DRAFT

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

ENVIRONMENTAL IMPACT STUDY
GREENWAY WASTEWATER TREATMENT PLANT
CITY OF LONDON

Prepared for:
THE CITY OF LONDON

Prepared by:
MATRIX SOLUTIONS INC.

Version 0.2
November 2021
Guelph, Ontario

650 Woodlawn Rd W, Unit 7B
Guelph, ON N1K 1B8
T 519.772.3777 F 226.314.1908
www.matrix-solutions.com

ENVIRONMENTAL IMPACT STUDY

GREENWAY WASTEWATER TREATMENT PLANT

CITY OF LONDON

Prepared for City of London, November 2021

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

reviewed by
Robyn Leppington, B.Sc.
Senior Aquatic Biologist

Karen Reis, B.E.S. (Hons)
Ecologist

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
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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 Plant (WWTP) 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 Greenway WWTP, with the Adelaide 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 Greenway WWTP recommended developing a floodwall/berm.

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

- significant valleylands
- woodland
- candidate and confirmed significant wildlife habitat
- candidate and confirmed species at risk (SAR)
- fish and fish habitat

The most significant ecological functions identified within the Greenway WWTP study area include a significant valleyland, fish and fish habitat, the woodland, as well as confirmed aquatic SAR (Eastern Spiny Softshell, Silver Shiner, and Black Redhorse). Additional SAR were also observed within the study area, including Bank Swallow, Barn Swallow, and Chimney Swift; however, these species do not have confirmed nesting sites within the study area and are not anticipated to be directly impacted during construction activities. Furthermore, a confirmed SAR plant (Kentucky Coffee-tree) was identified as a planted species; therefore, it does not receive protection under the *Endangered Species Act*.

The major undertakings of the flood mitigation alternatives at the Greenway WWTP include the creation of a floodwall/berm along the northern and eastern boundaries of the WWTP, extending slightly south into the outer edge of the existing woodland. The greatest risk to the natural heritage features within the Greenway WWTP study area is the proximity of the proposed construction works to the Thames River (approximately 25 m north). However, if mitigation measures are followed, there are no anticipated impacts to this system while construction works are occurring. The southwest portion of the property contains an off-leash dog park, a parking lot, and a small woodland. This section will require some vegetation removal of edge species adjacent to the Greenway WWTP in order to erect the proposed berm.

This will result in a short-term disturbance to the area; however, it has been recommended within the mitigation measures to create a tree preservation plan and replanting plan for those disturbed areas. This should include a replacement of trees at a 3:1 ratio as well as native seed mix as per *The London Plan* (City of London 2016). It is anticipated that the long-term effects of this project shall result in a 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 Plant (WWTP) 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 Greenway WWTP, with the Adelaide WWTP to be 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 Greenway WWTP is located at 109 Greenside Avenue (Figure 1). Greenway is situated within 25 m of the Thames River to the north. The property is bordered on the east and west by Greenway Park and associated amenities. South of the site is Kensal Park and some private residential land. The Greenway property features some coniferous hedgerows, lone trees, and remnant woodlot associated with a steep slope on the southern edge of the parcel.

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 floodwall/berm for the Greenway WWTP.

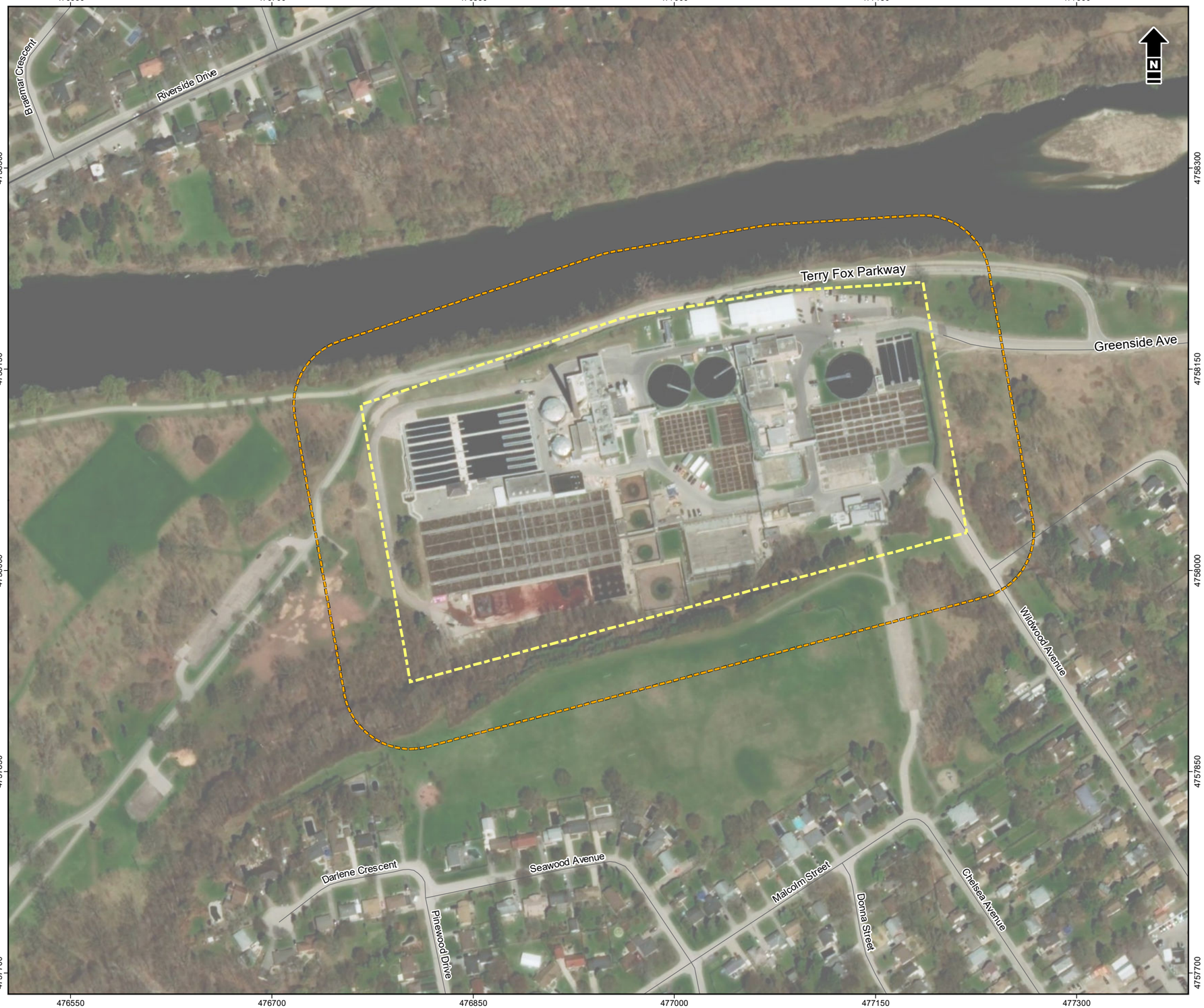
This EIS document was completed to meet the objectives and criteria as defined within the approved Terms of Reference (Appendix A) as well as applicable federal, provincial, and municipal policies and guidelines as defined in Section 2.

Easting (m)

476550 476700 476850 477000 477150 477300

Northing (m)

4758300 4758150 4758000 4757850 4757700



- Greenway Wastewater Treatment Plant Study Area
- Greenway 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

Greenway Study Area

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

Figure 1

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 Greenway 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.

Greenway 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 Greenway 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 Greenway 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 Greenway and 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
One River Master Plan Environmental Assessment, River Characterization, City of London, Thames River (Matrix 2019)	Report	One River Master Plan Municipal Class 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 Greenway 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 Greenway 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 Plant 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 6 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 Greenway 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 Greenway 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 Greenway study area is 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 Greenway 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 (Appendix C).

5.3 Terrestrial Habitat

5.3.1 Vegetation Communities

Vegetation communities within the Greenway study area are mapped on Figure 3 and described in further detail in Table 3. The Greenway study area contains seven terrestrial ELC community types as confirmed during the 2021 field visits.

TABLE 3 Ecological Land Classification Communities - Greenway Wastewater Treatment Plant

Ecological Land Classification Community Type	Community Description
FOD7-4 Fresh-Moist Black Walnut Lowland Deciduous Forest	This community represents the forested bank to the south of the Greenway Wastewater Treatment Plant (WWTP). The canopy was dominated by Black Walnut (*Juglans nigra*), with Sugar Maple (*Acer saccharum*), Red Maple (*Acer rubrum*), Manitoba Maple (*Acer negundo*), Black Cherry (*Prunus serotina*), Hackberry (*Celtis occidentalis*), Paper Birch (*Betula papyrifera*), and American Beech (*Fagus grandifolia*) appearing as common canopy constituents. Manitoba Maple (*Acer negundo*) approaching co-dominance in sections. The understory was relatively open, with common species including Manitoba Maple, European Buckthorn (*Rhamnus cathartica*), River Grape (*Vitis riparia*), young Green Ash (*Fraxinus pennsylvanica*), and Choke Cherry (*Prunus virginiana*). Standing snags and downed woody debris were common. Ground cover was variable, though Yellow Avens (*Geum aleppicum*), Virginia Stickseed (*Hackelia virginiana*), White Vervain (*Verbena urticifolia*), and Burdock (*Arctium minus*). There was also evidence of significant growth of Garlic Mustard (*Alliaria petiolata*) persisting from earlier in the growing season.
CUW1 Mineral Cultural Woodland	Several small woodland areas are present west and south of the Greenway WWTP. These wooded areas are fragmented and individually result in a canopy cover of approximately 60%. Canopy species are largely heterogeneous, though common species include Sugar Maple, Manitoba Maple, Hackberry (*Celtis occidentalis*), Black Walnut, and Tamarack (*Larix laricina*). Under-canopy was relatively open, and commonly include Bird Cherry (*Prunus avium*), European Buckthorn, River Grape, Virginia Creeper (*Parthenocissus quinquefolia*). Groundcover was generally consistent with the adjacent open cultural ecosites.
CUW1/CUT1 Mineral Cultural Woodland/Mineral Cultural Thicket	West of the Greenway WWTP, a patchy cultural woodland/cultural thicket is present. Treed sections of this ecosite have a variable canopy, though they are dominated in some areas by Black Walnut and in other areas by Silver Maple (*Acer saccharinum*). Other common canopy constituents include Bur Oak (*Quercus macrocarpa*), Norway Maple (*Acer platanoides*), thornless Honey Locus (*Gleditsia thoacanthos ssp. inermis*), Green Ash, and Manitoba Maple. Thicket portions of this ecosite are generally dominated by a thick growth of Staghorn Sumac, though European Buckthorn, River Grape, and Virginia Creeper are common. The ground layer is influenced by adjacent CUM1 ecosites, though shade-tolerant species such as White Vervain, Yellow Avens, and Enchanter's Nightshade (*Circaea Lutetiana*) are present at the interior as well.

Ecological Land Classification Community Type	Community Description
CUT1 Buckthorn Mineral Cultural Thicket	An off-leash dog park is present southwest of the Greenway WWTP. Approximately half of this dog park contains a cultural thicket comprised predominantly of tall European Buckthorn. The thicket extends west to margin the southern FOD7-4 in these areas. Other common species include young Manitoba Maple, Gray Dogwood (*Cornus racemosa*), Tatarian Honeysuckle (*Lonicera tatarica*), European Privet (*Ligustrum vulgare*), River Grape, and Virginia Creeper. Understory is generally sparse, likely due to the presence of dogs, but common species include Giant Ragweed (*Ambrosia trifida*), Burdock, Yellow Avens, Goutweed (*Aegopodium podagraria*), and Ground Ivy (*Glechoma hederacea*).
CUT/CUM Mineral Cultural Thicket/ Mineral Cultural Meadow	Multiple open areas are present with little to no presence of trees. The shrub layer in these areas is variable, but common species include European Buckthorn, Fragrant Sumac (*Rhus aromatica*), Staghorn Sumac (*Rhus typhina*), River Grape, and Virginia Creeper. Ground layer is generally graminoid-dominated, with common species including Orchard Grass (*Dactylis glomerata*), Kentucky Bluegrass (*Poa pratensis*), Annual Bluegrass (*Poa annua*), Timothy (*Phleum pratense*), Smooth Brome (*Bromus inermis*), Quackgrass (*Elymus repens*), and Green Foxtail (*Setaria viridis*). Common non-graminoid species include Common Dandelion (*Taraxacum officinale*), Canada Thistle (*Setaria viridis*), Bird's-foot Trefoil (*Lotus corniculatus*), White Clover (*Trifolium repens*), Red Clover (*Trifolium pratense*), Perforate St. John's Wort (*Hypericum perforatum*), and Canada Goldenrod (*Solidago canadensis*).
CUH1/BBO1 Mineral Cultural Hedgerow/ Mineral Open Beach	The southern riparian shoreline of the Thames north of the Greenway WWTP consists of a narrow band of mature trees with intermittent mineral open beach beyond. The upper canopy of the linear corridor was dominated by Crack Willow (*Salix fragilis*), with Little-leaf Linden (*Tilia cordata*), Maniotba Maple, Black Walnut, and Hackberry relatively common. Occasional large Eastern Cottonwood (*Populus deltoides*) dominate the intermittent super-canopy in areas. The BBO1 areas were not accessible but appear to be sparsely vegetated with low sedges (*Carex sp*.) and forbs.
CUH1 White Cedar Mineral Cultural Hedgerow	Two small cultural hedgerows are present adjacent to the northern and eastern fences of the Greenway WWTP. These hedgerows predominantly consist of Eastern White Cedar (*Thuja occidentalis*), with common presence of River Grape and Virginia Creeper. Young Manitoba Maple are intermittently present at the margins.
D Open/Disturbed	Multiple areas were identified as having been heavily modified or disturbed within the Greenway 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.

Easting (m)

476600 476800 477000 477200 477400 477600

Northing (m)

4758600 4758400 4758200 4758000 4757800 4757600

Braemar Crescent
Riverside Drive
Old Riverside Drive
Forward Avenue
Hutton Place
Terry Fox Parkway
Greenside Ave
Darlene Crescent
Seawood Avenue
Malcolm Street
Donna Street
Chelsea Avenue
Springbank Drive
Wildwood Avenue
Forest Hill Avenue
Greenwood Avenue
Carol Street
Pinewood Drive
Randol Drive
Trowbridge Avenue
Mary Avenue

CUH1 | CUH1/BBO1 | CUW1/CUT1 | CUT/CUM | CUW1 | CUT1 | FOD7-4 | D

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

N

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

ELC Code | Description

- CUH1 | White Cedar Mineral Cultural Hedgerow
- CUH1/BBO1 | Mineral Cultural Hedgerow/Mineral Open Beach
- CUT/CUM | Mineral Cultural Thicket/Mineral Cultural Woodland
- CUT1 | Buckthorn Mineral Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- CUW1/CUT1 | Mineral Cultural Woodland/Mineral Cultural Thicket
- D | Open/Disturbed
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest

1:4,500 metres
45 0 45 90
NAD 1983 UTM Zone 17N

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City of London
Greenway and Adelaide Wastewater Treatment Plants

Greenway Wastewater Treatment Plant Ecological Land Classification Communities

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

Figure 2

I:\City of London\32667\Figures and Tables\EA\2021\Report\EIS_Reporting\Greenway\Figure-2-Greenway_Wastewater_Treatment_Plant_Ecological_Land_Classification_Communities.mxd - Tabloid_L - 25-Nov-21, 06:06 PM - imwright - TID005

5.3.2 Flora

5.3.2.1 Greenway Study Area

Based on the background review, a total of three SAR and six SCC were identified as potentially occurring within the Greenway 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.

A total of 120 vascular plant species were observed within the Greenway study area during field observations. A complete vascular plant list is provided in Appendix D. Of these species, 10 are considered S4, 44 are considered S5, and 65 are considered species not applicable(SNA)/species not ranked (SNR). One plant SAR was identified within the Greenway study area: the threatened Kentucky Coffee-tree (*Gymnocladus dioicus*). This tree appears to be commonly planted as a landscape tree along the footpath/parkway corridor to the northwest of the Greenway WWTP. No other SAR or SCC were observed within the Greenway study area.

5.4 Wildlife and Wildlife Habitat

5.4.1 Birds

Based on the background review, there were a total of 91 avian species with the potential to occur within the Greenway study area. Of the 91 species identified, 7 SAR and 1 SCC were noted within the Greenway 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.

A total of 44 bird species were observed during surveys within the Greenway study area (Appendix E). A total of three SAR birds were observed within the Greenway study area: Bank Swallow, Barn Swallow and Chimney Swift. For all three SAR birds, they were observed as foraging within or as flyovers for the study area, and it was noted that no nesting habitat exists within the study for these three species. The confirmed SAR birds are discussed further in Section 6.6. No SCC birds were observed within the Greenway study area.

5.4.2 Herpetofauna

No site-specific field surveys were conducted for herptofauna within the Greenway study area. However, the background review noted a total of 19 herpetofauna species that have a potential to occur. Of the 19 species identified, there are 3 SAR and 3 SCC noted within the Greenway 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 Greenway study area. Of the 40 species identified, 5 SAR are noted within the Greenway study area and no SCC were identified. 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

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 Greenway study area, of which 20 have been assessed as high-quality snags (Table 4). These high-quality snags should be considered potential SAR bat habitat for Myotis species, and removal of high-quality habitat trees as identified in Table 5 should be treated as though candidate SAR bat habitat is being removed.

No formal leaf-on survey was conducted, but the FOD7-4, CUW1, and CUH1/BBO1 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.

It should be noted that a large portion of the FOD7-4 ecosite within the WWTP compound was inaccessible due to lack of access within the fenced area of the Greenway WWTP. Snag trees and mature Oak and Maples were identified from a distance, indicating that additional habitat potential is present within this feature beyond that survey findings indicate.

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

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description
1	Sugar Maple[(1)]	122	1	Cavities numerous from 5 to 15m
2	c.f. American Basswood[(1)]	43	3	Dead and hollow
3	Crack Willow[(1)]	55	3	Dead limb knotholes/cavities at 12 m and sloughed bark from 4 to 9 m
4	Manitoba Maple	29, 34	2	Sloughed bark and woodpecker holes at 5 m
5	Sugar Maple[(1)]	87	1	Sloughed bark 3 to 15 m, knotholes on upper limbs m. Declining tree
6	Unknown deciduous	120	3	Sloughed bark/cavities at base, cavity at 8 m
7	Red Oak[(1)]	58	1	Cavity/knot hole apps 12 m high; declining live tree
8	Sugar Maple[(1)]	88	1	Knothole at 15 m
9	Deciduous dead	31	4	Dead with numerous low cavities
10	Deciduous dead	20	NA	Significant sloughed bark at 3 m
11	Ash sp. (dead)[(1)]	32, 26	2	Dead with sloughed bark along main stem
12	Ash sp. (dead)[(1)]	26	2	Dead with sloughed bark along main stem
13	Manitoba Maple	47, 38, 31	1	Hollow at base, knot/woodpecker holes at 4 m
14	Crack Willow[(1)]	Approximately 35, 55, 50	2	Sloughed bark, live declining tree
15	Unknown deciduous[(1)]	Unknown	1	Potential cavities at 10+ m
16	Norway Maple	Approximately 60	1	Sloughed bark appx 4 m high
17	Crack Willow	Approximately 65, 55, 80, 70	2	Knotholes and sloughed bark from 2 to 7 m
18	Sugar Maple[(1)]	Approximately 225	1	Knothole cavity at 10, 12 m
19	Ash sp. (dead)	44	3	Sloughed bark 1 to 5 m
20	Sugar Maple[(1)]	84	1	Knothole at 15 m
21	Ash sp. (dead)	46	2	Bark sloughing at base
22	Ash sp. (dead)[(1)]	Unknown	2	Dead standing ash with sloughed bark/cavities at 8 to 14 m
23	Ash sp. (dead)[(1)]	Unknown	2	Dead standing ash with sloughed bark/cavities at 8 to 14 m
24	Ash sp. (dead)[(1)]	Unknown	2	Dead standing ash with sloughed bark/cavities at 8 to 14 m
25	Sugar Maple[(1)]	Approximately 95	2	Dead or nearly so, sloughed bark at 9 to 13 m, cavity at 20 m
26	Deciduous dead[(1)]	62	3	Dead, no bark cavity at 9 m, 11 m, hollow at 6 m
27	Norway Maple[(1)]	Approximately 60	1	Sloughed bark approximately 15 m high

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description
28	Crack Willow(1)	Approximately 200+	1	Sloughed bark 8 m, 12+ m, potential bat box/tree box installed
29	Crack Willow	Approximately 45	3	Sloughed bark at 8 m
30	Sugar Maple(1)	97	1	Hollow at 1 m, cavities at 10 m, 14 m

(1) High-quality snag tree

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 Greenway study area have a total of 5.51 ha; therefore, a total of 55 or more snags are required for the forested areas within Greenway study area to be considered candidate SWH for bat maternity roosting habitat. Of the 30 total snags within the Greenway study area, only 18 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 is not considered SWH for bat maternity roosting.

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

Ecological Land Classification Community	Surveyed Area (ha)	No. of High-quality Snags	Snag Density (snag/ha)
CUW1	1.53	4	2.61
CUW1/CUT1	1.22	1	0.82
CUH1/BBO1	0.89	4	4.49
FOD7-4	1.87	9	4.81
TOTAL AREA	**5.51**		

Easting (m)

476550 476700 476850 477000 477150 477300

Northing (m)

4758300 4758150 4758000 4757850 4757700

Braemar Crescent
Riverside Drive
Terry Fox Parkway
Greenside Ave
Wildwood Avenue
Darlene Crescent
Seawood Avenue
Pinewood Drive
Malcolm Street
Donna Street
Chelsea Avenue

GW01 GW02 GW04 GW09 GW11 GW12 GW15 GW16 GW17 GW18 GW19 GW20 GW21 GW22 GW23 GW24 GW25 GW26 GW29 GW30

N

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

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

1:3,000 metres
30 0 30 60
NAD 1983 UTM Zone 17N

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City of London
Greenway and Adelaide Wastewater Treatment Plants

Greenway Wastewater Treatment Plant High-Quality Bat Trees

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

Figure 3

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5.4.4 Insects

Based on the background review, there are a total of 60 species within the Greenway study area. Of these, four SCC species were noted within the Greenway study area. No SAR were identified within the study area. The potential SCC noted in the background review were assessed to identify their potential to occur within the study area within Section 6.3.

5.5 Aquatic Resources

The main branch of the Thames River adjacent to Greenway WWTP consists of a wide, low-gradient, fairly homogenous channel with a series of pools, riffles, runs, and several bar formations. Through London, the River Valley is encroached by urban land use and confined by several flood protection dykes and natural and constructed slopes (Matrix 2019). The Coves ESA is located 350 m upstream of the Greenway WWTP. This area was once a meander of the Thames River and now encompasses a series of oxbow ponds (Matrix 2019).

5.5.1.1 Fish Community

Background fisheries data was compiled from fish sampling records from DFO, MNRF, MECP, and UTRCA (Table 6). The results of these records indicate the potential for 37 fish species within the Greenway study area, which include 2 SAR and 1 SCC species. The confirmed SAR species include 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. This species and its protected habitat are discussed in Section 6.6. The SCC include the Spotted Sucker (*Minytrema melanops*), which is classified as special concern under the ESA and SARA. This species is discussed further in Section 6.3.

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

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Bigmouth Buffalo	*Ictiobus cyprinellus*	-	-	X	-
Black Redhorse	*Moxostoma duquesnei*	Threatened	Threatened	X	X
Blackside Darter	*Percina maculata*	-	-	X	-
Bluntnose Minnow	*Pimephales notatus*	-	-	X	-
Brown Bullhead	*Ameiurus nebulosus*	-	-	X	-
Central Stoneroller	*Campostoma anomalum*	-	-	X	-
Common Carp	*Cyprinus carpio*	-	-	X	-
Common Shiner	*Luxilus cornutus*	-	-	X	-
Fathead Minnow	*Pimephales promelas*	-	-	X	-
Greenside Darter	*Etheostoma blennioides*	-	-	X	-
Green Sunfish	*Lepomis cyanellus*	-	-	X	-
Golden Redhorse	*Moxostoma erythrurum*	-	-	X	-
Johnny Darter	*Etheostoma nigrum*	-	-	X	-

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Largemouth Bass	*Micropterus salmoides*	-	-	X	-
Longnose Gar	*Lepisosteus osseus*	-	-	X	-
Northern Hog Sucker	*Hypentelium nigricans*	-	-	X	-
Northern Pike	*Esox lucius*	-	-	X	-
Mimic Shiner	*Notropis volucellus*	-	-		-
Pumpkinseed	*Lepomis gibbosus*	-	-	X	-
Quillback	*Carpiodes cyprinus*	-	-	X	-
Rainbow Darter	*Etheostoma caeruleum*	-	-	X	-
Rainbow Trout	*Oncorhynchus mykiss*	-	-	X	-
Rock Bass	*Ambloplites rupestris*	-	-	X	-
Roseyface Shiner	*Notropis rubellus*	-	-	X	-
Sea Lamprey	*Petromyzon marinus*	-	-	X	-
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	-	X	-
Silver Redhorse	*Moxostoma anisurum*	-	-	X	-
Silver Shiner	*Notropis photogenis*	Threatened	Threatened		X
Smallmouth Bass	*Micropterus dolomieu*	-	-	X	-
Spotfin shiner	*Cyprinella spiloptera*	-	-	X	-
Spotted Sucker	*Minytrema melanops*	Special Concern	Special Concern	X	X
Stonecat	*Noturus flavus*	-	-		-
Stripped Shiner	*Luxilus chrysocephalus*	-	-	X	-
Walleye	*Sander vitreus*	-	-	X	-
White Sucker	*Catostomus commersonii*	-	-	X	-
Yellow Bullhead	*Ameiurus natalis*	-	-	X	-
Yellow Perch	*Perca flavescens*	-	-	X	-

SARA - *Species at Risk Act*
ESA - *Endangered Species Act*
UTRCA - Upper Thames Region Conservation Authority
DFO - Fisheries and Oceans Canada

5.5.1.2 Mussel Community

Data collected from UTRCA as well as federal and provincial databases indicate the potential for 10 species of mussels, which include 3 SAR and 3 SCC (Table 7). All three SAR species are considered to have potential habitat within the Thames River and are discussed further in Section 6.6.

Two of the SCC are considered to have potential habitat within the Thames River and include Black Sandshell (*Ligumia recta*) and Mucket (*Actinonaias ligamentina*). These species are discussed further in Section 6.3.

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

Common Name	Scientific Name	S-rank	SARA[1]	ESA[2]	UTRCA Data 2005-2020	DFO SAR Mapping	MECP Data
Black Sandshell	*Ligumia recta*	S3	-	-	X	-	-
Elktoe	*Alasmidonta marginata*	S3	-	-	X	-	-
Fluted-shell	*Lasmigona costata*	S5	-	-	X	-	-
Fragile Papershell	*Leptodea fragilis*	S4	-	-	X	-	-
Mucket	*Actinonaias ligamentina*	S3	-	-	X	-	-
Plain Pocketbook	*Lampsilis cardium*	S4	-	-	X	-	-
Rayed Bean	*Villosa fabalis*	S1	Endangered	Endangered	-	X	-
Round Pigtoe	*Pleurobema sintoxia*	S1	Endangered	Endangered	-	X	X
White Heelsplitter	*Lasmigona complanata*	S5	-	-	X	-	-
Wavy-rayed Lampmussel	*Lampsilis fasciola*	S2	Special Concern	Threatened	X	X	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 Greenway study area:

- ANSIs
- ESA
- Significant woodlands
- Provincially Significant Wetlands
- Wetlands and Unevaluated Wetlands

Significant features that are present within the study area are discussed further in Sections 6.1 to 6.6.

6.1 Significant Valleylands and Corridors

Valleylands are linear natural areas that occur in a valley or other landform depression that have water flowing through or standing for some period of the year (MNR 2010). These areas are important corridors which provide unique features and functions to an area as well as linkages to terrestrial and aquatic habitats.

The City's official plan recognizes significant valleylands, which are mapped on Map 5 (Natural Heritage) of *The London Plan* (City of London 2016). The map indicated that the Thames River Valley is considered a Significant Valleyland (Appendix C).

The Greenway WWTP is located directly adjacent to the Thames River Valley (approximately 20 m south of the river).

6.2 Woodlands

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

No significant woodlands were identified within the Greenway study area; however, the City did indicate the presence of a woodland directly southwest of the Greenway WWTP (Appendix C; Figure 4). The City describes woodlands as "woodlands that are not determined to be ecologically significant but are to be retained for public open space or park purposes, or woodlands to be retained at the property owner's request as a private woodland, will be included in the Green Space Place Type on Map 1 and identified as woodlands on Map 5" (City of London 2016).

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 Greenway Wastewater Treatment Plant

Category	Wildlife Habitat	Greenway Wastewater Treatment Plant
Seasonal Concentration Areas of Animals	Shorebird Migratory Stopover Area	Candidate - Patchy BBO1 ecosites are present adjacent to the Thames River
	Turtle Wintering Areas	Candidate - Thames River contains open water areas with deep pools
Rare Vegetation Communities and Specialized Habitat for Wildlife	Turtle Nesting Habitat	Candidate - The Thames River shoreline within the study area contains sand and gravel soil for nesting.
Habitat for Species of Conservation Concern	Special Concern and Rare Wildlife Species	Candidate • Eastern Wood Pewee • Eastern Ribbonsnake • Hackberry Emperor • Monarch • Tawny Emperor • Spotted Sucker • Black Sandshell • Mucket • Eastern Stiff-leaved Goldenrod • Hairy Fruited Sedge Confirmed • Northern Map Turtle • Snapping Turtle
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

As presented in Section 5.5, the Greenway study area includes the Thames River, which contains fish as well as permanent fish habitat.

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 Greenway study area was complied from the background review and agency consultation. A total of 23 SAR were identified as potentially occurring within the Greenway 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 9.

The results of the assessment indicated that 10 species were considered to have potential habitat, and a total of 7 species were confirmed (Table 9).

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

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

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:

- **Bank Swallows** were observed foraging within the Greenway study area. Habitat used exclusively during the breeding season includes the nest (nest burrow and nest cup material), the nest site (bank), and the surrounding open foraging habitat (MECP 2020). The Bank Swallow is afforded species and general habitat protection under the ESA. No nest sites were observed within the study area and as a result are not considered further in the impact assessment for the study area.

- **Barn Swallows** were observed foraging within the Greenway study area. The ESA general habitat protection identifies three categories of protection which ranges from the lowest tolerance to alteration (Category 1) to the highest tolerance to alteration (Category 3). Category 1 includes the nest, Category 2 is the area within 5 m of the nest, and Category 3 is the area between 5 to 20 m of the best. General building use and building improvements that do not impair the function of the habitat have been identified as compatible with the habitat legislation. No Barn Swallow nests were observed within the study area and as a result are not considered further in the impact assessment for the study area.

- **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 areas 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.

- **Kentucky Coffee-tree** was identified within the open parking area and appeared to be planted specimens. The species and habitat protection under the ESA only apply to natural growing species. The species within the study area appears to be planted and therefore would not be awarded protection under the ESA.

- **Spiny Softshell** was identified within 1 km of the study area by UTRCA staff during recent studies. This species uses highly aquatic habitats during its life cycle, and prefers sandy substrates for nesting, shallow soft bottom areas for nursery habitat, deep pools for hibernation, and riffle areas for foraging (MECP 2020). The Spiny Softshell is afforded species and general habitat protection under the ESA, 2007. Habitat and basking areas may occur over a large area to satisfy all habitat requirements for the Spiny Softshell (MECP 2020).

- **Silver Shiner** utilizes deep riffles and pools of large rivers to carry out its lifecycle. The ESA general habitat protection identifies three categories of protection which ranges from the lowest tolerance to alteration (Category 1) to the highest tolerance to alteration (Category 3). Category 1 habitats have been identified as flowing pools, run, and riffles in occupied reaches; Category 2 has been identified

as shallow, nearshore habitats; and areas with aquatic vegetation in occupied reaches, and Category 3 has been identified as floodplains and riparian edges adjacent to occupied reaches (MECP 2020).

- **Black Redhorse** was identified within 1 km of the study area by UTRCA staff during recent studies. This species lives in pools and riffle areas of medium-sized rivers that are usually less than two metres deep (MECP 2020). The Black Redhorse is afforded species and general habitat protection under the ESA.

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 Greenway Study Area

Significant Feature	Greenway Wastewater Treatment Plant
Significant Valleylands	Confirmed
Significant Woodland	None
Woodlands	Confirmed
Wetlands	None
Significant Wildlife Habitat	Confirmed and Candidate
Fish and Fish Habitat	Confirmed - direct
Species at Risk	Confirmed and Potential

Easting (m)

476600 476700 476800 476900 477000 477100 477200 477300

Northing (m)

4758300 4758200 4758100 4758000 4757900 4757800

Riverside Drive

Terry Fox Parkway

Greensi

Windwood Avenue

Darlene Crescent

Seawood Avenue

Malcolm Street

Donna Street

Chelsea Avenue

N

- Greenway Wastewater Treatment Plant Study Area
- Greenway Wastewater Treatment Plant Study Area (50m Buffer)
- Candidate SWH, Potential SAR Habitat
- Confirmed SAR Habitat, Confirmed SWH
- Significant Valleyland (London Plan), Candidate SWH, Potential SAR Habitat
- Woodland (London Plan), Candidate SWH, Potential SAR Habitat
- 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
Greenway Wastewater Treatment Plant

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

Figure 4

I:\City\of\London\32667\FiguresAndTables\EA\2021\Report\EIS_Reporting\Greenway\Figure-4-Significant_Features_And_Functions_Greenway_Wastewater_Treatment_Plant.mxd - Tabbud_L - 25-Nov-21, 06:09 PM - Imwright - TID005

7 FLOOD PROTECTION ALTERNATIVES

Matrix recommended that site-level flood protection approaches (e.g., berms, floodwalls) 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 are summarized in Table 11.

TABLE 11 Shortlist of Alternatives for the Greenway Study Area

Site-level Flood Protection	Greenway Wastewater Treatment Plant
Option 1	Floodwall
Option 2	Berm
Option 3	Combination of Floodwall and Berm
Option 4	Do Nothing

The major undertakings of the flood mitigation alternatives at Greenway WWTP include the creation of a floodwall and/or berm along the northern and eastern potions of the WWTP and extending slightly south into the outer edge of the current woodland.

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 WWTP that will influence the natural environment:

- construction access, staging, and laydown areas
- vegetation clearing, earthworks/grubbing, and disposal
- near-water construction works

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 valleylands
- woodlands
- SWH
- fish and aquatic habitat
- 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 floodwall and/or 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 removal of vegetation along the west and southwest side of the Greenway WWTP, which could include the removal of SAR trees or SAR bat habitat, as well as the proximity of construction activities to the Thames River (25 m), which is also aquatic 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 Greenway
• Significant Valleylands • Fish and Aquatic Habitat • SAR • Habitat of SCC	• Near-water Works to create the floodwall/berm along the northern section of the Greenway WWTP (25m from the Thames River)	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-6D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short-term, isolated, temporary disturbance to the natural features. • The Thames River system is not anticipated to be negatively affected if mitigation measures are followed. • 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 Greenway
• Woodlands • General Wildlife and Habitat • Potential SWH	• Vegetation clearing, earthworks/ grubbing to create the floodwall/berm along the south-west side of the Greenway WWTP adjacent to the dog park and woodland.	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-6D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short term, isolated, temporary disturbance to the natural features. • If the prescribed mitigation measures are followed, then the planting of new, native, vegetation within the area should result in no long-term impacts to the environment.
		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	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-6D Erosion and Sedimentation Control 1E-9E	• It is assumed that construction access and staging will utilize the pre-existing roads and parking lot such as the Greenway PCP entry, Terry Fox Parkway, and the dog park parking area.
		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**: Implement a dust management plan for the suppression of fugitive dust.

- **5D**: Ensure that temporarily disturbed areas are restored with native vegetation and monitored during construction and post construction based on UTRCA and the cities specifications.

- **6D**: 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. In addition to these mitigation measures, the following are also recommended:

- Transplant Kentucky Coffee-trees (see Section 11.2 for details).

However, 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 floodwall and/or berm within the 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 Greenway study area, the northern portion of the site where the floodwall and/or berm is to be erected is already disturbed and will include minimal vegetation removal. The greatest risk to this portion of work will be the proximity to the Thames River (25 m). However, if mitigation measures are followed, there should be no impact to this system while construction works are occurring. The southwest portion of the property contains an off-leash dog park, a parking lot, and a small woodland. This section will require some vegetation removal of edge species adjacent to the Greenway WWTP in order to erect the proposed berm. This will result in short-term disturbance to the area; however, it has been recommended within the mitigation measures that a tree preservation plan and replanting plan be created for those areas disturbed. This should include a replacement of trees at a 3:1 ratio as well as, native seed mix. It is anticipated that the long-term effects of this project shall result in a 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:

- Conduct a tree inventory (by a certified arborist) within the area of disturbance 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 WWTP 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 Greenway WWTP, with the Adelaide 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 Greenway WWTP recommended developing a floodwall/berm.

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 Greenway study area included significant valleyland, fish and fish habitat, the woodland, as well as confirmed aquatic SAR (Eastern Spiny Softshell, Silver Shiner, and Black Redhorse). The confirmed avian SAR (Bank Swallow, Barn Swallow, and Chimney Swift) were observed foraging within the study area but did not have confirmed nesting sites within the study area; and therefore, were not anticipated to be directly impacted during construction activities. Furthermore, the confirmed SAR plant (Kentucky Coffee-tree) was identified as a planted species and, therefore, does not receive protection under the ESA. The major undertakings of the flood mitigation alternatives included the creation of a floodwall and/or berm along the northern and eastern potions of

the Greenway WWTP and extending slightly south into the outer edge of the current woodland. 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 Greenway study area is adequately protected.

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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
D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

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

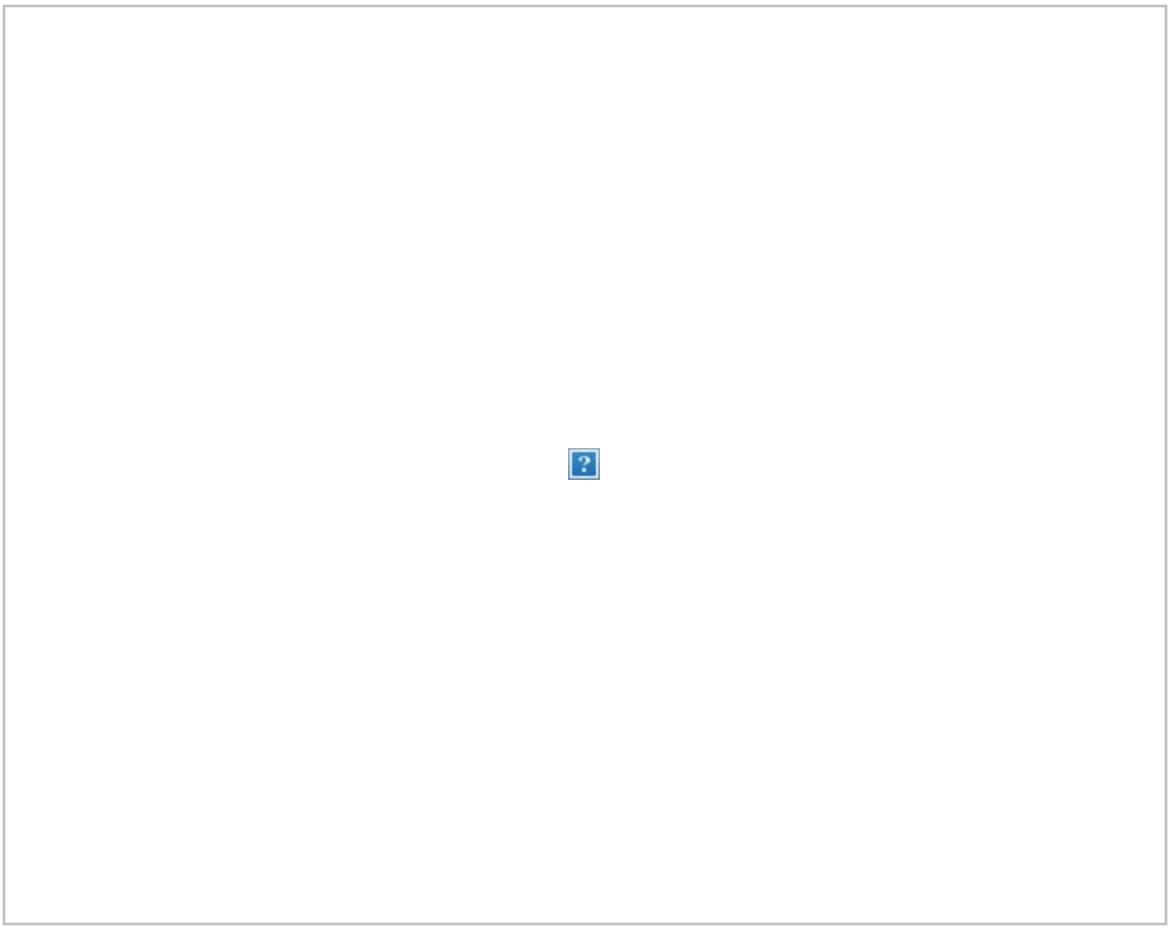
Hi there,

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

MATRIX SOLUTIONS INC.

Environment & Engineering

650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8

D 226.314.1926 **C** 226.332.4392

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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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D 226.314.1926 **C** 226.332.4392
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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,

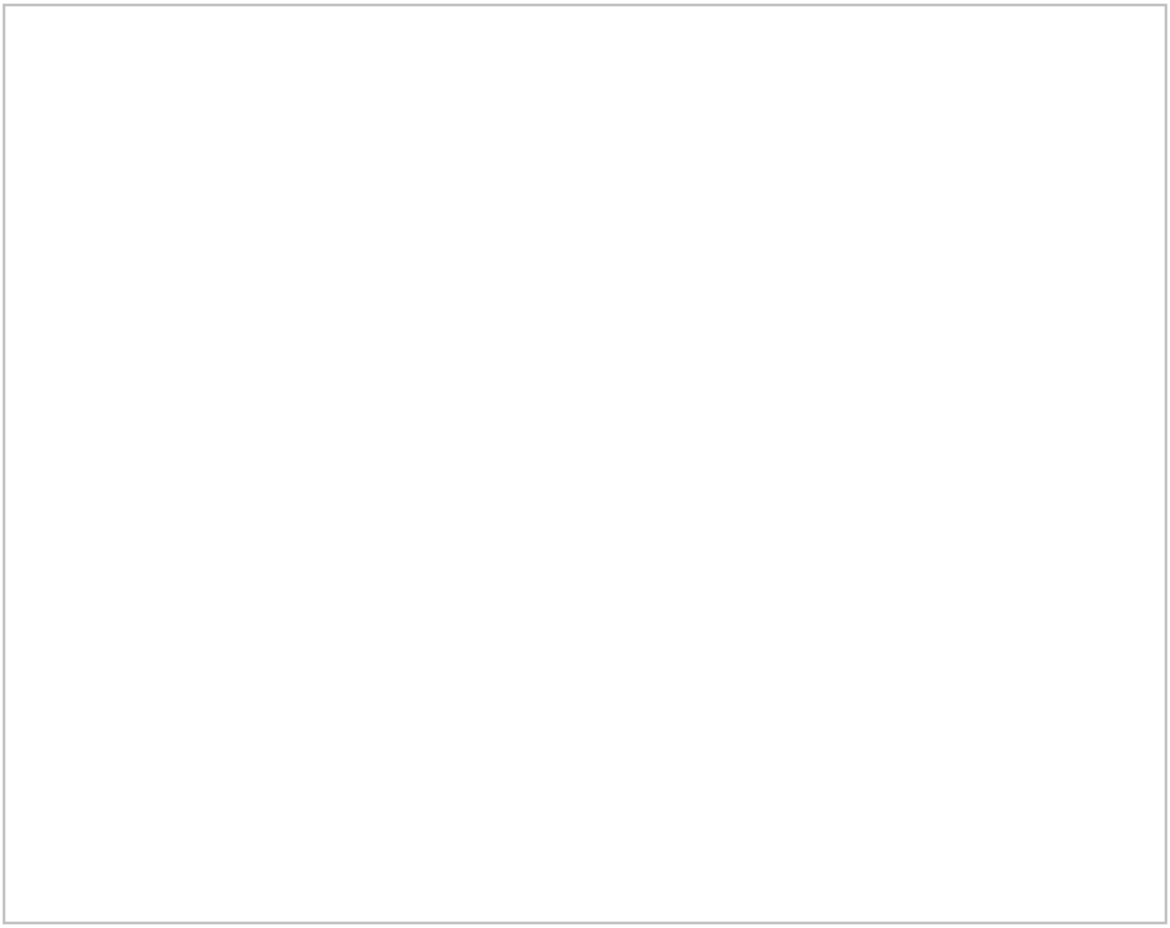
We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario. We've completed a background review using LIO, NHIC, iNaturalist, eBird, the OBBA, ORAA, and the Ontario Butterfly Atlas and carried out a preliminary desktop analysis based on the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

DRAFT



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

MATRIX SOLUTIONS INC.
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D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

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,

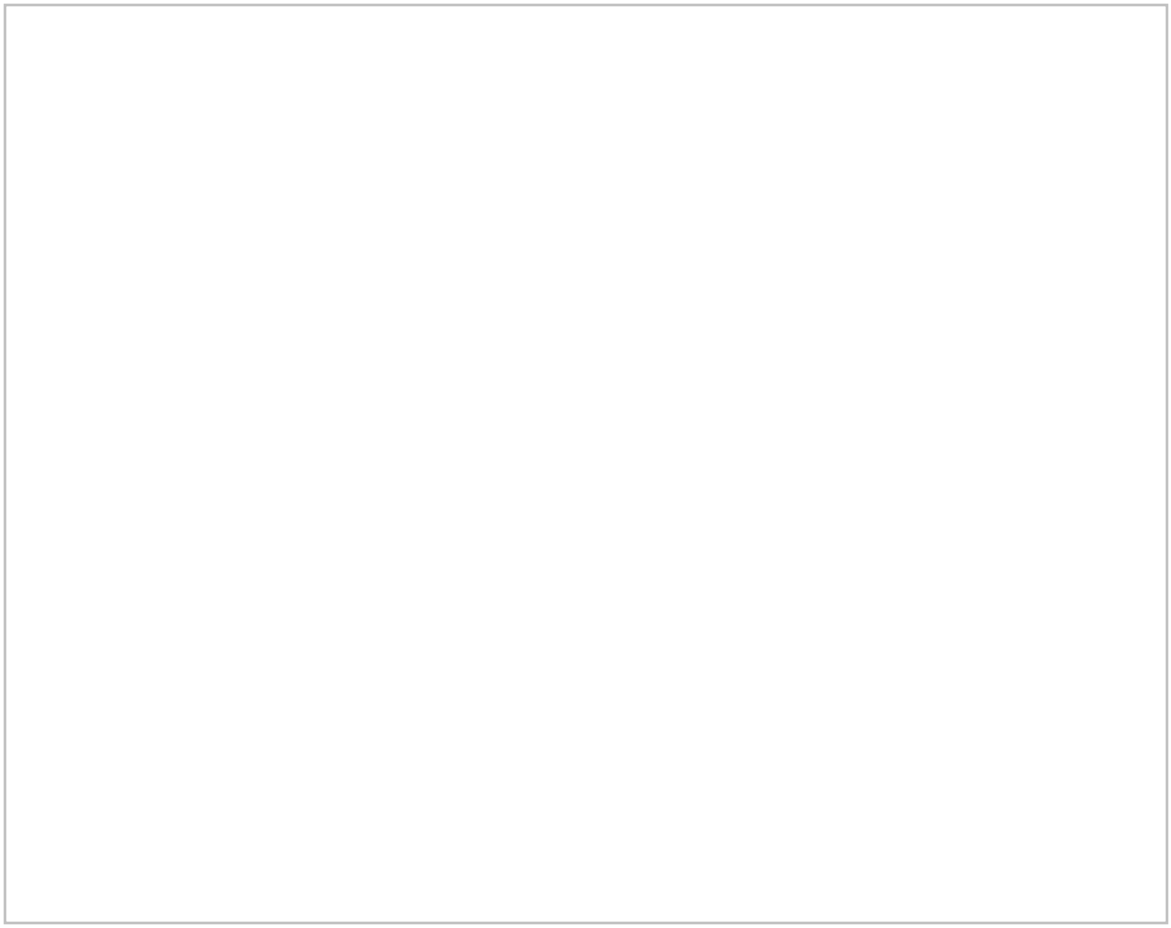
We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario in the vicinity of the Adelaide and Greenway wastewater treatment plants.

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)

DRAFT



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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650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
D 226.314.1926 **C** 226.332.4392
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DRAFT

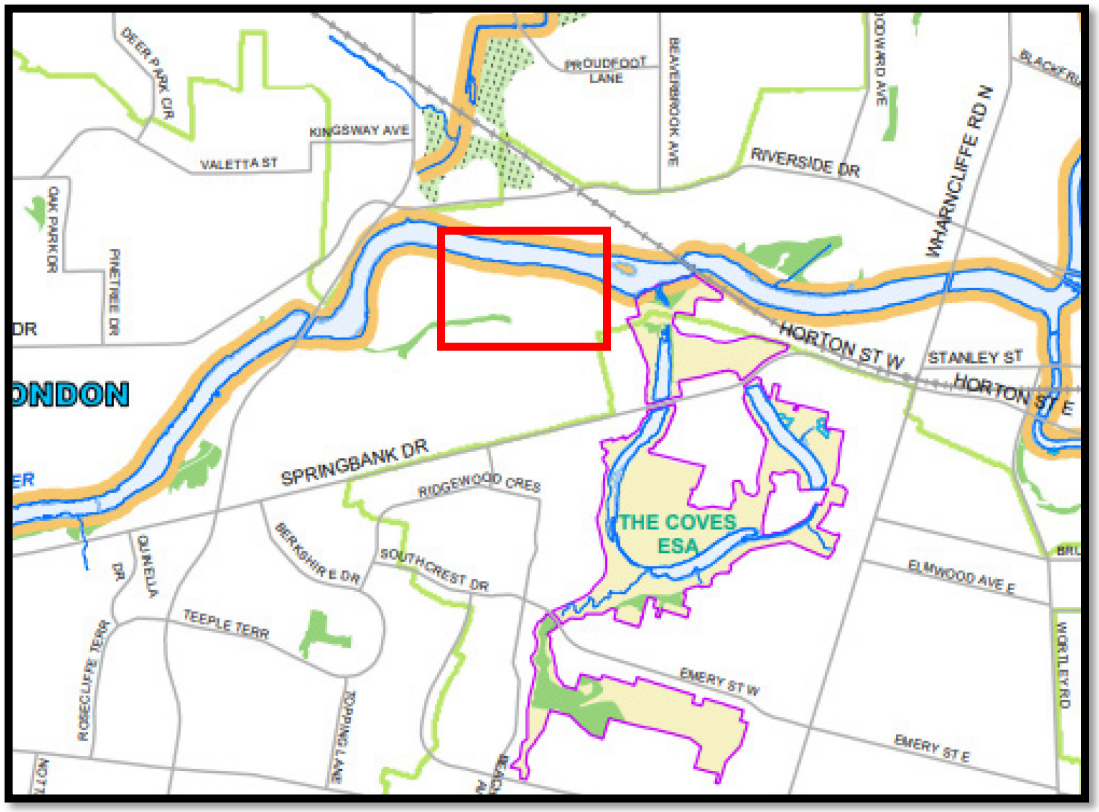
DRAFT

APPENDIX C
Background Data

APPENDIX C

CITY OF LONDON OFFICIAL PLAN MAPPING

Greenway 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
- Environmentally Significant Areas (ESA) (NAME)
- 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 Greenway

OGF ID	Element Type	Common Name	Scientific Name	S-Rank	SARO Status	COSEWIC Status	ATLAS NAD83 IDENT
870202	NATURAL AREA	Thames River					17MH7658
870202	SPECIES	Silver Shiner	Notropis photogenis		THR	THR	17MH7658
870202	SPECIES	Mucket	Actinonaias ligamentina				17MH7658
870202	SPECIES	Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	Acipenser fulvescens pop. 3		THR	THR	17MH7658
870202	SPECIES	Hairy-fruited Sedge	Carex trichocarpa				17MH7658
870202	SPECIES	American Badger (Southwestern Ontario population)	Taxidea taxus jacksoni		END	END	17MH7658
870202	SPECIES	Spiny Softshell	Apalone spinifera		END	END	17MH7658
870202	SPECIES	Edible Valerian	Valeriana edulis				17MH7658
870202	SPECIES	Eastern Green-violet	Hybanthus concolor				17MH7658
870202	SPECIES	Eastern Stiff-leaved Goldenrod	Solidago rigida ssp. rigida				17MH7658
870202	SPECIES	Eastern Meadowlark	Sturnella magna		THR	THR	17MH7658
870202	SPECIES	Broad Beech Fern	Phegopteris hexagonoptera		SC	SC	17MH7658
870202	SPECIES	Northern Map Turtle	Graptemys geographica		SC	SC	17MH7658
870202	SPECIES	Snapping Turtle	Chelydra serpentina		SC	SC	17MH7658
870201	NATURAL AREA	Thames River					17MH7657
870201	SPECIES	Silver Shiner	Notropis photogenis		THR	THR	17MH7657
870201	SPECIES	Mucket	Actinonaias ligamentina				17MH7657
870201	SPECIES	Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	Acipenser fulvescens pop. 3		THR	THR	17MH7657
870201	SPECIES	American Badger (Southwestern Ontario population)	Taxidea taxus jacksoni		END	END	17MH7657
870201	SPECIES	Spiny Softshell	Apalone spinifera		END	END	17MH7657
870201	SPECIES	Edible Valerian	Valeriana edulis				17MH7657
870201	SPECIES	Eastern Stiff-leaved Goldenrod	Solidago rigida ssp. rigida				17MH7657
870201	SPECIES	Eastern Meadowlark	Sturnella magna		THR	THR	17MH7657
870201	SPECIES	Broad Beech Fern	Phegopteris hexagonoptera		SC	SC	17MH7657
870201	SPECIES	Northern Map Turtle	Graptemys geographica		SC	SC	17MH7657
870201	SPECIES	Snapping Turtle	Chelydra serpentina		SC	SC	17MH7657
870212	NATURAL AREA	Thames River					17MH7758
870212	SPECIES	Silver Shiner	Notropis photogenis		THR	THR	17MH7758
870212	SPECIES	Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	Acipenser fulvescens pop. 3		THR	THR	17MH7758
870212	SPECIES	Hairy-fruited Sedge	Carex trichocarpa				17MH7758
870212	SPECIES	Spiny Softshell	Apalone spinifera		END	END	17MH7758
870212	SPECIES	Edible Valerian	Valeriana edulis				17MH7758
870212	SPECIES	Midland Painted Turtle	Chrysemys picta marginata			SC	17MH7758
870212	SPECIES	Eastern Stiff-leaved Goldenrod	Solidago rigida ssp. rigida				17MH7758
870212	SPECIES	Eastern Meadowlark	Sturnella magna		THR	THR	17MH7758
870212	SPECIES	Broad Beech Fern	Phegopteris hexagonoptera		SC	SC	17MH7758
870212	SPECIES	Wood Thrush	Hylocichla mustelina		SC	THR	17MH7758
870212	SPECIES	Northern Map Turtle	Graptemys geographica		SC	SC	17MH7758
870212	SPECIES	Snapping Turtle	Chelydra serpentina		SC	SC	17MH7758
870211	NATURAL AREA	THE COVES					17MH7757
870211	SPECIES	Hairy-fruited Sedge	Carex trichocarpa				17MH7757
870211	SPECIES	Chinese Hemlock-parsley	Conioselinum chinense				17MH7757
870211	SPECIES	Spiny Softshell	Apalone spinifera		END	END	17MH7757
870211	SPECIES	Edible Valerian	Valeriana edulis				17MH7757
870211	SPECIES	Midland Painted Turtle	Chrysemys picta marginata			SC	17MH7757
870211	SPECIES	Eastern Stiff-leaved Goldenrod	Solidago rigida ssp. rigida				17MH7757
870211	SPECIES	Chimney Swift	Chaetura pelagica		THR	THR	17MH7757
870211	SPECIES	Eastern Meadowlark	Sturnella magna		THR	THR	17MH7757
870211	SPECIES	Broad Beech Fern	Phegopteris hexagonoptera		SC	SC	17MH7757
870211	SPECIES	Wood Thrush	Hylocichla mustelina		SC	THR	17MH7757
870211	SPECIES	Butternut	Juglans cinerea		END	END	17MH7757
870211	RESTRICTED SPECIES	Restricted Species	Restricted Species				17MH7757

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

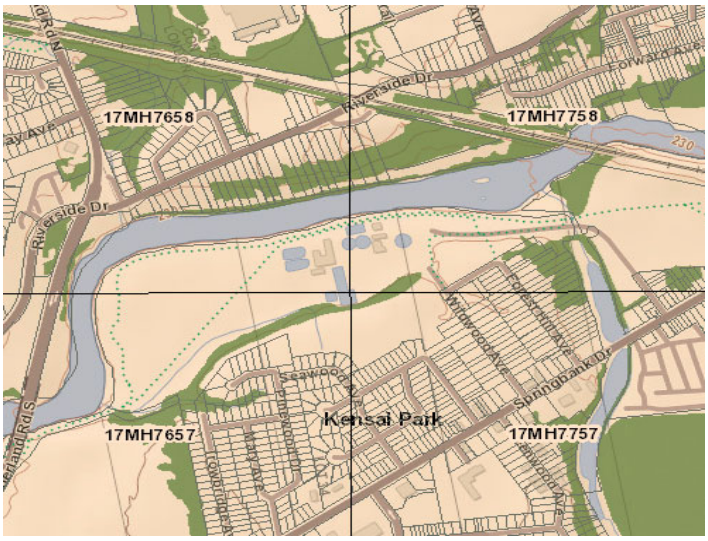


TABLE C2 Ontario Reptile and Amphibian Atlas - Species Results for 17MH75

Species No.	Common Name	No. of Records	Earliest Year	Latest Year
1	Blanding's Turtle	1	1965	1965
3	Midland Painted Turtle	30	1964	2019
4	Northern Map Turtle	40	1988	2018
5	Red-eared Slider	3	2011	2017
6	Snapping Turtle	29	1965	2019
10	Dekay's Brownsnake	7	1964	2013
11	Eastern Foxsnake	1	2011	2011
12	Eastern Gartersnake	36	1929	2018
13	Eastern Hog-nosed Snake	9	1955	2017
18	Milksnake	12	1964	2019
19	Northern Watersnake	2	1990	1990
20	Queensnake	1	1990	1990
24	Smooth Greensnake	2	1957	1964
25	American Bullfrog	3	1996	2013
27	Gray Treefrog	42	1956	2018
28	Green Frog	80	1956	2018
30	Northern Leopard Frog	26	1956	2017
31	Pickerel Frog	3	1956	2013
32	Spring Peeper	114	1955	2017
33	Western Chorus Frog	21	1996	2017
34	Wood Frog	20	1929	2015
35	American Toad	88	1956	2019
40	Red-spotted Newt	5	1955	2018
41	Eastern Red-backed Salamander	22	1929	2015
42	Four-toed Salamander	1	1935	1935
48	Spotted Salamander	4	1954	2018

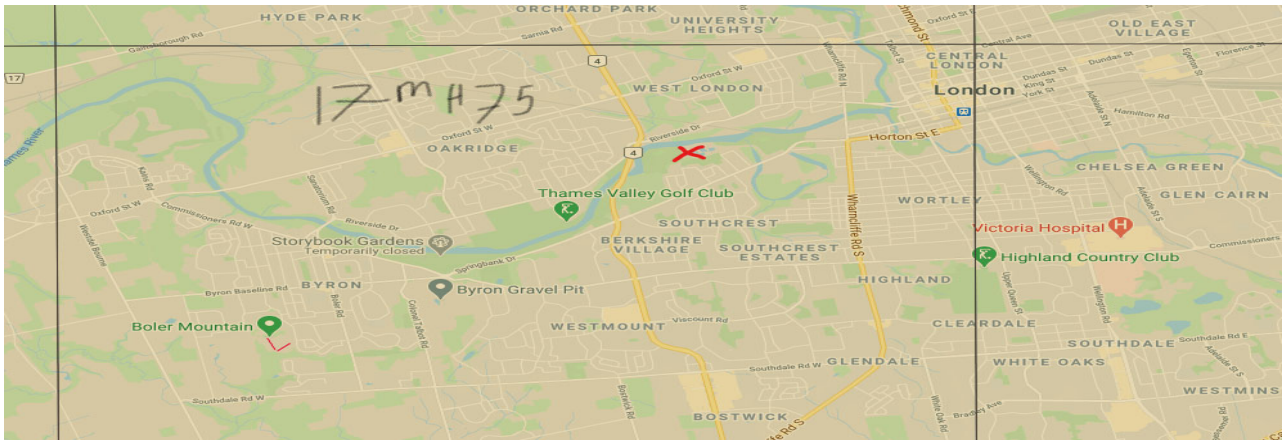


TABLE C3 Ontario Butterfly Atlas - Species Results for 17MH75

Species No.	Common Name	Scientific Name	No. of Records	Earliest in Year (Adults)	Latest in Year (Adults)	Earliest Year	Latest Year
88	Acadian Hairstreak	Satyrium acadica	1	10-Jul	10-Jul	1910	1910
8	Sleepy Duskywing	Erynnis brizo	1	24-May	24-May	1969	1969
130	Silvery Checkerspot	Chlosyne nycteis	1	06-Jun	06-Jun	1990	1990
63	Mustard White	Pieris oleracea	1	06-Jun	06-Jun	2015	2015
124	Silver-bordered Fritillary	Boloria selene	1	06-Jun	06-Jun	2015	2015
152	Hackberry Emperor	Asterocampa celtis	1	25-Jul	25-Jul	2015	2015
33	Long Dash Skipper	Polites mystic	1	27-Jun	27-Jun	2016	2016
155	Eyed Brown	Lethe eurydice	1	27-Jun	27-Jun	2016	2016
104	Gray Hairstreak	Strymon melinus	1	21-Oct	21-Oct	2017	2017
70	Orange Sulphur	Colias eurytheme	1	28-Jul	28-Jul	2018	2018
141	Gray Comma	Polygonia progne	1	12-Jul	12-Jul	2018	2018
36	Little Glassywing	Pompeius verna	1	08-Jul	08-Jul	2019	2019
110	Summer Azure	Celastrina neglecta	1	03-Aug	03-Aug	2019	2019
7	Dreamy Duskywing	Erynnis icelus	2	24-May	23-Jun	1907	1969
125	Meadow Fritillary	Boloria bellona	2	22-May	01-Jul	1965	2014
144	Milbert's Tortoiseshell	Aglais milberti	2	27-Jun	07-Sep	1964	2016
40	Hobomok Skipper	Poanes hobomok	2	02-Jun	03-Jun	1906	2018
60	Spicebush Swallowtail	Papilio troilus	2	19-Aug	19-Aug	2018	2018
38	Delaware Skipper	Anatrytone logan	2	01-Jul	08-Jul	2014	2019
148	Common Buckeye	Junonia coenia	2	12-Jul	28-Oct	2012	2019
145	American Lady	Vanessa virginiensis	2	18-Apr	16-Sep	2016	2019
154	Northern Pearly-Eye	Lethe anthedon	2	02-Jul	05-Jul	2016	2019
117	American Snout	Libytheana carinenta	2	05-Jul	28-Jul	2017	2019
15	Wild Indigo Duskywing	Erynnis baptisiae	2	31-Jul	02-Sep	2018	2019
156	Appalachian Brown	Lethe appalachia	2	17-Jun	29-Jun	2018	2019
9	Juvenal's Duskywing	Erynnis juvenalis	3	23-May	27-May	1908	1975
153	Tawny Emperor	Asterocampa clyton	3	01-Jul	09-Jul	1968	2014
31	Tawny-edged Skipper	Polites themistocles	3	03-Jun	10-Jul	2014	2019
35	Northern Broken-Dash	Wallengrenia egeremet	3	01-Jul	28-Jul	2014	2019
119	Great Spangled Fritillary	Speyeria cybele	3	29-Jun	10-Jul	2014	2019
23	Least Skipper	Ancyloxypha numitor	3	24-Jun	10-Aug	2016	2019
159	Common Wood-Nymph	Cercyonis pegala	3	05-Jul	15-Jul	2016	2019
47	Dun Skipper	Euphyes vestris	4	01-Jul	09-Aug	2014	2018
135	Baltimore Checkerspot	Euphydryas phaeton	4	27-Jun	07-Jul	1968	2019
91	Banded Hairstreak	Satyrium calanus	4	14-Jul	25-Jul	1869	2019
136	Question Mark	Polygonia interrogationis	5	01-Jul	18-Aug	2014	2019
132	Pearl Crescent	Phyciodes tharos	6	19-Jun	24-Aug	2013	2019
151	Viceroy	Limenitis archippus	6	29-Jun	15-Sep	2016	2019
82	American Copper	Lycaena phlaeas	7	31-May	17-Sep	1908	1920
58	Eastern Tiger Swallowtail	Papilio glaucus	7	06-Jun	25-Aug	2012	2019
146	Painted Lady	Vanessa cardui	8	18-Apr	09-Oct	2012	2019
150	Red-spotted Purple	Limenitis arthemis astyanax	8	01-Jul	14-Aug	1911	2019
25	European Skipper	Thymelicus lineola	9	22-Jun	10-Jul	2014	2019
157	Little Wood-Satyr	Megisto cymela	9	06-Jun	31-Jul	2014	2019
1	Silver-spotted Skipper	Epargyreus clarus	9	05-Jul	22-Sep	2017	2019
30	Peck's Skipper	Polites peckius	10	28-Jul	04-Sep	2012	2019
107	Eastern Tailed Blue	Cupido comyntas	11	01-Jun	08-Sep	1964	2019
69	Clouded Sulphur	Colias philodice	11	10-Jul	12-Oct	2014	2019
57	Eastern Giant Swallowtail	Papilio cresphontes	11	28-Jul	17-Sep	1893	2019
111	Azure sp.	Celastrina sp.	12	19-Apr	29-Aug	1963	2019
143	Mourning Cloak	Nymphalis antiopa	12	27-Mar	21-Oct	1985	2019
158	Common Ringlet	Coenonympha tullia	12	02-Jun	07-Sep	2015	2019
147	Red Admiral	Vanessa atalanta	15	10-Apr	22-Sep	2012	2019
133	Northern Crescent	Phyciodes cocyta	16	16-Jun	13-Sep	2014	2019
55	Black Swallowtail	Papilio polyxenes	16	15-May	28-Aug	2016	2019
137	Eastern Comma	Polygonia comma	17	05-Apr	30-Oct	1967	2019
96	Brown Elfin	Callophrys augustinus	21	23-Apr	06-Jun	1908	2014
85	Bog Copper	Lycaena epixanthe	23	08-Jun	24-Sep	1910	2019
167	Monarch	Danaus plexippus	29	25-May	09-Oct	2012	2019
65	Cabbage White	Pieris rapae	41	27-Mar	17-Sep	1999	2019

TABLE C4 Ontario Breeding Bird Atlas - Species List for Square 17MH75

Region	Square	Species	Breeding Evidence			
			Max BE	Categ	#Sq	Atlasser Name
4	17MH75	Canada Goose	FY	CONF	1	Betsy Baldwin
4	17MH75	Wood Duck	FY	CONF	1	Betsy Baldwin
4	17MH75	Mallard	FY	CONF	1	2 atlassers
4	17MH75	Hooded Merganser	FY	CONF	1	Peter A Read
4	17MH75	Ruffed Grouse	S	POSS	1	Betsy Baldwin
4	17MH75	Wild Turkey	FY	CONF	1	Brad T. McLeod
4	17MH75	Great Blue Heron	H	POSS	1	Dave Martin
4	17MH75	Green Heron	FY	CONF	1	Betsy Baldwin
4	17MH75	Turkey Vulture	FY	CONF	1	Betsy Baldwin
4	17MH75	Sharp-shinned Hawk	AE	CONF	1	Betsy Baldwin
4	17MH75	Cooper's Hawk	AE	CONF	1	Betsy Baldwin
4	17MH75	Red-tailed Hawk	NY	CONF	1	Betsy Baldwin
4	17MH75	American Kestrel	D	PROB	1	Betsy Baldwin
4	17MH75	Virginia Rail	P	PROB	1	Betsy Baldwin
4	17MH75	Sora	T	PROB	1	Betsy Baldwin
4	17MH75	Killdeer	NE	CONF	1	Betsy Baldwin
4	17MH75	Rock Pigeon	AE	CONF	1	Betsy Baldwin
4	17MH75	Spotted Sandpiper	P	PROB	1	Betsy Baldwin
4	17MH75	American Woodcock	H	POSS	1	Betsy Baldwin
4	17MH75	Mourning Dove	FY	CONF	1	Betsy Baldwin
4	17MH75	Yellow-billed Cuckoo	H	POSS	1	Betsy Baldwin
4	17MH75	Black-billed Cuckoo	S	POSS	1	EarthQuest Canada
4	17MH75	Eastern Screech-Owl	FY	CONF	1	EarthQuest Canada
4	17MH75	Great Horned Owl	NY	CONF	1	Betsy Baldwin
4	17MH75	Common Nighthawk	P	PROB	1	Betsy Baldwin
4	17MH75	Chimney Swift	AE	CONF	1	Betsy Baldwin
4	17MH75	Ruby-throated Hummingbird	T	PROB	1	Betsy Baldwin
4	17MH75	Belted Kingfisher	T	PROB	1	2 atlassers
4	17MH75	Red-bellied Woodpecker	CF	CONF	1	Betsy Baldwin
4	17MH75	Yellow-bellied Sapsucker	D	PROB	1	Betsy Baldwin
4	17MH75	Downy Woodpecker	NY	CONF	1	EarthQuest Canada
4	17MH75	Hairy Woodpecker	FY	CONF	1	Betsy Baldwin
4	17MH75	Northern Flicker	NY	CONF	1	EarthQuest Canada
4	17MH75	Eastern Wood-Pewee	S	POSS	1	3 atlassers
4	17MH75	Willow Flycatcher	S	POSS	1	Dave Martin
4	17MH75	Least Flycatcher	S	POSS	1	Betsy Baldwin
4	17MH75	Eastern Phoebe	NY	CONF	1	Betsy Baldwin
4	17MH75	Great Crested Flycatcher	FY	CONF	1	Betsy Baldwin
4	17MH75	Eastern Kingbird	FY	CONF	1	Betsy Baldwin
4	17MH75	Warbling Vireo	CF	CONF	1	Betsy Baldwin
4	17MH75	Red-eyed Vireo	NU	CONF	1	Betsy Baldwin
4	17MH75	Blue Jay	CF	CONF	1	EarthQuest Canada
4	17MH75	American Crow	NY	CONF	1	Betsy Baldwin
4	17MH75	Horned Lark	T	PROB	1	Dave Martin
4	17MH75	Purple Martin	H	POSS	1	Betsy Baldwin
4	17MH75	Tree Swallow	CF	CONF	1	Betsy Baldwin
4	17MH75	Northern Rough-winged Swallow	CF	CONF	1	Betsy Baldwin
4	17MH75	Bank Swallow	AE	CONF	1	Betsy Baldwin
4	17MH75	Cliff Swallow	AE	CONF	1	Betsy Baldwin
4	17MH75	Barn Swallow	NE	CONF	1	Ryan Zimmerling
4	17MH75	Black-capped Chickadee	NY	CONF	1	Betsy Baldwin
4	17MH75	Red-breasted Nuthatch	CF	CONF	1	Betsy Baldwin
4	17MH75	White-breasted Nuthatch	FY	CONF	1	Betsy Baldwin
4	17MH75	Carolina Wren	FY	CONF	1	Betsy Baldwin
4	17MH75	House Wren	NE	CONF	1	Betsy Baldwin
4	17MH75	Blue-gray Gnatcatcher	AE	CONF	1	Betsy Baldwin
4	17MH75	Eastern Bluebird	NY	CONF	1	Betsy Baldwin
4	17MH75	Veery	S	POSS	1	Betsy Baldwin
4	17MH75	Wood Thrush	T	PROB	1	Betsy Baldwin
4	17MH75	American Robin	NY	CONF	1	Betsy Baldwin
4	17MH75	Gray Catbird	AE	CONF	1	Betsy Baldwin
4	17MH75	Brown Thrasher	NY	CONF	1	Betsy Baldwin

4	17MH75	European Starling	NY	CONF	1	Betsy Baldwin
4	17MH75	Cedar Waxwing	CF	CONF	1	Betsy Baldwin
4	17MH75	Blue-winged Warbler	T	PROB	1	Betsy Baldwin
4	17MH75	Yellow Warbler	CF	CONF	1	Betsy Baldwin
4	17MH75	Chestnut-sided Warbler	H	POSS	1	Betsy Baldwin
4	17MH75	Pine Warbler	T	PROB	1	Betsy Baldwin
4	17MH75	American Redstart	S	POSS	1	Betsy Baldwin
4	17MH75	Common Yellowthroat	CF	CONF	1	Betsy Baldwin
4	17MH75	Eastern Towhee	T	PROB	1	Betsy Baldwin
4	17MH75	Chipping Sparrow	CF	CONF	1	Betsy Baldwin
4	17MH75	Field Sparrow	B	PROB	1	Betsy Baldwin
4	17MH75	Vesper Sparrow	P	PROB	1	Betsy Baldwin
4	17MH75	Savannah Sparrow	CF	CONF	1	Betsy Baldwin
4	17MH75	Song Sparrow	NE	CONF	1	EarthQuest Canada
4	17MH75	Swamp Sparrow	S	POSS	1	Betsy Baldwin
4	17MH75	Scarlet Tanager	S	POSS	1	Betsy Baldwin
4	17MH75	Northern Cardinal	FY	CONF	1	Betsy Baldwin
4	17MH75	Rose-breasted Grosbeak	FY	CONF	1	Betsy Baldwin
4	17MH75	Indigo Bunting	FY	CONF	1	Betsy Baldwin
4	17MH75	Bobolink	T	PROB	1	Betsy Baldwin
4	17MH75	Red-winged Blackbird	NE	CONF	1	Betsy Baldwin
4	17MH75	Eastern Meadowlark	DD	CONF	1	Betsy Baldwin
4	17MH75	Common Grackle	CF	CONF	1	2 atlassers
4	17MH75	Brown-headed Cowbird	FY	CONF	1	Betsy Baldwin
4	17MH75	Orchard Oriole	CF	CONF	1	Betsy Baldwin
4	17MH75	Baltimore Oriole	CF	CONF	1	EarthQuest Canada
4	17MH75	House Finch	FY	CONF	1	Betsy Baldwin
4	17MH75	American Goldfinch	NE	CONF	1	EarthQuest Canada
4	17MH75	House Sparrow	NY	CONF	1	Ryan Zimmerling

FIGURE C1 Fisheries and Oceans Canada - Species at Risk Results (Greenway)

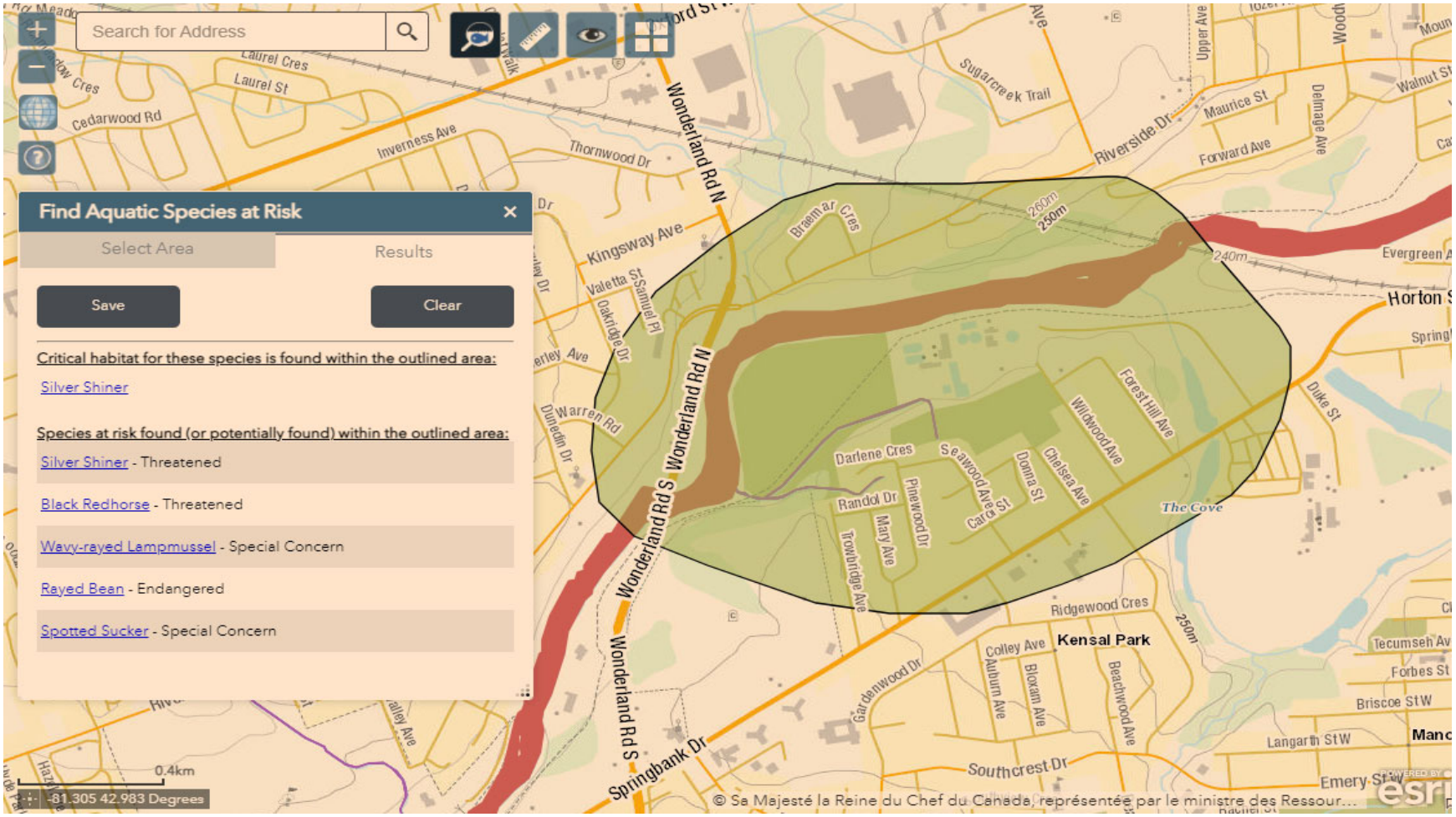


TABLE C5 Ontario Mammal Atlas Results

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 Greenway Wastewater Treatment Centre - Flora Results 2021

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUW1	CUW1/CUT1	CUT/CUM	CUT1	CUH1/BBO1	CUH1	FOD7-4	D
Tree	*Fagus grandifolia*	American Beech	-	-	S4							x	
Tree	*Ulmus americana*	American Elm	-	-	S5					x		x	
Tree	*Sorbus americana*	American Mountain-ash	-	-	S5		x						
Tree	*Acer ginnala*	Amur Mapl	-	-	SNA							x	
Graminoid	*Poa annua*	Annual Bluegrass	-	-	SNA	x	x	x	x	x		x	x
Herb	*Erigeron annuus*	Annual Fleabane	-	-	S5	x	x	x		x		x	
Tree	*Tilia americana*	Basswood	-	-	S5		x			x		x	
Tree	*Cary cordiformis*	Bitternut Hickory	-	-	S5							x	
Tree	*Prunus serotina*	Black Cherry	-	-	SNR		x					x	
Herb	*Medicago lupulina*	Black medic	-	-	SNA	x	x	x		x		x	x
Herb	*Rubus occidentalis*	Black Raspberry	-	-	S5	x	x			x	x	x	
Tree	*Picea mariana*	Black Spruce	-	-	S5		x						
Tree	*Juglans nigra*	Black Walnut	-	-	S4?	x	x			x		x	
Herb	*Solidago flexicaulis*	Broadleaf Goldenrod	-	-	S5							x	
Herb	*Cirsium vulgare*	Bull Thistle	-	-	SNA		x						x
Tree	*Quercus macrocarpa*	Bur Oak	-	-	S5		x			x		x	
Herb	*Linaria vulgaris*	Butter-and-eggs	-	-	SNA	x	x	x		x		x	x
Herb	*Solidago canadensis*	Canada Goldenrod	-	-	SNR	x	x	x	x	x		x	
Tree	*Prunus nigra*	Canada Plum	-	-	S4							x	
Herb	*Cirsium arvense*	Canada Thistle	-	-	SNA	x	x	x	x	x			x
Graminoid	*Elymus canadensis*	Canada Wildrye	-	-	S5		x						
Herb	*Laportea canadensis*	Canada Wood Nettle	-	-	S5					x		x	
Herb	*Scrophularia marilandica*	Carpenter's Square Figwort	-	-	S4					x		x	
Tree	*Prunus virginiana*	Chokecherry	-	-	S5					x		x	
Shrub	*Solanum dulcamara*	Climbing Nightshade	-	-	SNA	x	x	x		x	x	x	
Tree	*Malus pumila*	Common Apple	-	-	SNA							x	
Herb	*Arctium minus*	Common Burdock	-	-	SNA	x	x	x	x	x		x	
Herb	*Taraxacum officinale*	Common Dandelion	-	-	SNA	x	x	x	x	x		x	x
Shrub	*Sambucus nigra*	Common Elderberry	-	-	SNA				x				
Tree	*Celtis occidentalis*	Common Hackberry	-	-	S4	x	x			x		x	
Tree	*Syringa vulgaris*	Common Lilac	-	-	SNA	x							
Herb	*Asclepias syriaca*	Common Milkweed	-	-	S5		x	x					
Herb	*Leonurus cardiaca*	Common Motherwort	-	-	SNA		x					x	
Herb	*Verbascum thapsus*	Common Mullein	-	-	SNA		x	x					x
Herb	*Plantago major*	Common Plantain	-	-	SNA	x	x	x	x	x		x	x
Herb	*Ambrosia artemisiifolia*	Common Ragweed	-	-	S5		x		x	x		x	x
Herb	*Tanacetum vulgare*	Common Tansy	-	-	SNA		x	x		x			
Herb	*Dipsacus fullonum*	Common Teasel	-	-	SNA		x	x	x	x			x
Tree	*Salix fragilis*	Crack Willow	-	-	SNA	x	x			x			
Herb	*Campanula rapunculoides*	Creeping Bellflower	-	-	SNA	x	x	x				x	
Herb	*Rumex crispus*	Curled Dock	-	-	SNA	x				x		x	
Herb	*Rudbeckia laciniata*	Cut-leaved Coneflower	-	-	S5	x						x	
Tree	*Populus deltoides*	Eastern Cottonwood	-	-	S5		x			x		x	
Tree	*Thuja occidentalis*	Eastern White Cedar	-	-	S5		x				x	x	
Tree	*Pinus strobus*	Eastern White Pine	-	-	S5	x							
Herb	*Circaea Lutetiana*	Enchanter's Nightshade	-	-	S5		x					x	
Herb	*Plantago lanceolata*	English Plantain	-	-	SNA		x	x	x				x
Shrub	*Rhamnus cathartica*	European Buckthorn	-	-	SNA	x	x	x	x	x	x	x	x
Shrub	*Ligustrum vulgare*	European Privet	-	-	SNA		x	x	x			x	x
Shrub	*Rhus aromatica*	Fragrant Sumac	-	-	S4	x	x	x		x			
Herb	*Lotus corniculatus*	Garden Bird's-foot Trefoil	-	-	SNA	x	x	x	x	x		x	x
Herb	*Alliaria petiolata*	Garlic Mustard	-	-	SNA	x	x	x		x		x	
Herb	*Aegopodium podagraria*	Goutweed	-	-	SNA		x			x		x	

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUW1	CUW1/CUT1	CUT/CUM	CUT1	CUH1/BBO1	CUH1	FOD7-4	D
Herb	*Ambrosia trifida*	Great Ragweed	-	-	S5				x	x		x	
Herb	*Chelidonium majus*	Greater Celandine	-	-	SNA							x	
Tree	*Fraxinus pennsylvanica*	Green Ash	-	-	S4	x	x			x		x	
Graminoid	*Setaria viridis*	Green Foxtail	-	-	SNA	x	x	x	x	x		x	x
Shrub	*Cornus racemosa*	Grey Dogwood	-	-	S5	x	x	x		x		x	
Herb	*Glechoma hederacea*	Ground-ivy	-	-	SNA	x	x	x	x	x		x	x
Herb	*Impatiens glandulifera*	Himalayan balsam	-	-	SNA							x	
Shrub	*Reynoutria japonica*	Japanese Knotweed	-	-	SNA							x	
Graminoid	*Poa pratensis*	Kentucky Bluegrass	-	-	S5	x	x	x	x	x		x	
Tree	*Gymnocladus dioicus*	Kentucky coffeetree	THR	THR	S2		x	x					
Herb	*Ranunculus ficaria*	Lesser Calendine	-	-	SNA							x	
Herb	*Maianthemum canadense*	Lily of the Valley	-	-	S5							x	
Tree	*Tilia cordata*	Little-leaved Linden	-	-	SNA	x	x			x		x	
Tree	*Acer negundo*	Manitoba Maple	-	-	S5	x	x		x	x	x	x	x
Shrub	*Rosa multiflora*	Multiflora Rose	-	-	SNA					x		x	
Tree	*Catalpa speciosa*	Northern Catalpa	-	-	SNA					x		x	
Tree	*Quercus rubra*	Northern Red Oak	-	-	S5		x					x	
Tree	*Acer Platanoides*	Norway Maple	-	-	SNA		x					x	
Tree	*Picea abies*	Norway Spruce	-	-	SNA							x	
Herb	*Hieracium aurantiacum*	Orange Hawkweed	-	-	SNA		x			x			x
Graminoid	*Dactylis glomerata*	Orchard Grass	-	-	SNA	x	x	x	x			x	x
Tree	*Betula papyrifera*	Paper Birch	-	-	SNR		x			x			
Herb	*Hypericum perforatum*	Perforated St. John's Wort	-	-	SNA	x	x	x	x	x		x	x
Graminoid	*Elymus repens*	Quackgrass	-	-	SNA	x	x	x	x	x			x
Herb	*Trifolium pratense*	Red Clover	-	-	SNA	x	x	x	x	x		x	x
Graminoid	*Festuca rubra*	Red Fescue	-	-	SNA								x
Tree	*Acer rubrum*	Red Maple	-	-	S5		x			x		x	
Tree	*Pinus resinosa*	Red Pine	-	-	S5	x						x	
Graminoid	*Phalaris arundinacea*	Reed Canarygrass	-	-	S5	x			x			x	
Herb	*Vitis riparia*	Riverbank Grape	-	-	S5	x	x	x	x	x	x	x	x
Shrub	*Eleagnus angustifolia*	Russian Olive	-	-	SNA	x							
Tree	*Pinus sylvestris*	Scotch Pine	-	-	SNA	x						x	
Herb	*Prunella vulgaris*	Self-heal	-	-	S5							x	x
Tree	*Acer saccharinum*	Silver Maple	-	-	S5		x			x		x	
Herb	*Galium mollugo*	Smooth Bedstraw	-	-	SNA	x	x	x		x		x	
Herb	*Bromus inermis*	Smooth Brome	-	-	SNA	x	x	x		x		x	
Graminoid	*Digitaria ischaemum*	Smooth Crabgrass	-	-	SNA		x	x	x				
Herb	*Saponaria officinalis*	Soapwort	-	-	SNA		x					x	
Herb	*Sonchus sp.*	Sow Thistle	-	-	SNA	x						x	x
Herb	*Impatiens capensis*	Spotted Jewelweed	-	-	S5					x		x	
Shrub	*Rhus typhina*	Staghorn Sumac	-	-	S5		x	x	x	x		x	
Herb	*Hackelia virginiana*	Stickseed	-	-	S5							x	
Herb	*Urtica dioica*	Stinging Nettle	-	-	S5		x	x		x		x	
Tree	*Acer saccharum*	Sugar Maple	-	-	S5	x	x		x	x		x	
Tree	*Prunus avium*	Sweet Cherry	-	-	SNA					x		x	
Tree	*Acer pseudoplatanus*	Sycamore	-	-	SNA		x						
Herb	*Solidago altissima*	Tall Goldenrod	-	-	S5	x	x	x	x	x		x	
Tree	*Larix laricina*	Tamarack	-	-	S5	x				x		x	
Shrub	*Lonicera tatarica*	Tatarian Honeysuckle	-	-	SNA	x	x	x		x	x	x	
Tree	*Gleditsia triacanthos var. inermis*	Thornless Honey Locust	-	-	SNR		x			x		x	
Herb	*Phleum pratense*	Timothy	-	-	SNA	x		x	x	x			x
Herb	*Vicia cracca*	Tufted Vetch	-	-	SNA		x						x
Tree	*Liriodendron tulipifera*	Tulip Tree	-	-	S4	x	x						
Herb	*Oxalis stricta*	Upright Yellow Wood-sorrel	-	-	SNA	x	x	x	x	x		x	

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUW1	CUW1/CUT1	CUT/CUM	CUT1	CUH1/BBO1	CUH1	FOD7-4	D
Shrub	*Parthenocissus quinquefolia*	Virginia Creeper	-	-	S4?	x	x	x		x	x	x	
Tree	*Fraxinus americana*	White Ash	-	-	S4		x					x	
Herb	*Trifolium repens*	White Clover	-	-	SNA	x	x	x	x	x		x	x
Tree	*Morus alba*	White Mulberry	-	-	SNA	x	x			x		x	
Herb	*Ageratina altissima*	White Snakeroot	-	-	S5		x			x		x	
Herb	*Verbena urticifolia*	White Vergain	-	-	S5		x		x	x		x	
Herb	*Oxalis montana*	White Wood-sorrel			S5							x	
Herb	*Daucus carota*	Wild Carrot	-	-	SNA	x	x	x	x	x		x	x
Herb	*Cichorium intybus*	Wild Chicory	-	-	SNA	x	x	x	x	x		x	x
Herb	*Geum aleppicum*	Yellow Avens	-	-	S5		x		x			x	
Tree	*Betula alleghaniensis*	Yellow Birch	-	-	S5		x						
Herb	*Lysimachia terrestris*	Yellow Loosestrife	-	-	S5					x			
Herb	*Barbarea vulgaris*	Yellow Rocket	-	-	SNA							x	

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

APPENDIX E
Breeding Bird Survey Results

TABLE E1 Breeding Bird Summary Results for Greenway Wastewater Treatment Centre

Visit Number	Date	Weather
Visit 1:	June 4, 2021	17-18°C, 0 wind, 90-100% cloud cover, no precipitation
Visit 2:	June 24, 2021	18-20°C, 2-3 South wind, 0-40% 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	BBS-4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS-4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS-4	BBS-5	BBS-6	
American Goldfinch	*Spinus tristis*				P:H 1 P:S 1	O:X 1	P:S 1	P:H 4			PR:P 3 P:S	P:H 1			P:S 2 PR:P		Probable	Possible	Possible	Possible	Probable	
American Redstart	*Setophaga ruticilla*																					
American Robin	*Turdus migratorius*				P:S 3	P:S 4	P:S 2	P:S 2		P:S 3	P:S 4 C:FY	P:S 7 PR:A C:FY	P:S 4	P:S 1	P:H 1	Possible	Confirmed	Confirmed	Possible	Possible	Possible	
Bank Swallow	*Riparia riparia*	Threatened	Threatened					O:X 1												Observed		BBS-5 Visit 1: Foraging.
Baltimore Oriole	*Icterus galbula*				P:H 1	P:S 1											Possible	Possible				
Barn Swallow	*Hirundo rustica*	Threatened	Threatened				O:X 2	O:X 4						O:X 2					Observed	Observed		BBS-4 Visit 1: Foraging over WWTP BBS-5 Visit 1: Foraging, no visible nesting habitat/structures. BBS-5 Visit 2: Foraging over playing fields.
Black-capped Chickadee	*Poecile atricapillus*				P:S 1	P:H 2						P:S 2					Possible	Possible				
Brown-headed Cowbird	*Molothrus ater*							P:S 2 PR:P			P:S 1						Possible			Probable		
Blue Jay	*Cyanocitta cristata*													P:H 2 PR:A						Probable		
Canada Goose	*Branta canadensis*																					
Cedar Waxwing	*Bombycilla cedrorum*				4						PR:P 2						Probable					
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened				O:X 3	O:X 2											Observed	Observed		BBS-3 Visit 1: Flyover. BBS-4 Visit 1: Foraging over WWTP BBS-5 Visit 1: Foraging.
Common Grackle	*Quiscalus quiscula*			P:H 4 C:FY	C:FY 6				P:H 2				P:H 1			Confirmed	Confirmed		Possible		Possible	
Downy Woodpecker	*Picoides pubescens*										PR:P 2	P:H 1					Probable	Possible				
Eastern Kingbird	*Tyrannus tyrannus*										P:H 1						Possible					
European Starling	*Sturnus vulgaris*				C:FY 3	P:S 1	C:FY 9	C:FY 15			C:FY 9		P:H 1				Confirmed	Possible	Confirmed	Confirmed		
Great Blue Heron	*Ardea herodias*																					BBS-6 Visit 1: Flyover toward vines.
Great Crested Flycatcher	*Myiarchus crinitus*													P:H 1						Possible		
Gray Catbird	*Dumetella carolinensis*					P:S 1			P:H 1						PR:A 1			Possible			Probable	
Hairy Woodpecker	*Picoides villosus*																					
House Finch	*Haemorhous mexicanus*																					
House Sparrow	*Passer domesticus*																					
House Wren	*Troglodytes aedon*						P:S 1		P:S 1										Possible		Possible	
Indigo Bunting	*Passerina cyanea*						P:S 1				P:S 1						Possible		Possible			
Killdeer	*Charadrius vociferus*						P:H 1			P:H 2			P:H 2		O:X 2	Possible			Possible		Observed	BBS-6 Visit 2: River bank.
Mallard	*Anas platyrhynchos*				O:X 2												Observed					
Mourning Dove	*Zenaida macroura*			P:H 4			P:S 1						P:H 1			Possible			Possible			
Northern Cardinal	*Cardinalis cardinalis*			P:S 1	P:S 1			P:S 1	P:S 1	P:S 1	P:S 1	P:S 1	P:S 1		P:H 1	Possible	Possible	Possible	Possible	Possible	Possible	
Northern Flicker	*Colaptes auratus*						P:S 1												Possible			
Northern Gannet	*Morus bassanus*						P:S 1												Possible			
Northern Pintail	*Anas acuta*																					
Osprey	*Pandion haliaetus*									C:NY 1						Confirmed						BBS-1 Visit 1: Platform.
Rose-breasted Grosbeak	*Pheucticus ludovicianus*																					
Red-breasted Nuthatch	*Sitta canadensis*				P:S 1												Possible					
Red-bellied Woodpecker	*Melanerpes carolinus*							P:H 1	P:H 1		P:H 1			P:H 1	P:H 1		Posible			Possible	Possible	
Red-eyed Vireo	*Vireo olivaceus*					P:S 1												Possible				
Rock Pigeon	*Columba livia*				O:X 1					O:X 12						Observed	Observed					BBS-1 Visit 1: Flyby.
Red-tailed Hawk	*Buteo jamaicensis*													P:H 1						Possible		
Red-winged Blackbird	*Agelaius phoeniceus*			P:S 2	P:S 2	P:S 2	P:S 2		P:S 3	P:S 2	P:S 3	P:H 2 P:S	P:S 3	P:S 4 PR:A		Possible	Possible	Possible	Possible	Probable	Possible	
Song Sparrow	*Melospiza melodia*			P:S 1	P:S 2			P:S 2	P:S 1		P:S 1	P:S 1		P:S 2	P:S 3 PR:A	Possible	Possible	Possible		Possible	Probable	
Spotted Sandpiper	*Actitis macularius*														P:H 1						Possible	
Warbling Vireo	*Vireo gilvus*			P:S 1	P:S 1			P:S 1			P:S 1			P:S 1		Possible	Possible			Possible		
Willow Flycatcher	*Empidonax traillii*																					
Yellow Warbler	*Setophaga petechia*			P:S 3 PR:P	P:S 1	P:S 1	P:S 1	P:S 2	P:S 2	P:S 1	P:S 2			P:S 1	P:S 3 PR:A C:CF	Probable	Possible	Possible	Possible	Possible	Confirmed	

	BBS-1	BBS-2	BBS-3	BBS-4	BBS-5	BBS-6
Easting	477227	476689	476807	477108	477688	477486
Northing	4758128	4758088	4757941	4757986	4758317	4758285

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

Probable Breeding
PR:P - Pair observed in their breeding season in suitable nesting habitat
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 copulation
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 flight
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 count

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 Greenway WWTC
		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.	• None - No evidence of spring flooding within the area
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	• None – candidate ELC ecosite codes were not on site. Area did not contain. Ponds, marshes, lakes, bays, coastal inlets

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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.	• Candidate – Patchy BBO1 ecosites are present adjacent to the Thames River.
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- Study area did not contain a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. •

Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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 Greenway WWTC
		ELC Ecosite Codes	Habitat Criteria and Information Sources		
			• University Biology Departments with bat experts.		
Turtle Wintering Areas **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	• Midland Painted Turtle **Special Concern:** • Northern Map Turtle • Snapping Turtle	Snapping and Midland Painted Turtles; 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. Information Sources • 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 – Thames River contains open water areas with deep pools.
Reptile Hibernaculum **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	**Snakes:** • Eastern Gartersnake • Northern Watersnake • Northern Red-bellied Snake • Northern Brownsnake • Smooth Green Snake • Northern Ring-necked Snake **Special Concern:** • Milksnake • Eastern Ribbonsnake	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. Information Sources • 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. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (e.g. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct)(E) • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in	• 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 Greenway WWTC
		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 Greenway WWTC
		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- does not contain rocky islands or peninsulas. Suitable habitat may be present within nearby sections of the 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 Greenway WWTC
		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 Greenway WWTC
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources		
Cliffs and Talus Slopes **Rationale:** 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. Information Sources • 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 **Rationale:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered, but less than 60%.	A sand barren area >0.5 ha in size[Ⓔ]. Information Sources • 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 **Rationale:** 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] Information Sources • 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 **Rationale**: Due to historic logging practices and land clearance for agriculture, old	Forest Community Series: FOD FOC FOM SWD	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland area is >0.5 ha.[Ⓔ] Information Sources	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 Greenway WWTC
	ELC Ecosite Codes	Habitat Description	Detailed Information and Sources		
growth forest is rare in Ecoregion 7E.	SWC SWM		• 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 Greenway WWTC
	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 Greenway WWTC
		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. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from 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.	• None- There are no wetland communities within the study area
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). <u>Information Sources</u> • 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.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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]	• Candidate – The Thames River shoreline within the study area contains sand and gravel soil for nesting. • Known nesting sites further upstream in the Thames

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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.	• None- The topography of the FOD ecosite on the study area does not likely support vernal pooling.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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.	• None- the study area does not contain wetland habitat.
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 Greenway WWTC
		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 Greenway WWTC
		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.	• None- the study area does not contain wetlands
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 Greenway WWTC
		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.	• None- the study area does not contain wetland features, or wet meadows.
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 • Eastern Ribbonsnake • Hackberry Emperor • Monarch • Tawny Emperor • Spotted Sucker • Black Sandshell • Mucket

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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.	• Eastern Stiff-leaved Goldenrod • Hairy Fruited Sedge Confirmed – • Northern Map Turtle • Snapping Turtle

TABLE F5 Animal Movement Corridors

Wildlife Habitat	Species	Candidate SWH		Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Greenway WWTC
		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 Greenway WWTC
		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
GREENWAY WASTEWATER TREATMENT CENTRE

TABLE G1 Avian Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

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

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

TABLE G2 Herpetofauna Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

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	Potential- suitable habitat for this species may be present on the nearshore banks adjacent to the Thames River.
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	Aquatic habitats with mollusc prey and basking areas	Confirmed- This species at been confirmed within the Thames River surrounding Greenway WWTC
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	Prefers shallow aquatic habitats and gravel/sand banks for nesting.	Confirmed- This species at been confirmed within the Thames River surrounding Greenway WWTC

[1] Ontario Nature 2021

TABLE G3 Insects Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

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.
Sleepy Duskywing	*Erynnis brizo*	S1	-	-	Oak or Oak-Pine Scrubland	Unlikely- the study area did not contain oak or oak-pine scrubland.
Tawny Emperor	*Asterocampa clyton*	S2S3	-	-	Riparian habitats which support Hackberry trees	Potential – Hackberry trees are present within treed ecosites on the study area.

[1] IUCN 2021

TABLE G4 Fish Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

Common name	Scientific name	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Spotted Sucker	*Minytrema melanops*	S5	SC	SC	Clear creeks and small to moderate sized rivers with sand and gravel substrate	Potential- the Thames River meets the description of preferred habitat.

[1] IUCN 2021

TABLE G5 Mussel Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

Common name	*Scientific Name*	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Black Sandshell	*Ligumia recta*	S3	-	-	Found in medium-large rivers with strong current and substrates of coarse sand and gravel with cobbles.	Potential- the Thames River meets the description of preferred habitat.
Elktoe	*Alasmidonta marginata*	S3	-	-	Found in cool, medium-sized creeks or rivers with fast to moderately-flowing currents. They prefer rock and gravel substrates.	Unlikely- the Thames River is a large, warm-water, river, which would not meet this species preferred habitat.
Mucket	*Actinonaias ligamentina*	S3	-	-	Found in medium to large rivers with coarse sand and gravel substrates.	Potential- the Thames River meets the description of preferred habitat.

[1] IUCN 2021.

TABLE G6 Plant Species of Conservation Concern Assessment for Greenway Wastewater Treatment Centre

Common name	*Scientific Name*	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Broad Beech Fern	*Phegopteris hexagonoptera*	S3	**SC**	-	Grows in rich soils in deciduous forests, often in areas dominated by maple and beech trees	Unlikely- the study area does not contain deciduous forests and the species was not observed during the 2021 field study.
Chinese Hemlock-parsley	*Conioselinum chinense*	S2	-	-	Grows in stream banks, swamps and riparian forests	Unlikely-the species was not observed during the 2021 field study.
Eastern Green-violet	*Hybanthus concolor*	S2	-	-	Grows in nutrient rich, calcareous forests and woodlands, typically in mesic or bottomland conditions	Unlikely- the study area does not contain mesic bottomland deciduous forests and the species was not observed during the 2020 field study.
Eastern Stiff-leaved Goldenrod	*Solidago rigida ssp. rigida*	S3	-	-	found in open, dry areas associated with calcareous or sandy soil.	Potential – this species may be present within CUM1 ecosites within the study area.
Edible Valerian	*Valeriana edulis*	S1	-	-	Grows in moist montane meadows and subalpine parks	Unlikely- the study area does not contain moist meadows and the species was not observed during the 2021 field study.
Hairy Fruited Sedge	*Carex trichocarpa*	S3	-	-	Openings in bottomlands, marshes, wet meadows, wet thickets along streams and rivers	Potential - the species was not observed during the 2021 field study but may be present on vegetated portions of the lower banks of the Thames River

[1] FNAA 2020Adelaide Wastewater Treatment plant

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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 Greenway Wastewater Treatment Centre

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 (3)						
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 as potentially occurring within NHIC 1km square	Potential – Suitable habitat is present within lowland areas of wooded ecosites within the study area. This species was no observed within the study area during the 2021 field study.
Kentucky Coffee-tree	*Gymnocladus dioicus*	THR	THR	This tree is found in floodplains and river valleys	MECP records for Greenway WWTC	Confirmed – This species is present within open parking areas near the dog park. Individuals observed within the study area during the 2021 field study are assumed to be planted as ornamentals.
Red Mulberry	*Morus rubra*	END	END	This species is found in forested floodplains, valleys, moist slopes in mixed hardwood forests	MECP records for Greenway WWTC	Unlikely – Wooded ecosites within the study area, however it was not observed within the study area during the 2021 field study.
Birds (7)						
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.	Species identified within *OBBA* 10 km square.	Confirmed – The species was identified during the breeding bird survey foraging within the study area. The study area does not contain suitable banks for bank swallow nesting, and therefore it is assumed that this species is nesting on the northern bank of the Thames River. Since no habitat exists within study area, no further impact assessment is required.
Barn Swallow	*Hirundo rustica*	THR	THR	This species prefers human-made structures, such as open barns, bridges, or culverts to build their nests.	Species identified within OBBA 10 km square.	Confirmed – The species was identified during the breeding bird survey foraging within the study area. This species may have nest cups on the WWTC or under the pedestrian bridge located upstream of the study area. No nest cups were observed during the breeding bird survey. Since no habitat exists within study area, no further impact assessment is required.
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 in order to roost or build their nest.	Species noted within the One River EA (Matrix 2019). Species identified within NHIC 1km square.	Confirmed – The species was identified during the breeding bird survey foraging within 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.
Wood Thrush	*Hylocichla mustelina*	SC	THR	This species prefers mature, unfragmented, deciduous forests.	Species identified within NHIC 1km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Herpetofauna (3)						
Eastern Spiny Softshell	*Apalone spinifera*	END	THR	This species prefers slow-moving large water bodies or rivers with soft muddy bottoms and aquatic vegetation. Nests are located near water on sandy beaches or gravel banks with sun.	Species noted within the One River EA (Matrix 2019). Species identified within NHIC 1km square	Confirmed – The Thames River within the study area contains the preferred habitat for this species. This species has been documented within the study area in recent years (Matrix 2019).

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
Eastern Foxsnake	*Pantherophis gloydi*	END	END	This species is found in old fields, marshes, along hedgerows, drainage canals and shorelines.	Species identified within ORAA 10km square	Potential – the narrow treed riparian corridor of the Thames River may be suitable habitat for this species.
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.
Mammals (5)						
American Badger	*Taxidea taxus*	END	END	This species prefers open grassland habitats	This species was identified as potentially occurring within NHIC 1km square	Unlikely – The study area does not contain the suitable habitat for this species.
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 (3)						
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.	Critical habitat and species presence were documented by Fisheries and Oceans Canada (DFO 2021)	Confirmed – The Thames River within the study area contains recent records of this species (Ramsey 2021, Pers. Comm.).
Lake Sturgeon	*(Great Lakes - Upper St. Lawrence River population)*	THR	NAR	Larger rivers and lakes, usually less than 30 feet deep.	This species was identified as potentially occurring within NHIC 1km square	Unlikely – The study area does not contain the preferred habitat for this species.
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.	Species noted within the One River EA (Matrix 2019). Critical habitat and species presence were documented by Fisheries and Oceans Canada (DFO 2021)	Confirmed – The Thames River within the study area contains recent records of this species and has been identified as critical habitat by the DFO.

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 (3)						
Rayed Bean	*Villosa fabalis*	END	END	This species prefers small to large streams often in or near riffle areas, and in the headwaters and smaller tributaries of river systems. Four potential host species for the larvae include Mottled Sculpin (*Cottus bairdii*), Smallmouth Bass (*Micropterus dolomieu*), Greenside Darter (*Etheostoma blennioides*) and Rainbow Darter (*Etheostoma caeruleum*).	Species presence was documented by Fisheries and Oceans Canada (DFO 2021)	Potential – The Thames River within the study area contains the preferred habitat for this species, and the host species are present.
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*).	MECP records for Greenway WWTC.	Potential – The Thames River within the study area contains the preferred habitat for this species, and the host species are present.
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 UTRCA records (Ramsey 2021, Pers. Comm.)	Potential – The Thames River within the study area contains the preferred habitat for this species, and the host species are present.

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

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