wildlife habitat;
e) significant areas of natural and scientific interest; and
f) coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and, 2.1.6 unless the ecological function of the

adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.1.9 Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue.

2.2.2.1 Natural Heritage Reference Manual

The *Natural Heritage Reference Manual for the Natural Heritage Policies of the Provincial Policy Statement, 2005* (NHRM; MNR 2010) was developed to provide technical guidance for implementing the natural heritage policies of the PPS. Although not yet updated to reflect changes adopted by the 2020 PPS update, it still functions as an important tool for those involved in development and review of policy documents, review and approval of development applications, and matters before provincial boards and tribunals. The NHRM is organized by specific natural heritage policies and provides basic guidance materials in the main sections, supported by more technical material in its appendices. The NHRM provides criteria in which to evaluate natural heritage features for their significance as well as recommendations for mitigation. Natural heritage features covered under the NHRM include:

- significant habitat of endangered and threatened species
- significant wetlands and significant coastal wetlands
- significant woodlands
- significant valleylands
- SWH
- significant areas of natural and scientific interest (ANSIs)
- fish habitat

Some of these features (i.e., Provincially Significant Wetlands [PSWs] and ANSIs) are identified, often with input from consultants, by the Ontario Ministry of Natural Resources and Forestry (MNRF). Others are to be identified by the local area municipalities or planning authorities (i.e., significant woodlands, significant valleylands, SWH). Threatened and endangered species are designated at the provincial level, but their habitat is typically not identified or verified until site-specific studies are completed and, if present, confirmed by MNRF. It is expected that even where features have been identified at the provincial, regional, or local levels that verification and some level of refinement will be required at the site-specific level.

2.2.2.2 Significant Wildlife Habitat Technical Guide

Pre-dating the NHRM, the *Significant Wildlife Habitat Technical Guide* (SWHTG; MNR 2000) was prepared to assist planning authorities and other participants in the land use planning systems. The SWHTG provides a technical manual that presents information on the identification, description, and prioritization of SWH. The document describes in detail some of the techniques, issues, and processes identified in the NHRM and provides a compilation of relevant technical support materials and references. Though it is

based on a former version of the NHRM, it provides additional information for evaluating SWH. In order to ensure a comprehensive approach identifying and evaluating SWH, the SWHTG divides wildlife habitat into four categories:

- seasonal concentration areas
- rare vegetation communities or specialized habitats for wildlife
- habitats of species of conservation concern
- animal movement corridors

More recently, due to Ontario's size and biodiversity, MNRF also created SWH ecoregion criteria schedules that support the SWHTG and provide criteria that are reflective of regional significance. Information provided in the schedules includes descriptions of wildlife habitat, wildlife species, and the criteria required to determine SWH. For this project, the assessment of SWH follows the guidelines in *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015).

2.2.3 Conservation Authorities Act

Section 28(1) of the *Conservation Authorities Act* empowers conservation authorities with the ability to make regulations governing development that can have an impact on watercourses, water bodies, and other hazard lands such as floodplains and wetlands.

Adelaide WWTP is within the Upper Thames Region Conservation Authority (UTRCA) regulation limits. As such, development on these lands must adhere to the policies and regulations of Ontario Regulation 157/06: *Upper Thames River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*.

Proposed developments or associated works that may impact UTRCA-regulated areas may require permitting from UTRCA.

2.2.3.1 Upper Thames River Conservation Authority Environmental Planning Policy Manual

The *Environmental Planning Policy Manual for the Upper Thames River Conservation Authority* was approved on June 28, 2006, and was revised on October 24, 2017 (UTRCA 2017). The purpose of the manual is to provide local Upper Thames watershed policies that will guide development and site alteration while protecting, preserving, and enhancing the natural environment (UTRCA 2017).

The document identifies natural hazards (floodplains and slopes) and natural heritage resources (wetlands, woodlands, valleylands, wildlife habitat, threatened and endangered species, aquatic/fish habitat, and life science areas), and illustrates the UTRCA protection and preservation policies for these features. The goal of this planning document is to protect natural heritage features from negative impacts

and to maintain, restore, and enhance the biodiversity, ecological function, and connectivity of natural heritage features within the watershed (UTRCA 2017).

2.2.4 Accessibility for Ontarians with Disabilities Act

Ontario Regulation 413/12: *Integrated Accessibility Standards* provides for the development, implementation, and enforcement of accessibility standards in order to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures, and premises on or before January 1, 2025.

2.3 Municipal Legislation, Policies, and Guidelines

2.3.1 The London Plan (City of London Official Plan)

The London Plan is the City's new official plan adopted by City council on June 23, 2016, and was approved by the Minister on December 28, 2016 (City of London 2016). The plan establishes a policy framework to guide the City's growth and development. The objectives and policies of this plan were drafted by City council to assist in making decisions for the physical development of the municipality, while having regard for relevant social, economic, and environmental matters.

The City has mapped the natural heritage system and identified areas as Green Space Place Type or Environmental Review Place Type. Natural heritage areas that are within the Green Space Place Type represent significant natural features and ecological functions. Natural heritage features and areas and other areas included in the Green Space Place Type include:

- fish habitat
- habitat of endangered species and threatened species
- PSWs
- significant woodlands and woodlands
- significant valleylands
- SWH
- ANSIs
- water resource systems
- Environmentally Significant Areas (ESAs)
- upland corridors
- potential naturalization areas
- adjacent lands

Natural heritage features and areas included in the Environmental Review Place Type include:

- unevaluated wetlands
- unevaluated vegetation patches
- other vegetation patches larger than 0.5 ha
- valleylands
- potential ESAs

The environmental policies section of *The London Plan* further describes the natural heritage features as well as the permitted and unpermitted development and alternation within these features.

2.3.2 City of London Environmental Management Guidelines

In 2007, the City completed and approved a set of six Environmental Management Guidelines (City of London 2007). These guidelines provide a consistent template, which has clear expectations and ensures that relevant issues are not overlooked and that unnecessary items are excluded.

The City's *Guidelines for the Preparation and Review of Environmental Impact Statements* was utilized most extensively during the planning process for this project to determine the scope of the EIS (City of London 2003). The project is subject to EIS requirements, as it is located within a significant river corridor (among other components discussed in Section 5 of this report). A review of the EIS Issues Summary Checklist was completed to scope the EIS and identify ecological data gaps within the Adelaide WWTP study area. The EIS final Terms of Reference was approved by the City on May 4, 2021 (Appendix A).

2.3.3 Thames Valley Corridor Plan

The *City of London Thames Valley Corridor Plan* (Dillon Consulting and D.R. Poulton 2011) recommends measures to protect and enhance the natural features within the Thames River Valley in support of *The London Plan* (City of London 2016). A key ecological goal of the *City of London Thames Valley Corridor Plan* is to preserve, enhance, and create ecological corridors and linkages between natural features in order to establish a continuous corridor along the Thames River and enhance linkages to tributary watersheds (Dillon Consulting and D.R. Poulton 2011).

2.3.4 Middlesex County Official Plan

The *Middlesex County Official Plan* was most recently consolidated in 2006 (Middlesex County 2006). Middlesex County surrounds the City, but the City itself is politically separate from Middlesex County.

The *Middlesex County Official Plan* endeavours to work with the City and provide seamless policy integration with *The London Plan*.

3 STUDY APPROACH AND METHODOLOGY

Information pertaining to natural heritage resources within or adjacent to the Adelaide WWTP study area was obtained through a review of available background studies, databases, and field investigations.

3.1 Background Review

The following information sources were reviewed for records related to natural heritage features that have the potential or are known to occur within the Adelaide study area.

Initial background requests regarding terrestrial sensitivities and SAR were submitted to the Ministry of the Environment, Conservation and Parks (MECP) and to the UTRCA. In addition to information provided by these regulatory agencies, other publicly available data sources were reviewed to determine potential species of conservation concern (SCC) and SAR whose occurrence ranges overlap with the study area. Background review material for the study area has also been obtained from available secondary source reports. The majority of background information was provided by the UTRCA. The sources reviewed are outlined in Table 1.

TABLE 1 Background Data Sources Reviewed

Source	Type	Description
Ministry of Environment, Conservation and Parks (MECP; Markham 2021, Pers. Comm.)	Agency Correspondence	A project screening request was sent to MECP on May 12, 2021, for information related to natural heritage features and species at risk (SAR) potential within the study area. The MECP responded on August 27, 2021, indicating additional SAR and species of conservation concern (SCC), which were incorporated into Appendix B
Upper Thames Region Conservation Authority (UTRCA; Ramsey 2021, Pers. Comm.)	Agency Correspondence	A background request for natural heritage information was submitted to UTRCA on May 12, 2021. This information was received on June 9, 2021, and was incorporated into Appendix B.
Ministry of Natural Resources and Forestry (MNRF; Webb 2021, Pers. Comm.)	Agency Correspondence	A background request for natural heritage information was submitted to MNRF on May 12, 2021. This information was received on June 9, 2021, and was incorporated into Appendix B.
Aquatic Species at Risk Maps (DFO 2021b)	Online Database	Aquatic SAR mapping is made available online by Fisheries and Oceans Canada for species listed endangered, threatened, or special concern under the *Species at Risk Act*. Results are included in Appendix C.
Natural Heritage Information Center (NHIC) Make-a-Map: Natural Heritage Areas (NHA MaM) (MNRF 2021a)	Online Database	A web application that provides information on provincial parks, conservation reserves, and natural heritage features (i.e., Areas of Natural and Scientific Interest (ANSI), wetlands, woodlands, and natural heritage systems related to provincial policy plan areas, such as the Niagara Escarpment, Oak Ridges Moraine, and Greenbelt Plans.) The NHA MaM also provides NHIC data, which is organized into 1 km^2 map squares and includes information on SCC and SAR records. Results are included in Appendix C.

Source	Type	Description
Lands Information Ontario (LIO) Geospatial Data (MNRF 2021b)	Online Database	LIO data is maintained by MNRF and provides key provincial geospatial data for Ontario. Shapefiles obtained from the LIO open datasets were used to show the natural features within the study area. Key datasets that were reviewed for the study area include policy plan areas, municipal land use designations, ANSIs, provincial parks and conservation areas, wetlands, woodlands, and watercourses.
Atlas of the Mammals of Ontario (Dobbyn 1994)	Online Atlas	The *Atlas of the Mammals of Ontario* shows the geographic distribution of mammals for three time periods: pre-1900, 1900 to 1969, and 1970 to 1993. A review of the 1970 to 1993 period was completed. Results are included in Appendix C.
Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature 2015)	Online Atlas	The ORAA provides known ranges of reptiles and amphibian species in Ontario based on historic and current species occurrences. Results are included in Appendix C.
Ontario Breeding Bird Atlas Guide for Participants (OBBA; OBBA 2001)	Online Atlas	The OBBA provides a list of bird species that have been observed during surveys completed between 1981 and 1985, and 2001 and 2005. Species that were documented between 2001 and 2005 were considered as part of this study. Results are included in Appendix C.
Ontario Butterfly Atlas (OBA; TEA 2019)	Online Atlas	The OBA collects observations of butterflies within Ontario. Sightings were reviewed from 2016 onward. Results are included in Appendix C.
Important Bird Areas of Canada (IBA; Bird Studies Canada 2021)	Online Atlas	The IBA was reviewed to determine if there are any important bird areas within the study area. Reviewed and study area are not located within an important bird area.
The London Plan (City of London 2016)	Online Mapping	*The London Plan* is the City of London's official plan, and schedules were reviewed to determine if there were any identified natural heritage features within the study area. Results are included in Appendix C
Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study, Richmond Street to Adelaide Street (Dillon Consulting 2016)	Report	Environmental impact study for lands adjacent to and partially within the Thames River Valley between Richmond Street and Adelaide Street in London. Significant findings were incorporated into this report.
One River Master Plan Environmental Assessment, River Characterization, City of London, Thames River (Matrix 2019)	Report	The One River Master Plan Municipal Class Environmental Assessment (EA) was initiated to integrate the outcomes of the dam, Ribbon of the Thames design, and other various improvement projects along the Thames River and adjacent valley corridor. The EA included lands adjacent to the Thames River from "the Forks" to Springbank Dam. Significant findings were incorporated into this report.
City of London Thames Valley Corridor Plan (Dillon Consulting and D.R. Poulton 2011)	Report	The *City of London Thames Valley Corridor Plan* recommends measures to protect and enhance the natural features within the Thames River Valley in support of *The London Plan*

3.2 Analysis of Significance and Sensitivity

The ecological features identified within the study area are evaluated to determine the significance of each feature. Significance is based on regional, provincial, and federal designations, which are described in the following subsections.

3.2.1 Natural Area Designations

Natural area designations are those that are recognized as significant on official plans or in other policy planning documents. This includes ANSIs (provincially, regionally, or other), significant wetlands (provincially, regionally, or locally), significant woodlands, and ESAs. ANSIs and ESA are evaluated by the province or municipality, while of these designations, only wetlands and woodlands can be assessed for significance by non-government organizations.

3.2.2 Significant Wildlife Habitat Screening

MNRF provides specific guidance on identifying and assessing wildlife habitat in the SWHTG (MNR 2000), the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015), and the NHRM (MNR 2010). The MNRF recognizes five main categories of wildlife habitat, each with several wildlife habitat types, each with criteria to evaluate significance. A description of each wildlife habitat category is provided below.

- **Seasonal concentration areas of animals:** defined as “areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons” and areas that are “localized and relatively small in relation to the area of habitat used at other times of the year” (MNR 2010).

- **Rare vegetation communities:** defined as “areas that contain a provincially rare vegetation community and areas that contain a vegetation community that is rare within the planning area” (MNR 2010).

- **Specialized habitat for wildlife:** defined as “areas that support wildlife species that have highly specific habitat requirements, areas with high species and community diversity, and areas that provide habitat that greatly enhances species' survival” (MNR 2010).

- **Habitat for SCC:** defined as “habitats of species that are designated at the national level as Endangered or Threatened by COSEWIC [the Committee on the Status of Endangered Wildlife in Canada], which are not protected in regulation under Ontario's ESA [the *Endangered Species Act*]; habitats of species listed as Special Concern under the ESA on the SARO [Species at Risk in Ontario] List (formerly referred to as "Vulnerable" in the SWHTG); and habitats of species that are assigned a provincial (i.e., sub-national) conservation status rank of S1 to S3 and are not on the SARO List” (MNR 2010).

- **Animal movement corridors:** defined as “elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another” (MNR 2010).

3.2.3 Species at Risk Screening

The background review identified potential SAR that could occur within the Adelaide study area. All SAR identified were screened to determine the likelihood of occurrence and whether suitable habitat is present.

SAR are defined in this report to include the following provincial and federal designations:

- ESA (provincial): all provincially designated species that are listed as extirpated, endangered, or threatened on the SARO list and protected under the ESA; species listed as special concern are considered a SCC, as they are not protected under the ESA.

- SARA (federal): only applies to fish and migratory birds protected under the MBCA, anywhere they occur (e.g., includes non-federal land), that are designated as extirpated, endangered, and/or threatened under the SARA. All other species are only protected if special provisions or executive orders are made.

To determine if suitable habitat for SAR is available within the study area, the preferred habitat requirements for reported SAR were compared to vegetation communities, aquatic habitats, and niche habitats identified during field inventories and the background review. The results of the SAR habitat screening are provided in Section 6.7.

4 FIELD METHODOLOGY

Matrix staff completed field inventories within the Adelaide study area during the spring and summer of 2021 as part of the EIS. Field inventories completed by each staff member are provided in Table 2. Detailed methods are described in the following subsections.

TABLE 2 Field Survey Summary

Field Inventory	Date	Matrix Staff
Vegetation (Ecological Land Classification, Botanical Inventory, Invasive Species)	April 16, 2021 August 9, 2021 August 13, 2021	Peter De Carvalho
Bat Maternity Roosting Habitat Survey	April 16, 2021(Leaf-off) August 9, 2021(Leaf -on)	Peter De Carvalho
Breeding Birds	June 4, 2021 June 24, 2021	Matthew Ilse
Incidental Observations	Collected during all site visits	All Staff

4.1.1 Ecological Land Classification

Vegetation community delineation was completed within the study area using aerial photography and refined thorough investigations in the field. The standard Ecological Land Classification (ELC) system for southern Ontario (Lee 2008; Lee et al. 1998) was applied. Details of the vegetation communities were recorded, including species composition and dominance, community structure, uncommon species or features, and evidence of anthropogenic disturbance. Vegetation community status rarity was assessed through National Heritage Information Centre vegetation community rankings (MNRF 2021c).

4.1.2 Botanical Inventories

A botanical inventory was completed during the field inventories for each of the vegetation communities. The field investigations were completed during spring and summer. A list of species was compiled to determine the presence of SCC, SAR, and invasive species. Habitats of SCC, SAR, and invasive species identified during the field inventories were mapped for the ELC community in which they encompassed.

Plants were identified to family, genus, species, subspecies, and hybrid level according to the Newmaster (1998) *Ontario Plant List* and cross-referenced with the *Database of Vascular Plants of Canada* (Brouillet et al. 2020) for scientifically accepted nomenclature.

4.1.3 Breeding Birds

Breeding bird surveys were conducted following the protocol outlined in the *Ontario Breeding Bird Atlas Guide for Participants* (OBBA 2001). The protocol states that two rounds of surveys should be completed between May 24 and July 10, between 05:00 and 10:00, and under reasonable weather conditions. Surveys should not be completed if there is heavy rain, heavy fog, or if winds are greater than 3 on the Beaufort scale (i.e., >19 km/hour). A total of six stations were surveyed to reflect the different habitats within the study area. These stations were spaced approximately 300 m apart to reduce any overlap in observations between stations. Observations were made using direct (visual observation) and indirect (songs and alarm call) methods to identify the level of breeding evidence. Observations of breeding evidence for each species were recorded based on the definitions provided by the *Ontario Breeding Bird Atlas Guide of Participants* (OBBA 2001).

4.1.4 Bat Maternity Roosting Survey

The location of suitable bat maternity roosting habitat, including snags, was identified following the modified methodology of the Guelph District *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis, and Tri-coloured Bat* (MNRF 2017). This scoped assessment will indicate the likelihood that appropriate habitat for SAR bats is present; however, it will not confirm the presence or absence of any bat species.

Phase 1 Bat Habitat Suitability Assessment consists of evaluating the study area and deciding whether any area would be designated as a coniferous, deciduous, or mixed wooded ELC ecosite. Preliminary analyses

indicated deciduous treed areas present adjacent to the Adelaide WWTP. These treed areas were surveyed for suitable maternity roost trees through a leaf-off habitat assessment.

Identifying suitable roost trees for Little Brown Myotis and Northern Myotis includes recording the location of all snags that exhibit appropriate attributes including cavities, loose bark, cracks, or knot holes. Identifying suitable roost trees for Tri-Coloured Bats includes recording the location of any Oak trees greater than 10 cm diameter at breast height (DBH), Maple trees greater than 10 cm DBH if the tree includes dead/dying leaf clusters, and any Maple tree greater than 25 cm DBH. A formal leaf-on habitat assessment was not completed, though the presence of appropriately sized Oak and Maple trees were noted during subsequent ELC field studies.

4.1.5 Incidental Wildlife

All wildlife observations were documented on all field visits. This included actual direct observations (including vocalizations) of individuals and signs of wildlife presence (i.e., tracks, scats, dens, nests, etc.).

4.1.6 Significant Wildlife Habitat and Species at Risk Assessment

An assessment of potential SWH and potential SAR habitat within the study area was conducted during the field surveys. The study area was assessed for habitat identified within the criteria outlined in the *Significant Wildlife Habitat Technical Guide* (MNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015). Natural areas were also assessed for their potential to provide habitat for those SAR and SCC identified during background review or observed during field investigations.

5 DESCRIPTION OF THE NATURAL ENVIRONMENT

5.1 Terrain Setting

The Adelaide study area is located adjacent to the Thames River, one of the largest river systems in southern Ontario. The Thames River is set in southern Ontario in the Carolinian Zone (Ecoregion 7E), which extends from Windsor to Toronto. The Carolinian Zone is the most human-populated zone in Canada and hosts more species than any other region in Canada (Carolinian Canada 2021). However, development over the past few hundred years had reduced the biodiversity of the ecoregion by over 90%. Ongoing conservation measures and expanding urban populations and development makes this zone uniquely situated for governance and regulatory measures.

The study area are located within the Caradoc Sand Plains and London Annex physiographic regions of southern Ontario. This region generally consists of gravel alluvium, which is spread over the Thames River and includes fox fine sandy loam, berrien sandy loam, and burford gravely loam (Chapman and Putnam 1984).

5.2 Identified Natural Heritage Features

There are no ESAs, PSWs or locally significant wetlands, or ANSIs present within the study area.

The London Plan (City of London 2016) Map 5 (Natural Heritage) has identified a "Woodland" to the southeast, "Significant Valleyland" to the north of the Greenway study area, and a "Significant Woodland" to the south and southeast of the Adelaide study area (Appendix C). The "Significant Woodland" adjacent to the Adelaide study area is also known as the "Huron Street Woods (patch 00027)".

5.3 Terrestrial Habitat

5.3.1 Vegetation Communities

Vegetation communities within the Adelaide study area are mapped on Figure 2 and described in further detail in Table 3. The Adelaide study area contains 14 ELC community types (7 terrestrial, 6 wetlands, and 1 terrestrial/wetland).

TABLE 3 Ecological Land Classification Communities - Adelaide Wastewater Treatment Plant

Ecological Land Classification Community Type	Community Description
FOD7-4 Fresh-Moist Black Walnut Lowland Deciduous Forest	This community defines the largest wooded areas of the study area south of the Adelaide Wastewater Treatment Plant (WWTP). The canopy was found to be variable, but mostly dominated by Black Walnut (*Juglans nigra*), with Manitoba Maple (*Acer negundo*) approaching co-dominance in sections. Common canopy constituents include Basswood (*Tilia americana*), Crack Willow (*Salix fragilis*), and Hackberry (*Celtis occidentalis*). Though most of these woodlands were found to be fresh-moist, a ridge on the easternmost FOD margin slopes upwards. This west-facing slope features a higher proportion of Sugar Maple (*Acer saccharum*) and Black Cherry (*Prunus serotina*). Understory is relatively open, and dominated by Manitoba Maple, European Buckthorn (*Rhamnus cathartica*), River Grape (*Vitis riparia*), young Green Ash (*Fraxinus pennsylvanica*), and willow species (*Salix sp.*), though margins and clearings are often choked with a dense shrub-layer dominated by European Buckthorn, young Manitoba Maple, and Red-osier Dogwood (*Cornus sericea*). Ground cover was variable, with no single species dominating. Growth form varied from forb to forb/graminoid mixed, to graminoid-dominated. There was also evidence of significant growth of Garlic Mustard (*Alliaria petiolata*) persisting from earlier in the growing season. Additionally, the understory was found to be frequently sparse, resulting in a high proportion of bare mineral soil. FOD7 ecosites can represent a transition between upland forest and lowland swamps.
FOD7 Fresh-Moist Lowland Deciduous Forest	A linear wooded feature is present east of the Adelaide WWTP. The canopy of this forest is similar in composition to the FOD7-4 ecosites, but generally dominated by Eastern Cottonwood (*Populus deltoides*), with Black Walnut approaching co-dominance. Much of the woodland is surrounded by a pronounced margin dominated by shrubs (European Buckthorn, Salix sp.). FOD7 ecosites can represent a transition between upland forest and lowland swamps.

Ecological Land Classification Community Type	Community Description
MAM2/MAS2/SWT2 Mineral Meadow Marsh/ Mineral Shallow Marsh/ Mineral Thicket Swamp	An approximately linear wet slough bisects the FOD7-4 ecosite southwest of the Adelaide WWTP. The dominant vegetation form within this slough vacillates between meadow marsh, shallow marsh, and thicket swamp ecosites. Meadow marsh ecosites were dominated by Reed Canary Grass, with common presence of Common Reed, Common Cattail, Purple Loosestrife, Spotted Jewelweed (*Impatiens capensis*), and sedges. Shallow marsh areas featured similar assemblage as meadow marsh but were inundated with standing water and had a higher proportion of emergent macrophytes (Common Cattail, Narrow-leaf Cattail). The thicket areas were dominated by willow species (Black, Slender - *Salix c.f. petiolaris*) with Red-osier Dogwood and River Grape common. It was also noted that the wettest portions of this ecosite contained Dodder (*Cuscuta gronovii*).
SWT2-2 Willow Mineral Thicket Swamp	A depression to the west of the Adelaide WWTP features several wetland types. Several areas are dominated by willow species (*Salix c.f. nigra*). Other common species include Red-osier Dogwood, young Eastern Cottonwood, and young Green Ash (*Fraxinus pennsylvanica*) The ground-layer was more sparse than adjacent non-thicket areas, but composition was generally similar. Common ground species included Reed-canary Grass (*Phalaris arundinacea*), Black Bulrush (*Scirpus atrovirens*), Softstem Bulrush (*Schoenoplectus tabernaemontani*), Purple Loosestrife (*Lythrum salicaria*), and sedges (*Carex sp.*).
MAM2-1 Reed-canary Grass Mineral Meadow Marsh	The areas not wet enough to contain standing water and not dominated by shrubs typically resemble meadow marsh dominated by Reed-canary Grass. Other common ground species include Black Bulrush, Softstem Bulrush, Purple Loosestrife, and sedges.
MAS2-1 Cattail Mineral Meadow Marsh	A large area of persistent standing water was noted south of the FOD7 ecosite. This area was dominated by Common Cattail (*Typhus latifolia*), Narrow-leaf Cattail (*Typhus angustifolia*), and Common Reed (*Phragmites australis*). Actual depth was assumed to be >2 m and substrate was assumed to be mineral, though this was not confirmed in the field.
MAS2a Phragmites Mineral Meadow Marsh	A smaller depression southeast of the MAS2-1 ecosite was found to contain standing water. This depression was almost completely dominated by Common Reed, though Common Cattail, Narrow-leaved Cattail, and Purple Loosestrife were noted to persist at the margins.
MAS2b Mineral Shallow Marsh	A deep linear outlet channel runs generally east west to the west of the Adelaide WWTP. This channel was found to be full of water both in late spring (May) and in mid-summer (July). The channel is lined with large armour-stone, but significant vegetation growth was noted within the channel in sections. Species composition was variable but typically consisted of Jewelweed, Common Boneset (*Eupatorium perfoliatum*), Joe Pye Weed (*Eutrichium purpureum*), Common Cattail, Narrow-leaf Cattail, Phragmites, Black Bulrush, Softstem Bulrush, and willow species.
CUM1 Mineral Cultural Meadow	Large sections of open upland habitat are present within the Adelaide study area. Though species composition tends to be variable, they are typically graminoid-dominated. Reed-canary Grass is the most common species noted, though other grasses were found to be common (Orchard Grass - *Dactylis glomerata*; Kentucky Bluegrass - *Poa pratensis*; Timothy - *Phleum pratense*; Smooth Brome - *Bromus inermis*; Large Crab Grass - *Digitaria sanguinalis*). Common non-graminoid species include Common Dandelion (*Taraxacum officinale*), Bird's-foot Trefoil (*Lotus corniculatus*), Perforate St. John's Wort (*Hypericum perforatum*), and Canada Goldenrod (*Solidago canadensis*).

Ecological Land Classification Community Type	Community Description
CUM1/MAM2-10 Mineral Cultural Meadow/ Forb Mineral Meadow Marsh	A section of open area northeast of the MAS2-1 ecosite formed a complex of upland cultural meadow and narrow linear depressions that were filled with water. This resulted in a mix of upland (CUM1) and lowland (MAM2-10 ecosites). The upland species were similar in composition to surrounding CUM1 ecosite assemblages.
CUT1a Mineral Cultural Thicket	CUT1a ecosites feature a higher density of shrub species, but typically share the understory composition as adjacent CUM1 areas. Common shrub species include Common Ninebark (*Physocarpus opulifolius*), Gray Dogwood (*Cornus racemosa*), European Buckthorn, and River Grape.
CUT1b European Buckthorn Cultural Thicket	A large thicket comprised almost entirely of a continuous canopy of tall European Buckthorn was noted as present north of the FOD7-4 ecosites. This thicket featured very low species diversity and the understory was almost completely devoid of herbaceous species.
CUT1/CUM1 Mineral Cultural Meadow/ Mineral Cultural Thicket	Several portions of the study area were noted as having vegetation assemblages resembling CUM1 and CUT1a ecosites. These areas are denoted as CUT1/CUM1.
CUW1 Mineral Cultural Woodland	Small, wooded parcels are present throughout the study area. These are variable in composition, but typically either dominated by Trembling Aspen (*Populus tremuloides*), Manitoba Maple, or Black Walnut. These ecosites do not typically form a significant canopy and are often associated with robust shrub margins comprised of European Buckthorn, Gray Dogwood, River Grape, and Ninebark. Understory is typically similar to adjacent CUM1 areas.
D Open/Disturbed	Multiple areas were identified as having been heavily modified or disturbed within the Adelaide study area. This includes granular and paved pathways, informal trail systems, sports fields, and other manicured or landscaped areas. Manicured lawns are typically graminoid-dominated with sod-forming species interspersed with common weeds. Waste areas are similarly dominated by weedy or non-native species. Habitat potential in these areas is typically low, though lone mature trees do have potential to support nesting birds and mammals. A small drainage swale was noted at the northwest corner of the Adelaide WWTP. This small pocket contains meadow species including Purple Loosestrife, Red-osier Dogwood, and willow species. It is approximately 400 m^2 and isolated within a field of mowed grass. Habitat potential for this feature is low due to its small size and isolated nature.

Easting (m)

479400 479600 479800 480000 480200

Northing (m)

4763000 4762800 4762600 4762400 4762200

BBS-4 BBS-5 BBS-6 BBS-1 BBS-2 BBS-3

D MAM2 CUW1 FOD7 CUM1 CUM1/MAM2-10 SWT2-2 MAM2-1 MAS2b MAS2-1 CUM1/CUT1 CUT1b MAS2a CUT1a FOD7-4 MAM2/MAS2/SWT2

Kipps Lane Belfield Street Adelaide Street North Huron Street

N

- Adelaide Wastewater Treatment Plant Study Area
- Adelaide Wastewater Treatment Plant Study Area (50m Buffer)
- Highway
- Road
- Breeding Bird Survey Point

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

1:4,000 metres

40 0 40 80

NAD 1983 UTM Zone 17N

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ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Wastewater Treatment Plant Ecological Land Classification Communities

Date:	Project:	Submitter:	Reviewer:
November 2021	32667	K. Reis	R. Leppington

Figure 2

5.3.2 Flora

Based on the background review, a total of one SAR and six SCC were identified as potentially occurring within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Adelaide study area are discussed further in Sections 6.6 and 6.3, respectively.

A total of 145 vascular plant species were observed within the Adelaide study area. A complete vascular plant list is provided in Appendix D. Of these species, 11 are considered S4, 56 are considered S5, and 78 are considered SNA/SNR. No SAR or SCC ranked species were observed within the Adelaide study area.

5.4 Wildlife and Wildlife Habitat

5.4.1 Birds

Based on the background review, there were a total of 128 avian species identified as having a potential to occur within the Adelaide study area. Of the 128 species identified, 9 SAR and 2 SCC were noted within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Adelaide study area are discussed further in Sections 6.6 and 6.3, respectively.

A total of 36 bird species were observed during surveys within the Adelaide study area (Appendix E). Only one SAR was observed within the Adelaide study area: Chimney Swift. The Chimney Swift was observed as a flyover near the river and not a breeder for the Adelaide study area. SAR birds are discussed further in Section 6.6. No bird SCC were observed within the Adelaide study area.

5.4.2 Herpetofauna

5.4.2.1 Adelaide Study Area

No site-specific field surveys were conducted for herptofauna within the Adelaide study area. However, the background review noted a total of 23 herpetofauna species that have a potential to occur within the Adelaide study area. Of the 23 species identified, there are 4 SAR and 3 SCC noted within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Greenway study area are discussed further in Sections 6.6 and 6.3, respectively.

5.4.3 Mammals

Based on the background review, there are a total of 40 mammal species that have a potential to occur within the study area. Of the 40 species identified, 4 SAR were noted within the study area and no SCC. The SAR were assessed to identify the habitat potential within the study area within Section 6.6.

5.4.3.1 Bat Maternity Roosting Survey

Species at Risk Habitat

The Tri-coloured Bat and the two Myotis species require different roosting habitat characteristics. Little Brown Myotis and Northern Myotis roost in tree cavities, crevices, and under loose exfoliating bark in wooded areas located near water. The Tri-coloured Bat most often roost in foliage (both dead and alive) within or below the canopy. Often, Oak (*Quercus sp.*) species are utilized for roosting because the leaves are retained longer in the fall season; however, Maple (*Acer sp.*) species are also used. Tri-Coloured Bats forage along riparian corridors and open water.

Identifying suitable roost trees for Little Brown Myotis and Northern Myotis included recording the location of all snags that exhibit appropriate attributes including cavities, loose bark, cracks, or knot holes.

A total of 30 snags greater than 10 cm DBH were located within the Adelaide study area, of which 7 are considered high-quality snags (Table 4). These high-quality snags should be considered potential SAR bat habitat for Myotis SAR, and removal of high-quality habitat trees as identified in Table 6 should be treated as though candidate SAR bat habitat is being removed.

No formal leaf-on survey was conducted, but the FOD7-4, FOD7, and CUW1 ecosites were noted to contain Oak and/or Maple trees greater than 10 cm DBH. These areas should be assumed to contain habitat that may support Tri-colored Bat. Removal of mature Oak or Maple trees, or other project works that may otherwise result in significant encroachment/impacts within these ecosites, should be treated as potential impact to candidate Tri-colored Bat habitat.

TABLE 4 Summary of Little Brown Myotis and Northern Myotis Suitable Roost Trees within Adelaide Study Area (Leaf-off Survey)

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description
1	Deciduous (dead)	58	3	Long dead, some remaining loose bark may provide bat maternity habitat potential
2	Manitoba Maple	43, 29	2	Declining tree, large cavity 2 m high, some sloughed bark
3	Manitoba Maple	38	3	Knothole at 5 m
4	Manitoba Maple	35	3	Cavity at 3 m
5	Ash sp. (dead)	23	4	Dead, main stem split at 3 m
6	Ash sp. (dead)(1)	38	1	Dead with fissured bark at 9 to 11 m
7	American Basswood	43	1	Cavity at 9 m
8	Common Hackberry	144	1	Knothole at 5 m, sloughed bark at 8 m on one stem
9	Crack Willow	130, 89, 187	1	At least one large cavity at 6 m
10	Manitoba Maple(1)	157	1	Large hollow off main stem 9 m high
11	Manitoba Maple	45	3	Fallen and hollowed at base
12	Common Hackberry	68	1	Knothole at 3 m, 7 m

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description
13	Crack willow(1)	220	1	Broken branch forming new cavity plus sloughing bark at point of break
14	Manitoba Maple(1)	97	2	Crown broken, dead stems w significant bark sloughing.
15	Common Hackberry	165	1	Knothole at 6 m
16	Manitoba Maple	38, 67	1	Cavity 1 m from base
17	Crack Willow	350+	1	Declining tree, cavity noted at 5 m, sloughed bark at 8 m
18	Eastern Cottonwood	93, 71, 102	1	Cavity approximately 8 m from base
19	Crack Willow	200+	4	Multiple injuries, fissured and cracked at multiple spots 2 to 5 m high
20	American Basswood	22	4	Bent with conspicuous knot hole at 3 m
21	Crack Willow(1)	157	1	Shagging bark with apparent cavities from 4 to 11 m
22	Crack Willow(1)	300+	1	Downed branches providing cavity shelter, cavity at 12 m
23	Crack Willow	300+	1	Two dead stems, one hollow from 3 to 6+ m
24	American Basswood(1)	41, 33	2	Dead, main stem appears to be rotted, partially hallow
25	Deciduous (dead)	40	4	Dead, some cavities near the top (6 m) and some sloughed bark at 5 m
26	Common Hackberry	123	1	Knotholes at 5, 6, and 8 m
27	American Basswood	18, 22	2	Knotholes (3) approximately 4 m high
28	Crack Willow	43	1	Fissured bark at 2 m
29	Manitoba Maple	34	2	Declining tree; twisted and cracked stem providing cavity 7 m high
30	Manitoba Maple	250+	1	Declining tree; sloughing bark on two dying stems

(1) high-quality snag trees

Significant Wildlife Habitat - Bat Maternity Colonies

As per the criteria from the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015) and the Bats and Bat Habitats: Guidelines for Wind Power Projects (MNR 2011), forested ELC communities that have a snag density greater than 10 snags per hectare for trees greater than 25 cm DBH that are in early decay (i.e., decay class 1 to 3) are considered to be candidate SWH for bat maternity roosting habitat.

The forested ELC polygons within the Adelaide study area have a total of 1.88 ha; therefore, a total of 19 or more snags are required for the study area to be considered candidate SWH for bat maternity roosting habitat. Of the 30 total snags within the Adelaide study area, only 7 trees are considered to be high-quality maternity roosting trees (i.e., decay class 1 to 3; Table 5 and Figure 3).

Therefore, the forested communities within the study area are not considered SWH for bat maternity roosting.

TABLE 5 Summary of High-quality Snags per Ecological Land Classification Community Type, Adelaide Wastewater Treatment Plant

Ecological Land Classification Community	Surveyed Area (ha)	No. of High-quality Snags	Snag Density (snag/ha)
FOD7-4 West	0.16	1	6.25
FOD7-4 East	1.72	6	3.49
TOTAL AREA	**1.88**		

Easting (m)

479400 479550 479700 479850 480000 480150

Northing (m)

4762800 4762650 4762500 4762350 4762200

- Adelaide Wastewater Treatment Plant Study Area
- Adelaide Wastewater Treatment Plant Study Area (50m Buffer)
- Highway
- Road
- High-Quality Bat Tree

1:3,000 metres

30 0 30 60

NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Wastewater Treatment Plant High-Quality Bat Trees

Date:	Project:	Submitter:	Reviewer:
November 2021	32667	K. Reis	R. Leppington

Figure 3

5.4.4 Insects

Based on the background review, there are a total of 49 species within the Adelaide study area. Of these, two SCC species were noted within the Adelaide study area. No SAR were identified within either of the study area. The potential SCC noted in the background review were assessed to identify if their potential within the study area within Section 6.3.

5.5 Aquatic Resources

The North Thames River adjacent to the Adelaide WWTP originates near Mitchell and flows through St. Mary's before reaching Fanshawe Dam approximately 13 km upstream of the Forks. The North Thames River is regulated by Fanshawe Dam with one unregulated tributary, Medway Creek, contributing natural flows downstream of the reservoir (Matrix 2019).

5.5.1 Fish Community

Background fisheries data has largely been compiled from fish sampling records from DFO, Royal Ontario Museum, MNRF, and UTRCA (Table 6). The results of these records indicate the potential for 28 fish species within the Adelaide study area, which include 2 SAR and 1 SCC. The confirmed SAR species included Silver Shiner (*Notropis photogenis*), which is classified as threatened under the ESA and under SARA; and Black Redhorse (*Moxostoma duquesnei*), which is classified as threatened under the ESA and under SARA. The confirmed SCC includes the Northern Sunfish (*Lepomis peltastes*), which is classified as special concern under the ESA 2007 and SARA.

The study area for the Adelaide WWTP is located 300 m from the Thames River. Although there are confirmed and candidate SAR and SCC within the Thames River, the works associated with this project are unlikely to have any impact on the river, and therefore, will not impact these species. These species will therefore not be discussed further in the later sections.

TABLE 6 Historical Fisheries Data Within and Surrounding the Adelaide Study Area

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Black Redhorse	*Moxostoma duquesnei*	Threatened	Threatened	X	X
Bluegill	*Lepomis macrochirus*	-	-	X	-
Bluntnose Minnow	*Pimephales notatus*	-	-	X	-
Brassy Minnow	*Hybognathus hankinsoni*	-	-	X	-
Central Stoneroller	*Campostoma anomalum*	-	-	X	-
Common Carp	*Cyprinus carpio*	-	-	X	-
Common Shiner	*Luxilus cornutus*	-	-	X	-
Fantail Darter	*Etheostoma flabellare*	-	-	X	-
Greenside Darter	*Etheostoma blennioides*	-	-	X	-
Johnny Darter	*Etheostoma nigrum*	-	-	X	-
Largemouth Bass	*Micropterus salmoides*	-	-	X	-

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Longnose Dace	*Rhinichthys cataractae*			X	-
Northern Hog Sucker	*Hypentelium nigricans*	-	-	X	-
Northern Pike	*Esox lucius*	-	-	X	-
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes*	Special Concern	Special Concern	-	X
Mimic Shiner	*Notropis volucellus*	-	-	X	-
Pumpkinseed	*Lepomis gibbosus*	-	-	X	-
Rainbow Darter	*Etheostoma caeruleum*	-	-	X	-
River Chub	*Nocomis micropogon*	-	-	X	-
Rock Bass	*Ambloplites rupestris*	-	-	X	-
Roseyface Shiner	*Notropis rubellus*	-	-	X	-
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	-	X	-
Silver Shiner	*Notropis photogenis*	Threatened	Threatened	-	X
Smallmouth Bass	*Micropterus dolomieu*	-	-	X	-
Spotfin Shiner	*Cyprinella spiloptera*	-	-	X	-
Stonecat	*Noturus flavus*	-	-	X	-
Stripped Shiner	*Luxilus chrysocephalus*	-	-	X	-
White Sucker	*Catostomus commersonii*	-	-	X	-

SARA - *Species at Risk Act*
ESA - *Endangered Species Act*
UTRCA - Upper Thames River Conservation Authority
DFO - Fisheries and Oceans Canada
MECP - Ontario Ministry of the Environment, Conservation and Parks

5.5.1.1 Mussel Community

Current mussel data was collected from federal and provincial databases. The UTRCA did not have any available mussel data for the Adelaide study area. Federal and provincial datasets indicated the potential for two species of mussels, which are also considered to be SAR (Table 7).

As discussed in Section 5.5.1 the Adelaide WWTP is located 300 m from the Thames River. Although there are confirmed and candidate SAR and SCC within the Thames River, the works associated with this project are unlikely to have any impact on the river, and therefore, will not impact these species. These species will therefore not be discussed further in the later sections.

TABLE 7 Historical Mussel Data Within and Surrounding the Adelaide Study Area

Common Name	Scientific Name	SARA	ESA	MECP data	DFO SAR Mapping
Round Pigtoe	*Pleurobema sintoxia*	END	END	X	
Wavy-rayed Lampmussel	*Lampsilis fasciola*	THR	SC		X

SARA - *Species at Risk Act*
ESA - *Endangered Species Act*
UTRCA - Upper Thames River Conservation Authority
DFO - Fisheries and Oceans Canada
MECP - Ontario Ministry of the Environment, Conservation and Parks

6 SIGNIFICANT NATURAL HERITAGE FEATURES AND FUNCTIONS

Significant natural heritage features and functions include those listed in the Provincial Policy Statement (MMAH 2020), the NHRM (MNR 2010), the SWHTG (MNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015). The findings of the site investigations were cross-referenced with the criteria provided in these documents to identify the presence of or potential presence of significant natural heritage features.

The following significant features were not present within the study area:

- ANSIs
- ESA
- Significant Valleylands

Significant features that are present within the study area are discussed further in Sections 6.1 to 6.8.

6.1 Significant Woodlands

Woodlands include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional, and provincial levels.

The City's official plan recognizes significant woodlands and woodlands, which are mapped on Map 5 (Natural Heritage) of the London Plan (City of London 2016). The map indicated that there is a significant woodland directly adjacent to the Adelaide WWTP (Appendix C; Figure 3).

6.2 Wetlands

Wetlands include lands that are seasonally or permanently covered by shallow water, as well as lands where the water is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. Wetlands also vary in their level of significance at the local, regional, and provincial levels.

Although no PSW's or wetlands are identified on the City of London's Map 5 (Natural Heritage) within the study area, the field investigations identified wetland vegetation communities adjacent the Adelaide WWTP to the east (Figure 4). The City's environmental policies require that wetlands identified via ELC are unevaluated wetlands and should be evaluated by a qualified person in accordance with the Ontario Wetland Evaluation System (OWES; MNRF 2014), with the evaluation approved by the MNRF, to determine its significance.

6.3 Significant Wildlife Habitat

The assessment of SWH follows the guidelines in the NHRM (MNR 2010) and the criteria from the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015), with support from the SWHTG (MNR 2000) as appropriate. There are four categories of SWH which include the following:

- seasonal concentration areas of animals
- rare vegetation communities or specialized habitat for wildlife
- habitat for species of conservation concern
- animal movement corridors

Each of these categories includes various SWH types and with criteria to evaluate significance. These four categories were assessed based on the background studies and field investigations performed by Matrix. A full SWH evaluation is provided in Appendix F, and a summary of the confirmed or candidate SWH is provided in Table 8. To support the evaluation of SCC habitat in Appendix F, a specific evaluation with regards to SCC and their potential to occur within the study area is provided in Appendix G.

TABLE 8 Significant Wildlife Habitat Assessment Summary for Adelaide Wastewater Treatment Plan and Greenway Wastewater Treatment Centre

Category	Wildlife Habitat	Adelaide Wastewater Treatment Plant
Seasonal Concentration Areas of Animals	Waterfowl Stopover and Staging Areas (Terrestrial)	Candidate - Open areas adjacent to wetlands west of facility may be subjected to sheet water flooding conditions following spring freshet.
	Waterfowl Stopover and Staging Areas (Aquatic)	Candidate - MAS2 ecosites present west of facility.
	Turtle Wintering Areas	Candidate - The larger SAM2 ecosite west of the facility may be suitable overwintering habitat.
Rare Vegetation Communities and Specialized Habitat for Wildlife	Waterfowl Nesting Area	Candidate - The wetland complex if MAM, MAS, and SWT ecosites south and west of the facility meets the areal ELC requirements for this habitat type.
	Amphibian Breeding Habitat (Woodland)	Candidate - the FOD7-4 ecosites likely support vernal pooling in the early spring.
	Amphibian Breeding Habitat (Wetland)	Candidate - the MAS ecosites may support wetland-breeding amphibians.

Category	Wildlife Habitat	Adelaide Wastewater Treatment Plant
Habitat for Species of Conservation Concern	Special Concern and Rare Wildlife Species	Candidate • Eastern Wood Pewee • Grasshopper Sparrow • Snapping Turtle • Hackberry Emperor • Monarch Confirmed • none
	Marsh Breeding Bird Habitat	Candidate - the MAS ecosites within the study area contain shallow water with emergent aquatic vegetation.
	Terrestrial Crayfish	Candidate - cultural meadows adjacent to MAM2, MAS2, or SWT ecosites may support terrestrial crayfish habitat.
Animal Movement Corridors	Amphibian Movement Corridor	Candidate - natural areas adjacent or within the contiguous natural corridor of the Thames River should be considered potential amphibian movement corridors.

6.4 Fish and Fish Habitat

Although the Thames River is not within the Adelaide study area, an outlet channel that directs water toward the Thames River (MAS2 on Figure 2) exists and indirectly supports fish habitat within the Thames River through the supply of water and nutrients.

Fish and fish habitat are regulated by DFO under the *Fisheries Ac*. The *Fisheries Act* requires that projects avoid causing the death of a fish or a HADD of fish habitat unless authorized by the Minister or a designated representative. The determination of death of fish or HADD is typically done through a self-assessment process.

6.5 Linkages and Corridors

Linkages and corridors are important features within a natural system. These features are continuous, often linear bands of vegetation in the landscape which provide opportunities to connect natural areas and provide cover for wildlife movement and dispersal of otherwise isolated populations.

The Thames River Valley has been designated as a significant valleyland within *The London Plan* (City of London 2016). This area represents a significant linkage for both terrestrial and aquatic organisms. The wooded riparian area along the edge of the Thames River provides a linkage to other natural areas within the Thames River Valley system.

6.6 Species at Risk

A list of SAR with potential to occur on or adjacent to the study area was complied from the background review and agency consultation. A total of 22 SAR were identified as potentially occurring within the Adelaide study area. Following the field investigations, further evaluation was completed for SAR

probability of occurrence based on the observed habitat characteristics within the study area. A full evaluation is provided in Appendix H, and a summary provided below in Table 14.

The results of the assessment indicated that 7 species within Adelaide study area were considered to have potential habitat. One additional species was confirmed within the Adelaide study area (Table 9).

TABLE 9 Species at Risk Potential Presence within the Greenway and Adelaide Study Area

Species	ESA	SARA	Adelaide Wastewater Treatment Plant
Butternut	END	END	Potential
Kentucky Coffee-tree	THR	THR	Potential
Bank Swallow	THR	THR	N/A
Barn Swallow	THR	THR	N/A
Bobolink	THR	THR	Potential
Chimney Swift	THR	THR	Confirmed
Eastern Meadowlark	THR	THR	Potential
Redheaded Woodpecker	SC	THR	Potential
Eastern Spiny Softshell	END	THR	N/A
Eastern Foxsnake	END	END	N/A
Little Brown Myotis	END	END	Potential
Northern Myotis	END	END	Potential
Tricoloured Bat	END	END	Potential
Black Redhorse	THR	NAR	N/A
Silver Shiner	THR	THR	N/A
Rayed Bean	END	END	N/A
Round Pigtoe	END	END	N/A
Wavvy-rayed Lampmussel	THR	SC	N/A

The species indicated as potentially occurring within the study area were not observed during the surveys conducted by Matrix; however, there is still likelihood that they could be present based on previous observations as well as suitable habitats within the study area. Species with confirmed identification within the study area may require additional habitat protection and considerations. These species and their habitat protections under the ESA are as follows:

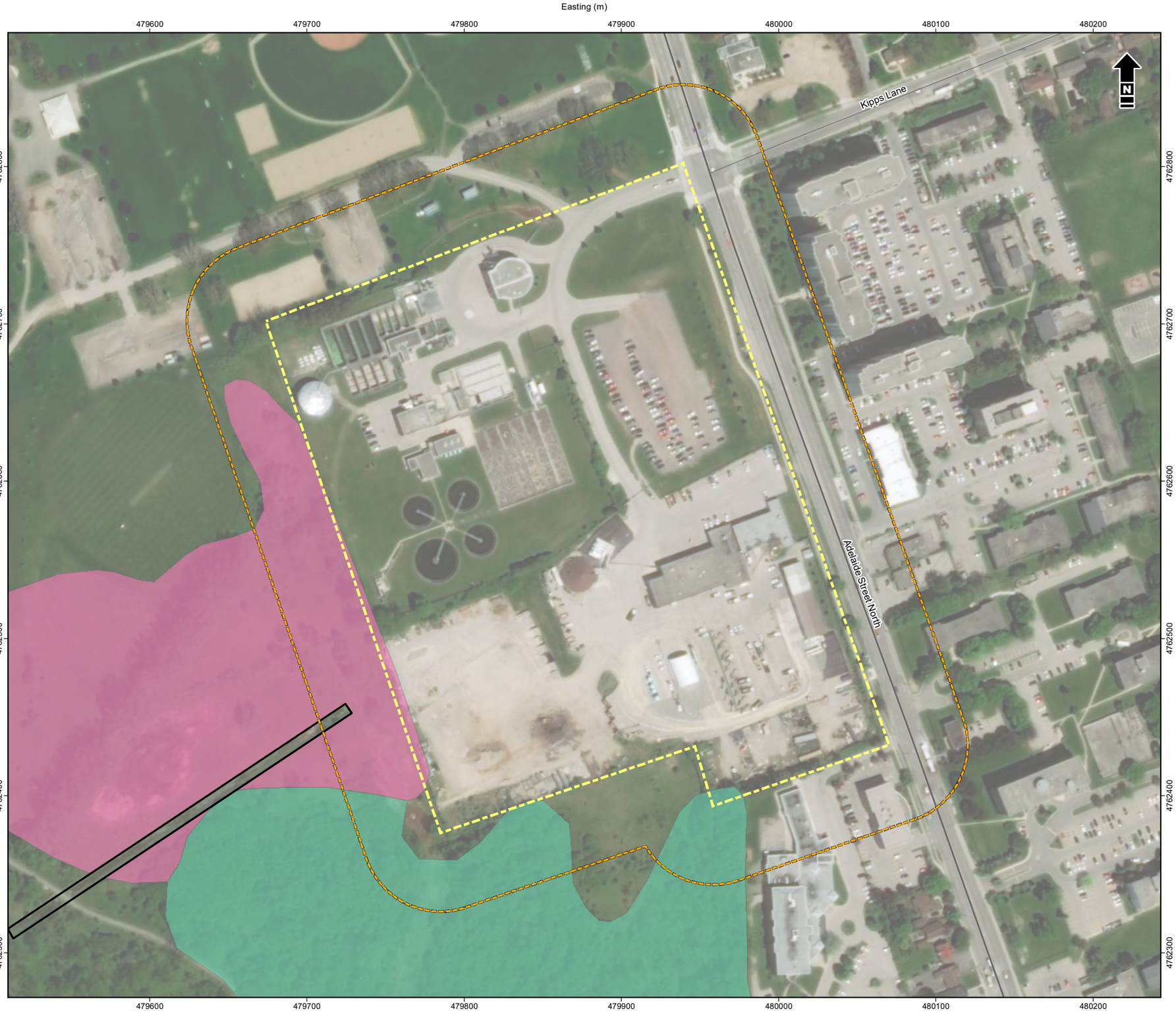
- **Chimney Swifts** were observed flying over the study area. The ESA general habitat protection identifies this species habitat as, human-made nesting/roosting feature, or a natural nesting/roosting tree cavity and the area within 90 m of the tree. Regular building use and building improvements that do not impair the function of the habitat are considered acceptable. The study area did not include any candidate nesting trees or chimneys and as a result are not considered further in the impact assessment for the study area.

6.7 Significant Features and Functions Summary

Based on the background review and site investigations to date, the potential and confirmed significant features and functions that are present within the study area are summarized in Table 10 and depicted in Figures 4.

TABLE 10 Confirmed and Candidate Significant Features within the Adelaide Study Area

Significant Feature	Adelaide Wastewater Treatment Plant
Significant Valleylands	None
Significant Woodland	Confirmed
Woodlands	N/A
Wetlands	Confirmed
Significant Wildlife Habitat	Candidate
Fish and Fish Habitat	Confirmed - Indirect
Species at Risk	Confirmed and Potential



DRAFT

- Adelaide Wastewater Treatment Plant Study Area
- Adelaide Wastewater Treatment Plant Study Area (50m Buffer)
- Drainage Feature
- Candidate SWH, Potential SAR Habitat
- Significant Woodland (London Plan), Potential SAR Habitat, Candidate SWH
- Highway
- Road

1:2,500 metres
25 0 25 50
NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Significant Features and Functions Adelaide Wastewater Treatment Plant

Date:	Project:	Submitter:	Reviewer:
November 2021	32667	K. Reis	R. Leppington

Figure 4

7 FLOOD PROTECTION ALTERNATIVES

Matrix recommended that site-level flood protection approaches (e.g., berms) form the basis of the short list of alternative solutions developed to conceptual design. This recommendation relies on the key outcome of the hydraulic analysis completed by Matrix (2021a, 2021b), which demonstrates that this mitigation approach results in no or negligible upstream flood impacts (i.e., backwater). In addition, the comparative advantage of site-level flood protection is that it is expected to be fully implemented within the study area. As a result, site-level flood protection is considered more readily constructable, with less environmental and land use impacts compared to the other approaches that were screened out in this assessment.

A total of four options were selected for each site and are summarized in Table 11.

TABLE 11 Shortlist of Alternatives for the Adelaide Study Area

Site-level Flood Protection	Adelaide Wastewater Treatment Plant
Option 1	Berm with Raised Entrance Way
Option 2	Berm with Temporary Measure at Entrance Way in Response Flood Forecasts
Option 3	Berm with Parking Lot Protection
Option 4	Do Nothing

The major undertakings of the flood mitigation alternatives at Adelaide WWTP include the creation of a berm which would encapsulate the north, west, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property which largely includes the parking lot.

7.1 Project Activities

Although there are four alternatives listed for each site, the construction footprint associated with the creation of a floodwall and/or berm will result in similar habitat alternation with the exception of “do nothing” option. Therefore, the impact assessment will focus on the following activities associated with floodwall/berm construction around the perimeter of the Greenway WTTC and the Adelaide WWTP that will influence the natural environment:

- construction access, staging, and laydown areas
- vegetation clearing, earthworks/grubbing, and disposal
- near-water construction works (Adelaide works will be within 25 m from an outlet channel into the Thames River)

The anticipated effects and mitigations of these construction works will be discussed further in Section 8.

8 EFFECTS ASSESSMENT

The results of the natural heritage assessment indicated a number of ecological features that are present within the study area:

- significant woodlands
- wetlands
- SWH
- fish and aquatic habitat (indirect habitat at Adelaide)
- SAR

Each of these natural features are significant, as they support flora and fauna communities, connections between aquatic and terrestrial environments and, in the case of the SAR, support species that have limited habitats elsewhere both nationally and provincially. If the preferred alternative damages or interferes with these features and their function, habitat and species loss can occur.

Both direct and indirect impacts on natural heritage features and functions can occur as a result of the preferred alternative. Impacts and residual effects on natural heritage features were assessed based on the following criteria:

- duration: long or short-term
- extent: localized or expansive
- permanent: permanent or temporary
- severity: positive or negative

Most direct impacts occur during the construction phase of a project, and contain localized, short-term, temporary, negative effects that can be reduced through avoidance and proper construction practices. After construction, there may be more long-term, indirect impacts while the site recovers, and vegetation growth takes place. Typically, after the site revegetates, there is either a neutral or positive impact due to intentional native plantings, improved sediment control, and runoff control.

Predicted potential impacts associated with the short list of alternatives are described in the sections below including recommended mitigation measures and residual impacts (after mitigation).

8.1 Potential Impacts

The construction of a berms will require construction, permanent land alternation, and re-vegetation of the study area. Table 12 illustrates the potential impacts to the natural heritage features, as well as mitigation measures which should be followed to avoid serious harm. Once the mitigation measures are implemented, the residual effects are assessed to determine their duration, extent, severity, and permanence.

The greatest potential impacts are associated with the construction proximity to the significant woodland along the southern portion of the study area, wetlands along the west perimeter of the facility, as well as the outfall channel along the south-western side of the study area which drains directly into the Thames River, which is SAR habitat.

It is assumed that construction access and staging will utilize the pre-existing roads and parking lots within the study area.

TABLE 12 Impacts, Mitigations, and Net Effects of the Short List of Alternatives

Natural Heritage Features	Project Activity	Potential Impacts	Mitigation Measures	Net Effects Adelaide
• Fish and Aquatic Habitat • SAR • Habitat of SCC	• Near-water works to create the floodwall/berm along the western section of the Adelaide WWTP (25m from storm water outfall)	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction and rutting outside of construction zone • damage to edge trees (i.e., outside of construction zone) • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-4A Best Construction Practices • 1B-7B Prevention of Terrestrial Disturbance • 1D-3D, 5D-7D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short-term, isolated, temporary disturbance to the natural features. • If the erosion and sediment controls are followed, no additional sedimentation should enter the existing stormwater drain. • No long-term negative impacts are anticipated following the mitigation measures.
		Disturbance/Avoidance of Habitat • increase noise during construction • increased human presence	Timing Widows • 1A -4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting sites	Timing Widows • 1A -4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	

Natural Heritage Features	Project Activity	Potential Impacts	Mitigation Measures	Net Effects Adelaide
• Significant Woodlands • Wetlands • General Wildlife and Habitat • Potential SWH	• Vegetation clearing, earthworks/ grubbing to create the floodwall/berm along the north, west, and southern portion of the property adjacent to the Significant Woodland and wetlands	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-2A, 4A Best Construction Practices • 2B, 4B, 6B, 7B Prevention of Terrestrial Disturbance • 1D-7D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short term, isolated, temporary disturbance to the natural features. • As prescribed in the mitigations, construction activities should occur outside of the dripline of the Significant woodland. This will ensure no long-term negative impacts to this system.
		Disturbance/Avoidance of Habitat • increased noise during construction • increased human presence	Timing Widows • 1A-2A, 4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting site	Timing Widows • 1A, 2A, 4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	
• General Wildlife and Habitat	• Construction access, staging, and laydown areas within both study areas	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-2A, 4A Best Construction Practices • 2B, 4B, 6B, 7B Prevention of Terrestrial Disturbance • 1D-7D Erosion and Sedimentation Control 1E-9E	• It is assumed that construction access and staging will utilize the pre-existing roads and parking lots such as the Adelaide Parking lot, or the disturbed area to the south of the WWTP.
		Disturbance/Avoidance of Habitat • increased noise during construction • increased human presence	Timing Widows • 1A-2A, 4A Prevention of Wildlife Mortality and Disturbance 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting site	Timing Widows • 1A, 2A, 4A Prevention of Wildlife Mortality and Disturbance 1C-5C	

9 MITIGATION MEASURES

The following outlines mitigation recommendations for construction and operational effects to the natural heritage features within the study area. These mitigation measures are designed to prevent or significantly reduce impacts to terrestrial habitat communities.

9.1 Timing Windows/Working in the Dry

The magnitude of effects to aquatic habitat and communities is related to the extent, timing, and duration of the project. The following mitigation measures are recommended:

- **1A**: Remove trees outside of the breeding bird window of April 10 to August 15 (Government of Canada 2021) and outside periods where other wildlife are migrating/emerging to hibernacula and/or nesting sites through consultation with UTRCA. If trees are to be removed during the breeding bird window, then an avian biologist must conduct a nesting survey before tree removals.

- **2A**: Confine the contractor to the minimum area necessary to perform the work.

- **3A**: In the event work needs to take place in the river, no in-water work should occur between March 15 and July 15 to protect spawning fish (MNRF 2021)

- **4A**: Ensure candidate SAR bat snag trees are protected during construction. If snag trees can not be avoided, it is recommended that snag removal occur between October 1 and March 31, of a given year.

9.2 Best Construction Practices

Implementation of best construction practices during construction will reduce the potential for spills or other materials/equipment entering the water. The following measures will be employed:

- **1B**: Control all equipment maintenance and refuelling to prevent any discharge of petroleum products. Conduct vehicular maintenance and refuelling at least 30 m from the watercourse, watercourse banks, and natural heritage features.

- **2B**: Implement surface protection measures to minimize soil compaction.

- **3B**: Store construction material, excess material, construction debris, and empty containers at least 30 m from the watercourse and banks to prevent entry.

- **4B**: Enlist an environmental monitor onsite to provide advice and ensure that activities will not have any negative effects. Information for site-specific SAR should be posted in construction trailer.

- **5B**: Implement a stormwater management plan to maintain pre-construction drainage patterns and flows during all project phases.

- **6B**: Implement an emergency and response management plan to address the potential for spills.

- **7B**: Implement "Clean Equipment Protocol for Industry" (Halloran et al. 2013) to inspect and clean equipment for the purposes of invasive species prevention.

9.3 Prevention of Wildlife Mortality and Disturbance

Preventative measures during construction will reduce the potential mortality and disturbance of wildlife within the Study area, and should include the following:

- **1C**: Demarcate wildlife habitat to avoid offsite disturbance and to restrict construction activities to the work areas.

- **2C**: Implement traffic limits if onsite vehicle use is required.

- **3C**: Install exclusionary fencing to prevent wildlife from entering the construction site. Exclusionary fencing should not prohibit access to nearby habitats. Where required, redirect wildlife to areas where they can avoid the potential for incidental take, and still have access to habitats. Exclusionary fencing should be monitored daily throughout construction.

- **4C**: Inspect construction area for wildlife each morning before the commencement of construction activities. Removal of trapped wildlife should be completed by a qualified biologist.

- **5C**: Educate workers to be aware of potential wildlife occurrences and measures to take to minimized potential for injury or incidental take. Maintain a log to record and report incidents of injury and/or mortality.

9.4 Prevention of Terrestrial Disturbance

Preventative measures during construction will reduce the likelihood of disturbance and destruction of the terrestrial features, and should include the following:

- **1D**: Identify setbacks from natural features and trees with the installation of tree protection fencing along the disturbance limit (10 m). No construction activities are to occur outside of these fences (including overhead), nor the piling of construction materials.

- **2D**: Minimize the construction disturbance area to the extent feasible.

- **3D**: Retain an Arborist during detailed design to create a tree preservation plan to protect as many healthy, native trees as possible through the process.

- **4D**: Ensure floodwall and/or berm construction is located outside of the dripline for the Significant Woodland and boundary of wetlands adjacent to Adelaide WWTP

- **5D**: Implement a dust management plan for the suppression of fugitive dust.

- **6D**: Ensure that temporarily disturbed areas are restored with native vegetation and monitored during construction and post construction based on UTRCA and the cities specifications.

- **7D**: Develop a restoration plan to prescribe when and how disturbed areas will be restored. Plantings should consist of native trees, shrubs and seed mixes. Tree replacement should be at a 3:1 tree replacement ratio.

9.5 Erosion and Sediment Control

Effective erosion and sediment control (ESC) will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout their operational life. ESC measures will include:

- **1E**: Develop an ESC plan to minimize the potential for erosion and construction-related sediment release into nearby natural features/water bodies and prepare ESC plan condition reports as part of the monitoring and maintenance plan.

- **2E**: Install ESC measures before ground breaking.

- **3E**: Monitor and maintain ESC measures as per specifications.

- **4E**: Delineate storage, stockpiling, and staging areas prior to construction and inspected.

- **5F**: Install sediment control fence along the channel margins to prevent the entry of sediment into the watercourse.

- **6E**: Avoid construction during high volume rain events or significant snow melts/thaws. Construction will resume once soils have stabilized to avoid risk of erosion, soil compaction, or the potential for sediment release into nearby natural features/watercourses.

- **7E**: Direct discharge from sediment clean out to a filter bag or taken offsite for disposal.

- **8E**: Implement construction monitoring to ensure erosion and sediment measures are in place and working effectively. ESC should be checked weekly and after major rain events (>10 mm) to ensure it

is installed and functioning properly. Daily monitoring will be completed by the contractor. Any deficiencies should be repaired immediately. A construction monitoring log should be maintained to ensure any deficiencies and corrective actions are documented.

- **9E**: Remove all temporary ESCs following construction once disturbed areas have stabilized.

9.6 Species at Risk

Terrestrial SAR species (i.e., plants, birds, snakes, and bats) identified in Table 14 in Section 6.7 are typically impacted by the loss of habitat and incidental encounters due to vegetation removal, site clearing activities, and construction activities. Aquatic SAR species (i.e., turtles, fish, and mussels) identified in Table 14 in Section 6.7 are all are associated with the Thames River and are typically impacted directly by in-water works through the destruction of habitat (which is not anticipated for the flood protection works at either site) or indirectly by near-water works (i.e., sedimentation, erosion, or other water quality issues arising from nearby construction machinery).

Impacts to both terrestrial and aquatic SAR can be mitigated through the implementation of the mitigations identified in Sections 9.1 to 9.5.

SAR habitat is protected under the ESA; therefore, at the detailed design stage it will be important to confirm potential occurrence (i.e., location of SAR and SAR habitat) as well as permitting report requirements under the ESA. Permitting and additional studies are discussed further in Section 11.

10 RESIDUAL IMPACTS AFTER MITIGATION

The construction of the berm within the Adelaide study area is anticipated to result in an isolated, temporary disturbance and loss of habitat while construction is taking place; however, the long-term impacts associated with this project are expected to create an overall net benefit once the new vegetation has reached maturity.

Within the Adelaide study area, the north and east portions of the site where the berm and raised entrance are to be erected are already disturbed and will include minimal vegetation removal. Any trees removed within this area will be replaced at a 3:1 ratio, which will result in a long-term net benefit for the area once the trees reach maturity. The majority of the natural heritage features within the site are located along the west and south side of the property. It has been recommended within the mitigation measures that the construction of the berm does not impede with the significant woodland located directly south of the proposed berm or the wetland communities located to the west. Tree protection fencing for this area should be located outside of the dripline in order to keep the significant woodland and wetlands intact. Along the western side of the proposed berm, there will be some vegetation removal, which is located within 25 m of a stormwater outfall that outlets into the Thames River. Mitigation measures have been put in place in order to protect this outfall and the Thames River from

erosion, sedimentation, and spills. Any trees removed should be replaced at a 3:1 ratio, which will result in a long-term net benefit for the area once the trees and vegetation reach maturity.

11 NEXT STEPS

11.1 Permitting

At the detailed design stage, potential requirements under the ESA and the City's tree protection bylaw will need to be confirmed. Specifically, the following:

- **UTRCA Permit:** any works with the regulation limit (under Ontario Regulation 157/06) will require a permit through the UTRCA.
- **ESA Permit:** under Section 17 (2) (c) of the ESA, 2007, it identifies permits for activities which may contravene the ESA. Permits related to habitat destruction would require an Overall Benefit Permit.
- **City of London Tree Bylaw Permit:** will be required for the removal of trees within the study area.
- **City of London Park Occupancy Permit:** depending on the footprint of disturbance a park occupancy permit may be required from the City's parks department.

11.2 Future Work

The impact assessment detailed within this EIS report is based on preliminary conceptual design details. Potential impacts and recommended mitigation should be revisited at the detailed design stage of the project as designs are finalized to ensure that negative impacts are minimized or eliminated through implementation of appropriate mitigation or compensation measures.

It is recommended that the following be completed in advance of finalizing construction documents to ensure requirements under the ESA are appropriately addressed and sufficient time is available to obtain the necessary permits. At the detailed design stage, the following additional studies are recommended:

- Confirm wetland boundaries, complete the OWES evaluation and confirm buffer/setbacks. Unevaluated wetlands at the Adelaide study area should be evaluated by a qualified person in accordance with the OWES, with the evaluation approved by the MNRF, to determine its significance. Once the boundaries are confirmed, and evaluation of the appropriate setback should be conducted.
- Confirm significant woodland boundary and buffer/setbacks. The significant woodland (i.e., Huron Street Woods) should be mapped in the field with a City ecologist. Once the boundaries are confirmed, an evaluation of the appropriate setback should be conducted.

- Conduct a tree inventory (by a certified arborist) within the area of disturbance at both facilities to determine if any SAR trees (Kentucky Coffee-tree or Butternut) exist within the disturbance footprint.
    - If a Butternut is found, a Butternut health assessment is recommended on each specimen. If the Butternut is a pure species, no construction works are to occur within 25 m of Butternut. Any construction activities occurring within 25 m of the Butternut that could pose harm will be subject to an MECP Notice of Activity to register the project activities.
    - MECP should be consulted with regards to any potential requirements for the planted Kentucky Coffee-trees and discuss possible transplantation of candidate specimens.
- Consultation with MECP with regards to the candidate SAR bat maternity roost habitat. MECP will confirm if additional bat acoustic surveys should be completed to confirm the presence or absence of potential SAR bats in an individual tree or forested area identified as potential maternity roosting habitat that will be impacted or removed. If SAR bats are present, approval for SAR bat habitat removal from the MECP will be required. Overall benefit permitting for SAR bats may include installation of compensation measures (i.e., bat boxes) to enhance bat roosting habitat adjacent to the facility where habitat is removed.
- identified candidate SWH habitat and potential SAR habitat will need to be reviewed in more detail once the area of impact is confirmed for this project.
- Additional screening as required based on the future changes to species' listings or habitat regulations of the ESA.

12 CONCLUSION

The City retained Matrix to complete two Municipal Class EAs to address climate change resiliency measures at the Greenway WWTC and the Adelaide WWTP. The two facilities have been identified as vulnerable to severe flooding. The EAs will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

This report focused on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP to be discussed in a separate report. The purpose of the Environmental Impact Study (EIS) was to define and record the natural heritage features, discuss implications and constraints to the proposed short list of alternatives, and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives for Adelaide WWTP recommended developing a berm with varying entrance protection.

Matrix combined information from the ecological field studies with relevant information from previous background studies to identify significant features within the study area. The results indicated a wide

range of terrestrial and aquatic species and habitat features present or likely present within the study area. In the analysis of significance and function, several natural heritage features were identified, which included significant valleylands, significant woodlands and woodland, wetlands, SWH, fish and fish habitat, and SAR.

The most significant ecological functions identified within the Adelaide study area included the significant woodland and unevaluated wetlands. The confirmed avian SAR (Chimney Swift) was observed flying over the study area but did not have confirmed nesting sites within the study area and, therefore, was not anticipated to be directly impacted during construction activities. The major undertakings of the flood mitigation alternatives at Adelaide WWTP include the creation of a berm which would encapsulate the north, west, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property which largely includes the parking lot. These construction activities, along with construction access, staging, and vegetation clearing, are anticipated to have localized temporary effects to the natural features during construction; however, no long-term negative impacts are expected following the prescribed mitigation measures.

Any long-term effects associated with these projects are expected to improve the natural features through increased native plantings. Appropriate approvals should be obtained during the detailed design phase of this project to ensure the natural features and functions within the study area are adequately protected.

13 REFERENCES

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APPENDIX A
Terms of Reference

Appendix A

Environmental Impact Study
ISSUES SUMMARY CHECKLIST REPORT

Application Title: Greenway and Adelaide WWTP Climate Change Resiliency EA
Date Submitted: April 22, 2020
Proponent: City of London

Qualifications

Primary Consultant: Matrix Solutions Inc.
Key contact person: Andrew Doherty (adoherty@matrix-solutions.com)
Other consultant / field personnel:

Hydrogeology / Hydrology: Matrix Solutions
Biological – Flora: Matrix Solutions
Biological – Fauna: Matrix Solutions
Other: Prime Strategy and Planning, CIMA+

Context for Background Information

Subwatershed: Fork of Thames/Central London
Tributary Fact Sheet Number: n/a
Planning / Policy Area: Greenway WWTP- Southcrest; Adelaide WWTP - North London

Technical Advisory Review Team

- ☑ Ecologist Planner: Emily Williamson
- ☐ Planner for File:
- ☑ EEPAC: Sandy Levin
- ☑ Conservation Authority: Brent Verscheure
- ☑ Ministry of Natural Resources:
- ☐ Ministry of Municipal Affairs and Housing:
- ☐ Ministry of Agriculture and food:
- ☐ Other Review Groups (e.g., Community Associations , Field Naturalists):

To be identified in the broad EA consultation

1.0 DESCRIPTION OF THE ENVIRONMENT (FEATURES)

Purpose: To have a clear understanding of the current status of the land, and the proposed "development" or land use change.

1.1 Mapping (Location and Context)

Current Aerial Photography

- ☑ Land Use - Excerpts of the Official Plan for the City of London Ontario Schedules A, B, showing a 5-10 km radius of subject site
- ☑ Terrain setting @ 1:10,000 - 1:15,000 scale showing landscape features, subwatershed divides
- ☑ Existing Environmental Resources showing @1:2,000 - 1:5,000 showing Vegetation, Hydrology, contours, linages.
- ☑ Environmental Plan or Strategy from Subwatershed reports (tributary fact sheet), Community (Area) Plans, or other

1.2 Description of Site, Adjacent lands, Linage with Natural Heritage System

List all supporting studies and reports available to provide background summary (e.g. subwatershed, hydrological, geo-technical, natural heritage etc.).

Check the first box if the information is relevant and required as part of this study. Check the second box if sufficient data is available.

Hydrogeological Studies for both sites (to be provided by the City)
Geotehnical Studies for both sites (to be provided by the City)
Greenway WWTP Expansion EIS (to be provided by the City)
One River Master Plan EA (Jacobs, 2018)
Thames Valley Corridor Plan - City of London (Dillon & DR Poulton Associates, 2011)
The Forks Watershed Report Card (UTRCA, 2017)
SLSR (2016) Dougan, TVC connection with Dillon doing the EIS (Emily to provide)

1.2.1 Terrain Setting

☑	☑	Soils (surface and subsurface)
☐	☐	Glacial geomorphology - landform type
☑	☑	Subwatershed
☑	☑	Topographic features
☐	☐	Ground water discharge
☑	☑	Shallow ground water/baseflow
☐	☐	Ground water discharge/aquifer
☐	☐	Aggregate resources

1.2.2 Hydrology

- ☑ ☑ Hydrological catchment boundary and of wetlands + determine the catchment areas of all wetlands
- ☑ ☑ Surface drainage pattern
- ☑ ☑ Watercourses (Permanent, Intermittent)
- ☑ ☑ Stream order (Headwater, 1st, 2nd, 3rd or higher)
- ☐ ☐ Agricultural Drains
- ☑ ☑ Downstream receiving watercourse
- ☑ ☑ Hazard Line (Map 6)

1.2.3 Natural Hazards

- ☑ ☐ 100 year Erosion Line
- ☑ ☑ Floodline mapping
- ☑ ☑ Max line mapping – UTRCA mapping + text based regulated areas

1.2.4 Vegetation

- ☑ ☑ Vegetation patch Number 00027 (Huron Street Woods)
- ☑ ☐ System (Terrestrial, Wetland, Aquatic)
- ☑ ☐ Cover (Open, Shrub, Treed)
- ☑ ☐ Community Type(s)
- ☑ ☐ ELC Community Class (Bluff, Forest, Swamp, Tallgrass Prairie, Savannah & Woodland, Fen, Bog, Marsh, Open Water, Shallow Water)
  ELC Community Sites
- ☑ ☐ Rare Vegetation Communities

1.2.5 Flora

- ☑ ☐ Flora (Inventory dates, Source)

  Greenway WWTP Expansion EIS (to be provided by the City)

  flora and rare vegetation will be identified during the the ELC surveys

- ☑ ☐ Rare Flora (National, Provincial, Regional)

  Greenway WWTP Expansion EIS (to be provided by the City)

  flora and rare vegetation will be identified during the the ELC surveys

1.2.6 Fauna

☑ ☐ Fauna (Inventory dates; sources)

incidential observations will be recorded

Greenway WWTP Expansion EIS (to be provided by the City)

☑ ☐ Breeding Birds surveys to be completed
☑ ☐ Migratory Birds incidental observations will be recorded
☑ ☐ Amphibians incidental observations will be recorded
☑ ☐ Reptiles incidental observations will be recorded
☑ ☐ Mammals incidental observations will be recorded
☑ ☐ Butterflies incidental observations will be recorded
☑ ☐ Odonata incidental observations will be recorded
☑ ☐ Other
☑ ☐ Partners In Flight (PIF)

breeding bird survey to be conducted and incidental species observations will be noted during all site surveys

☑ ☐ Rare Fauna

1.2.7 Wildlife Habitat + as per MNRF 2015 Criteria, as amended from time to time, and all applicable Official Plan policies and In-force London Plan policies

☑ ☐ Species-At-Risk Regulated Habitat critical habitat mapping

☑ ☐ Winter habitat for deer, wild turkey
☑ ☐ Waterfowl Habitat (wetlands, poorly drained landscape - bottomlands, beaver ponds, seasonally flooded areas, staging areas, feeding areas)
☐ ☐ Colonial Birds Habitat
☑ ☐ Hibernacula
☑ ☐ Habitat for Raptors
☐ ☐ Forests with springs or seeps

Ephemeral ponds

☑ ☐ Wildlife trees (snags, cavities, x-large trees > 65 cm DBH)

☑ ☐ Forest Interior Birds

not present

☑ ☐ Area-sensitive birds

1.2.8 Aquatic Habitat

(SWS Aquatic Resource Management Reports)

☑ ☑ Fish Communities

UTRCA fisheries data
One River sampling data

☑ ☑ Fish spawning areas

☑ ☑ Fish migration routes

☑ ☑ Thermal refuge for fish

☑ ☑ Benthic inventory

UTRCA benthic data
City of London data

☑ ☑ Substrate

☑ ☑ Riparian habitat (extent and type)

Greenway has riparian habitat mapped in the One River EA

1.2.9 Linkages and Corridors

(The diversity of natural features in an area, and the natural connections between them should be maintained, and improved where possible. PPS 2.3.3)

- ☑ ☑ Valleylands
- ☑ ☑ Significant Watercourses (Thames River, Stoney Creek, Medway Creek, Dingman Creek, Pottersburg Creek, Wabuno Creek, Mud Creek, Stanton Creek (Drain), Kelly Creek (Drain)

  Thames River

- ☑ ☑ Upland Corridors / species migration routes
- ☑ ☑ Big Picture Cores and Corridors
- ☑ ☑ Linkages between aquatic and terrestrial areas (riparian habitat, runoff)
- ☑ ☑ Groundwater connections
- ☑ ☑ Patch clusters (mosaic of patches in the landscape)

1.3 Social Values

1.3.1 Human Use Values

- ☑ ☑ Recreational linkages for hiking, walking
- ☑ ☑ Nature appreciation, aesthetics
- ☑ ☑ Education, research
- ☑ ☐ Cultural / traditional heritage
- ☑ ☑ Social (parks and open space)
- ☐ ☐ Resources Products (e.g. timber, fish, furbearers, peat)
- ☐ ☐ Aggregate Resources

1.3.2 Land Use - Cultural

- ☑ ☑ Archaeological (pre 1500)
- ☑ ☑ Historical (post 1500 - present)
- ☑ ☑ Adjacent historical and archeological
- ☑ ☑ Future

1.3.3 Land Use - Active

- ☑ ☑ Archaeological (pre 1500)

- ☑ ☑ Historical (post 1500 - present)
- ☑ ☐ Adjacent historical and archeological
- ☑ ☑ Future

1.3.4 Other

2.0 EVALUATION OF SIGNIFICANCE

Components of the Natural Heritage System
The policies in Section 15.4 apply to recognized and potential components of the natural heritage system as delineated on Schedule 'B' or features that may be considered for inclusion on Schedule 'S'. They also address the protection of environmental quality and ecological function with respect to water quality, fish habitat, groundwater recharge, headwaters and aquifers.

- ☑ **A component of a Subject Lands Status Report that is required to be included in the EIS is the evaluation of significance of all potential natural heritage features and areas recognized by In-force London Plan policies and/ or Official Plan policies.**

- ☑ **A component of a Subject Lands Status Report that is required to be included in the EIS is the confirmation and mapping of boundaries of all natural heritage features and areas.**

2.1 Environmentally Significant Areas

- ☐ Identified Environmentally Significant Areas (ESA)
- ☐ Name
- ☐ Potential ESAs - Expansion of an Existing ESA
- ☐ Name
- ☐ Potential ESA - Area not associated with an existing ESA
- ☐ Name

2.2 Wetlands

- ☐ Provincially Significant Wetlands
- ☐ Name
- ☐ Wetlands
- ☐ Name
- ☐ Unevaluated Wetlands

2.3 Areas of Natural and Scientific Interest

- ☐ Provincial Life Science ANSI
- ☐ Regional Life Science ANSI

- ☐ Earth Science ANSI

2.4 Habitat of Species-At-Risk (SAR)

- ☑ Endangered
- ☑ Threatened
- ☑ Vulnerable / Special Concern

2.5 Woodlands and Vegetation Patches

- ☑ Significant Woodlands
- ☑ Unevaluated Vegetation Patches and/ or other patches > 0.5ha

2.6 Corridors and Linkages

- ☑ River, Stream and Ravine Corridors
- ☑ Upland Corridors
- ☑ Naturalization and Anti-fragmentation Areas

3.0 IDENTIFICATION AND DESCRIPTION OF FUNCTIONS

Ecological Functions the natural processes, products or services that species and non-living environments provide or perform within or between ecosystems and landscapes. Check those functions that will be required to assess for the study (key and supporting functions).

3.1 Biological Functions

- ☑ Habitat (provision of food, shelter for species)
- ☐ Limiting habitat
- ☐ Species life histories (reproduction and dispersal)
- ☐ Habitat guilds
- ☑ Indicator species
- ☑ Keystone species
- ☑ Introduced species
- ☐ Predation / parasitism
- ☐ Population dynamics
- ☑ Vegetation structure, density and diversity
- ☐ Food chain support
- ☐ Productivity
- ☑ Diversity
- ☐ Carbon cycle
- ☐ Energy cycling
- ☑ Succession and disturbance processes
- ☑ Relationships between species and communities

3.2 Hydrological and Wetland Functions

- ☐ Groundwater recharge and discharge (hydrogeology)
- ☐ Water storage and release (fluvial geomorphology)
- ☐ Maintaining water cycles (water balance)
- ☐ Water quality improvement
- ☑ Flood damage reduction
- ☐ Shoreline stabilization / erosion control
- ☐ Sediment trapping
- ☐ Nutrient retention and removal / biochemical cycling
- ☐ Aquatic habitat (fish, macroinvertebrates)

3.3 Landscape Features and Functions

- ☑ Size
- ☑ Connections, corridors and linkages
- ☑ Proximity to other areas / natural heritage features (e.g. woodlands, wetlands, valleylands, water, etc.)
- ☑ Fragmentation

3.4 Functions, Benefits and Values of Importance to Humans

- ☑ Contributing to healthy and productive landscapes
- ☐ Improving air quality by supplying oxygen and absorbing carbon dioxide
- ☐ Converting and storing atmospheric carbon
- ☐ Providing natural resources for economic benefit
- ☐ Providing green space for human activities
- ☑ Aesthetic and quality-of-life benefit
- ☑ Environmental targets and/or environmental management strategies

4.0 ADDITIONAL COMPONENTS AND NOTES

• EIS to show and demonstrate conformity with the Provincial Policy Statement (2020), in-force London Plan (as of Nov. 2019) policies, and current Official Plan policies (1989), Environmental Management Guidelines (2006).

General Project Infromation

Two parallel Schedule B Municipal Class Environmental Assessments to assess and develop flood mitigation concepts for climate change resiliency at the Greenway and Adelaide WWTPs in the City of London.

The project scope is summarized as follows:

1) Background Studies
- ecology assessment and environmental impact study
- stage 1 archaeology assessment (subcontracted to Archaeology Research Associates)
- define pumping/operation requirements at WWTPs (subcontracted to CIMA+)
- hydraulic screening and long-list of flood mitigation options

2) Conceptual Design
- develop short-list of conceptual flood mitigation options
- conceptual WWTP pumping options (subcontracted to CIMA+)
- evaluate and select preferred conceptual options
- reporting

3)Consultation (subcontractor support from PRIME Planning and Strategy)
-EA documentation
- consultation planning and execution
- stakeholder meetings
- Public Information Centers

Environmental Impact Study
- see attached memo outlining the draft Terms of Reference for the EIS for details
- Objected for the scoped EIS will be to characterize existing conditions, assess potential impacts from the proposed design alternatives for the WWTPs, provide recommendations and mitigations for the design and construction of the preferred climate resiliency measures for both WWTPs.
- One EIS report will be produced that will summarize both sites
- assumed study area is WWTP fence area plus area within 50m

Filed investigation for both sites will consist of the following:
- one season (summer) botanical inventory
- one season (summer) ELC
- breeding bird survey: two visits between May 24 and July 10
- bat habitat survey: two visits - leaf off in April, leaf on with ELC visit
- SAR screening - evaluate if habitat for SAR is present and the probability of species occurrence in study area
- assess potential of wildlife habitat (significant, sensitive/key habitats)
- incidental species observations during all site visits.

DRAFT

APPENDIX B
Correspondence

From: Peter De Carvalho
To: Karen Reis
Cc: Robyn Leppington
Subject: FW: [External] RE: SAR Information Request - Central London Sites MECP
Date: September 14, 2021 11:13:21 AM
Attachments: image001.png
image002.png
image003.png

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
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2019 Canada's Greenest Employers

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: August 27, 2021 4:40 PM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Subject: [External] RE: SAR Information Request - Central London Sites

Hello Peter,

RE: Species at Risk Data Request – City of London Wastewater Treatment Plants

I apologize for the delay in response. The Ministry of the Environment, Conservation and Parks (MECP) understands that Matrix Solutions Inc. is conducting natural heritage studies for lands associated with the Greenway Wastewater Treatment Centre and the Adelaide Wastewater Treatment Plant in the City of London, as identified in the information provided.

An initial species at risk (SAR) information screening has been completed under the *Endangered Species Act, 2007* (ESA) by MECP's Species at Risk Branch (SARB) for the above-noted project location with respect to endangered and threatened species in Ontario. The following species at risk, in addition to the species identified in the Matrix memo, are known to occur in the general area of the project and should be considered in any assessment of potential impacts to SAR and/or habitat:

Greenway Wastewater Treatment Centre

- Red Mulberry (endangered) – receives species and general habitat protection.
- Round Pigtoe (endangered) – receives species and general habitat protection.
- Kentucky Coffee-tree (threatened) – receives species and general habitat protection.

Adelaide Wastewater Treatment Plant

- Kentucky Coffee-tree (threatened) – receives species and general habitat protection.
- Red-headed Woodpecker – this species is currently listed as special concern but will be up-listed to endangered in 2022, which will trigger species and habitat protection.

Please note that this is an initial screening for endangered and threatened SAR and the absence of an element occurrence does not indicate the absence of species. The province has not been surveyed comprehensively for the presence or absence of SAR and Ontario's data relies on observers to report sightings of SAR. Field assessments by a qualified professional may be necessary if there is a high likelihood for SAR species and/or habitat to occur within the project footprint and potentially be impacted.

The position of SARB is based on the information that has been provided by you on behalf of the proponent. Should information not have been made available and considered in our review, or new information comes to light, or if on-site conditions and circumstances change, please contact SARB as soon as possible (SAROntario@ontario.ca) to discuss next steps.

Regards,

Kathryn Markham
Management Biologist
Permissions and Compliance Section, Species at Risk Branch
Ministry of the Environment, Conservation and Parks

From: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Sent: May 12, 2021 6:42 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: SAR Information Request - Central London Sites

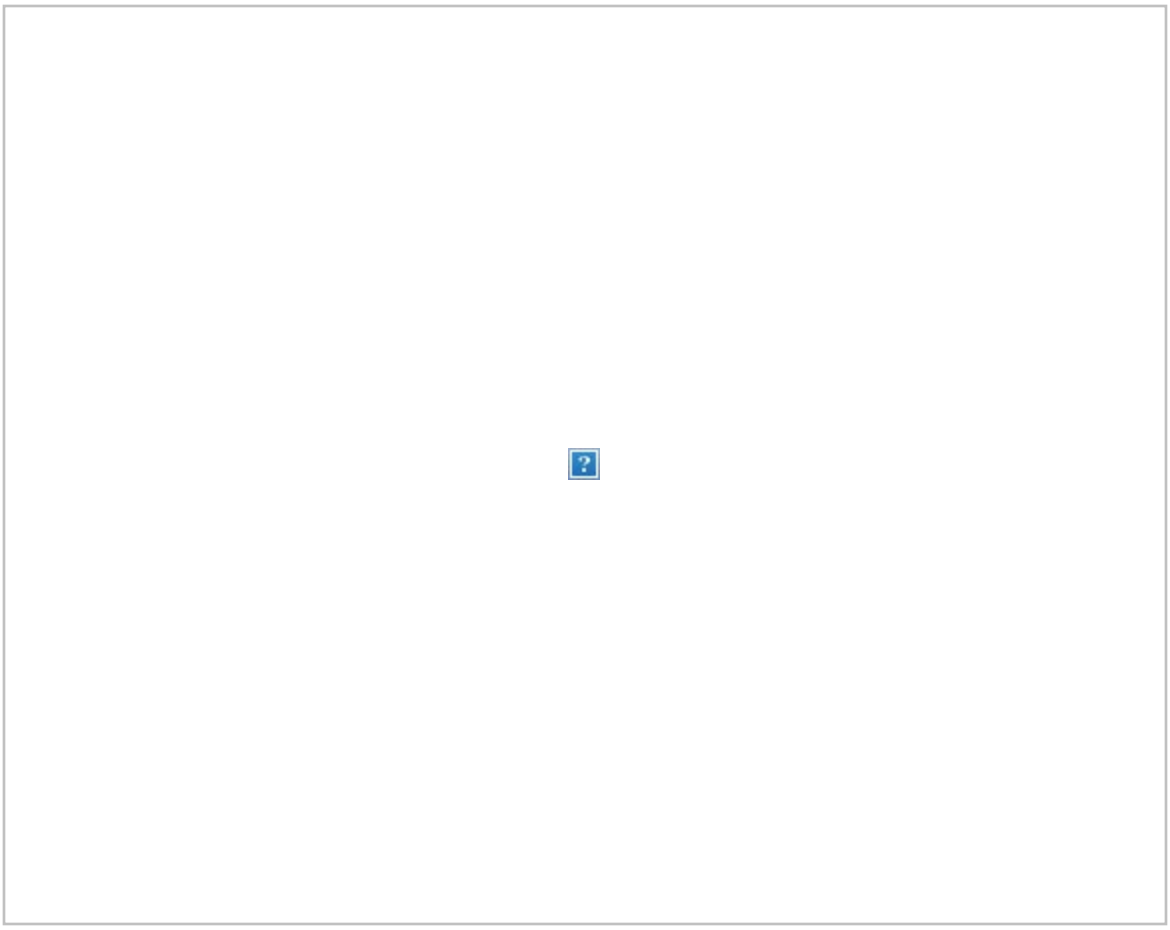
Hi there,

We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario. We've completed a background review using LIO, NHIC, iNaturalist, eBird, the OBBA, ORAA, and the Ontario Butterfly Atlas and carried out a preliminary desktop analysis based on the MNRF Natural Heritage Information Request Guide.

At this time we're requesting any additional SAR information from MECP records to evaluate constraints on and adjacent to these properties.

The two sites are the lands within 50 m of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)

And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)



We have identified the following species as potentially present within our study areas:

Common Name	Scientific Name	ESA	SARA
Birds			
Bank Swallow	Riparia riparia	THR	THR
Barn Swallow	Hirundo rustica	THR	THR
Bobolink	Dolichonyx oryzivorus	THR	THR
Chimney Swift	Chaetura pelagica	THR	THR
Common Nighthawk	Contopus virens	SC	SC
Eastern Meadowlark	Sturnella magna	THR	THR
Eastern Wood-pewee	Contopus virens	SC	SC
Wood Thrush	Hylocichla mustelina	SC	THR
Aquatic			
Black Redhorse	Moxostoma duquesnei	THR	THR
Lake Sturgeon	Acipenser fulvescens pop 3	END	THR
Silver Shiner	Notropis photogenis	THR	THR
Wavy-rayed Lampmussel	Lampsilis fasciola	THR	SC
Rayed Bean	Villosa fabalis	END	END
Spotted Sucker	Minytrema melanops	SC	SC
Reptiles			
Blanding's Turtle	emydoidea blandingii	END	END
Eastern Foxsnake	Pantherophis vulpinus	END	END
Eastern Hog-nosed Snake	Heterodon platirhinos	THR	THR
Northern Map Turtle	Graptemys geographica	SC	SC
Queensnake	Regina septemvittata	END	END
Snapping Turtle	Chelydra serpentina	SC	SC
Spiny Softshell	Apalone spinifera	END	END
Invertebrates			
Monarch	Danaus plexippus	SC	SC
Mammals			
American Badger	Taxidea taxus jacksoni	END	END
Flora			
Broad Beech Fern	Phegopteris hexagonoptera	SC	SC
Butternut	Juglans cinerea	END	END

Any information you can provide regarding the natural heritage of the area and potential presence of additional SAR, SCC, or SWH would be greatly appreciated.

Thanks so much for your time,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

DRAFT

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2019 Canada's Greenest Employers

From: Peter De Carvalho
To: Karen Reis
Cc: Robyn Leppington
Subject: FW: [External] FW: Natural Heritage/SWH Information Request - Central London Sites MNRF
Date: September 14, 2021 11:14:57 AM
Attachments: image001.png
image002.png
image003.png

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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www.matrix-solutions.com

2019 Canada's Greenest Employers

From: Webb, Jason (MNRF) <Jason.Webb@ontario.ca>
Sent: June 9, 2021 8:57 AM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Subject: [External] FW: Natural Heritage/SWH Information Request - Central London Sites

Hello Peter,

Thank you for sending an email to the Ministry of Natural Resources and Forestry (MNRF) nrisc@ontario.ca email requesting background information for the wastewater treatment plants in London.

Please circulate any future related projects within the MNRF Aylmer District geography to MNRF.Ayl.Planners@ontario.ca.

As requested, please see the following information as it pertains to each site:

Greenway Wastewater Treatment Centre:

- In the event work needs to take place in the river, no in-water work should occur between **March 15 – July 15** to protect spawning fish
- The project is not located within proximity to a Provincially Significant Wetland Complex
- The project is not located within proximity to a provincially significant ANSI
- No known Significant Wildlife Habitat

Adelaide Wastewater Treatment Plant

- In the event work needs to take place in the river, no in-water work should occur between **March 15 – July 15** to protect spawning fish
- The project is not located within proximity to a Provincially Significant Wetland Complex
- The project is not located within proximity to a provincially significant ANSI
- No Known Significant Wildlife Habitat

The Ministry of Environment, Conservation and Parks (MECP) has now assumed responsibility for the Endangered Species Act (ESA), including species at risk (SAR) in Ontario. All future correspondence related to ESA or SAR should be sent to SAROntario@ontario.ca to reach the MECP directly.

Please let me know directly if you have any additional questions or require clarification.

Thanks,

Jason Webb
Management Biologist
Ministry of Natural Resources and Forestry
Aylmer District
226-559-4906
Jason.webb@ontario.ca

Please Note: As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Sent: Wednesday, May 12, 2021 6:47 PM
To: NRISC (MNRF) <NRISC@ontario.ca>
Subject: Natural Heritage/SWH Information Request - Central London Sites

Hi there,

We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario. We've completed a background review using LIO, NHIC, iNaturalist, eBird, the OBBA, ORAA, and the Ontario Butterfly Atlas and carried out a preliminary desktop analysis based on the MNRF Natural Heritage Information Request Guide.

At this time we're requesting any additional natural heritage information (wetland assessments, SWH, other natural heritage features) from MNRF records to evaluate constraints on and adjacent to these properties.

The two sites are the lands within 50 m of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)

And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)

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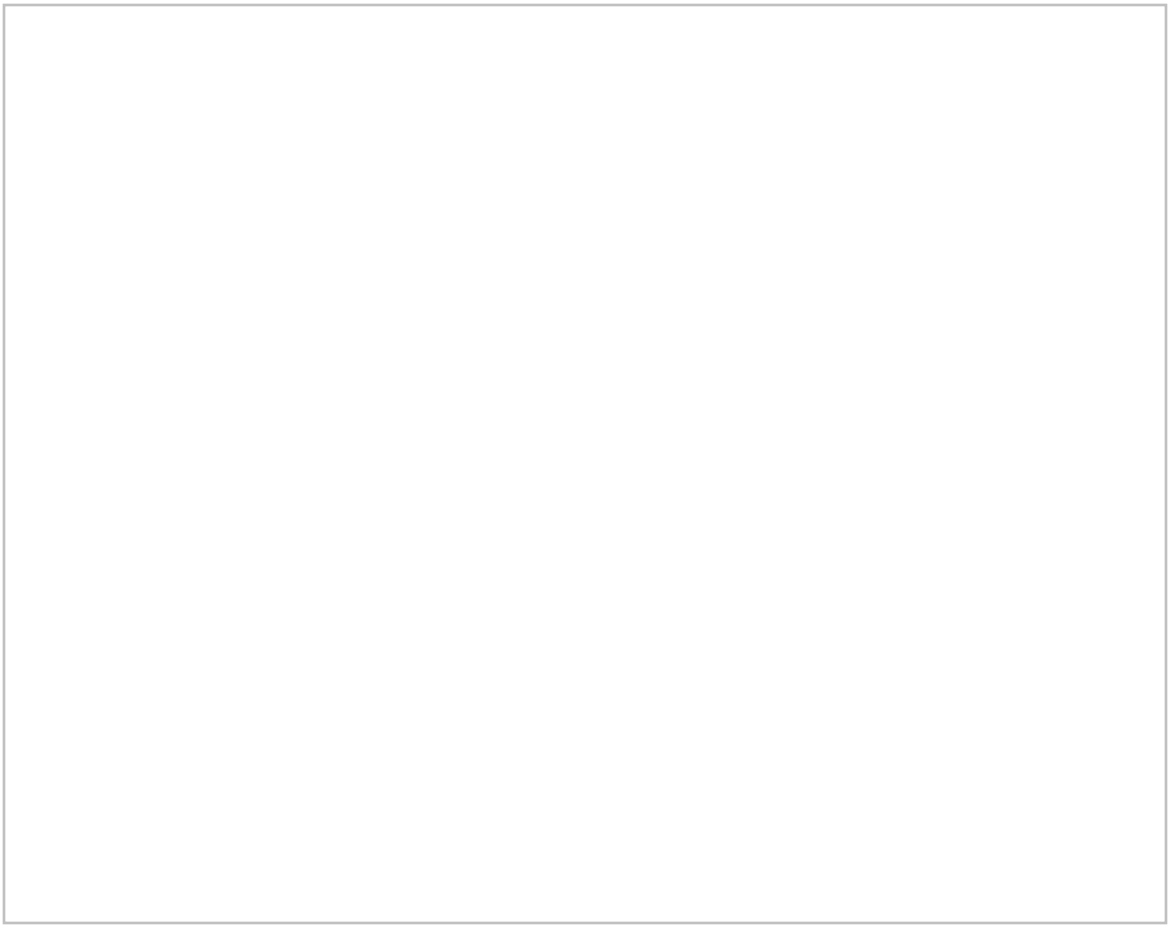

Any information you can provide for these sites would be greatly appreciated.

Thanks for your help,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

2019 Canada's Greenest Employers

From:	Peter De Carvalho
To:	Karen Reis
Cc:	Robyn Leppington
Subject:	FW: [External] Information Request - Greenway and Adelaide WWTP, London UTRCA
Date:	September 14, 2021 11:14:33 AM
Attachments:	IMAGE.png IMAGE.png IMAGE.png Greenway - regulations mapping.pdf Greenway - mussel records.pdf Greenway - fish records.pdf Greenway - benthic records.pdf Adelaide WTF - regulations mapping.pdf Adelaide WTP - fish records.pdf Adelaide WTP - benthic records.pdf image002.jpg

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Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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2019 Canada's Greenest Employers

From: Cari Ramsey <ramseyc@thamesriver.on.ca>
Sent: June 1, 2021 12:44 PM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Cc: Brent Verscheure <VerscheureB@thamesriver.on.ca>; Robyn Leppington <rleppington@matrix-solutions.com>
Subject: [External] Information Request - Greenway and Adelaide WWTP, London

Hi Peter;

Attached is the information we have for the two WWTPs noted above:

Greenway
1. fish, mussel, and benthic records are attached
2. regulations mapping attached
3. ESA are present within 1km of the subject property - MNRF should be contacted for most up to date information
4, SARA species are present within 1km of the subject property - DFO should be contacted for most up to date information
5. Please note that we have records of some species at risk snakes and turtle in the area. Please brief all staff/contractors to be aware of the potential presence of these species when working with heavy machinery to ensure they avoid any juveniles and adults that may be inhabitating the area
6. Watercourses in the area are warm water, therefore in-water work can be done between July 1 - March 15.

Adelaide

1. fish and benthic records attached. There are no mussel records for that area.
2. regulations mapping attached
3. ESA are present within 1km of the subject property - MNRF should be contacted for most up to date information
4, SARA species are present within 1km of the subject property - DFO should be contacted for most up to date information
5. Please note that we have records of some species at risk snakes and turtle in the area. Please brief all staff/contractors to be aware of the potential presence of these species when working with heavy machinery to ensure they avoid any juveniles and adults that may be inhabitating the area
6. Watercourses in the area are warm water, therefore in-water work can be done between July 1 - March 15.

If you have any additional information you need please let me know.

Thanks!
Cari

Cari Ramsey
Environmental Regulations Technician/ Health and Safety Specialist
UTRCA
1424 Clarke Side Road
London, ON
N5V 5B9
(519)451-2800 ext. 289
ramseyc@thamesriver.on.ca
>>> Brent Verscheure 5/13/2021 11:55 AM >>>
Thank you for your inquiry and data request, Peter.
UTRCA staff will compile data and provide to you at our earliest opportunity.

Please be patient as this data request may take up to 3 weeks.

Regards,

Brent Verscheure
Land Use Regulations Officer
1424 Clarke Rd, London, ON N5V 5B9
Tel: 519-451-2800 Ext. 318
Email:verscheureb@thamesriver.on.ca
Web:www.thamesriver.on.ca

All UTRCA offices and buildings are closed to the public to help protect the public and staff from COVID-19. I am working remotely during this time and will be monitoring all messages and emails. We apologize for any inconvenience this may cause.

>>> Peter De Carvalho <pdecarvalho@matrix-solutions.com> 5/12/2021 7:04 PM >>>
Mr. Verscheure,

We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario in the vicinity of the Adelaide and Greenway wastewater treatment plants.

We've completed our preliminary desktop review and are now reaching out to request any available aquatic data (fish and mussel species, benthic invertebrates, water quality data *etc*.), terrestrial/wetland data (turtles, amphibians, vegetation assemblies, confirmed or candidate significant wildlife habitats, other records of species of conservation concern, *etc*.) and any information or data available for the Huron Street Woods to the south and west of the Adelaide site.

As mentioned, the two sites encompass the lands within the vicinity (appx 120 m) of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)

And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)

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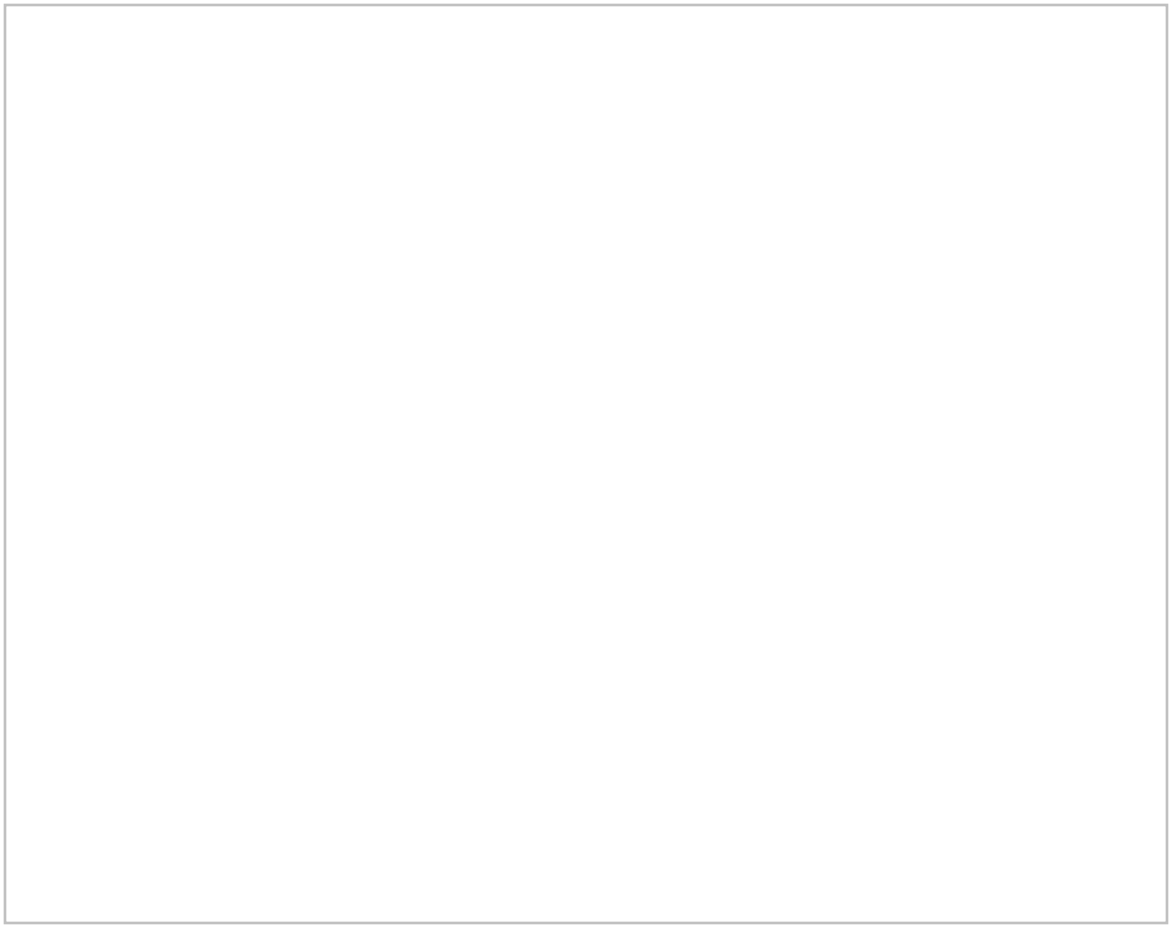

Any information you can provide for these sites would be greatly appreciated.

Thanks very much for your help,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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DRAFT

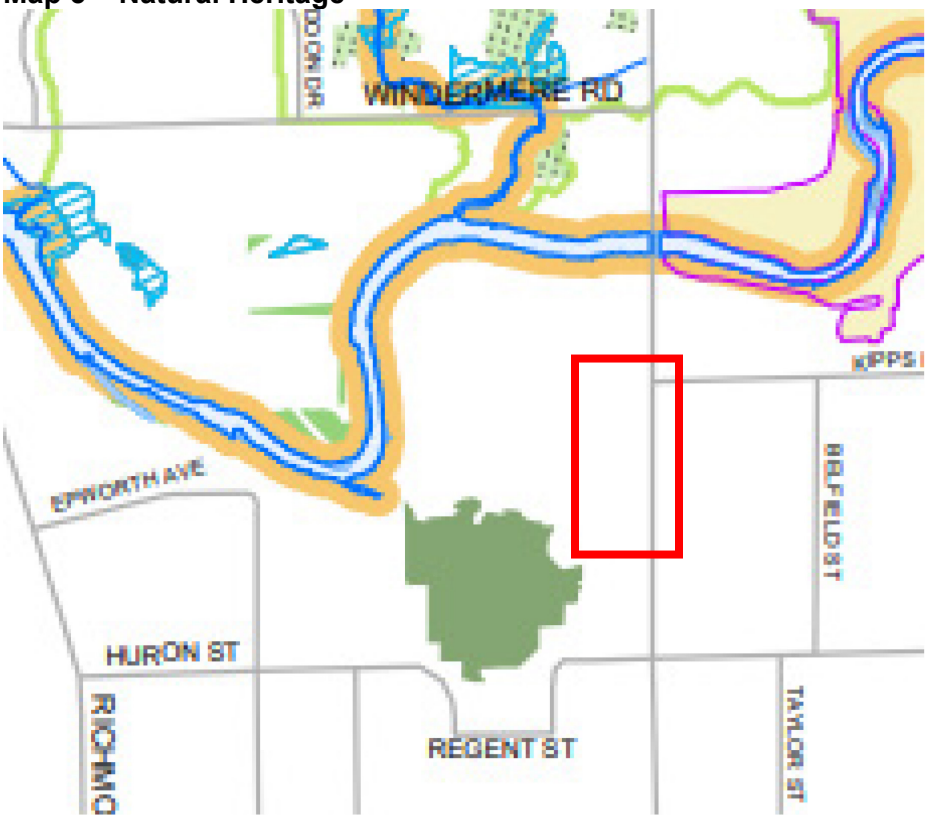
DRAFT

APPENDIX C
Background Data

APPENDIX C

CITY OF LONDON OFFICIAL PLAN MAPPING

Adelaide Study Area
Map 5 – Natural Heritage



LEGEND

NATURAL HERITAGE SYSTEM

- Provincially Significant Wetlands
- Wetlands
- Unevaluated Wetlands
- Significant Woodlands
- Woodlands
- Significant Valleylands
- Valleylands
- Areas of Natural and Scientific Interest
- NAME Environmentally Significant Areas (ESA)
- Potential ESAs
- Upland Corridors
- Potential Naturalization Areas
- Unevaluated Vegetation Patches

BASE MAP FEATURES

- Streets (See Map 3)
- Railways
- Urban Growth Boundary
- Water Courses/Ponds
- Water Bodies
- Conservation Authority Boundary
- Subwatershed Boundary
- STONEY CREEK Subwatershed Name

TABLE C1 Natural Heritage Information Centre - Species Results for Adelaide

OGF ID	Element Type	Common Name	Scientific Name	S-rank	SARO Status	COSEWIC Status	ATLAS NAD83 IDENT
870326	SPECIES	Spiny Softshell	*Apalone spinifera*		END	END	17MH7962
870326	SPECIES	Barn Swallow	*Hirundo rustica*		THR	THR	17MH7962
870326	SPECIES	Chimney Swift	*Chaetura pelagica*		THR	THR	17MH7962
870326	SPECIES	Bobolink	*Dolichonyx oryzivorus*		THR	THR	17MH7962
870326	SPECIES	Northern Map Turtle	*Graptemys geographica*		SC	SC	17MH7962
870326	SPECIES	Snapping Turtle	*Chelydra serpentina*		SC	SC	17MH7962
881436	SPECIES	Lowland Brittle Fern	*Cystopteris protrusa*				17MH8062
881436	SPECIES	Slender Mountain-mint	*Pycnanthemum tenuifolium*				17MH8062
881436	SPECIES	Hairy-fruited Sedge	*Carex trichocarpa*				17MH8062
881436	SPECIES	Striped Cream Violet	*Viola striata*				17MH8062
881436	SPECIES	Rigid Sedge	*Carex tetanica*				17MH8062
881436	SPECIES	Soft-hairy False Gromwell	*Lithospermum parviflorum*				17MH8062
881436	SPECIES	Bobolink	*Dolichonyx oryzivorus*		THR	THR	17MH8062

SARO - Species at Risk Ontario
COSEWIC - Committee on the Status of Endangered Wildlife in Canada
END - endangered
THR - threatened
SC - special concern

TABLE C2 Ontario Reptile and Amphibian Atlas - Species Results for 17MH76

Species No.	Common Name	No. of Records	Earliest Year	Latest Year
1	Blanding's Turtle	1	1923	1923
3	Midland Painted Turtle	24	1986	2018
4	Northern Map Turtle	41	1986	2019
5	Red-eared Slider	6	2009	2018
6	Snapping Turtle	36	1986	2019
10	Dekay's Brownsnake	8	1921	2019
12	Eastern Gartersnake	27	1986	2019
13	Eastern Hog-nosed Snake	4	1965	1981
18	Milksnake	8	1986	2019
20	Queensnake	11	1955	1997
25	American Bullfrog	8	1994	2018
27	Gray Treefrog	213	1994	2017
28	Green Frog	124	1986	2019
30	Northern Leopard Frog	24	1987	2019
31	Pickerel Frog	11	2000	2009
32	Spring Peeper	285	1989	2017
33	Western Chorus Frog	147	1995	2017
34	Wood Frog	38	1986	1998
35	American Toad	132	1960	2019
40	Red-spotted Newt	1	2018	2018
41	Eastern Red-backed Salamander	10	1986	2019
44	Mudpuppy	2	2002	2010

TABLE C3 Ontario Reptile and Amphibian Atlas - Species Results for 17MH86

Species No.	Common Name	No. of Records	Earliest Year	Latest Year
3	Midland Painted Turtle	33	1986	2019
4	Northern Map Turtle	72	1985	2018
5	Red-eared Slider	1	2009	2009
6	Snapping Turtle	38	1970	2019
10	Dekay's Brownsnake	19	1952	2018
12	Eastern Gartersnake	43	1985	2019
13	Eastern Hog-nosed Snake	2	2013	2013
18	Milksnake	43	1985	2019
20	Queensnake	93	1964	2016
21	Red-bellied Snake	23	1986	2014
27	Gray Treefrog	12	1990	2013
28	Green Frog	43	1985	2018
30	Northern Leopard Frog	50	1985	2011
32	Spring Peeper	32	1986	2017
34	Wood Frog	4	1993	1994
35	American Toad	67	1962	2018
40	Red-spotted Newt	4	1990	2019
41	Eastern Red-backed Salamander	5	1989	1994
49	Five-lined Skink	1	2015	2015

TABLE C4 Ontario Butterfly Atlas - Species Results for 17MH76

Species No.	Common Name	Scientific Name	No. of Records	Earliest in Year (adults)	Latest in Year (adults)	Earliest Year	Latest Year
120	Aphrodite Fritillary	Speyeria aphrodite	1			(year not recorded)	(year not recorded)
8	Sleepy Duskywing	Erynnis brizo	1	24-May	24-May	1904	1904
40	Hobomok Skipper	Poanes hobomok	1	15-Jun	15-Jun	1904	1904
155	Eyed Brown	Lethe eurydice	1	25-Jun	25-Jun	1905	1905
85	Bog Copper	Lycaena epixanthe	1	27-Jul	27-Jul	1909	1909
63	Mustard White	Pieris oleracea	1	14-May	14-May	1950	1950
149	White Admiral	Limenitis arthemis arthemis	1	16-Jun	16-Jun	1977	1977
38	Delaware Skipper	Anatrytone logan	1	11-Jul	11-Jul	2018	2018
132	Pearl Crescent	Phyciodes tharos	1	16-Jun	16-Jun	2018	2018
154	Northern Pearly-Eye	Lethe anthedon	1	09-Jul	09-Jul	2019	2019
153	Tawny Emperor	Asterocampa clyton	2	22-Jun	16-Jul	1981	2002
88	Acadian Hairstreak	Satyrium acadica	2	26-Jun	04-Jul	2016	2016
91	Banded Hairstreak	Satyrium calanus	2	18-Jul	21-Jul	1912	2018
43	Dion Skipper	Euphyes dion	2	12-Jul	16-Jul	1909	2018
58	Eastern Tiger Swallowtail	Papilio glaucus	2	07-Jun	11-Aug	2018	2019
156	Appalachian Brown	Lethe appalachia	2	07-Jul	12-Jul	2019	2019
33	Long Dash Skipper	Polites mystic	3	18-May	01-Jul	1903	1909
35	Northern Broken-Dash	Wallengrenia egeremet	3	03-Jul	13-Jul	2002	2018
42	Broad-winged Skipper	Poanes viator	3	10-Jul	30-Jul	1904	2018
145	American Lady	Vanessa virginiensis	3	11-May	19-Aug	1972	2019
47	Dun Skipper	Euphyes vestris	3	16-Jul	13-Aug	1909	2019
92	Hickory Hairstreak	Satyrium caryaevorus	3	12-Jul	21-Jul	2018	2019
119	Great Spangled Fritillary	Speyeria cybele	3	23-Jun	07-Aug	2018	2019
157	Little Wood-Satyr	Megisto cymela	3	21-Jun	12-Aug	2018	2019
84	Bronze Copper	Lycaena hyllus	4	25-Jun	21-Sep	1902	2018
143	Lintner's Mourning Cloak	Nymphalis antiopa lintnerii	4	07-Apr	01-Sep	2013	2019
111	Azure sp.	Celastrina sp.	4	17-Apr	31-Jul	2017	2019
15	Wild Indigo Duskywing	Erynnis baptisiae	5	13-Jul	09-Sep	2018	2019
107	Eastern Tailed Blue	Cupido comyntas	5	13-Jul	16-Sep	2018	2019
158	Common Ringlet	Coenonympha tullia	5	03-Jun	24-Aug	2017	2019
146	Painted Lady	Vanessa cardui	6	27-Jun	16-Sep	1968	2019
159	Common Wood-Nymph	Cercyonis pegala	6	03-Jul	15-Aug	1970	2019
57	Eastern Giant Swallowtail	Papilio cresphontes	6	27-Jul	02-Sep	2018	2019
150	Red-spotted Purple	Limenitis arthemis astyanax	6	02-Aug	09-Sep	2019	2019
144	Milbert's Tortoiseshell	Aglais milberti	7	07-Jun	08-Oct	1968	2018
137	Eastern Comma	Polygonia comma	7	07-Apr	18-Oct	1908	2019
31	Tawny-edged Skipper	Polites themistocles	7	07-Jun	09-Jul	1903	2019
23	Least Skipper	Ancyloxypha numitor	7	07-Jun	01-Oct	2018	2019
136	Question Mark	Polygonia interrogationis	8	18-Mar	17-Sep	1965	2019
69	Clouded Sulphur	Colias philodice	9	21-Jun	27-Oct	2017	2019
151	Viceroy	Limenitis archippus	9	06-Jun	16-Sep	2018	2019
25	European Skipper	Thymelicus lineola	11	15-Jun	21-Jul	1910	2019
55	Black Swallowtail	Papilio polyxenes	12	27-May	30-Sep	1972	2019
147	Red Admiral	Vanessa atalanta	12	10-Apr	25-Sep	1908	2019
1	Silver-spotted Skipper	Epargyreus clarus	13	12-Jun	30-Aug	2016	2019
133	Northern Crescent	Phyciodes cocyta	15	02-Jun	04-Oct	2016	2019
30	Peck's Skipper	Polites peckius	17	06-Jun	01-Sep	1909	2019
65	Cabbage White	Pieris rapae	20	07-Jun	28-Sep	1909	2019
167	Monarch	Danaus plexippus	37	13-Jun	28-Sep	1968	2019

TABLE C5 Ontario Butterfly Atlas - Species Results for 17M86

Species No.	Common Name	Scientific Name	No. of Records	Earliest in Year (adults)	Latest in Year (adults)	Earliest Year	Latest Year
61	Checkered White	Pontia protodice	1	19-Oct	19-Oct	1894	1894
19	Common Checkered Skipper	Pyrgus communis	1			1895	1895
109	Northern Azure	Celastrina lucia	1	08-May	08-May	1901	1901
60	Spicebush Swallowtail	Papilio troilus	1			1999	1999
88	Acadian Hairstreak	Satyrium acadica	1	12-Jul	12-Jul	2004	2004
9	Juvenal's Duskywing	Erynnis juvenalis	1	15-Jun	15-Jun	2014	2014
15	Wild Indigo Duskywing	Erynnis baptisiae	1	31-Jul	31-Jul	2014	2014
31	Tawny-edged Skipper	Polites themistocles	1	15-Jun	15-Jun	2014	2014
63	Mustard White	Pieris oleracea	1	31-Jul	31-Jul	2014	2014
93	Striped Hairstreak	Satyrium liparops	1	31-Jul	31-Jul	2014	2014
144	Milbert's Tortoiseshell	Aglais milberti	1	15-Apr	15-Apr	2015	2015
1	Silver-spotted Skipper	Epargyreus clarus	1	11-Jul	11-Jul	2017	2017
35	Northern Broken-Dash	Wallengrenia egeremet	1	11-Jul	11-Jul	2017	2017
153	Tawny Emperor	Asterocampa clyton	1	23-Jul	23-Jul	2018	2018
57	Eastern Giant Swallowtail	Papilio cresphontes	2	21-Aug	25-Aug	1901	2003
30	Peck's Skipper	Polites peckius	2	15-Jun	11-Jul	2014	2017
132	Pearl Crescent	Phyciodes tharos	2	15-Jun	11-Jul	2014	2017
111	Azure sp.	Celastrina sp.	2	08-May	15-Jun	2014	2018
23	Least Skipper	Ancyloxypha numitor	2	15-Jun	10-Aug	2014	2019
40	Hobomok Skipper	Poanes hobomok	2	11-Jun	15-Jun	2014	2019
91	Banded Hairstreak	Satyrium calanus	2	05-Jul	06-Jul	2016	2019
145	American Lady	Vanessa virginiensis	2	27-May	05-Jul	2016	2019
20	Common Sootywing	Pholisora catullus	2	11-Jul	01-Aug	2017	2019
136	Question Mark	Polygonia interrogationis	2	06-Jul	11-Jul	2017	2019
154	Northern Pearly-Eye	Lethe anthedon	2	03-Jul	11-Jul	2017	2019
70	Orange Sulphur	Colias eurytheme	3	15-Jun	11-Jul	2014	2017
69	Clouded Sulphur	Colias philodice	3	05-Jul	11-Jul	2016	2017
107	Eastern Tailed Blue	Cupido comyntas	3	05-Jul	11-Sep	2016	2018
158	Common Ringlet	Coenonympha tullia	3	15-Jun	27-Jun	2014	2019
151	Viceroy	Limenitis archippus	3	01-Aug	11-Sep	2018	2019
108.1	Spring Azure	Celastrina ladon	4	21-Apr	06-May	1899	1904
150	Red-spotted Purple	Limenitis arthemis astyanax	4	23-Jun	07-Aug	2019	2019
119	Great Spangled Fritillary	Speyeria cybele	4	05-Jul	11-Jul	2016	2019
143	Mourning Cloak	Nymphalis antiopa	4	11-Jun	11-Jul	2012	2019
147	Red Admiral	Vanessa atalanta	4	14-Apr	06-Jul	2017	2019
25	European Skipper	Thymelicus lineola	5	15-Jun	11-Jul	2015	2018
159	Common Wood-Nymph	Cercyonis pegala	5	05-Jul	31-Jul	2014	2019
137	Eastern Comma	Polygonia comma	5	07-May	01-Aug	2015	2019
152	Hackberry Emperor	Asterocampa celtis	5	15-Jun	31-Aug	2018	2019
58	Eastern Tiger Swallowtail	Papilio glaucus	6	30-May	11-Jul	1995	2017
65	Cabbage White	Pieris rapae	6	08-May	11-Sep	2014	2018
55	Black Swallowtail	Papilio polyxenes	6	13-May	05-Jul	1965	2019
133	Northern Crescent	Phyciodes cocyta	7	15-Jun	06-Aug	2014	2018
157	Little Wood-Satyr	Megisto cymela	7	15-Jun	01-Aug	2004	2019
167	Monarch	Danaus plexippus	15	12-Jun	27-Sep	1901	2019

DRAFT

TABLE C6 Ontario Breeding Bird Atlas - Species List for Square 17MH76

Region	Square	Species	Breeding Evidence			
			Max BE	Categ	#Sq	Atlasser Name
4	17MH76	Canada Goose	FY	CONF	1	3 atlassers
4	17MH76	Wood Duck	NE	CONF	1	Ryan Zimmerling
4	17MH76	Mallard	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Ring-necked Pheasant	S	POSS	1	Bob McGee
4	17MH76	Ruffed Grouse	H	POSS	1	Stephen Bucciarelli
4	17MH76	Wild Turkey	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Northern Bobwhite	T	PROB	1	Stephen Bucciarelli
4	17MH76	American Bittern	T	PROB	1	Stephen Bucciarelli
4	17MH76	Great Blue Heron	H	POSS	1	2 atlassers
4	17MH76	Green Heron	A	PROB	1	Stephen Bucciarelli
4	17MH76	Turkey Vulture	V	PROB	1	Stephen Bucciarelli
4	17MH76	Northern Harrier	CF	CONF	1	Dave Martin
4	17MH76	Sharp-shinned Hawk	AE	CONF	1	Stephen Bucciarelli
4	17MH76	Cooper's Hawk	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Red-tailed Hawk	NY	CONF	1	2 atlassers
4	17MH76	American Kestrel	FY	CONF	1	Bob McGee
4	17MH76	Virginia Rail	A	PROB	1	Stephen Bucciarelli
4	17MH76	Sora	A	PROB	1	Stephen Bucciarelli
4	17MH76	Killdeer	DD	CONF	1	2 atlassers
4	17MH76	Rock Pigeon	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Spotted Sandpiper	T	PROB	1	Dave Martin
4	17MH76	Common Snipe	H	POSS	1	Bob McGee
4	17MH76	American Woodcock	FY	CONF	1	Dave Martin
4	17MH76	Black Tern	S	POSS	1	
4	17MH76	Mourning Dove	FY	CONF	1	2 atlassers
4	17MH76	Yellow-billed Cuckoo	H	POSS	1	Stephen Bucciarelli
4	17MH76	Black-billed Cuckoo	CF	CONF	1	Bob McGee
4	17MH76	Eastern Screech-Owl	T	PROB	1	Stephen Bucciarelli
4	17MH76	Great Horned Owl	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Long-eared Owl	H	POSS	1	Stephen Bucciarelli
4	17MH76	Common Nighthawk	P	PROB	1	Stephen Bucciarelli
4	17MH76	Chimney Swift	AE	CONF	1	Bill Lindley
4	17MH76	Ruby-throated Hummingbird	T	PROB	1	2 atlassers
4	17MH76	Belted Kingfisher	AE	CONF	1	Bob McGee
4	17MH76	Red-bellied Woodpecker	NY	CONF	1	Dave Martin
4	17MH76	Yellow-bellied Sapsucker	FY	CONF	1	Bob McGee
4	17MH76	Downy Woodpecker	AE	CONF	1	Bob McGee
4	17MH76	Hairy Woodpecker	NY	CONF	1	2 atlassers
4	17MH76	Northern Flicker	NY	CONF	1	Dave Martin
4	17MH76	Eastern Wood-Pewee	T	PROB	1	Dave Martin
4	17MH76	Willow Flycatcher	CF	CONF	1	2 atlassers
4	17MH76	Least Flycatcher	S	POSS	1	Stephen Bucciarelli
4	17MH76	Eastern Phoebe	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Great Crested Flycatcher	T	PROB	1	2 atlassers
4	17MH76	Eastern Kingbird	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Warbling Vireo	A	PROB	1	Stephen Bucciarelli
4	17MH76	Red-eyed Vireo	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Blue Jay	NY	CONF	1	Stephen Bucciarelli
4	17MH76	American Crow	NE	CONF	1	2 atlassers
4	17MH76	Horned Lark	T	PROB	1	Dave Martin
4	17MH76	Purple Martin	NY	CONF	1	Bob McGee
4	17MH76	Tree Swallow	NY	CONF	1	2 atlassers
4	17MH76	Northern Rough-winged Swallow	FY	CONF	1	Bob McGee
4	17MH76	Cliff Swallow	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Barn Swallow	NY	CONF	1	2 atlassers
4	17MH76	Black-capped Chickadee	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Red-breasted Nuthatch	V	PROB	1	Stephen Bucciarelli
4	17MH76	White-breasted Nuthatch	FY	CONF	1	2 atlassers
4	17MH76	Brown Creeper	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Carolina Wren	NE	CONF	1	Bob McGee
4	17MH76	House Wren	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Winter Wren	S	POSS	1	Stephen Bucciarelli
4	17MH76	Sedge Wren	A	PROB	1	Dave Martin
4	17MH76	Marsh Wren	CF	CONF	1	Stephen Bucciarelli
4	17MH76	Blue-gray Gnatcatcher	H	POSS	1	Stephen Bucciarelli
4	17MH76	Eastern Bluebird	AE	CONF	1	Bob McGee
4	17MH76	Veery	S	POSS	1	Stephen Bucciarelli
4	17MH76	Wood Thrush	A	PROB	1	Dave Martin
4	17MH76	American Robin	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Gray Catbird	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Brown Thrasher	T	PROB	1	Dave Martin
4	17MH76	European Starling	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Cedar Waxwing	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Blue-winged Warbler	S	POSS	1	Bob McGee
4	17MH76	Yellow Warbler	CF	CONF	1	Bob McGee
4	17MH76	Chestnut-sided Warbler	T	PROB	1	Bob McGee
4	17MH76	Blackburnian Warbler	T	PROB	1	Stephen Bucciarelli
4	17MH76	American Redstart	T	PROB	1	Stephen Bucciarelli
4	17MH76	Common Yellowthroat	A	PROB	1	2 atlassers
4	17MH76	Eastern Towhee	A	PROB	1	Stephen Bucciarelli
4	17MH76	Chipping Sparrow	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Field Sparrow	CF	CONF	1	Stephen Bucciarelli
4	17MH76	Vesper Sparrow	T	PROB	1	Stephen Bucciarelli
4	17MH76	Savannah Sparrow	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Song Sparrow	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Swamp Sparrow	DD	CONF	1	Dave Martin
4	17MH76	White-throated Sparrow	S	POSS	1	Bob McGee
4	17MH76	Scarlet Tanager	FS	CONF	1	Stephen Bucciarelli
4	17MH76	Northern Cardinal	NY	CONF	1	Bob McGee
4	17MH76	Rose-breasted Grosbeak	NY	CONF	1	2 atlassers
4	17MH76	Indigo Bunting	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Bobolink	AE	CONF	1	Bob McGee
4	17MH76	Red-winged Blackbird	NE	CONF	1	Dave Martin
4	17MH76	Eastern Meadowlark	A	PROB	1	Stephen Bucciarelli
4	17MH76	Common Grackle	FY	CONF	1	3 atlassers
4	17MH76	Brown-headed Cowbird	FY	CONF	1	2 atlassers
4	17MH76	Orchard Oriole	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Baltimore Oriole	NY	CONF	1	Stephen Bucciarelli
4	17MH76	House Finch	NY	CONF	1	Stephen Bucciarelli
4	17MH76	American Goldfinch	NY	CONF	1	Stephen Bucciarelli
4	17MH76	House Sparrow	NY	CONF	1	2 atlassers

TABLE C7 Ontario Breeding Bird Atlas - Species List for Square 17MH86

Region	Square	Species	Breeding Evidence			
			Max BE	Categ	#Sq	Atlasser Name
4	17MH86	Canada Goose	NE	CONF	1	2 atlassers
4	17MH86	Mute Swan	T	PROB	1	Bill Lindley
4	17MH86	Wood Duck	FY	CONF	1	Bill Lindley
4	17MH86	American Black Duck	NE	CONF	1	Bill Lindley
4	17MH86	Mallard	FY	CONF	1	Bill Lindley
4	17MH86	Blue-winged Teal	D	PROB	1	Bill Lindley
4	17MH86	Green-winged Teal	P	PROB	1	2 atlassers
4	17MH86	Ring-necked Pheasant	T	PROB	1	Bill Lindley
4	17MH86	Wild Turkey	FY	CONF	1	2 atlassers
4	17MH86	Pied-billed Grebe	D	PROB	1	Bill Lindley
4	17MH86	Double-crested Cormorant	NB	CONF	1	Bill Lindley
4	17MH86	American Bittern	FY	CONF	1	Bill Lindley
4	17MH86	Great Blue Heron	H	POSS	1	Bill Lindley
4	17MH86	Green Heron	FY	CONF	1	Bill Lindley
4	17MH86	Turkey Vulture	H	POSS	1	Bill Lindley
4	17MH86	Osprey	NE	CONF	1	Bill Lindley
4	17MH86	Bald Eagle	NY	CONF	1	2 atlassers
4	17MH86	Northern Harrier	CF	CONF	1	Bill Lindley
4	17MH86	Sharp-shinned Hawk	CF	CONF	1	Bill Lindley
4	17MH86	Cooper's Hawk	CF	CONF	1	Bill Lindley
4	17MH86	Red-shouldered Hawk	H	POSS	1	Bill Lindley
4	17MH86	Red-tailed Hawk	NY	CONF	1	Bill Lindley
4	17MH86	American Kestrel	FY	CONF	1	Bill Lindley
4	17MH86	Virginia Rail	T	PROB	1	Bill Lindley
4	17MH86	Sora	T	PROB	1	Bill Lindley
4	17MH86	Common Gallinule	H	POSS	1	Bill Lindley
4	17MH86	American Coot	H	POSS	1	Bill Lindley
4	17MH86	Killdeer	DD	CONF	1	Bill Lindley
4	17MH86	Rock Pigeon	FY	CONF	1	Bill Lindley
4	17MH86	Spotted Sandpiper	NE	CONF	1	Bill Lindley
4	17MH86	Upland Sandpiper	AE	CONF	1	Bill Lindley
4	17MH86	Common Snipe	D	PROB	1	Bill Lindley
4	17MH86	American Woodcock	T	PROB	1	Bill Lindley
4	17MH86	Mourning Dove	FY	CONF	1	Bill Lindley
4	17MH86	Yellow-billed Cuckoo	NB	CONF	1	Bill Lindley
4	17MH86	Black-billed Cuckoo	FY	CONF	1	Bill Lindley
4	17MH86	Eastern Screech-Owl	T	PROB	1	Bill Lindley
4	17MH86	Great Horned Owl	CF	CONF	1	Bill Lindley
4	17MH86	Northern Saw-whet Owl	T	PROB	1	Bill Lindley
4	17MH86	Common Nighthawk	D	PROB	1	Bill Lindley
4	17MH86	Chimney Swift	AE	CONF	1	Bill Lindley
4	17MH86	Ruby-throated Hummingbird	FY	CONF	1	Bill Lindley
4	17MH86	Belted Kingfisher	AE	CONF	1	Bill Lindley
4	17MH86	Red-headed Woodpecker	T	PROB	1	Bill Lindley
4	17MH86	Red-bellied Woodpecker	CF	CONF	1	Bill Lindley
4	17MH86	Yellow-bellied Sapsucker	AE	CONF	1	Bill Lindley
4	17MH86	Downy Woodpecker	NY	CONF	1	Bill Lindley
4	17MH86	Hairy Woodpecker	AE	CONF	1	Bill Lindley
4	17MH86	Northern Flicker	CF	CONF	1	Bill Lindley
4	17MH86	Pileated Woodpecker	AE	CONF	1	Bill Lindley
4	17MH86	Eastern Wood-Pewee	T	PROB	1	2 atlassers
4	17MH86	Alder Flycatcher	NB	CONF	1	Bill Lindley
4	17MH86	Willow Flycatcher	FY	CONF	1	Ian Platt
4	17MH86	Least Flycatcher	T	PROB	1	2 atlassers
4	17MH86	Eastern Phoebe	NE	CONF	1	Bill Lindley
4	17MH86	Great Crested Flycatcher	NB	CONF	1	Bill Lindley
4	17MH86	Eastern Kingbird	NE	CONF	1	Bill Lindley
4	17MH86	Yellow-throated Vireo	T	PROB	1	Bill Lindley
4	17MH86	Warbling Vireo	CF	CONF	1	Bill Lindley
4	17MH86	Red-eyed Vireo	NE	CONF	1	Bill Lindley
4	17MH86	Blue Jay	CF	CONF	1	Bill Lindley
4	17MH86	American Crow	CF	CONF	1	Bill Lindley
4	17MH86	Horned Lark	D	PROB	1	Bill Lindley
4	17MH86	Purple Martin	AE	CONF	1	Bill Lindley
4	17MH86	Tree Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Northern Rough-winged Swallow	AE	CONF	1	2 atlassers
4	17MH86	Bank Swallow	AE	CONF	1	2 atlassers
4	17MH86	Cliff Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Barn Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Black-capped Chickadee	FY	CONF	1	Bill Lindley
4	17MH86	Red-breasted Nuthatch	AE	CONF	1	Bill Lindley
4	17MH86	White-breasted Nuthatch	CF	CONF	1	Bill Lindley
4	17MH86	Brown Creeper	T	PROB	1	Dave Martin
4	17MH86	Carolina Wren	A	PROB	1	Bill Lindley
4	17MH86	House Wren	FS	CONF	1	Bill Lindley
4	17MH86	Marsh Wren	P	PROB	1	Bill Lindley
4	17MH86	Golden-crowned Kinglet	CF	CONF	1	Bill Lindley
4	17MH86	Blue-gray Gnatcatcher	P	PROB	1	Bill Lindley
4	17MH86	Eastern Bluebird	FY	CONF	1	Bill Lindley
4	17MH86	Veery	H	POSS	1	Bill Lindley
4	17MH86	Wood Thrush	T	PROB	1	2 atlassers
4	17MH86	American Robin	NE	CONF	1	Bill Lindley
4	17MH86	Gray Catbird	CF	CONF	1	Bill Lindley
4	17MH86	Northern Mockingbird	T	PROB	1	Bill Lindley
4	17MH86	Brown Thrasher	CF	CONF	1	Bill Lindley
4	17MH86	European Starling	AE	CONF	1	Bill Lindley
4	17MH86	Cedar Waxwing	FY	CONF	1	Bill Lindley
4	17MH86	Yellow Warbler	NE	CONF	1	Bill Lindley
4	17MH86	Chestnut-sided Warbler	P	PROB	1	Bill Lindley
4	17MH86	Black-throated Green Warbler	S	POSS	1	Bill Lindley
4	17MH86	Pine Warbler	CF	CONF	1	Bill Lindley
4	17MH86	American Redstart	T	PROB	1	2 atlassers
4	17MH86	Ovenbird	T	PROB	1	Bill Lindley
4	17MH86	Northern Waterthrush	T	PROB	1	Bill Lindley
4	17MH86	Mourning Warbler	T	PROB	1	2 atlassers
4	17MH86	Common Yellowthroat	NE	CONF	1	Bill Lindley
4	17MH86	Eastern Towhee	T	PROB	1	2 atlassers
4	17MH86	Chipping Sparrow	FY	CONF	1	Bill Lindley
4	17MH86	Field Sparrow	NE	CONF	1	Bill Lindley
4	17MH86	Vesper Sparrow	DD	CONF	1	Bill Lindley
4	17MH86	Savannah Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Grasshopper Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Song Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Swamp Sparrow	T	PROB	1	Bill Lindley
4	17MH86	White-throated Sparrow	T	PROB	1	Bill Lindley
4	17MH86	Scarlet Tanager	T	PROB	1	Bill Lindley
4	17MH86	Northern Cardinal	NE	CONF	1	Bill Lindley
4	17MH86	Rose-breasted Grosbeak	FY	CONF	1	Bill Lindley
4	17MH86	Indigo Bunting	CF	CONF	1	Bill Lindley
4	17MH86	Bobolink	D	PROB	1	Bill Lindley
4	17MH86	Red-winged Blackbird	NE	CONF	1	Bill Lindley
4	17MH86	Eastern Meadowlark	AE	CONF	1	Bill Lindley
4	17MH86	Common Grackle	FY	CONF	1	Bill Lindley
4	17MH86	Brown-headed Cowbird	FY	CONF	1	3 atlassers
4	17MH86	Orchard Oriole	NB	CONF	1	Bill Lindley
4	17MH86	Baltimore Oriole	AE	CONF	1	Bill Lindley
4	17MH86	House Finch	CF	CONF	1	Bill Lindley
4	17MH86	White-winged Crossbill	H	POSS	1	Bill Lindley
4	17MH86	American Goldfinch	FY	CONF	1	Bill Lindley
4	17MH86	House Sparrow	NY	CONF	1	Bill Lindley

FIGURE C1 Department of Fisheries and Oceans - Species at Risk Results (Adelaide)

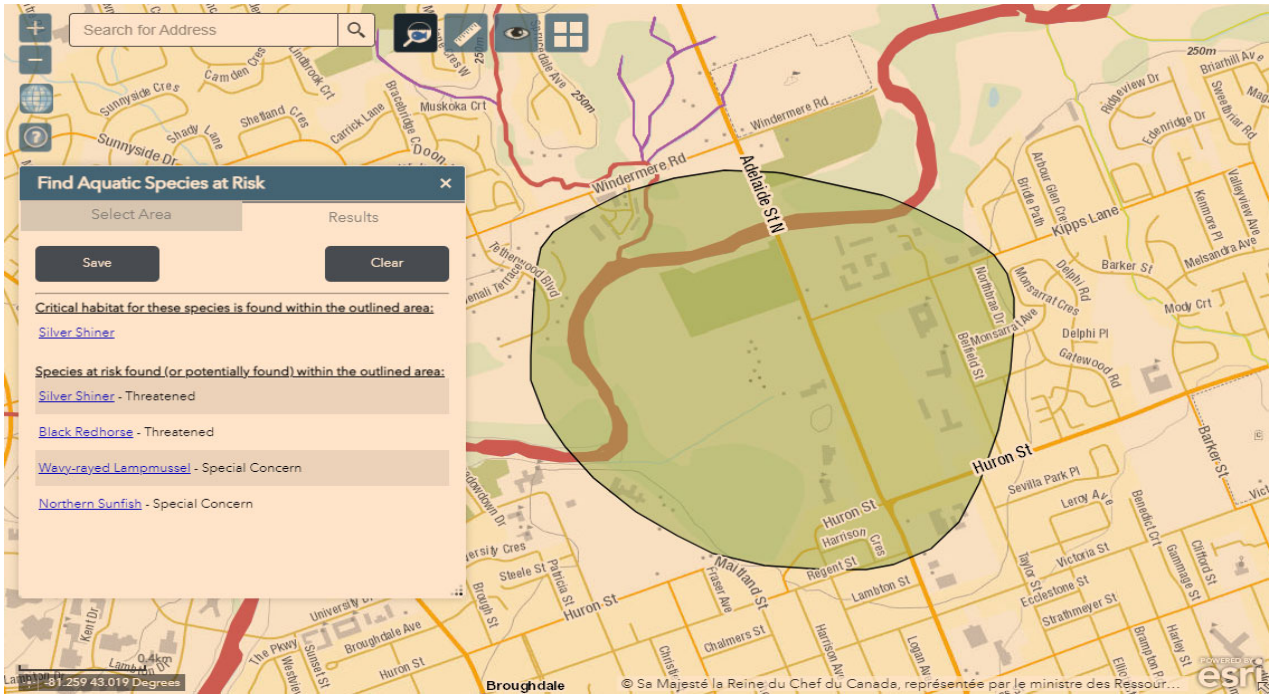


TABLE C8 Ontario Mammal Atlas Results

Common Name	Scientific Name	Provincial (S-rank)	National (SARA)	Provincial (ESA)
American Badger (Southwestern Ontario Population)	*Taxidea taxus jacksoni*	S1	END	END
Beaver	*Castor canadensis*	S5		
Big Brown Bat	*Eptesicus fuscus*	S4		
Coyote	*Canis latrans*	S5		
Deer Mouse	*Peromyscus maniculatus*	S5		
Eastern Chipmunk	*Tamias striatus*	S5		
Eastern Cottontail	*Sylvilagus floridanus*	S5		
Eastern Gray Squirrel	*Sciurus carolinensis*	S5		
Eastern Small-footed *Myotis*	*Myotis leibii*	S2S3	END	END
Eastern Red Bat	*Lasiurus borealis*	S4		
Ermine	*Mustela erminea*	S5		
Hairy-tailed Mole	*Parascalops breweri*	S4		
Hoary Bat	*Lasiurus cinereus*	S4		
House Mouse	*Mus musculus*	SNA		
Little Brown *Myotis*	*Myotis lucifugus*	S4	END	END
Long-tailed weasel	*Mustela frenata*	S4		
Masked Shrew	*Sorex cinereus*	S5		
Meadow Jumping Mouse	*Zapus hudsonicus*	S5		
Meadow Vole	*Microtus pennsylvanicus*	S5		
Mink	*Mustela vison*	S4		
Muskrat	*Ondatra zibethicus*	S5		
Northern *Myotis*	*Myotis septentrionalis*	S3	END	END
Northern Short-tailed Shrew	*Blarina brevicauda*	S5		
Norway Rat	*Rattus norvegicus*	SNA		
Porcupine	*Erethizon dorsatum*	S5		
Raccoon	*Procyon lotor*	S5		
Red Fox	*Vulpes vulpes*	S5		
Red Squirrel	*Tamiasciurus hudsonicus*	S5		
Silver-haired Bat	*Lasionycteris noctivagans*	S4		
Smoky Shrew	*Sorex fumeus*	S5		
Snowshoe Hare	*Lepus americanus*	S5		
Southern Flying Squirrel	*Glaucomys volans*	S4		
Star-nosed Mole	*Condylura cristata*	S5		
Striped Skunk	*Mephitis mephitis*	S5		
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END
Virginia Opposum	*Didelphis virginiana*	S4		
White-footed Mouse	*Peromyscus leucopus*	S5		
White-tailed Deer	*Odocoileus virginianus*	S5		
Woodchuck	*Marmota monax*	S5		
Woodland Jumping Mouse	*Napaeozapus insignis*	S5		

SARA - *Species at Risk Act*

ESA - *Endangered Species Act*

END - endangered

DRAFT

APPENDIX D
Flora Inventory Results

TABLE D1 Adelaide Wastewater Treatment Plant - Flora Results 2021

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	UM1/MAM2-1	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/SV	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Tree	*Ulmus americana*	American Elm	-	-	S5			x												
Herb	*Amphicarpaea bracteata*	American Hog-peanut	-	-	S5					x										
Tree	*Lonicera maackii*	Amur Honeysuckle	-	-	SNA					x										
Tree	*Acer ginnala*	Amur Maple	-	-	SNA														x	
Graminoid	*Poa annua*	Annual Bluegrass	-	-	SNA	x	x	x			x								x	x
Herb	*Erigeron annuus*	Annual Fleabane	-	-	S5					x	x								x	
Graminoid	*Scirpus atrovirens*	Black Bulrush	-	-	S5		x								x		x			
Tree	*Prunus serotina*	Black Cherry	-	-	SNR					x										
Tree	*Robinia pseudoacacia*	Black Locust	-	-	SNA		x	x											x	
Herb	*Medicago lupulina*	Black medic	-	-	SNA		x	x			x							x	x	x
Herb	*Rubus occidentalis*	Black Raspberry	-	-	S5					x	x								x	
Tree	*Juglans nigra*	Black Walnut	-	-	S4?			x	x	x	x		x					x	x	x
Tree	*Salix nigra*	Black Willow	-	-	S4		x											x		
Herb	*Solidago flexicaulis*	Broadleaf Goldenrod	-	-	S5	x	x		x											
Graminoid	*Andropogon virginicus*	Broomsedge	-	-	S4		x								x					
Herb	*Rudbeckia triloba*	Brown-eyed Susan	-	-	SNA		x													
Herb	*Cicuta bulbifera*	Bulb-bearing Water Hemlock	-	-	S5								x							
Herb	*Cirsium vulgare*	Bull Thistle	-	-	SNA					x	x				x			x		x
Herb	*Linaria vulgaris*	Butter-and-eggs	-	-	SNA			x												x
Herb	*Anemone canadensis*	Canada Anemone	-	-	S5					x										
Herb	*Solidago canadensis*	Canada Goldenrod	-	-	SNR	x	x	x	x	x	x								x	
Herb	*Cirsium arvense*	Canada Thistle	-	-	SNA	x	x	x	x	x	x				x			x	x	x
Graminoid	*Elymus canadensis*	Canada Wildrye	-	-	S5	x	x	x		x	x								x	
Tree	*Prunus virginiana*	Chokecherry	-	-	S5														x	
Shrub	*Apocynum cannabinum*	Clasping-leaf Dogbane	-	-	SNR					x										
Herb	*Fallopia scandens*	Climbing False Buckwheat	-	-	S4					x										
Shrub	*Solanum dulcamara*	Climbing Nightshade	-	-	SNA	x	x	x	x		x				x			x	x	x
Tree	*Malus pumila*	Common Apple	-	-	SNA															
Herb	*Eupatorium perfoliatum*	Common Boneset	-	-	S5		x						x	x	x		x	x		
Herb	*Arctium minus*	Common Burdock	-	-	SNA			x	x				x					x	x	x
Herb	*Typha latifolia*	Common Cattail	-	-	S5								x	x		x	x			
Herb	*Taraxacum officinale*	Common Dandelion	-	-	SNA			x	x		x	x	x					x	x	x
Shrub	*Sambucus nigra*	Common Elderberry	-	-	SNA															
Tree	*Celtis occidentalis*	Common Hackberry	-	-	S4			x		x									x	x
Herb	*Equisetum arvense*	Common Horsetail	-	-	S5		x						x		x			x		
Tree	*Syringa vulgaris*	Common Lilac	-	-	SNA			x												
Herb	*Asclepias syriaca*	Common Milkweed	-	-	S5	x	x		x		x								x	
Herb	*Leonurus cardiaca*	Common Motherwort	-	-	SNA			x	x											x
Herb	*Verbascum thapsus*	Common Mullein	-	-	SNA						x								x	
Herb	*Plantago major*	Common Plantain	-	-	SNA			x	x		x		x		x			x	x	x
Herb	*Ambrosia artemisiifolia*	Common Ragweed	-	-	S5			x											x	x
Graminoid	*Phragmites australis*	Common Reed	-	-	SNA		x						x	x	x	x	x	x	x	
Herb	*Hypericum perforatum*	Common St. John's Wort	-	-	SNA			x			x								x	
Herb	*Tanacetum vulgare*	Common Tansy	-	-	SNA	x	x	x			x				x				x	x
Herb	*Dipsacus fullonum*	Common Teasel	-	-	SNA		x	x	x		x								x	
Graminoid	*Phleum pratense*	Common Timothy	-	-	SNA					x	x								x	
Tree	*Salix fragilis*	Crack Willow	-	-	SNA				x	x										x
Herb	*Campanula rapunculoides*	Creeping Bellflower	-	-	SNA			x			x							x	x	x
Herb	*Lysimachia nummularia*	Creeping Jenny	-	-	SNA					x										
Herb	*Rumex crispus*	Curled Dock	-	-	SNA	x	x	x	x				x	x				x	x	
Herb	*Rudbeckia laciniata*	Cut-leaved Coneflower	-	-	S5		x			x										
Tree	*Populus deltoides*	Eastern Cottonwood	-	-	S5	x	x	x	x											x
Shrub	*Physocarpus opulifolius*	Eastern Ninebark	-	-	S5	x	x	x		x	x			x					x	
Tree	*Juniperus virginiana*	Eastern Red-cedar	-	-	S5		x	x				x								
Tree	*Thuja occidentalis*	Eastern White Cedar	-	-	S5	x	x	x										x	x	
Herb	*Circaea Lutetiana*	Enchanter's Nightshade	-	-	S5					x										
Shrub	*Rhamnus cathartica*	European Buckthorn	-	-	SNA	x	x	x	x	x	x	x	x					x	x	x
Shrub	*Ligustrum vulgare*	European Privet	-	-	SNA			x	x	x	x							x	x	x
Herb	*Convolvulus arvensis*	Field Bindweed	-	-	SNA	x	x	x	x	x	x									x
Graminoid	*Carex vulpinoidea*	Fox Sedge	-	-	S5		x													
Shrub	*Rhus aromatica*	Fragrant Sumac	-	-	S4						x								x	
Graminoid	*Bromus ciliatus*	Fringed Brome	-	-	S5					x										
Herb	*Lotus corniculatus*	Garden Bird's-foot Trefoil	-	-	SNA	x	x	x		x	x				x				x	x
Herb	*Alliaria petiolata*	Garlic Mustard	-	-	SNA	x	x	x	x	x	x	x	x		x				x	x
Shrub	*Frangula alnus*	Glossy Buckthorn	-	-	SNA				x				x					x		
Herb	*Aegopodium podagraria*	Goutweed	-	-	SNA					x								x		x
Herb	*Ambrosia trifida*	Great Ragweed	-	-	S5		x						x						x	
Herb	*Chelidonium majus*	Greater Celandine	-	-	SNA				x											

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	UM1/MAM2-1	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/SV	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Tree	*Fraxinus pennsylvanica*	Green Ash	-	-	S4			x	x	x	x	x							x	
Graminoid	*Setaria viridis*	Green Foxtail	-	-	SNA			x												
Shrub	*Cornus racemosa*	Grey Dogwood	-	-	S5	x	x	x		x	x								x	x
Herb	*Cuscuta gronovii*	Gronovius Dodder	-	-	S5								x							
Herb	*Glechoma hederacea*	Ground-ivy	-	-	SNA				x		x							x		x
Herb	*Epilobium parviflorum*	Hairy Willowherb	-	-	SNA		x													
Shrub	*Salix candida*	Hoary Willow	-	-	S5		x											x		
Herb	*Arisaema triphyllum*	Jack-in-the-Pulpit	-	-	S5					x										
Shrub	*Reynoutria japonica*	Japanese Knotweed	-	-	SNA						x	x								
Herb	*Polygonum virgininanum*	Jump seed	-	-	S4					x										
Graminoid	*Poa pratensis*	Kentucky Bluegrass	-	-	S5	x	x	x		x	x				x			x		x
Tree	*Tilia cordata*	Little-leaved Linden	-	-	SNA															x
Tree	*Acer negundo*	Manitoba Maple	-	-	S5		x	x	x	x	x	x	x					x	x	x
Herb	*Epilobium palustre*	Marsh Willowherb	-	-	S5								x							
Shrub	*Rosa multiflora*	Multiflora Rose	-	-	SNA													x	x	
Herb	*Typha angustifolia*	Narrowleaf Cattail	-	-	SNA								x	x		x	x			x
Herb	*Bidens cernua*	Nodding Beggarticks	-	-	S5					x							x			
Herb	*Alisma triviale*	Northern Water-plantain	-	-	S5								x							
Tree	*Acer Platanoides*	Norway Maple	-	-	SNA			x												
Herb	*Hieracium aurantiacum*	Orange Hawkweed	-	-	SNA															x
Graminoid	*Dactylis glomerata*	Orchard Grass	-	-	SNA		x	x		x	x				x				x	x
Tree	*Betula papyrifera*	Paper Birch	-	-	SNR														x	
Herb	*Eutrochium purpureum*	Purple Joe Pye Weed	-	-	S4		x			x			x	x	x		x	x		
Herb	*Lythrum salicaria*	Purple Loosestrife	-	-	SNA		x				x		x	x	x		x	x	x	x
Graminoid	*Elymus repens*	Quackgrass	-	-	SNA			x	x	x	x								x	
Herb	*Trifolium pratense*	Red Clover	-	-	SNA		x	x	x		x								x	x
Graminoid	*Festuca rubra*	Red Fescue	-	-	SNA														x	
Tree	*Pinus resinosa*	Red Pine	-	-	S5			x												x
Shrub	*Cornus sericea*	Red-osier Dogwood	-	-	S5								x					x		x
Graminoid	*Phalaris arundinacea*	Reed Canarygrass	-	-	S5	x	x	x	x		x		x	x	x	x	x	x	x	x
Herb	*Vitis riparia*	Riverbank Grape	-	-	S5	x	x	x	x	x	x	x	x					x	x	x
Shrub	*Eleagnus angustifolia*	Russian Olive	-	-	SNA						x									x
Tree	*Pinus sylvestris*	Scotch Pine	-	-	SNA			x												
Herb	*Prunella vulgaris*	Self-heal	-	-	S5			x	x											
Tree	*Acer saccharinum*	Silver Maple	-	-	S5															x
Graminoid	*Juncus tenuis*	Slender Rush	-	-	SNR		x													
Shrub	*Salix petiolaris*	Slender Willow	-	-	S5		x						x	x				x		
Herb	*Galium trifidum*	Small Bedstraw	-	-	SNR		x						x							
Herb	*Galium mollugo*	Smooth Bedstraw	-	-	SNA	x	x	x	x		x									x
Graminoid	*Bromus inermis*	Smooth Brome	-	-	SNA		x			x	x								x	
Graminoid	*Digitaria ischaemum*	Smooth Crabgrass	-	-	SNA															x
Graminoid	*Digitaria ischaemum*	Smooth Crabgrass	-	-	SNA			x												x
Herb	*Crepis capillaris*	Smooth Hawk's-beard	-	-	SNA					x									x	x
Herb	*Saponaria officinalis*	Soapwort	-	-	SNA						x									
Herb	*Sonchus sp.*	Sow-thistle	-	-	-			x												x
Herb	*Impatiens capensis*	Spotted Jewelweed	-	-	S5		x		x	x	x	x	x	x	x		x	x		
Herb	*Centaurea stoebe*	Spotted Knapweed	-	-	SNA	x	x		x	x	x									
Shrub	*Rhus typhina*	Staghorn Sumac	-	-	S5			x	x		x								x	x
Herb	*Hackelia virginiana*	Stickseed	-	-	S5				x			x	x							
Herb	*Urtica dioica*	Stinging Nettle	-	-	S5				x				x						x	x
Tree	*Acer saccharum*	Sugar Maple	-	-	S5			x												
Herb	*Asclepias incarnata*	Swamp Milkweed	-	-	S5								x							
Herb	*Solidago altissima*	Tall Goldenrod	-	-	S5	x	x	x	x	x	x								x	
Shrub	*Lonicera tatarica*	Tatarian Honeysuckle	-	-	SNA			x	x		x								x	x
Herb	*Vicia cracca*	Tufted Vetch	-	-	SNA		x												x	
Tree	*Liriodendron tulipifera*	Tulip Tree	-	-	S4			x												
Herb	*Oxalis stricta*	Upright Yellow Wood-sorrel	-	-	SNA			x	x		x									
Herb	*Parthenocissus quinquefolia*	Virginia Creeper	-	-	S4?			x	x	x	x								x	x
Herb	*Clematis virginiana*	Virginia Virgin's-bower	-	-	S5					x										
Herb	*Polygonum amphibium*	Water Smartweed	-	-	S5								x	x						
Herb	*Rorippa nasturtium-aquaticum*	Watercress	-	-	SNA								x							
Herb	*Silene latifolia*	White Campion	-	-	SNA		x			x	x									
Herb	*Trifolium repens*	White Clover	-	-	SNA		x												x	x
Tree	*Morus alba*	White Mulberry	-	-	SNA			x	x										x	
Tree	*Quercus alba*	White Oak	-	-	S5					x										
Herb	*Ageratina altissima*	White Snakeroot	-	-	S5		x			x										
Herb	*Melilotus albus*	White Sweet-clover	-	-	SNA		x				x								x	
Herb	*Verbena urticifolia*	White Vervain	-	-	S5	x	x		x	x		x								
Herb	*Daucus carota*	Wild Carrot	-	-	SNA	x	x		x	x	x				x				x	x

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	UM1/MAM2-1	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/SV	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Herb	*Cichorium intybus*	Wild Chicory	-	-	SNA		x												x	x
Herb	*Allium vineale*	Wild Garlic	-	-	SNA		x				x								x	
Herb	*Mentha arvensis*	Wild Mint	-	-	SNR	x	x								x					
Shrub	*Ribes triste*	Wild Red Currant	-	-	S5	x	x													
Shrub	*Rubus idaeus*	Wild Red Raspberry	-	-	S5					x										
Shrub	*Salix sp.*	Willow	-	-	-		x		x	x			x	x	x		x	x	x	x
Herb	*Geum urbanum*	Wood Avens	-	-	SNA					x										
Graminoid	*Scirpus cyperinus*	Woolgrass	-	-	S5		x							x						
Herb	*Achillea millefolium*	Yarrow	-	-	SNA		x			x										x
Herb	*Geum aleppicum*	Yellow Avens	-	-	S5				x			x								

ESA - *Endangered Species Act*
SARA - *Species at Risk Act*

APPENDIX E
Breeding Bird Survey Results

TABLE E1 Breeding Bird Summary Results for Adelaide Wastewater Treatment Plant

Visit Number	Date	Weather
Visit 1:	June 4, 2021	15-16°C, 0 wind, 70-90% cloud cover, no precipitation
Visit 2:	June 24, 2021	18°C, 1-2 South wind, 40-90% cloud cover, no precipitation

Species		ESA Status	SARA Status	Visit 1: June 4, 2021						Visit 1: June 24, 2021						Highest Breeding Evidence						Comments
Common Name	Scientific Name			BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	
American Goldfinch	*Spinus tristis*			P:H 1		P:H 2						P:H 2 PR:P P:S				Possible		Probable				
American Redstart	*Setophaga ruticilla*			P:S 1	P:S 1	P:S 1		P:S 1	P:S 1	P:S 1	P:S 1			P:S 1		Possible	Possible	Possible		Possible	Possible	
American Robin	*Turdus migratorius*			P:S 2		P:S 2	P:S 3	P:H 8	P:S 3	P:S 1	P:S 2		P:S 5	C:FY 7	C:FY 9	Possible	Possible	Possible	Possible	Confirmed	Confirmed	
Baltimore Oriole	*Icterus galbula*						P:S 1		P:S 1					P:H 1					Possible	Possible	Possible	
Black-capped Chickadee	*Poecile atricapillus*					P:S 1	P:S 1					P:S 1						Possible	Possible			
Brown-headed Cowbird	*Molothrus ater*			P:S 1									P:S 1	P:S 1	P:H 1	Possible			Possible	Possible	Possible	
Blue Jay	*Cyanocitta cristata*				P:H 1	P:H 1					P:H 1						Possible	Possible				
Canada Goose	*Branta canadensis*								O:X 2												Observed	
Cedar Waxwing	*Bombycilla cedrorum*										P:H 1						Possible					
Chipping Sparrow	*Spizella passerina*												P:H 2						Possible			
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened			O:X 1												Observed				BBS-3 Visit 1: Flyover.
Common Grackle	*Quiscalus quiscula*						P:H 1	P:H 2											Possible	Possible		
Downy Woodpecker	*Picoides pubescens*								P:H 1					P:H 1	P:H 1					Possible	Possible	
Eastern Kingbird	*Tyrannus tyrannus*																					
European Starling	*Sturnus vulgaris*				P:H 1	O:X 1	P:H 2			O:X 1						Observed	Possible	Observed	Possible			
Great Blue Heron	*Ardea herodias*								O:X 1												Observed	BBS-6 Visit 1: Flyover toward river.
Great Crested Flycatcher	*Myiarchus crinitus*										P:S 1 P:H				P:S 1		Possible				Possible	
Gray Catbird	*Dumetella carolinensis*			P:S 1	PR:A 2	P:H 1		P:S 1	P:H 1	P:S 1	P:S 2		P:S 1	P:S 1	P:S 1	Possible	Probable	Possible	Possible	Possible	Possible	
Hairy Woodpecker	*Picoides villosus*				P:S 1												Possible					
House Finch	*Haemorhous mexicanus*							PR:P 1												Probable		
House Sparrow	*Passer domesticus*			P:H 1									P:H 10			Possible			Possible			
House Wren	*Troglodytes aedon*			P:S 2	P:S 2	P:S 1		P:S 2	P:S 2		P:S 1	P:S 1		P:S 2		Possible	Possible	Possible		Possible	Possible	
Indigo Bunting	*Passerina cyanea*				P:S 1	P:S 1	P:S 1	P:S1			P:S 1	P:S 1					Possible	Possible	Possible	Possible		
Killdeer	*Charadrius vociferus*						PR:P 1				P:H 1		P:H 1		P:H 1		Possible		Probable		Possible	
Mallard	*Anas platyrhynchos*														O:X 1						Observed	BBS-6 Visit 2: Flying toward river.
Mourning Dove	*Zenaida macroura*										P:S 1						Possible					
Northern Cardinal	*Cardinalis cardinalis*				P:S 1	P:S 2		P:S 1	P:S 1	P:S 1	P:S 1				P:S 1	Possible	Possible	Possible		Possible	Possible	
Northern Pintail	*Anas acuta*							P:S 1												Possible		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*							P:S 1							P:S 1					Possible	Possible	BBS-6 Visit 2: In trees toward river.
Red-bellied Woodpecker	*Melanerpes carolinus*			P:S 1												Possible						
Red-eyed Vireo	*Vireo olivaceus*					P:S 1				P:S 1		P:S 2						Possible				
Red-winged Blackbird	*Agelaius phoeniceus*			P:S 7 PR:A	P:S 1		P:H 2	P:S 3	P:S 5	PR:A 8 PR:P PR:V P:S C:FY	P:S 5 PR:P		P:S 2	P:S 4	P:H 8 P:S	Confirmed	Probable		Possible	Possible	Possible	
Song Sparrow	*Melospiza melodia*			P:S 2	P:S 2	P:H 2 P:S	P:S 1	P:S 2	P:S 2		P:S 1	P:S 1		P:S 1	P:S 2	Possible	Possible	Possible	Possible	Possible	Possible	
Warbling Vireo	*Vireo gilvus*			P:S 1			P:S 1	P:S 1	P:S 1				P:S 2	P:S 1	P:S 1	Possible			Possible	Possible	Possible	
Willow Flycatcher	*Empidonax traillii*				P:S 1												Possible					
Yellow Warbler	*Setophaga petechia*			P:S 2	P:S 1	P:S 1	P:S 1	P:S 2	P:S 3	P:S 1	P:H 1 P:S	P:S 4 PR:P PR:A	P:S 1	P:S 1	P:S 2	Possible	Possible	Probable	Possible	Possible	Possible	

	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6
Easting	479706	479797	479917	479763	479324	479477
Northing	4762512	4762373	4762412	4762991	4762775	4762547

Breeding Codes

Observed

O:X - Species observed during breeding season but no breeding evidence

Possible Breeding

P:S - Singing male present, or breeding calls hears, inits breeding season in suitable nesting habita

P:H - species observed during breeding season in suitable habitat

Probable Breeding

PR:P - Pair observed in their breeding season in suitable nesting habita

PR:T - Permanent territory presumed through territorial behaviour on both visits

PR:D - Courtship or display between a male and a female or 2 males, including courship,feeding or copulatio

PR:V - Visiting probable nest site

PR:A - Agitated behaviour or anxiety calls of an adult

PR:B - Brood patch on adult female or cloacal protuberance on adult male

PR:N - Nest-building or exacation of nest hole

Confirmed Breeding

C:DD - Distraction display

C:NU - Used nest or eggshells found

C:FY - Recently fledged young or downy young, including young incapable of sustained fligh

C:AE - Adult leaving or entering nest site

C:FS - Adult carrying fecal sac

C:CF - Adult carrying food for young

C:NE - Nest containing eggs

C:NY - Nest with young (seen or heard)

Note: use lower case if observed outside breeding bird survey time for point coun

ESA - *Endangered Species Act*

SARA - *Species at Risk Act*

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APPENDIX F
Significant Wildlife Habitat Assessment

TABLE F1 Seasonal Concentration Areas of Animals

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
Waterfowl Stopover and Staging Areas (Terrestrial) **<u>Rationale:</u>** Habitat important to migrating waterfowl.	• American Black Duck • Northern Pintail • Gadwall • Blue-winged Teal • Green-winged Teal • American Wigeon • Northern Shoveler • Tundra Swan	CUM1 CUT1 • Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. • Fields with seasonal flooding and waste grains in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	Fields with sheet water during Spring (mid-March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available. <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • Any mixed species aggregations of 100 or more individuals required. • The flooded field ecosite habitat plus a 100–300m radius, dependent on local site conditions and adjacent land use is the significant wildlife habitat. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWH MIST Index #7 provides development effects and mitigation measures.	• Candidate – Open areas adjacent to wetlands west of treatment plant may be subjected to sheet water flooding conditions following spring freshet
Waterfowl Stopover and Staging Areas (Aquatic) **<u>Rationale:</u>** Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	• Canada Goose • Cackling Goose • Snow Goose • American Black Duck • Northern Pintail • Northern Shoveler • American Wigeon • Gadwall • Green-winged Teal • Blue-winged Teal • Hooded Merganser • Common Merganser • Lesser Scaup • Greater Scaup • Long-tailed Duck • Surf Scoter • White-winged Scoter • Black Scoter • Ring-necked duck	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water) <u>Information Sources</u> • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan)	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in >700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100 m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from	• Candidate – MAS2 ecosites present west of treatment plant.

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
	• Common Goldeneye • Bufflehead • Redhead • Ruddy Duck • Red-breasted Merganser • Brant • Canvasback		• Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • NHIC Waterfowl Concentration Area	past surveys with species numbers and dates recorded). • SWH MIST [cxlix] Index #7 provides development effects and mitigation measures.	
Shorebird Migratory Stopover Area **<u>Rationale:</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	• Greater Yellowlegs • Lesser Yellowlegs • Marbled Godwit • Hudsonian Godwit • Black-bellied Plover • American Golden-Plover • Semipalmated Plover • Solitary Sandpiper • Spotted Sandpiper • Semipalmated Sandpiper • Pectoral Sandpiper • White-rumped Sandpiper • Baird's Sandpiper • Least Sandpiper • Purple Sandpiper • Stilt Sandpiper • Short-billed Dowitcher • Red-necked Phalarope • Whimbrel • Ruddy Turnstone • Sanderling • Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • NHIC Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and >1000© shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100© Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100 m radius area [cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi] • SWH MIST [cxlix] Index #8 provides development effects and mitigation measures.	• None – Habitat may be present at the nearby Thames River, but no shorelines exist within the study area.
Raptor Wintering Area **<u>Rationale:</u>** Sites used by multiple species, a high number of individuals and used annually are most significant	• Rough-legged Hawk • Red-tailed Hawk • Northern Harrier • American Kestrel • Snowy Owl **<u>Special Concern:</u>** • Short-eared Owl • Bald Eagle	<u>Hawks/Owls:</u> Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. <u>Bald Eagle:</u> Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering (hawk/owl) sites need to be >20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi.] • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15 ha) with adjacent woodlands[cxlix] • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle sites have open water and large trees and snags available for roosting[cxlix]	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or; At least 10 individuals and two of the listed hawk/owl species© • To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds©. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area© • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	• None – no habitat areas >20 ha are present.

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			Information Sources: • OMNRF Ecologist or Biologist • Naturalist clubs • NHIC Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities.		
Bat Hibernacula **Rationale:** Bat hibernacula are rare habitats in all Ontario landscapes.	• Big Brown Bat • Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • NHIC Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (e.g. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH(E). • The area includes 200 m radius around the entrance of the hibernaculum[cxlviii, ccvii, (E)] for most development types and 1000 m for wind farms[ccv]. • Studies are to be conducted during the peak swarming period (Aug.–Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]. • SWH MIST[cxlix] Index #1 provides development effects and mitigation measures.	• None – Study area did not contain Hibernacula ecosites.
Bat Maternity Colonies **Rationale:** Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	• Big Brown Bat • Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario[xxii]. • Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx, ccv] with >10/ha large diameter (>25 cm dbh) wildlife trees • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1–3[ccxiv] or class 1 or 2.[ccxii] • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx, lxiv] Information Sources • OMNRF for possible locations and contact for local experts	• Maternity Colonies with confirmed use by: • >10 Big Brown Bats(E) • >5 Adult Female Silver-haired Bats(E) • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies(E). • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]. • SWH MIST[cxlix] Index #12 provides development effects and mitigation measures.	• None– an assessment was completed on the number of snag trees per hectare, and the study area did not meet the threshold for bat maternity roosting habitat.

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			• University Biology Departments with bat experts.		
Turtle Wintering Areas **<u>Rationale:</u>** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	• Midland Painted Turtle **<u>Special Concern:</u>** • Northern Map Turtle • Snapping Turtle	Snapping and Midland Painted Turtles; ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	• For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxii] • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <u>Information Sources</u> • EIS studies carried out by Conservation Authorities. • Field Naturalists Clubs • OMNRF Ecologist or Biologist • NHIC	• Presence of 5 over-wintering Midland Painted Turtles is significant(E). • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant(E). • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept.–Oct.) or spring (Mar.–May)[cvii]. • Congregation of turtles is more common where wintering areas are limited and therefore significant.[cix, cxcxi, cxii] • SWH MIST[cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	• Candidate – The larger SAM2 ecosite west of the treatment plant may be suitable overwintering habitat.
Reptile Hibernaculum **<u>Rationale:</u>** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	**<u>Snakes:</u>** • Eastern Gartersnake • Northern Watersnake • Northern Red-bellied Snake • Northern Brownsnake • Smooth Green Snake • Northern Ring-necked Snake **<u>Special Concern:</u>** • Milksnake • Eastern Ribbonsnake	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator.	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line.[xliv, l, li, lii, cxii] • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. <u>Information Sources</u> • In spring, local residents or landowners may have observed the emergence of	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake spp. near potential hibernacula (e.g. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct)(E) • <u>Note</u>: If there are Special Concern Species present, then site is SWH • <u>Note</u>: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in	• None – Features such as fractured bedrock, old foundations, caves, alvars, rock barrens not present.

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			snakes on their property (e.g. old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists • NHIC	which the hibernacula is located plus a 30 m radius area is the SWH[E] • SWH MIST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula.	
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) **<u>Rationale:</u>** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	• Cliff Swallow • Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil, or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. <u>Information Sources</u> • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50 m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #4 provides development effects and mitigation measures	• None- Study area does not contain exposed banks that would support colonially nesting birds
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale:</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	• Great Blue Heron • Black-crowned Night-Heron • Great Egret • Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. <u>Information Sources</u> • Ontario Breeding Bird Atlas,[ccv] colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices. • Field Naturalist Clubs.	Studies confirming: • Presence of 2[E] or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH.[cc, ccvii] • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST[cxlix] Index #5 provides development effects and mitigation measures.	• None- the study area did not contain any of the candidate ecosites

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
Colonially-Nesting Bird Breeding Habitat (Ground) **Rationale:** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	• Herring Gull • Great Black-backed Gull • Little Gull • Ring-billed Gull • Common Tern • Caspian Tern • Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1–6 MAS1–3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas, rare/colonial species records • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • NHIC Colonial Waterbird Nesting Area • MNRF District Offices • Field Naturalist Clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern(E). • Presence of 5 or more pairs for Brewer's Blackbird(E). • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant(E). • The edge of the colony and a minimum 150 m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0 ha with a colony is the SWH[cc, ccvii] • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #6 provides development effects and mitigation measures.	• None- the study area does not contain rocky islands or peninsulas. Suitable habitat may be present within sections of the nearby Thames River.
Migratory Butterfly Stopover Areas **Rationale:** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	• Painted Lady • Red Admiral Special Concern • Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: Field: CUM CUT CUS Forest: FOC FOD FOM CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie or Lake Ontario[cxlix]. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south.[xxxii, xxxiii, xxxiv, xxxv, xxxvi] • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat. [cxlviii, cxlix] • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes.[xxxvii, xxxviii, xxxix, xl, xli] Information Sources • MNRF District Offices • NHIC • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100–500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur.[xl, xlii] • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 **or** >3000 with the presence of Painted Ladies or Red Admirals is to be considered significant. (E) • SWH MIST[cxlix] Index #16 provides development effects and mitigation measures.	• None- the study area is not within 5km from Lake Erie

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			• Toronto Entomologists Association • Conservation Authorities		
Landbird Migratory Stopover Areas **<u>Rationale</u>:** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Woodlots >5 ha(E) in size and within 5 km[iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Erie and Lake Ontario. If woodlands are rare in an area of shoreline, woodland fragments 2–5 ha can be considered for this habitat(E) • If multiple woodlands are located along the shoreline those Woodlands <2 km from Lake Erie and Lake Ontario are more significant[cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix] • The largest sites are more significant[cxlix] • Woodlots and forest fragments are important habitats to migrating birds,[ccxviii] these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH.[cxlviii] <u>Information Sources</u> • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates(E). This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Mar to May) and fall (Aug to Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #9 provides development effects and mitigation measures.	• None – the study area is not within 5km from Lake Erie.
Deer Winter Congregation Areas **<u>Rationale</u>:** Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth; however, deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions.[cxlviii]	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots >50 ha(E) • Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth; however, deer will annually congregate in large numbers in suitable woodlands.[cxlviii] • Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1–1.5 deer/ha.[ccxxiv] • Woodlots with high densities of deer due to artificial feeding are not significant(E). <u>Information Sources</u> • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF.[cxlviii] • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF.(E) • Studies should be completed during winter (Jan/Feb) when >20 cm of snow is on the ground using aerial survey techniques,[ccxxiv] ground or road surveys, or a pellet count deer density survey.[ccxxv] • SWH MIST[cxlix] Index #2 provides development effects and mitigation measures.	• None- the study area does not contain woodlots >50ha

TABLE F2 Rare Vegetation Communities

Rare Vegetation Community	Candidate SWH			Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources		
Cliffs and Talus Slopes **<u>Rationale</u>:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. <u>Information Sources</u> • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF Districts • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWH MIST[cxlix] Index #21 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Sand Barren **<u>Rationale</u>:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered, but less than 60%.	A sand barren area >0.5 ha in size[Ⓔ]. <u>Information Sources</u> • OMNRF Districts • NHIC has location information available on their website. • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.)[Ⓔ]. • SWH MIST[cxlix] Index #20 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Alvar **<u>Rationale</u>:** Alvars are extremely rare habitats in Ecoregion 7E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** *1) Carex crawei* *2) Panicum philadelphicum* *3) Eleocharis compressa* *4) Scutellaria parvula* *5) Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 7E[Ⓔcxlix]	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover.[lxxviii]	An Alvar site > 0.5 ha in size.[lxxv] Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie.[cxcix] <u>Information Sources</u> • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi] • Ontario Nature – Conserving Great Lakes Alvars[ccviii] • NHIC has location information available on their website. • OMNRF Staff • Field Naturalist Clubs • Conservation Authorities	• Field studies that identify four of the five[Ⓔ] **Alvar Indicator Species**[lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses[lxxv] • SWH MIST[cxlix] Index #17 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Old Growth Forest **<u>Rationale</u>**: Due to historic logging practices and land	Forest Community Series: FOD FOC FOM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of	Woodland area is >0.5 ha.[Ⓔ] <u>Information Sources</u>	Field Studies will determine: • If dominant trees species of the forest are >140 years old, then the area containing	• None- The forest community did not contain a dominate tree community > 140 years.

Rare Vegetation Community	Candidate SWH			Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources		
clearance for agriculture, old growth forest is rare in Ecoregion 7E.	SWD SWC SWM	a multi-layered canopy and an abundance of snags and downed woody debris.	• OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	these trees is Significant Wildlife Habitat[cxlviii] • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities[cxlviii] (cut stumps will not be present) • The area of forest ecosites combined or an ecoelement within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest area containing the old growth characteristics[lxxviii] • SWH MIST[cxlix] Index #23 provides development effects and mitigation measures.	
Savannah **Rationale:** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25–60%[lxxix, lxxx, lxxxi, lxxxii, lxxxiii] 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).	No minimum size to site.[E] Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • NHIC has location data available on their website. • OMNRF Districts • Field Naturalists Clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in [cxlix] Appendix N should be present[E]. Note: Savannah plant spp. list from Ecoregion 7E should be used.[cxlviii] • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWH MIST[cxlix] Index #18 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Tallgrass Prairie **Rationale:** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover[lxxix, lxxx, lxxxi, lxxxii, lxxxiii] 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).	No minimum size to site.[E] Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • OMNRF Districts • NHIC has location information available on their website. • Field Naturalists Clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in [cxlix] Appendix N should be present.[E] Note: Prairie plant spp. list from Ecoregion 7E should be used[cxlviii] • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWH MIST[cxlix] Index #19 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Other Rare Vegetation Communities **Rationale:** Plant communities that often contain rare	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG.[cxlviii] Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M.[cxlviii] The OMNRF/NHIC will have up to date listing for rare vegetation communities.	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG.[cxlviii] • Area of the ELC Vegetation Type polygon is the SWH.	• None – no rare vegetation communities as listed for Middlesex County on Appendix M of the SWHTG present.

Rare Vegetation Community	Candidate SWH			Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources		
species which depend on the habitat for survival.			Information Sources • NHIC has location information available on their website. • OMNRF Districts • Field Naturalists Clubs • Conservation Authorities	• SWH MIST[cxlix] Index #37 provides development effects and mitigation measures.	

TABLE F3 Specialized Habitat of Wildlife considered SWH

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
Waterfowl Nesting Area **Rationale:** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	• American Black Duck • Northern Pintail • Northern Shoveler • Gadwall • Blue-winged Teal • Green-winged Teal • Wood Duck • Hooded Merganser • Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: • MAS1 • MAS2 • MAS3 • SAS1 • SAM1 • SAF1 • MAM1 • MAM2 • MAM3 • MAM4 • MAM5 • MAM6 • SWT1 • SWT2 • SWD1 • SWD2 • SWD3 • SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards.[E] • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April–June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWH MIST[cxlix] Index #25 provides development effects and mitigation measures.	• Candidate – The wetland complex if MAM, MAS, and SWT ecosites south and west of the treatment plant meets the areal ELC requirements for this habitat type.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **Rationale:** Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • NHIC compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data.	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area.[cxlviii] • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH[ccvii], maintaining undisturbed shorelines with large trees within this area is important.[cxlviii] • For a Bald Eagle the active nest and a 400–800 m radius around the nest is the SWH.[cvi, ccvii] Area of the habitat from 400–800 m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat.[cvi] • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or	• None – no suitable ecosites are present adjacent to lakes, ponds, river or wetlands within the study area. Suitable BEONFP SWH may be present adjacent to the Thames River

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			• OMNRF District • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	suspected of not being used for >5 years before being considered not significant.[ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid-August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #26 provides development effects and mitigation measures.	
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	• Northern Goshawk • Cooper's Hawk • Sharp-shinned Hawk • Red-shouldered Hawk • Barred Owl • Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD, and CUP3	All natural or conifer plantation woodland/forest stands >30 ha with >4 ha of interior habitat.[lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv,xcvi, cxxxiii] Interior habitat determined with a 200 m buffer.[cxlviii] • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. <u>Information Sources</u> • OMNRF Districts • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of 1 or more active nests from species list is considered significant.[cxlviii] • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH[ccvii] (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl—A 200 m radius around the nest is the SWH.[ccvii] • Broad-winged Hawk and Coopers Hawk—A 100 m radius around the nest is the SWH.[ccvii] • Sharp-Shinned Hawk—A 50 m radius around the nest is the SWH.[ccvii] • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWH MIST[cxlix] Index #27 provides development effects and mitigation measures.	• None- the study area does not contain woodlands >30ha
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	• Midland Painted Turtle <u>Special Concern</u> • Northern Map Turtle • Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m)[cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles[Ⓔ] • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH.[Ⓔ] • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30–100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH.[cxlviii]	• None- The study area does not contain ecosites with exposed mineral soil suitable for turtle nesting.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • NHIC • Field Naturalist Clubs	• Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30–100 m area of habitat.[cxlix] • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST[cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	
Seeps and Springs **<u>Rationale:</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	• Wild Turkey • Ruffed Grouse • Spruce Grouse • White-tailed Deer • Salamander spp.	Seeps/Springs are areas where groundwater comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	• Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system.[cxvii, cxlix] • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species.[cxix, cxx, cxxi, cxxii, cxiii, cxiv] <u>Information Sources</u> • Topographical Map • Thermography • Hydrological surveys conducted by Conservation Authorities and MOE • Field Naturalists Clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	Field Studies confirm: • Presence of a site with two or more[E] seeps/springs should be considered SWH. • The area of an ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat.[cxlviii] • SWH MIST[cxlix] Index #30 provides development effects and mitigation measures	• None- the study area does not contain any springs or seeps
Amphibian Breeding Habitat (Woodland) **<u>Rationale:</u>** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	• Eastern Newt • Blue-spotted Salamander • Spotted Salamander • Gray Treefrog • Spring Peeper • Western Chorus Frog • Wood Frog	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500 m^2 (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size).[clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx] Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.[cxlviii]	Studies confirm; • Presence of breeding population of one or more of the listed newt/salamander species or two or more of the listed frog species with at least 20 individuals (adults or eggs masses) or two or more of the listed frog species with Call Level Codes of 3.[E] • A combination of observational study and call count surveys[cviii] will be required during the spring (March–June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands.	• Candidate – the FOD7-4 ecosites likely support vernal pooling in the early spring.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	• The habitat is the wetland area plus a 230 m radius of woodland area.[lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi] If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST[cxlix] Index #14 provides development effects and mitigation measures.	
Amphibian Breeding Habitat (Wetland) **Rationale:** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	• Eastern Newt • American Toad • Spotted Salamander • Four-toed Salamander • Blue-spotted Salamander • Gray Treefrog • Western Chorus Frog • Northern Leopard Frog • Pickerel Frog • Green Frog • Mink Frog • Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120 m) from woodland ecosites; however, larger wetlands containing predominantly aquatic species (e.g. Bullfrog) may be adjacent to woodlands	• Wetlands >500 m^2 (about 25 m diameter),[ccvii] supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats.[clxxxii] • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of breeding population of one or more of the listed newt/salamander species or two or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or two or more of the listed frog/toad species with Call Level Codes of 3. Ⓔ **or;** Wetland with confirmed breeding Bullfrogs are significant.Ⓔ • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys[cviii] will be required during the spring (March–June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST[cxlix] Index #15 provides development effects and mitigation measures.	• Candidate – the MAS ecosites may support wetland-breeding amphibians.
Woodland Area-Sensitive Bird Breeding Habitat **Rationale:** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area	• Yellow-bellied Sapsucker • Red-breasted Nuthatch • Veery • Blue-headed Vireo • Northern Parula • Black-throated Green Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.[cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix] • Interior forest habitat is at least 200 m from forest edge habitat.	Studies confirm: • Presence of nesting or breeding pairs of three or more of the listed wildlife species.Ⓔ • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH.Ⓔ	• None- the study area does not contain any woodlands >30ha

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
sensitive interior forest song birds.	• Blackburnian Warbler • Black-throated Blue Warbler • Ovenbird • Scarlet Tanager • Winter Wren • Pileated Woodpecker **Special Concern:** • Cerulean Warbler • Canada Warbler		<u>Information Sources</u> • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	• Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #34 provides development effects and mitigation measures.	

TABLE F3 Habitat of Species of conservation Concern considered SWH

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
Marsh Breeding Bird Habitat **Rationale:** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	• American Bittern • Virginia Rail • Sora • Common Moorhen • American Coot • Pied-billed Grebe • Marsh Wren • Sedge Wren • Common Loon • Green Heron • Trumpeter Swan **Special Concern:** • Black Tern • Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present.[cxxiv] • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • OMNRF District and wetland evaluations. • Field Naturalist clubs • NHIC Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of five or more nesting pairs of Sedge Wren or Marsh Wren **or** breeding by any combination of four or more of the listed species.Ⓔ • Note: any wetland with breeding of one or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH.Ⓔ • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #35 provides development effects and mitigation measures.	• Candidate – the MAS ecosites within the study area contain shallow water with emergent aquatic vegetation.
Open Country Bird Breeding Habitat **Rationale:** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	• Upland Sandpiper • Grasshopper Sparrow • Vesper Sparrow • Northern Harrier • Savannah Sparrow **Special Concern** • Short-eared Owl	CUM1 CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha.[clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix] • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years).Ⓔ • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Agricultural land classification maps, Ministry of Agriculture • Local bird clubs • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of two or more of the listed species.Ⓔ • A field with one or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #32 provides development effects and mitigation measures	• None- the study area does not include large grassland areas >30ha.
Shrub/Early Successional Bird Breeding Habitat	Indicator Spp: • Brown Thrasher • Clay-coloured Sparrow	CUT1 CUT2 CUS1	Large field areas succeeding to shrub and thicket habitats >10 ha[clxiv] in size.	Field Studies confirm:	• None- the study area does not contain large

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.	Common Spp. • Field Sparrow • Black-billed Cuckoo • Eastern Towhee • Willow Flycatcher **Special Concern:** • Yellow-breasted Chat • Golden-winged Warbler	CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	• Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years).Ⓔ • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species.[clxxiii] • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities.	• Presence of nesting or breeding of one of the indicator species and at least two of the common species.Ⓔ • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat.Ⓔ • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #33 provides development effects and mitigation measures.	shrub/thicket habitats >10ha.
Terrestrial Crayfish **Rationale:** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.[ccii]	Chimney or Digger Crayfish; (*Fallicambarus fodiens)* Devil Crayfish or Meadow Crayfish; (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows; the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. Information Sources • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of one or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites.[cci] • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult.[cci] • SWH MIST[cxlix] Index #36 provides development effects and mitigation measures.	• Candidate – cultural meadows adjacent to MAM2, MAS2, or SWT ecosites may support terrestrial crayfish habitat.
Special Concern and Rare Wildlife Species **Rationale:** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1–S3, SH) plant and animal species. Lists of these species are tracked by the NHIC.	All plant and animal element occurrences (EO) within a 1- or 10-km grid. Older element occurrences were recorded prior to GPS being available; therefore, location information may lack accuracy	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites.[lxxviii] Information Sources • NHIC will have Special Concern and Provincially Rare (S1–S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life	Candidate – • Eastern Wood Pewee • Grasshopper Sparrow • Snapping Turtle • Hackberry Emperor • Monarch Confirmed – none •

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			• Expert advice should be sought as many of the rare spp. have little information available about their requirements.	stage component for a species e.g. specific nesting habitat or foraging habitat. • SWH MIST[cxlix] Index #37 provides development effects and mitigation measures.	

TABLE F5 Animal Movement Corridors

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		ELC Ecosites	Habitat Criteria and Information Sources		
Amphibian Movement Corridors **Rationale:** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	• Eastern Newt • American Toad • Spotted Salamander • Four-toed Salamander • Blue-spotted Salamander • Gray Treefrog • Western Chorus Frog • Northern Leopard Frog • Pickerel Frog • Green Frog • Mink Frog • Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. • Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 **(Amphibian Breeding Habitat –Wetland)** of this Schedule. Information Sources • MNRF District Office • NHIC • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15 m of vegetation on both sides of waterway or be up to 200 m wide of woodland habitat and with gaps <20 m • Shorter corridors are more significant than longer corridors; however, amphibians must be able to get to and from their summer and breeding habitat • SWH MIST Index #40 provides development effects and mitigation measures	• Candidate – natural areas adjacent or within the contiguous natural corridor of the Thames River should be considered potential amphibian movement corridors.

TABLE F6 Significant Wildlife Habitat Expectations for Eco-districts within Eco-Region 7E

Ecodistrict	Wildlife Habitat and Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
		Ecosites and Habitat Description	Habitat Criteria and Information		
7E-2	**Bat Migratory Stopover Area** Rationale: Stopover areas for long distance migrant bats are important during fall migration. • Hoary Bat • Eastern Red Bat • Silver-haired Bat	No specific ELC types or habitat descriptions	• Long-distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migration may concentrate these species of bats at stopover areas. • This is the only known bat migratory stopover habitats based on current information. <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University of Waterloo, Biology Department	• Long Point (42°35'N, 80°30'E, to 42°33'N, 80°03'E) has been identified as a significant stop-over habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration. • The confirmation criteria and habitat areas for this SWH are still being determined. • SWH MIST Index #38 provides development effects and mitigation measures	• None- the study area is not included within the known stopover areas

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APPENDIX G
Species of Conservation Concern Assessment

APPENDIX G

SPECIES OF CONSERVATION CONCERN ASSESSMENT
ADELAIDE WASTEWATER TREATMENT PLANT

TABLE G1 Avian Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common Name	*Scientific Name*	Priority species[1]	ESA 2007	SARA 2002	Preferred Habitat[2]	Status and Observations
Eastern Wood-Pewee	*Contopus virens*	Regional Concern - Recovery Objective	SC	SC	Wooded habitats	Potential- Suitable habitat for this species is present in any mature wooded ecosite within the study area.
Grasshopper Sparrow	*Ammodramus savannarum*	Regional Concern - Increase	SC	SC	Open grassland areas with well-drained, sandy soil.	Potential -Suitable habitat for this species may be found within sections of CUM1 ecosite on the study area.

[1] Government of Canada 2014.
[2] Cornell lab of Ornithology 2021.

TABLE G2 Herpetofauna Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common Name	*Scientific Name*	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Eastern Ribbonsnake	*Thamnophis sauritus*	S4	SC	SC	Aquatic habitats with forested riparian zone	Unlikely- the Thames river and the riparian zone is outside of the study area
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	Prefers shallow aquatic habitats and gravel/sand banks for nesting.	Candidate – The larger MAS2-1 ecosite may be suitable habitat to support this species.
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	Aquatic habitats with mollusc prey and basking areas	Unlikely- the Thames river and the riparian zone is outside of the study area

Notes:
[1] Ontario Nature 2021

Table G3 Insects Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	Scientific name	S-Rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Hackberry Emperor	*Asterocampa celtis*	S3	-	-	Habitats which support Hackberry trees	Potential – Hackberry trees are present within treed ecosites on the study area.
Monarch	*Danaus plexippus*	S2N, S4B	SC	SC	Caterpillars are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats.	Potential – Common milkweed is present within CUM1 ecosites on the study area.

Notes:
[1] IUCN 2021

TABLE G4 Fish Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	Scientific name	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes*	S5	SC	SC	Shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds	None- the Thames River is located outside of the study area, and is not anticipated to be impacted.

[1] IUCN 2021

TABLE G5 Plant Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	*Scientific Name*	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Lowland Brittle Fer	*Cystopteris protrusa*	S2S3	-	-	In soil of moist, deciduous forests	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Slender Mountain-mint	*Pycnanthemum tenuifolium*	S3	-	-	Typically grows in dry, open, rocky woods, dry prairies and fields.	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Hairy Fruited Sedge	*Carex trichocarpa*	S3	-	-	Openings in bottomlands, marshes, wet meadows, wet thickets along streams and rivers	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Striped Cream Violet	*Viola striata*	S3	-	-	Riparian or alluvial woods, floodplains in silty loam, meadows	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Rigid Sedge	*Carex tetanica*	S3?	-	-	Calcareous fens, bogs, and swales	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	-	-	Dry, open, rocky or gravelly hillsides, fields, thickets, and prairies in calcareous regions.	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.

[1]FNAA 2020

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APPENDIX H
Species at Risk Assessment

APPENDIX H

SPECIES AT RISK HABITAT ASSESSMENT

TABLE H1 Habitat Assessment for Potential Species at Risk within Adelaide Wastewater Treatment Plant

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Flora (1)						
Kentucky Coffee-tree	*Gymnocladus dioicus*	THR	THR	This tree is found in floodplains and river valleys	MECP records for Adelaide WWTP	Potential – Suitable habitat for this species is present within treed ecosites on the study area.
Butternut	*Juglans cinerea*	END	END	This species prefers moist, well-drained soil, often found along streams. Also found on well-drained gravel sites.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016)	Potential – Suitable habitat for this species is present within treed ecosites on the study area. This species was no observed within the study area during the 2021 field study.
Birds (9)						
Bank Swallow	*Riparia riparia*	THR	THR	Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within OBBA 10 km square	Unlikely – The study area does not contain the preferred habitat for this species.
Barn Swallow	*Hirundo rustica*	THR	THR	This species prefers human-made structures, such as open barns, bridges, or culverts to build their nests.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within *OBBA* 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	This species prefers open prairie or meadow habitat and builds its nests on the ground in the dense grasses.	Species identified within OBBA 10 km square.	Potential – Open meadow habitat is present within CUM1 ecosites on the study area.
Chimney Swift	*Chaetura pelagica*	THR	THR	This species establishes colonies within unused chimneys to roost or build their nest.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within OBBA 10 km square.	Confirmed – The species was identified during the breeding bird survey flying over the study area. The study area does not contain suitable chimneys for nesting, and therefore it is assumed that this species is nesting within one of the surrounding neighbourhoods. Since no habitat exists within study area, no further impact assessment is required.
Common Nighthawk	*Chordeiles minor*	SC	THR	Open areas with little to no ground vegetation, such as, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Eastern Meadowlark	*Sturnella magna*	THR	THR	This species primarily breeds in prairie and grassland habitats, but may also breed in croplands, orchards, or overgrown fields.	Species identified within OBBA 10 km square.	Potential – Open meadow habitat is present within CUM1 ecosites on the study area.
Northern Bobwhite	*Colinus virginianus*	END	END	This species nests in savannahs, grasslands, around abandoned farm fields, along brushy fencerows.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Red-headed Woodpecker	*Melanerpes erythrocephalus*	SC	THR	This species prefers forest communities with an open understory.	MECP records for Adelaide WWTP	Potential – Suitable habitat for this species may be present within any wooded ecosite on the study area.
Wood Thrush	*Hylocichla mustelina*	SC	THR	This species prefers mature, unfragmented, deciduous forests.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Herpetofauna (4)						
Eastern Spiny	*Apalone spinifera*	END	THR	This species prefers slow-moving large	This species was identified within the Thames Valley Parkway North Branch	None – This species inhabits the Thames River which is not included in the

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Softshell				water bodies or rivers with soft, muddy bottoms and aquatic vegetation. Nests are located near water on sandy beaches or gravel banks with sun.	Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within NHIC 1km square	study area, and is not likely to be impacted by construction works.
Eastern Hog-nosed Snake	*Heterodon platirhinos*	THR	THR	This species prefers sandy, well-drained soils to burrow and lay eggs. Such as beaches and dry forests.	Species identified within ORAA 10km square	Unlikely – The study area does not contain the preferred habitat for this species.
Five-lined Skink (Carolinian population)	*Plestiodon fasciatus*	END		The Carolinian population can be found under woody debris in clearings with sand dunes, open forested areas, and wetlands.	Species identified within ORAA 10km square	Unlikely – The study area does not contain the preferred habitat for this species.
Queensnake	*Regina septemvittata*	END	THR	This species prefers water bodies with clear water, rocky or gravel bottoms, and an abundance of crayfish. Suitable hibernation sites include abutments of old bridges and crevices in bedrock.	Species identified within ORAA 10km square	None – This species inhabits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Mammals (4)						
Eastern Small-footed Myotis	*Myotis leibii*	END	END	Day and maternity roosts typically in cavities of trees, under rocks, in bedrock fissures, under bridges, culverts, abandoned buildings, etc. Hibernate in caves and abandoned mines.	Species distribution in the province poorly understood. Suitable habitat potential assessed for due diligence.	Unlikely – Though suitable roosting habitat may be present in the form of tree cavities, this species prefers rock crevices and anthropogenic structures. No overwintering habitat present.
Little Brown Myotis	*Myotis lucifugus*	END	END	Mature trees, roost within cavities and under loose bark. Can also utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species potential based on the Mammal atlas of Ontario	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Northern Myotis	*Myotis septentrionalis*	END	END	Mature trees, roost within cavities and under loose bark. Can also utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species potential based on the Mammal atlas of Ontario	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Tri-colored Bat	*Perimyotis subflavus*	END	END	Mature trees, with preference for downed foliage of oak and maple species. Has been observed to utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species distribution in the province poorly understood. Suitable habitat potential assessed for due diligence.	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Fish (2)						
Black Redhorse	*Moxostoma duquesnei*	THR	NAR	This species prefers pools and riffle of medium-sized rivers that are usually less than 2 m deep. This species has been observed in moderate to fast currents, with sandy or gravel substrates.	Species identified within the Thames River adjacent to the Adelaide facility during 2002-2012 studies (Ramsey 2021, Pers. Comm.)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Silver Shiner	*Notropis photogenis*	THR	THR	This species prefers deep riffles or pools of medium to large rivers with moderate to high gradients. Preferred substrates are variable.	Critical habitat and species presence were documented by Fisheries and Oceans Canada (DFO 2019)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Mussels (2)						
Round Pigtoe	*Pleurobema sintoxia*	END	END	This species is found in rivers of various sizes with deep water and sandy, rocky, or mud bottoms. Host species for larvae include Bluegill (*Lepomis macrochirus*), Spotfin shiner (*Cyprinella spiloptera*), Bluntnose minnow (*Pimephales notatus*), and Northern redbelly dace (*Chrosomus eos*).	Species potential or presence identified by the MECP	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Wavy-rayed Lampmussel	*Lampsilis fasciola*	THR	SC	This species prefers riffle areas of clear, small to medium sized streams and rivers of various sizes with gravel and sand stabilized with cobble and boulders. Larvae hosts for this species include: Smallmouth Bass and Largemouth Bass	Species was documented within DFO SAR records (DFO 2019)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.

ESA - *Endangered Species Act*
SARA - *Species at Risk Act*

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