

**ADDENDUM TO EXTEND ENVIRONMENTAL STUDY REPORT
Nanticoke Water Treatment Plant**

Appendix B

2023 Terrestrial and Aquatic
Ecology Report (Hutchinson
Environmental Sciences Ltd.)



Hutchinson

Environmental Sciences Ltd.

Nanticoke Water Treatment Plant
Addendum to Extend
Terrestrial and Aquatic Ecology
Report

Prepared for: J. L. Richards & Associates Ltd.
Job #: J220045

February 10, 2023

DRAFT FOR DISCUSSION

Nanticoke Terrestrial and Aquatic Ecology Report

February 10, 2023

HESL Job #: J220045

Ms. Jane Wilson, M.Sc., P.Eng.
Associate
Senior Environmental Engineer
J. L. Richards & Associates Ltd.
107 – 450 Speedvale Ave. West
Guelph, ON N1H 7Y6

Dear Ms. Wilson:

Re: Nanticoke Water Treatment Plant – Addendum to Extend, Terrestrial and Aquatic Ecology Report

We are pleased to submit this update to the 2006 Class Environmental Assessment (EA) – Environmental Study Report (ESR) EIS for the Nanticoke Water Treatment Plant Expansion Class EA. This update to the ESR characterizes natural heritage features and functions in the study area, assesses potential impacts of the proposed infrastructure project on them, and recommends mitigation measures to avoid or minimize negative environmental impacts, in accordance with relevant municipal, provincial, and federal policy. Several sensitivities related to species at risk habitat, significant wildlife habitat, and regulated areas under the Long Point Region Conservation Authority, were identified through background review and field investigations. Given the restricted nature of the proposed development, within existing disturbed areas, we believe that any potential negative impacts to the environment can be appropriately managed through recommended best practices. Consultation with regulatory agencies is ongoing to determine if any permits or approvals will be required.

Sincerely,
Per. Hutchinson Environmental Sciences Ltd.



Andrea Smith, Ph. D.
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Signatures

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Executive Summary

Haldimand County initiated a Class Environmental Assessment (EA) in 2002 to determine if an expansion of the WTP was required to meet future demands. The Class EA Environmental Study Report (ESR) was finalized in 2006. The Class EA determined that the existing WTP had sufficient capacity to provide potable water supply demands to the current service area beyond 2018, but that expansion would be required to meet increased water supply demand from the Lake Erie Industrial Park and/or supply municipal water to Caledonia, York, and Cayuga (which currently receive water from Hamilton). The recommended alternative of the Class EA ESR was to accommodate growth and a potential expanded service area through an expansion of the WTP on the existing site.

Haldimand County is currently investigating increasing the capacity of the WTP to accommodate forecasted growth in the County, as well as to potentially provide water to Norfolk County, Six Nations, and Caledonia, Cayuga, and York. As such, the County has identified the need to extend the Class EA ESR timeframe (which has already lapsed) by 10 years through the filing of an ESR Addendum. The ESR Addendum includes additional studies that were not required at the time of the 2006 ESR to determine whether the mitigating measures and preferred solution identified in the 2006 ESR are still valid.

Hutchinson Environmental Sciences Ltd. (HESL) prepared the following terrestrial and aquatic ecology report as part of the ESR Addendum. The report provides a comprehensive review of available environmental data and supporting technical studies to determine if there have been any changes to the existing site conditions since the 2006 ESR, to evaluate whether the preferred alternative (Alternative 4: Plant Expansion for Growth and Expanded Service Area with LEIP Potable Demand) and preferred alternative growth and service area options (Option 2, and possibly Option 3 in future), as well as associated mitigation measures identified in the 2006 ESR are still valid from a terrestrial and aquatic ecology perspective. Potential negative impacts of the proposed development on these features and functions and recommend mitigation measures to avoid or minimize impacts have also been identified.

A combination of background review and field investigations was undertaken to characterize natural heritage features and functions in the study area. No significant natural heritage features were previously mapped in the study area (e.g., provincially significant wetlands, provincially significant woodlands, ANSIs etc.). Portions of the study area are within LPRCA's regulated lands, along the northwestern and southern property boundary.

The property is mainly vacant, but contains disturbed areas including a paved road, several buildings and remnants of previous buildings, a gravel clearing, manicured lawn, a stormwater pond, a water treatment tank, and an industrial and low lift pumping station. The remainder of the property contains overgrown fields, hedgerow, and a meadow marsh and thicket swamp. The property is surrounded by agricultural fields and overgrown fields (to the north), industrial lands and open fields (to the east and west, including a construction/excavation site, and the Nanticoke Solar Facility, previously the Nanticoke Coal-fired Generating Station, both to the east of the property), and residential homes and cottages (to the south).

While much of the study area represents low to moderate habitat ecologically, it was found to support a variety of wildlife species. The overgrown mixed meadow may provide breeding habitat for Bobolink, and



Nanticoke Terrestrial and Aquatic Ecology Report

Eastern Meadowlark, two provincially threatened grassland species. In addition, the overgrown meadows may provide habitat for Eastern Foxsnake a federally and provincially endangered snake that occurs along the Lake Erie shoreline. The subject property may also provide Candidate SWH for Special Concern and Rare Wildlife Species.

Proposed expansion of the WTP will occur within the existing property boundaries of the existing WTP. To facilitate the expansion of the WTP capacity, two rectangular sections of the lot have been designated for future construction of the Haldimand Water Treatment Plant infrastructure. The proposed WTP expansion would initially occur within either overgrown field along the eastern boundary of the site or within an area of manicured lawn in the north-central portion of the property. A further expansion has been proposed for the longer term, which would encompass manicured lawn and overgrown fields on the east side of the property, as well as marsh and overgrown fields on the western side. This ESR Addendum focuses on assessing potential environmental impacts of the project related to development for both the Initial and Longer-term expansion options.

The restricted nature of the proposed development within existing disturbed sites minimizes any potential impacts to natural heritage features and functions. One component that was not studied as part of the 2006 ESR was the presence of SAR and SWH. Several new environmental sensitivities were identified including species at risk habitat for Bobolink, Eastern Meadowlark, and Eastern Foxsnake and SWH for special concern species, Snapping Turtle, Common Nighthawk, Barn Swallow, Grasshopper Sparrow, and Monarch. Potential negative impacts to these features can be appropriately minimized by implementing the recommended mitigation measures, particularly relating to restricting laydown area, avoiding sensitive timing windows, and enacting exclusion fencing and erosion and sediment control. Consultation with MECP is required to determine permitting requirements under the *ESA* (2007) and with LPRCA to determine permitting requirements in regulated areas. Following these recommendations and mitigation measures will ensure that the project complies with relevant federal, provincial, and municipal policy.



List of Abbreviations

ANSI	Area of Natural and Scientific Interest
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Study
ELC	Ecological Land Classification
HESL	Hutchinson Environmental Sciences Ltd.
MECP	Ministry of Environment, Conservation and Parks
MNR	Ministry of Natural Resources
MNRF	Ministry of Natural Resources and Forestry (MNR was renamed in 2014)
NHIC	Natural Heritage Information Centre
SWH	Significant Wildlife Habitat
LPRCA	Long Point Region Conservation Authority
WTP	Water Treatment Plant



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1. Introduction

The Nanticoke Water Treatment Plant (WTP) is owned by Haldimand County and currently operated under contract by the Ontario Clean Water Agency. It provides treated water to Lake Erie Industrial Park (LEIP), Townsend, Jarvis, Hagersville, and the Mississaugas of the Credit First Nation. Haldimand County initiated a Class Environmental Assessment (EA) in 2002 to determine if an expansion of the WTP was required to meet future demands. The Class EA Environmental Study Report (ESR) was finalized in 2006. The Class EA determined that the existing WTP had sufficient capacity to provide potable water supply demands to the current service area beyond 2018, but that expansion would be required to meet increased water supply demand from LEIP and/or supply municipal water to Caledonia, York, and Cayuga (which currently receive water from Hamilton). The recommended alternative of the Class EA ESR was to accommodate growth and a potential expanded service area through an expansion of the WTP on the existing site.

Haldimand County is currently investigating increasing the capacity of the WTP to accommodate forecasted growth in the County, as well as to provide water to Norfolk County, Six Nations, Caledonia, Cayuga, and York. As such, the County has identified the need to extend the Class EA ESR timeframe (which has already lapsed) by 10 years through the filing of an ESR Addendum. The ESR Addendum includes additional studies that were not required at the time of the 2006 ESR to determine whether the mitigating measures and preferred solution identified in the 2006 ESR are still valid.

Hutchinson Environmental Sciences Ltd. (HESL) has prepared the following terrestrial and aquatic ecology report as part of the ESR Addendum. The report provides a comprehensive review of available environmental data and supporting technical studies to determine if there have been any changes to the existing site conditions since the 2006 ESR, to evaluate whether the preferred alternative (Alternative 4: Plant Expansion for Growth and Expanded Service Area with LEIP Potable Demand) and preferred alternative growth and service area options (Option 2, and possibly Option 3 in future), as well as associated mitigation measures identified in the 2006 ESR are still valid from a terrestrial and aquatic ecology perspective.

The purpose of the terrestrial and aquatic ecology report is to

- characterize natural heritage features and functions in the study area (i.e., the property and adjacent lands, defined as within 120 m of the property),
- identify potential impacts of the proposed infrastructure WTP expansion on natural heritage features and functions,
- recommend mitigation measures to avoid and minimize negative effects on the natural environment, and
- ensure compliance with applicable legislation and policy.





Legend

Subject Property



Nanticoke Water Treatment Plant -
Addendum to Extend
Terrestrial and Aquatic Ecology Report

Project No.: 220045		Figure 1: Study Area
Date: 2022-10-03		
By: SA	Checked: AS	
Orthophotograph Date: 2018.		

2. Summary of the Nanticoke Water Supply Complex and 2006 Environmental Study Report (ESR)

The Nanticoke Water Supply Complex was conceived by the Province of Ontario in 1973 to supply industrial and potable water to a large area (as far as the communities of Kitchener and Waterloo). The current Nanticoke WTP was constructed in 1977 as part of a supply complex and was designed as an interim facility to serve the surrounding industry and communities until servicing concepts were better defined. Major industrial water uses include Ontario Power Generation, Lake Erie Steel Company, Imperial Oil and Nelson Steel. The focus was on “Regional” schemes including communities as far as the Region of Waterloo. When the facility was constructed the intake and forebay were sized for the envisioned larger service area however the population growth and water supply never materialized. As such, most of the Nanticoke WTP site is unoccupied.

In 2001, Haldimand County was formed and assumed ownership of the Nanticoke WTP. In the same year an Engineer’s Report prepared by the Ministry of the Environment identified the need for WTP upgrades in order to meet new Ontario Drinking Water Regulation 459/00. As a result, the interim plant completed the upgrades addressed in the Engineer’s Report in 2004 and 2005. The Class EA was initiated in response to the new Ontario Drinking Water Regulations, to determine if the WTP expansion was still required while addressing recommendations in the Engineer’s report.

In 2006, the Class EA for the upgrade and expansion of the Nanticoke WTP was completed. The WTP expansion was identified for two main reasons:

- The possible future supply of municipal water from Nanticoke to Caledonia, York and Cayuga which is currently provided by the City of Hamilton.
- The need to supply municipal and industrial water to service future development in the LEIP.

The recommended solution is based on staged WTP improvements which will address the future ultimate WTP treatment capacity needs.

The Class EA ESR was prepared to address the problem statement for the Nanticoke WTP expansion which is defined as the following:

“A 2001 Engineers Report identified the need for some WTP upgrades to meet new Ontario Drinking Water Regulation 459/00. WTP upgrades will allow the current development limitations to be lifted. As a component of the WTP upgrade, County Council is using this as an opportunity to review current and future WTP service areas and further one of the goals of the 2001 County Strategic Plan, which is self sufficiency in its water supply.

Therefore, the scope of the study will also include the feasibility of how to best expand the Nanticoke WTP to service the LEIP ultimate build out as well as areas within Haldimand County, such as Caledonia, Cayuga and York.”



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The Class EA ESR was completed by EarthTech (2006) to determine how the proposed Nanticoke WTP expansion will be sited, designed, constructed and operated.

Seven alternative water supply solutions were identified for consideration in the Class EA:

1. Do nothing;
2. Water conservation;
3. Plant expansion to accommodate growth and provide service area without LEIP potable demand;
4. Plant expansion for growth and expanded service area with LEIP potable demand;
5. New WTP at new location;
6. Combination of Haldimand and Hamilton Supply; and,
7. Limit growth.

Based on the evaluation, Alternative 4 (WTP expansion) was selected as the preferred water supply solution for the following reasons:

- Low Natural Environmental and Social/Cultural impacts (all impacts on existing site);
- Existing WTP site (owned by County) has ample land to accommodate growth and service area expansion;
- Ability of County to meet its corporate goals of being self sufficient in water supply;
- Low to moderate capital costs;
- Nearness to existing customers (e.g., current service area, LEIP);
- Ability to maximize existing infrastructure (e.g., intake); and
- Most viable.

Three alternatives for growth and service area options were evaluated:

- Option 1: Hamilton supply to current service area (with existing demands LEIP, Ontario Power Generation, Hagersville, Jarvis, Townsend plus Caledonia).
- Option 2: New Haldimand WTP to current Service Area plus Caledonia, Cayuga and York including First Nations with and without major LEIP potable requirements.
- Option 3: New WTP servicing Haldimand County, Norfolk County, Regional Municipality of Waterloo and Cities of Brantford, Guelph, Brant County, Six Nations, Mississaugas of the New Credit.

Based on the evaluation, Option 2 was selected as the preferred solution to the problem statement. This option was selected for the following reasons:

- Addresses the problem statement;
- Has the greatest ability to meet Haldimand County's Key Strategic Thrusts;
- Has the ability to address outside control of the County with respect to participation in decision making, rate structures and risks related to location/position on proposed water supply scheme;
- One of the Options with lower estimated capital, operations and maintenance costs.



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Although Option 3 (New WTP servicing Haldimand County, Norfolk County, Regional Municipality of Waterloo and Cities of Brantford, Guelph, Brant County, Six Nations, Mississaugas of the New Credit) was not selected, there is interest towards developing a new WTP that can serve all of the municipalities long-term water supply requirements. This Option is referred to as the long-term WTP footprint.

The report recommended that Water Supply Solution Alternative No. 4 (WTP Expansion to accommodate growth and expanded service area) and Growth and Service Area Options 2 and 3 are implemented.

The Class EA Report did not provide any outstanding environmental concerns that pertained to the construction of a future water treatment expansion at the property, and mitigative measures were provided to limit environmental impact should new water treatment infrastructure be constructed on the property.

3. Description of Proposed Works

The Nanticoke Water Treatment Plant is located at 33 Haldimand Road 55 on an industrial property that is approximately 32 ha in area (Figure 1). The legal description of the property is Concession 1 Part Lot 6 Part Road, Allow. Plan 18072 Part of Block E, Walpole Township, Nanticoke, Ontario. The property is mainly vacant, but contains disturbed areas including a paved road, several buildings and remnants of previous buildings, a gravel clearing, manicured lawn, a stormwater pond, a water treatment tank, and an industrial and low lift pumping station. The remainder of the property contains overgrown fields, hedgerow, and a meadow marsh and thicket swamp. The property is surrounded by agricultural fields and overgrown fields (to the north), industrial lands and open fields (to the east and west, including a construction/excavation site, and the Nanticoke Solar Facility, previously the Nanticoke Coal-fired Generating Station, both to the east of the property), and residential homes and cottages (to the south).

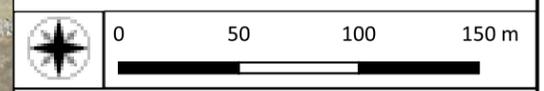
To facilitate the expansion of the WTP capacity, two rectangular sections of the lot have been designated for future construction of the Haldimand Water Treatment Plant infrastructure (Figure 2). The proposed WTP expansion would initially occur within either overgrown field along the eastern boundary of the site or within an area of manicured lawn in the north-central portion of the property (Figure 2). A further expansion has been proposed for the longer term, which would encompass manicured lawn and overgrown fields on the east side of the property, as well as marsh and overgrown fields on the western side (Figure 2).





Legend

- Subject Property
- Area set aside for Large Area Scheme WTP
- Haldimand only or with Expanded Service Area



Nanticoke Water Treatment Plant -
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Project No.: 220045
Date: 2023-02-10
By:SA Checked:AS
Orthophotograph Date:
2018.

Figure 2:

Proposed
Nanticoke WTP
Expansion

4. Policy Framework

The following federal, provincial, and municipal legislation and policy apply to the proposed infrastructure WTP expansion project.

4.1 Federal Policy

4.1.1 *Species at Risk Act (2002)*

The federal *Species at Risk Act (2002)* prohibits

- The killing, harm, harassment, capture, possession, collection, or trade of an individual of a wildlife species listed as extirpated, endangered, or threatened under the Act; and
- The damage or destruction of its residence or critical habitat.

The Act applies to all species listed as extirpated, endangered, or threatened occurring on federal lands, and to listed aquatic species and bird species covered by the *Migratory Birds Convention Act (1994)* wherever they occur in Canada.

4.1.2 *Migratory Birds Convention Act (1994)*

Under the *Migratory Birds Convention Act (1994)* it is illegal to disturb or destroy eggs and nests of migratory bird species listed under Article I of the Migratory Birds Convention, and illegal to hunt listed species without a permit.

4.2 Provincial Policy

4.2.1 *Environmental Assessment Act (1990)*

The *Environmental Assessment Act (1990)* provides for the protection, conservation, and wise management of the environment in Ontario. The Act applies to various enterprises, activities, proposals, plans and programs, including municipal development undertakings. As a municipal infrastructure project, the Nanticoke WTP falls under the class EA process, which establishes a standardized EA approach to classes of activities. The class EA “*applies to projects that are carried out routinely and have predictable environmental effects that can be readily managed*” (Government of Ontario 2021).

As part of a Class EA, proponents must provide a description of the expected environmental effects of the proposed project, as well as a description of measures that could be adopted to mitigate any adverse environmental effects resulting from the project.

4.2.2 *Endangered Species Act (2007)*

Ontario’s *Endangered Species Act (2007)* prohibits

- The killing, harm, harassment, or capture of a living individual belonging to a species listed as endangered or threatened under the Species at Risk in Ontario List; and



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- The damage or destruction of its habitat.

4.2.3 Fish and Wildlife Conservation Act (1997)

Ontario's *Fish and Wildlife Conservation Act (1997)* prohibits the destruction of nests and eggs of wild birds (not including species subject to the federal *Migratory Birds Convention Act* or the following exempted species: American Crow, *Corvus brachyrhynchos*; Brown-headed Cowbird, *Molothrus ater*; Common Grackle, *Quiscalus quiscula*; House Sparrow, *Passer domesticus*; Red-winged Blackbird, *Agelaius phoeniceus*; and European Starling, *Sturnus vulgaris*).

4.2.4 Conservation Authorities Act (1990)

Long Point Region Conservation Authority (LPRCA) regulates development (including infrastructure construction) within its jurisdiction through Ontario Regulation 178/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, under the *Conservation Authorities Act (1990)*. Under the regulation, development is prohibited in areas that are

- Adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to inland lakes that may be affected by flooding, erosion or dynamic beaches;
- River or stream valleys that have depressional features associated with a river or stream, whether or not they contain a watercourse;
- Hazardous lands;
- Wetlands; and
- other areas where it could interfere with hydrologic functions of a wetland (including within 120 m of all Provincially Significant Wetlands and within 30 m of all other wetlands).

unless the development will not affect control of flooding, erosion, dynamic beaches, or unstable soil or bedrock.

LPRCA may grant permission for development within the above-mentioned natural heritage features, with or without conditions. Proponents must apply to the LPRCA for a permit, providing information on

- the type and location of the proposed development;
- the proposed use of buildings and structures following completion of the development;
- the start and completion dates of the development;
- elevations of existing buildings and grades and proposed elevations of buildings and grades after development;
- drainage details before and after development,
- a complete description of the type of fill proposed to be placed or dumped; and
- any other technical studies or plans requested by LPRCA (Ontario Regulation 178/06).

The proposed Nanticoke infrastructure WTP expansion project occurs in areas within LPRCA regulated areas.

The Ontario Government recently made changes to the role of conservation authorities in reviewing development applications under the *Conservation Authorities Act (1990)*, including changing under what



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conditions development is prohibited¹. The government is currently considering additional changes to the *Conservation Authorities Act (1990)*. Thus, consultation with LPRCA will be required in future to determine possible permitting requirements.

4.3 Municipal Policy

4.3.1 Haldimand County Official Plan (2019)

The Haldimand County Official Plan provides the framework for land use changes in the County by protecting and managing the natural environment and directing and influencing growth patterns, while implementing the Provincial Policy Statement in the County. The County defines Natural Areas as provincially significant wetlands (PSW), provincially significant areas of natural and scientific interest (ANSIs), environmentally sensitive areas, habitat of endangered and threatened species, fish habitat, Carolinian Canada sites, and unevaluated wetlands. Haldimand County is undertaking a study (referred to as the Greenlands Study) to identify these areas, which will be completed through consultation with the Province, local conservation authorities and other interested parties. Natural Areas are divided into two categories:

1. Core Natural Environment Areas - include PSWs, hazard lands, habitat of endangered and threatened species. Generally, development and site alteration are not permitted in these areas.
2. Natural Environment Areas - include provincially significant areas of natural and scientific interest (both earth and life science), environmentally sensitive areas, fish habitat, Carolinian Canada sites and locally significant and unevaluated wetlands. Development and site alteration may be considered in these areas only where it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Section E of the Official Plan details the requirements for utilities within Haldimand County and states that *“Utilities and services necessary for the provision of municipal water..., are permitted in all land use designations provided that such development satisfies the provisions of the Environmental Assessment Act, the Environmental Protection Act, and any other relevant legislation except where any of these facilities would promote a development pattern that is contrary to the Official Plan.”*

Infrastructure design and construction will avoid siting within or immediately adjacent to Natural Environment Areas.

Schedule C.14 shows the study area is located approximately 500 m east of Nanticoke Creek, which is identified as a Core Natural Environment Area and within 120 m of Lake Erie, which is identified as Natural Environment Areas (i.e., Lakeshore Hazard Lands). Schedule C.14 also identifies the study area as a Specific Policies site (Nant 18), which states, *“A water treatment plant and accessory uses are permitted on lands identified as having reference to this subsection on Schedules “A.2” and “C.14”. As well, these uses may be permitted to expand in the future as appropriate provided the relevant requirements are met.”*

¹ *Bill 23 (Chapter 21 of the Statutes of Ontario, 2022). An Act to amend various statutes, to revoke various regulations and to enact the Supporting Growth and Housing In York and Durham Regions Act, 2022. Royal Assent Nov. 28, 2022.*



5. Methodology

5.1 Background Review and Consultation

HESL conducted a background review and corresponded with regulators at the beginning of the project to scope field efforts and to gain a general overview of natural heritage features present and potential species of conservation concern that could occur in the area. Information sources included the following:

- Ministry of Environment, Conservation and Parks (MECP) Species at Risk in Ontario list (MECP 2020);
- Ministry of Natural Resources (MNR) Natural Heritage Information Centre (NHIC) records of species at risk, rare plant communities, wildlife concentration areas, and natural areas (MNR 2021);
- Ontario Wetland Evaluation System – Southern Manual (MNR 2013);
- MNR's Natural Heritage Reference Manual and SWH resource material (MNR 2000, 2010; MNR 2014, 2015);
- Marsh Monitoring Program Participant's Handbook for Surveying Amphibians (Bird Studies Canada 2009);
- Federal Species at Risk Public Registry (Government of Canada 2018);
- Fisheries and Oceans Canada Aquatic Species at Risk Map (DFO 2020);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2018);
- Ontario Breeding Bird Atlas (OBBA; Bird Studies Canada et al. 2006);
- Ontario Butterfly Atlas (OBA; Macnaughton et al. 2022);
- eBird (eBird 2012);
- Bat Conservation International's bat species profiles (Bat Conservation International 2020);
- iNaturalist (iNaturalist 2019);
- Haldimand County Township Official Plan (2019);
- Ontario GeoHub – Aquatic Resource Area Line Segment (Land Information Ontario 2021);
- Long Point Region Conservation Authority Regulation Mapping (LPRCA 2022); and
- Aerial photography and topographic maps.

5.2 Field Investigations

Field work was completed in the spring and summer of 2022 to characterize the nature heritage features and functions in the study area. All the recommended servicing upgrades and expansion are planned within existing cleared and/or developed land within the subject property. However, adjacent lands include wetlands, watercourses, and grassland habitat. Field investigations included surveys of vegetation communities, breeding birds, and amphibians. Incidental observations of wildlife species were also recorded during all field investigations.

5.2.1 *Vegetation Communities*

Plant surveys were conducted on July 5, July 7 and September 12, 2022, to characterize vegetation communities using standard Ecological Land Classification (ELC techniques; Lee et al. 1998). All vascular



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plant species encountered were recorded, taking note of rare or sensitive species. ELC units were mapped on aerial photography in the field and a plant species list was compiled from observations.

5.2.2 *Breeding Amphibians*

Amphibian surveys were completed following the Marsh Monitoring Program protocol (Bird Studies Canada et al. 2009). A background review of aerial imagery and a preliminary site investigation were completed to determine suitable sampling locations near appropriate breeding habitat (i.e., wetlands or vernal ponds) within the study area, with particular focus on areas within or adjacent to the footprint of project infrastructure. Four sampling locations were selected (Figure 3). Three-minute surveys were conducted at each location, and all species and call level codes were recorded, as well as their approximate locations. Surveys were completed on May 25 and June 14, 2022, between 21:30 and 22:00 h. Weather conditions during surveys ranged from no rain to light drizzle, calm to light wind, and overcast to clear, with temperatures from 18°C to 21°C.

5.2.3 *Breeding Birds*

Two early morning breeding bird surveys were completed to document the bird communities in habitats within and adjacent to the proposed development. The OBBA protocol was followed to conduct five-minute point counts throughout the property (Figure 3). Nine-point count locations, spaced approximately 150 m apart, were surveyed. Point count observations were supplemented with observations made by slowly traversing between point count locations. All birds heard or seen during visits were recorded on aerial photo maps of the site, in the approximate location where they were detected (except birds obviously in transit between other locations, which were not recorded). Birds were assumed to be breeding if in suitable habitat and displaying breeding behaviour (e.g., singing male, pair observed together, adult visiting probable nest site, adult nest-building, adult carrying food for young). Species designated at risk federally and/or provincially were identified, as well as species considered area-sensitive (i.e., area-sensitive species require large areas of continuous habitat for breeding and foraging; MNR 2000).

Surveys were carried out on June 9 and July 1, 2022, between 06:15 and 08:30 h. Weather conditions ranged from 25 to 50% overcast, with no wind to gentle breezes, no precipitation, and temperatures between 13° and 21°C.

5.2.4 *Species at Risk*

Species of conservation concern, including species at risk, tend to be hard to detect in surveys because they often occur in low numbers and may be cryptic or elusive. Determining the presence or absence of these species from surveys alone may thus result in an underestimate of biodiversity. Many species of conservation concern, however, are associated with specific types of structural habitat and ecological communities (e.g., caves or cliffs, or specific ELC ecosites), and these habitat features may be used as indicators of the potential presence of these sensitive species. As a result, we combined information from wildlife surveys and incidental observations during field visits with data collected on vegetation communities to evaluate the potential for species of conservation concern to occur in the study area.



5.2.5 *Significant Wildlife Habitat*

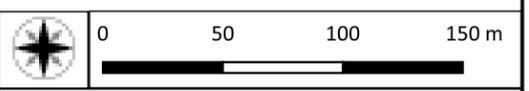
SWH is defined as wildlife habitat that is ecologically important in terms of features, functions, representation, or amount, and which contributes to the quality and diversity of a geographic area or natural heritage system (MNR 2000). SWH may include seasonal concentration areas, rare vegetation communities or specialized habitats for wildlife, habitats of species of conservation concern (not including threatened or endangered species) and animal movement corridors (MNRF 2015). Candidate SWH was identified in the field (based on species observations) and through a review of the ELC vegetation communities described for the study area. ELC communities documented on site were then compared with ELC ecosite classifications considered potential SWH for Ecoregion 7E, which encompasses the Nanticoke area (MNRF 2015).





Legend

- Subject Property
- Survey Locations**
- Amphibians
- Bird Point Counts



Nanticoke Water Treatment Plant -
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Project No.: 220045		Figure 3: Breeding Bird and Amphibian Survey Locations
Date: 2022-10-03		
By: SA	Checked: AS	
Orthophotograph Date: 2018.		

6. Existing Natural Heritage Conditions

6.1 Background Review

The study area is partially located within the Hickory Creek subwatershed, which ultimately drains to Lake Erie, while the northwestern portion is located within the Nanticoke Creek subwatershed. No significant natural heritage features are mapped by LPRCA or NHIC within the study area (LPRCA 2022, MNR 2022). Portions of the study area are within LPRCA's regulated lands, along the northwestern and southern property boundary. There are no watercourses or waterbodies located within the study area, with the exception of a stormwater pond, therefore no aquatic habitat surveys were completed as part of this study.

6.2 Vegetation Communities

Nine different vegetation communities were identified within the study area (Table 2, Figure 4). Representative photographs of the vegetation communities identified are provided in Appendix A. In addition, the subject property is surrounded by mixed meadow, thicket and active agricultural communities.



Photograph 1. Overview of subject property facing south



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Photograph 2. Overview of subject property facing northeast



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Table 1. Summary of Vegetation Communities.

Community Group	Vegetation Community Code	Vegetation Community Name
Marsh	MAMM1-3	Reed Canary Grass Graminoid Mineral Meadow
Marsh	MAMM1-12	Common Reed Graminoid Mineral Meadow
Marsh	MAMM1-16	Mixed Graminoid Mineral Meadow Marsh
Meadow	MEMM3	Dry – Fresh Mixed Meadow
Meadow	MEMM4	Fresh – Moist Mixed Meadow
Swamp	SWTM3-6	Mixed Willow Mineral Deciduous Thicket Swamp
Thicket	THDM2-4	Gray Dogwood Deciduous Shrub Thicket
Thicket	THDM3	Dry – Fresh Deciduous Hedgerow Thicket
Hedgerow	n/a	Hedgerow
Transportation and Utilities	CVI_3	Sewage and Water Treatment Plant

Meadow Marsh**(MAMM1-3) Reed Canary Grass Graminoid Mineral Meadow Marsh**

These communities are dominated almost exclusively by Reed Canarygrass (*Phalaris arundinacea*), with occasional patches of Spotted Joe Pye Weed (*Eutrochium maculatum*) and sedge species (e.g., *Carex cristatella*, *C. vulpinoidea*) growing on mineral soils.

(MAMM1-12) Common Reed Graminoid Mineral Meadow Marsh

These communities are dominated exclusively by a monoculture of Common Reed (*Phragmites australis* spp. *australis*) growing on mineral soils.

(MAMM1-16) Mixed Graminoid Mineral Meadow Marsh

These communities are characterized by an even mixture of Reed Canarygrass, native sedges (e.g., *Carex cristatella*, *C. lurida*, *C. retrosa*, *C. vulpinoidea*), rushes (e.g., *Juncus effusus*, *J. torreyi*) and bulrushes (*Scirpus atrovirens*, *S. microcarpus*) over mineral soils.



Nanticoke Terrestrial and Aquatic Ecology Report**Meadow****(MEMM3) Dry – Fresh Mixed Meadow**

Meadows with a dry to fresh moisture regime were found throughout the study area and are dominated by an even mixture of Common Teasel, Common Milkweed (*Asclepias syriaca*), goldenrod species (e.g., *Solidago altissima*, *S. canadensis*), aster species (e.g., *Symphotrichum ericoides*, *S. lanceolatum*, *S. novae-angliae*) and cool season grasses.

(MEMM4) Fresh – Moist Mixed Meadow

This community consists of a patchy mixture of Spreading Dogbane (*Apocynum androsaemifolium*), Wild Chicory (*Cichorium intybus*), Field Thistle (*Cirsium arvense*), Tall Goldenrod (*Solidago altissima* var. *altissima*), New England Aster (*Symphotrichum novae-angliae*), and a mixture of cool-season grasses and sedges scattered throughout.

Thicket**(THDM2-4) Gray Dogwood Deciduous Shrub Thicket**

This thicket community is dominated by Grey Dogwood (*Cornus racemosa*), with interspersed patches of Multiflora Rose (*Rosa multiflora*), Spotted Hawthorn (*Crataegus punctata*), European Buckthorn (*Rhamnus cathartica*), Highbush Cranberry (*Viburnum opulus* var. *opulus*), and Tatarian Honeysuckle (*Lonicera tatarica*). Herbaceous vegetation throughout the thicket is sparse, consisting of Tall Goldenrod, New England Aster, Reed Canarygrass, Common Teasel (*Dipsacus fullonum*), and Garden Bird's-foot Trefoil (*Lotus corniculatus*).

(THDM3) Dry – Fresh Deciduous Hedgerow Thicket

Thicket hedgerows throughout the study area are composed of an even mixture of Spotted Hawthorn, Tatarian Honeysuckle (*Lonicera tatarica*), and European Buckthorn, with sparse amounts of Silky Dogwood interspersed throughout. The ground layer predominantly consists of regenerating shrubs, as well as Tall Goldenrod, New England Aster, and a mixture of grass species.

Thicket Swamp**(SWTM3-6) Mixed Willow Mineral Deciduous Thicket Swamp**

Sandbar Willow (*Salix interior*) dominates these communities, with Heart-leaved Willow (*S. eriocephala*) and Silky Dogwood comprising a smaller component of the woody vegetation cover. Herbaceous vegetation cover predominantly consists of Reed Canarygrass, rushes (*Juncus* spp.), Red-tinged Bulrush (*Scirpus microcarpus*), and a mixture of wetland sedges (*Carex lurida*, *C. stipata*).

Hedgerow

Hedgerows along the eastern property line predominantly consist of planted Freeman's Maples (*Acer x freemanii*) and White Ash (*Fraxinus americana*) which were mowed underneath.

Woodland

The woodland adjacent to the property was assessed from the edge of Regional Road 55 due to access limitations, and observed to primarily consist of Norway Maple, dead ash (*Fraxinus* sp.,) and Freeman's



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Maple. Desktop interpretation of aerial photography suggests that there may be wetland present within this feature.

Constructed (Transportation and Utilities)**CVI 3 – Sewage and Water Treatment**

Portions of the study area consist of paved or unpaved access roads, parking lots, manicured lawn, holding ponds, and other associated infrastructure supporting water treatment processes.

6.2.1 *Vascular Plants Recorded*

A total of 115 vascular plant species were recorded within the study area (Appendix B). Despite extensive surveys spanning early to late summer, no vascular plant species of significance (i.e., provincially rare species or species at risk) were documented. Several vegetation communities were dominated by invasive plant species, such as the meadow marsh habitats (Reed Canary Grass, Common Reed), shrub thicket (European Buckthorn, Reed Canary Grass, Tatarian Honeysuckle), hedgerow (European Buckthorn, Tatarian Honeysuckle), and thicket swamp (Reed Canary Grass).





ELC Code	Community Name
MAMM1-3	Reed Canary Grass Graminoid Mineral Meadow
MAMM1-12	Common Reed Graminoid Mineral Meadow
MAMM1-16	Mixed Graminoid Mineral Meadow Marsh
MEMM3	Dry – Fresh Mixed Meadow
MEMM4	Fresh – Moist Mixed Meadow
SWTM3-6	Mixed Willow Mineral Deciduous Thicket Swamp
THDM2	Dry – Fresh Shrub Thicket
THDM2-4	Gray Dogwood Deciduous Shrub Thicket
N/A	Hedgerow
CVI_3	Sewage and Water Treatment Plant



Legend

- Subject Property
- Ecological Land Classification

Hutchinson
ENVIRONMENTAL
SCIENCES LTD.

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Project No.: 220045 Figure 4:
Date: 2022-10-03
By:SA Checked:DL Ecological Land
Orthophotograph Date: Classification
2018.

6.3 Breeding Amphibians

All amphibian calls were recorded within 100 m of Stations A and B. No amphibian calls were recorded at Stations C or D on either survey date. Some calls were recorded beyond Station A to the east and northeast, however they were outside the property boundaries and beyond the 100 m call zone. No calls were recorded at Stations A on the June 14th sample date.

Two amphibian species were detected, American Toad (*Anaxyrus americanus*) located at Station A beside Hwy 55 and Grey Treefrog (*Dryophytes versicolor*) located at Station B, in the existing stormwater pond. No species at risk amphibians were recorded at any of the survey stations.

Table 2. Amphibian Species and Approximate Numbers Heard During Breeding Surveys.

Stations	A	B	A	B
Survey Dates	25-May-2022	25-May-2022	14-Jun-2022	14-Jun-2022
Species Names				
American Toad (<i>Anaxyrus americanus</i>)	1			
Grey Treefrog (<i>Dryophytes versicolor</i>)		2		3
Total Heard within 100 m of Station	1	2	0	3

Notes: Code 1 – Calls not simultaneous
Code 2 – Some calls simultaneous
Code 3 – Full chorus



6.4 Breeding Birds

A total of 36 bird species were documented on the property, including two species at risk, three introduced species, and three area-sensitive species (Appendix C, Table 4).

The bird community on the property was comprised of species typical of the three main types of habitat present: constructed (dominated by manicured lawns, paved roadways, buildings and WTP infrastructure), wetland (meadow marsh and swamp thicket) and upland (mixed meadow and shrub thicket). These species included Killdeer (*Charadrius vociferus*), Mourning Dove (*Zenaida macroura*), American Robin (*Turdus migratorius*), European Starling, and House Sparrow (*Passer domesticus*) in the constructed areas, Marsh Wren (*Cistothorus palustris*), Yellow Warbler (*Setophaga petechia*), Swamp Sparrow (*Melospiza melodia*), and Red-winged Blackbird (*Agelaius phoeniceus*) in the wetlands, and Indigo Bunting (*Passerina cyanea*) Savannah Sparrow (*Passerculus sandwichensis*), Song Sparrow (*Melospiza melodia*), and Bobolink (*Dolichonyx oryzivorus*) in the grassland habitats. Several swallow species were observed aerial foraging over the property: Tree Swallow (*Tachycineta bicolor*), Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) and Barn Swallow (*Hirundo rustica*). A pair of Canada Geese (*Branta canadensis*) with five goslings was recorded in the stormwater pond.

The two bird species at risk documented on the property were Barn Swallow (listed as special concern in Ontario and threatened federally) and Bobolink, (listed as threatened in Ontario and federally). Barn Swallow was observed aerial foraging over the meadow marsh and mixed meadow habitats. Bobolink was observed in the mixed meadow. More information about the habitat requirements of the species at risk are found in Section 5.5.

The three introduced species observed on the property were European Starling (*Sturnus vulgaris*; observed in the constructed areas, as well as in the mixed meadow habitat), House Finch (*Haemorhous mexicanus*; observed in the wetland and mixed meadow habitats), and House Sparrow (*Passer domesticus*; observed in the constructed areas). European Starling and House Sparrow are native to Eurasia, while House Finch is native to western North America. Although not native to Ontario, all three species are considered naturalized in the province.

Area-sensitive species require large areas of continuous habitat for breeding and foraging. However, the specific area requirements vary by species. Hairy Woodpecker (*Picoides villosus*), observed in the hedgerow near the stormwater pond, needs at least 4 to 8 ha for its breeding territory. Savannah Sparrow and Bobolink, both observed in the mixed meadow, require grassland greater than 50 ha (MNR 2000).



6.5 Species at Risk

HESL identified 26 species at risk which could occur in the Haldimand area based on their geographic range and known or potential records of the species in the area (Table 3). Eighteen of these species were identified as not likely to occur within the study area, due to lack of suitable habitat. The remaining eight species at risk have the potential to occur in the study area due to presence of suitable habitat and include five bird species, two reptile species, and one insect species (Table 3).

Two species at risk were documented in the study area during 2022 field investigations: Barn Swallow and Bobolink, listed as special concern and threatened, respectively, under the *ESA* (2007). Six additional species at risk were identified during the background review as having potentially suitable habitat within the study area, although none were documented during field investigations.



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Table 3. Species at Risk with potential to occur in the vicinity of the study area.

Species	Status*	Source of Record†	Likelihood of SAR or its Habitat at or Near Project Area
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Special Concern (Provincially)	NHIC	Not likely to occur because no suitable habitat on property (e.g., large continuous woods with tall trees)
Bank Swallow (<i>Riparia riparia</i>)	Threatened (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat on property (e.g., vertical faces in silt and sand deposits, banks of rivers and lakes)
Barn Swallow (<i>Hirundo rustica</i>)	Special Concern (Provincially) and Threatened (Federally)	OBBA	Observed foraging over meadow marsh habitat
Black Tern (<i>Chlidonias niger</i>)	Special Concern (Provincially)	NHIC	Not likely to occur because no suitable habitat on property (e.g., large shallow marshes, especially in cattails, with areas of open water)
Bobolink (<i>Dolichonyx oryzivorus</i>)	Threatened (Provincially and Federally)	NHIC, OBBA	Observed in the mixed meadow habitat
Cerulean Warbler (<i>Setophaga cerulea</i>)	Threatened (Provincially) and Endangered (Federally)	OBBA	Not likely to occur because no suitable habitat on property (e.g., mature, deciduous forests with large, tall trees and an open understorey)
Chimney Swift (<i>Chaetura pelagica</i>)	Threatened (Provincially and Federally)	OBBA	Not likely to occur on the property because no suitable habitat (e.g., chimneys, hollow trees, caves). Potential to use old, abandoned grain elevator adjacent to property for nesting
Common Nighthawk (<i>Chordeiles minor</i>)	Special Concern (Provincially) and Threatened (Federally)	OBBA	Potential breeding habitat on flat gravel roof of one building
Eastern Meadowlark (<i>Sturnella magna</i>)	Threatened (Provincially and Federally)	NHIC, OBBA	Potential to occur in overgrown field



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Species	Status*	Source of Record†	Likelihood of SAR or its Habitat at or Near Project Area
Eastern Whip-poor-will	Threatened (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat (e.g., forested areas, savannahs, open woodlands)
Eastern Wood-pewee (<i>Contopus virens</i>)	Special Concern (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat (e.g., deciduous and mixed forest)
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	Special Concern (Provincially and Federally)	OBBA	Potential to occur in overgrown field
Least Bittern (<i>Ixobrychus exilis</i>)	Threatened (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat (e.g., deep wetlands with open pools and channels)
Louisiana Waterthrush (<i>Parkesia motacilla</i>)	Threatened (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat (e.g., steep, forested ravines with fast-flowing streams)
Peregrine Falcon (<i>Falco peregrinus</i>)	Special Concern (Provincially)	NHIC, OBBA	Not likely to occur because no suitable habitat (e.g., tall, steep cliff ledges close to large bodies of water and ledges of tall buildings)
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	Endangered (Provincially and Federally)	OBBA	Not likely to occur because no suitable habitat present (e.g., open woodland and woodland edges)
Wood Thrush (<i>Hylocichla mustelina</i>)	Special Concern (Provincially), Threatened (Federally)	OBBA	Not likely to occur because no suitable habitat present (e.g., mature deciduous and mixed forests)
Eastern Foxsnake (<i>Pantherophis gloydi</i>)	Carolinian Population – Endangered (Provincially and Federally)	NHIC, ORAA	Potential to occur in overgrown field/mixed meadow
Eastern Ribbonsnake (<i>Thamnophis sauritus</i>)	Special Concern (Provincially and Federally)	ORAA	Not likely to occur because no suitable habitat present (e.g., wetlands and shorelines near forest)



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Species	Status*	Source of Record†	Likelihood of SAR or its Habitat at or Near Project Area
Gray Ratsnake (<i>Pantherophis spiloides</i>)	Carolinian Population - Endangered (Provincially)	NHIC, ORAA	Not likely to occur because no suitable habitat present (e.g., at the edge of forest and open areas)
Queensnake (<i>Regina septemvittata</i>)	Endangered (Provincially and Federally)	NHIC, ORAA	Not likely to occur because no suitable habitat present (e.g., rivers, streams, and lakes)
Blanding's Turtle (<i>Emydoidea blandingii</i>)	Threatened (Provincially) and Endangered (Federally)	ORAA	Not likely to occur because no suitable habitat present (e.g., large wetlands and shallow lakes)
Midland Painted Turtle (<i>Chrysemys picata marginata</i>)	Special Concern (Federally)	NHIC, ORAA	Not likely to occur because no suitable habitat present (e.g., aquatic habitat with abundant basking sites)
Northern Map Turtle (<i>Graptemys geographica</i>)	Special Concern (Provincially and Federally)	NHIC, ORAA	Not likely to occur on the property because no suitable habitat present (e.g., rivers and lakeshores). Potential to occur along the adjacent Lake Erie shoreline
Snapping Turtle (<i>Chelydra serpentina</i>)	Special Concern (Provincially and Federally)	NHIC, ORAA	Potential to occur in marsh
Monarch (<i>Danaus plexippus</i>)	Special Concern (Provincially) and Endangered (Federally)	OBA	Potential to occur in meadow habitat, where host plant (Common Milkweed) found

* Provincially: based on the Species at Risk in Ontario (SARO) List, Federally: based on Committee on the Status of Endangered Wildlife in Canada (COSEWIC) List or Schedule 1 of the *Species at Risk Act*

†NHIC = Natural Heritage Information Centre, OBA = Ontario Butterfly Atlas, OBBA = Ontario Breeding Bird Atlas, ORAA = Ontario Reptile and Amphibian Atlas



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Bobolink is a threatened species both nationally and provincially. It breeds in a wide range of open grassland habitats, including pastures, meadows, hayfields and overgrown fields (Cornell University 2019; MECP 2021c,d). Bobolink is experiencing population declines in eastern North America primarily due to habitat loss and degradation (through mowing of hay during the breeding period, over-grazing by livestock, urban development, and reforestation; COSEWIC 2011b; MECP 2021c,d). Three males were observed in the mixed meadow to the north of the entrance roadway on the first breeding bird survey. No individuals were seen or heard on the second breeding bird survey, suggesting that the males were not successful in finding mates and breeding on the property in 2022. Bobolink is an area-sensitive species, which requires grassland habitat >50 ha in area for breeding, and typically avoids nesting near edges with roads, forests, and suburban development (Bollinger and Gavin 2004; Renfrew et al. 2004). As such, the relatively small grassland area present on the property (approximately 18.5 ha) and adjacent lands (approximately 6.9 ha) may not provide ideal nesting habitat for the species.

Eastern Meadowlark is a threatened species both nationally and provincially. It prefers moderately tall grasslands including pastures and hayfields and has been found in alfalfa fields, cropland borders, roadsides and overgrown fields. Eastern Meadowlark populations are declining due to land use changes and loss of suitable habitat from development and agriculture use. Potential habitat was identified on the subject property in the meadow communities.

Potential habitat for Eastern Foxsnake was identified on the subject property in the meadow communities. Eastern Foxsnake (Carolinian population) is listed as an endangered species both nationally and provincially. It is typically found in old fields, marshes, and hedgerows. The greatest threat to this species is habitat loss due to shoreline development and draining wetlands (MECP 2020). MECP has developed a habitat regulation for the Eastern Foxsnake which protects sites used for nesting, hibernation, and communal shedding and basking, as well as areas within 1500 metres of an Eastern Foxsnake (Carolinian population) that are suitable for it to carry out its life processes (e.g., foraging and thermoregulation) (MECP 2022). This regulation applies where the snake occurs and includes Haldimand County. Within Haldimand County, Eastern Foxsnake are associated with beach-dune and extensive marsh habitat and have been recorded in Big Creek and Long Point (COSEWIC 2008). However, intensive studies have not been conducted in Haldimand County, thus information regarding hibernacula locations are limited. The habitat regulation protects important habitat features including:

- Hibernacula and 100 metres around hibernacula.
- Natural or non-natural egg laying sites, communal shedding sites and communal basking sites and 30 metres around those sites.

One of the species at risk observed on the property (Barn Swallow) and four of the species at risk with potential to occur in the study area (Snapping Turtle, Common Nighthawk, Grasshopper Sparrow, Monarch Butterfly) are designated as special concern provincially and are therefore not afforded protection under the *ESA* (2007) and will be addressed through policies pertaining to Significant Wildlife Habitat (SWH; Section 5.6 of this report).



6.6 Significant Wildlife Habitat

The ELC vegetation communities described in the study area may provide habitat for several special concern species and therefore could represent the following candidate SWH:

- **Special Concern and Rare Wildlife Species Habitat:** possible where special concern or provincially rare (S1-S3, SH) plant and animal species have been recorded within the NHIC 1 km² square (MNR 2015).

Barn Swallow is a widespread aerial insectivore experiencing significant long-term population declines in North America. It was recently re-classified from threatened to special concern on the Species at Risk in Ontario List. Barn Swallow breeds in open country, typically near water. It often relies on human structures for nest sites, such as ledges and walls of old barns, culverts and bridges. The main factors affecting populations appear to be loss of nesting sites (e.g., open barns) and foraging habitat (e.g., open farmland) due to changing agricultural practices, as well as large-scale declines in insect prey likely due to pesticide use (COSEWIC 2011a; MECP 2021b). Barn Swallow was observed foraging over the meadow marsh and mixed meadow habitats. No nesting sites were observed on the property, although human structures could provide potential nesting habitat (e.g., roof eaves). Abandoned buildings on the adjacent property to the east may also provide suitable nesting habitat.

Common Nighthawk is listed as a special concern species and is typically found in open areas with little to no ground vegetation and could also occur in cultivated fields, along gravel roads and urban parks. Threats to the Common Nighthawk include insecticide use, habitat degradation and intensive agriculture, as well as increased predation from terrestrial predators such as skunks, racoons and American Crows (MECP 2020). The flat gravel roof of one building located on the WTP property (in the north-central section), may provide suitable nesting habitat for the Common Nighthawk.

Grasshopper Sparrow, a special concern species associated with grasslands, could also occur in the agricultural fields surrounding the WTP. This species is typically found in open grasslands, hayfields, pastures and, occasionally, croplands during the breeding season. Its populations are declining in North America due to habitat loss and fragmentation, which increase risk of nest predation, and changes to hay-cutting practices, which can destroy nests and young (MECP 2021e).

Snapping Turtle is listed as special concern provincially under Ontario's Endangered Species Act (2007) and nationally under the federal Species at Risk Act (2002). The species inhabits a variety of freshwater habitats, typically associated with slow-moving water with soft mud or sand bottom and abundant vegetation (ORAA 2018). Snapping Turtle can be found in small wetlands, ponds and ditches during the active season, and hibernates in mud or silt at the bottom of lakes and rivers over the winter. The turtle is long-lived, taking many years to mature and has a slow reproduction rate, all features which make it vulnerable to population decline (ORAA 2018). Snapping Turtles are threatened by road mortality, hunting, and poaching. The marsh ELC community likely doesn't provide high quality habitat for Snapping Turtles as there was no open water observed during any of the seasonal site visits.

Monarch Butterfly is distributed across southern Canada during the summer months. Caterpillars rely solely on milkweed species for food and are thus restricted to forest edge, meadows and open areas (Government



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of Ontario 2019). Adults occur in a variety of habitats where they feed on wildflower nectar. All Canadian populations migrate south to overwinter, with most converging on forests in central Mexico. The species is listed as endangered federally and special concern in Ontario, due primarily to habitat loss and fragmentation on its wintering grounds, as well as pesticide and herbicide use across its range (Government of Ontario 2019). The presence of the butterfly's host plant (Common Milkweed) in the mixed meadow raises the possibility that Monarch may breed in this habitat during the summer.

6.7 Evaluation of Significance

The findings of the background review and field investigations have been used to determine the significance of natural heritage features in accordance with the applicable municipal and provincial policy. Table 5 details the evaluation of significance of natural heritage features and ecological functions associated with the study area. No provincially significant wetlands, provincially significant woodlands or ANSIs were identified in the study area. However, based on field investigations, potential habitat for species at risk, and candidate significant wildlife habitat were identified at the WTP location. Portions of the study area are also within LPRCA's regulated area (Table 4).



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Table 4. Documented or Potential Ecological Sensitivities Within the Study Area.

Ecological Sensitivities – Field Investigations				Ecological Sensitivities – Policy Review	
Vegetation Communities	Species at Risk	Significant Wildlife Habitat	Fish and Fish Habitat	Natural Heritage System	LPRCA Regulated Area
No	Yes – Potential for Bobolink, Eastern Meadowlark, and Eastern Foxsnake	Yes – Potential for Barn Swallow, Grasshopper Sparrow, Common Nighthawk, Snapping Turtle, and Monarch	No	No	Yes – north east portion and southern property boundary



7. Impact Assessment

The study area is characterized by a mix of habitat types nested within an agricultural and industrial landscape. The area shows evidence of past and ongoing disturbance, including mowed and paved areas, successional habitat (e.g., shrub thickets and old field meadows), and croplands.

The vegetation communities in the study area reflect the influence of disturbance and human activity within this landscape. Many of the plant species recorded were weedy non-native invasives. Most of the habitats had low vegetative diversity and were of low to medium ecological value. The habitat where all proposed development would occur, was categorized as the following in Figures 3 and 4:

1. Initial Proposed WTP Expansion
 - Mixed meadow;
 - Hedgerow; and
 - Existing WTP

2. Longer Term Proposed WTP Expansion
 - Mixed meadow;
 - Reed Canary grass meadow;
 - Hedgerow thicket;
 - Mixed Willow thicket
 - Gray Dogwood thicket;
 - Meadow marsh; and
 - Common Reed meadow marsh

Two species at risk were observed on the subject property, Barn Swallow and Bobolink, while the site was identified as potential habitat for two other species at risk, Eastern Meadowlark and Eastern Foxsnake. SWH habitat was identified for five special concern species, Barn Swallow, Common Nighthawk, Grasshopper Sparrow, Snapping Turtle, and Monarch.

The proposed WTP expansion will be restricted to within existing property limits, which, as described above, are characterized as disturbed habitat, so impacts to natural heritage features are anticipated to be minimal. The proposed development has the potential to directly affect the vegetation communities through general construction impacts, which could disturb or destroy existing habitat but these habitats have been previously impacted by industry and agricultural practices. Use of machinery near water could release deleterious substances to wetlands (e.g., sediment or toxic materials) and exposed soils and work areas could lead to erosion issues. In addition, construction activity could disturb adjacent wildlife due to excessive noise and light. Potential impacts for each phase of the proposed WTP expansion are detailed below to address site-specific natural heritage features within and adjacent to the work area.



7.1 Initial Proposed WTP Expansion

The initial proposed expansion area (Figure 2) indicates footprint required to serve the existing Nanticoke WTP service area in addition to future supply to Caledonia, York, Cayuga and possibly Six Nations of the Grand River. To facilitate the expansion of the WTP capacity, two rectangular sections of the lot have been designated for future construction of the Haldimand Water Treatment Plant infrastructure. The location of the eastern footprint option has been kept as close as possible to the east of the subject property, so no additional land is required. The eastern footprint expansion option would be located in a low diversity, mixed meadow vegetation community, however this community may provide habitat for Bobolink, Eastern Meadowlark and Eastern Foxsnake. Impacts associated with the western option expansion of the WTP will be limited to the existing fenced-in area comprised of lawn and pavement. This area is of low value ecologically. Given the restricted nature of the proposed works within existing disturbed habitat, there is a low likelihood that the proposed works in either footprint will negatively impact adjacent significant natural heritage features and functions in this study area if the recommended mitigation measures (Section 7) are implemented.

7.2 Longer Term Proposed WTP Expansion

The long term WTP footprint is based on servicing Haldimand and the original area scheme municipalities (EarthTech 2006). The biggest difference between the Interim and Long-Term Nanticoke WTP is the size of the facility required to meet servicing demand from the LEIP. Permanent impacts associated with the expansion of the Nanticoke WTP will include the removal of vegetation communities listed in Table 5.

Table 5. Summary of Vegetation Removals in the Longer-Term Expansion

Vegetation Community	Area Removed (ha)
Marsh	1.45
Swamp	0.25
Total Wetland	1.7
Meadow	9.9
Thicket	2.01
Total Upland	3.0

The total amount of wetland that will be removed to accommodate the longer-term expansion is 1.7 ha, however, based on field investigations the wetlands were small pockets of wetland with low plant diversity and in some cases dominated by invasive species, no amphibians were observed or recorded, and no open water was observed during the 2022 surveys. The longer-term expansion footprint will also require the removal of 9.9 ha of meadow, which may provide habitat for three endangered species, Bobolink, Eastern Meadowlark and Eastern Foxsnake. Potential temporary impacts to the surrounding natural heritage



features include sediment-laden runoff or spilled toxic material from the work area. Given the restricted nature of the proposed works within existing disturbed habitat, there is a low likelihood that the proposed works will negatively impact adjacent significant natural heritage features and functions in this study area if the recommended mitigation measures (Section 7) are implemented.

8. Recommended Mitigation Measures

HESL recommends that the following mitigation measures be applied at the planning, construction, and post-construction stages of the development to minimize or avoid negative impacts on natural features and their ecological functions.

8.1 Site Selection

The size and location of the development can influence its impact on the surrounding environment. The development footprints of all infrastructure upgrades and expansions will be contained within the existing property boundaries at the Nanticoke WTP.

8.2 Timing

Construction should be scheduled for times of the year that avoid or minimize wildlife disturbance. These periods vary depending on wildlife species and habitat types. For example, hibernating wildlife are vulnerable to site clearing if it destroys their overwintering habitat (e.g., dens), while the spring and summer season is a sensitive period for many species that reproduce and raise young during this time. The migration period is also a higher risk period for many species of birds (Government of Canada 2019). Where it is not possible to avoid construction during sensitive wildlife periods, additional mitigation measures will need to be implemented as detailed in the following sections (i.e., relating to buffers, exclusion fencing, lighting, wildlife inspections, fill management, retention of vegetation etc.).

The federal *Migratory Birds Convention Act (1994)* protects the nests, eggs and young of most bird species from harm or destruction. The breeding bird season for the Nanticoke area extends from early April through late August for most species (ECCC 2017). As a result, any development activities that could disturb breeding birds, such as clearing of vegetation, loud noise emissions (e.g., >10 decibels above ambient in natural areas and >50 decibels), and high intensity operations (e.g., frequent, long-lasting and large-scale) should be scheduled outside of these periods (Government of Canada 2019).

Amphibian and reptile populations are active from March to October in southern Ontario (MNR 2016). It is recommended that construction activities be scheduled outside of these periods in areas close to, or including, potential habitat (such as wetlands, ditches and upland meadow and woodland habitat) to avoid disturbance of these species, and their habitats and movement corridors. For example, adult Snapping Turtles migrate from winter hibernation sites to summer habitat in April and May, while hatchlings move to water in early fall (MNR 2016). Amphibian species generally breed from mid-March to the end of July (Bird Studies et al. 2009).



8.2.1 Construction During Sensitive Periods

If construction is planned during sensitive wildlife periods, such as the active period for amphibians and reptiles (generally March through October) and/or the bird breeding season (e.g., early April through late August), the following approaches should be followed to minimize disturbance to these wildlife species.

Exclusion fencing should be installed prior to amphibian and reptile emergence from hibernation in spring (i.e., prior to March). The enclosed areas should be surveyed immediately after installation, and then daily during the amphibian/reptile active season (March-October). See Section 7.3 for more details on exclusion fencing.

For breeding birds, inspections of potential habitat should be conducted by a qualified avian biologist prior to commencement of construction activities. Surveys should be based on Canadian Wildlife Service guidelines to determine if birds are nesting in the planned construction area (Canadian Wildlife Service 2014), and the proponent should consult with the Canadian Wildlife Service to confirm their approach. If nests are found or evidence of breeding is observed, then a mitigation plan should be developed to avoid negative impacts on migratory birds and their nests, which may include buffers around active nests and/or delay of construction.

8.3 Exclusion Fencing

Exclusion fencing should be used during the construction phase to separate the development zone from surrounding habitat. This fencing is important both for preventing direct mortality to wildlife, and for preventing wildlife from using the construction zone as nesting habitat. Many turtle and snake species, for example, lay eggs in soft substrate, and may thus be attracted to any sand fill used during the construction phase. Best practices for exclusion fencing are described in MNRF (2013), including selection of fence type based on target species and choice of layout to maintain habitat connectivity. In general, fencing should be installed during the winter while reptiles and amphibians are still hibernating (i.e., November – February) and should be surveyed immediately after installation to ensure no individuals have become trapped. Fence inspections should be carried out on a regular basis, including after spring thaw, throughout the active season, and after heavy storm events. Any damage affecting integrity should be fixed as soon as possible (MNRF 2013).

8.4 Lighting

Birds migrating at night can become disoriented by outdoor lighting, especially during inclement weather (e.g., fog, heavy rain). The best way to avoid this problem is to avoid illuminating construction areas during bird migratory periods. Construction areas should not be lit at night during spring (March-June) and fall (August-October) bird migration periods to avoid disrupting migration patterns and disorienting birds. If this is not possible, the following steps should be taken to minimize the risk of creating light traps during migration (City of Markham 2014):

- Restrict lighting only to where required for safety and security and ensure light does not spill over into adjacent areas;
- Avoid up-lighting (light projected upward to sky) by providing shields on light fixtures;



- Consider motion sensor lighting rather than continuous illumination; and
- Turn off or minimize light usage from 11 pm to 6 am.

8.5 Wildlife Inspections

Routine inspections for wildlife are recommended within the construction zone during the construction period. An inspection of the work site is generally recommended prior to operations beginning daily to ensure that no wildlife has become trapped within the construction zone, especially if any work is occurring during the spring/summer when many species are more active, or present in the area. This would typically be less of a concern for construction activities occurring during the winter. At a minimum, it is recommended that the construction zone be inspected immediately after exclusion fencing is installed, and then regularly in conjunction with inspections of the fencing to make sure there are no openings to let animals in (i.e., including after spring thaw and after any heavy rain events).

The construction site should be thoroughly inspected for wildlife, such as birds that may have become disoriented, or reptiles trapped by fencing, and any individuals should be safely removed from the construction area. A qualified expert should be available to conduct these routine inspections and any translocations that may be necessary. Where possible, wildlife should be allowed to leave the site on their own, following safe routes, unless individuals are injured or in immediate danger. Any species at risk encountered should be properly handled, moved, and reported, following species at risk handling protocol under the *Endangered Species Act* (2007; Government of Ontario undated). Construction staff should be trained on the identification of potential species at risk that could occur in the area to aid in daily monitoring and reporting.

8.6 Site Management

The construction site should also be managed to prevent attracting wildlife to the area. In particular,

- Food wastes and other garbage should be properly secured and disposed of;
- Proper site drainage should be implemented to limit the occurrence of standing pools of water; and
- Construction features which could offer shelter (such as piles of construction material and debris, as well as open pipes, bins, buildings, and trailers) should be properly secured to prevent wildlife access. For example, piles of soil, fill, brush, and rocks should be covered, pipes should be capped, and structures should be closed.

8.7 Erosion and Sediment Control Plan

A plan should be developed to control erosion and subsequent sedimentation that could occur during and negatively impact adjacent watercourses and wetlands. Controls, such as sediment barriers, should be securely installed prior to the initiation of work to avoid leakage during inclement weather. Regular monitoring and inspection should be carried out to ensure control measures are structurally sound and functioning effectively (including within 24 hours following any storm event). Adjustments to control measures should be made as necessary to improve performance. Control measures should be maintained until vegetation has established on exposed soils.



8.8 Retention of Vegetation and Habitat Features

The natural vegetation in the study areas should be protected as much as possible, to maintain native plant diversity and the wildlife habitat it provides. Vegetation serves many important functions, including provision of shade, food, nesting habitat, movement corridors, and protection from predators. Any vegetation that must be removed during construction should be replaced with plantings of native species once development is complete. Topsoil management should be implemented as part of revegetation efforts. For example, the top 20 to 30 cm of any stripped topsoil should be retained, stored, and used in restoration works so that the native and local seedbank is retained. Revegetated areas should be monitored to ensure successful establishment of native plantings. Special attention should be paid to construction works along the northwest property boundary as this portion is located within the drainage area for Nanticoke Creek.

8.9 Invasive Species Management

Many invasive plant species were documented in the study area. Efforts should be made during construction to avoid the introduction and spread of additional invasive plant species to the area, and from the area to other construction sites and surrounding natural areas. Invasive seeds and plant material can be inadvertently transferred from site to site on construction vehicles and equipment. All vehicles and equipment should be thoroughly washed to remove mud, seeds and plant material before they are moved among construction sites. We recommend consulting the Ontario Invasive Plant Council's Clean Equipment Protocol for more information (Halloran et al. 2013). Once invasive plant species are established it is extremely difficult to eradicate them from invaded areas.

9. Regulatory Authorization

Natural heritage related permitting may be required from different regulatory agencies in support of the proposed project. Details on potential regulatory authorization requirements are provided below.

9.1.1 *MECP Request for Project Review*

A preliminary screening of species at risk was submitted to MECP in September 2022 to initiate discussion on what permits or approvals may be necessary.

9.1.2 *LPRCA Regulated Lands Permitting*

A small portion of the LPRCA regulated area overlaps with the subject property in the northwest corner and southern property boundary. The options for the Initial expansion footprint do not encroach into the LPRCA Regulated Area, however the northwest corner of the Longer-Term expansion option encroaches by approximately 167 m². As detailed in LPRCA's Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Section 2, development is prohibited in wetlands. Consultation with LPRCA is required to determine permitting needs for the Longer-term expansion option.



10. Summary and Conclusions

The preferred servicing options for the Nanticoke WTP Class EA Study are to expand for growth and expanded service area with LEIP potable demand. This report was prepared as an addendum to the 2006 Class EA prepared by EarthTech. All proposed expansion works would be confined to the existing property boundaries, however there will be impacts to the natural heritage features and functions that have been documented on the property.

A combination of background review and field investigations was undertaken to characterize natural heritage features and functions in the study area. No significant natural heritage features were previously mapped in the study area as part of the ESR (e.g., provincially significant wetlands, provincially significant woodlands, ANSIs etc.). LPRCA's regulated area overlaps with the subject property in the northwest corner and southern property boundary, and a portion of the long-term expansion encroaches on the LPRCA's regulated area in the northwest corner.

The subject property has been highly disturbed and is comprised of overgrown fields, thickets and small meadow marsh pockets with scattered trees and shrubs, as well as pavement and buildings. The wetland communities observed on the subject property were low quality with low plant diversity, dominated by invasive plant species, and did not have any open water habitat. As such, no amphibians were documented during the surveys in the wetland communities, however Barn Swallow may use this habitat for aerial foraging. The WTP also has a stormwater pond and meadow, and contains numerous invasive plant species, such as Reed Canary Grass, Common Reed, and European Buckthorn. While much of the study area represents low to moderate quality habitat, it was found to support a variety of wildlife species. Two amphibian species were identified, near the stormwater pond and directly south of the cement facility (Figure 3). The overgrown meadows on the subject property may also provide breeding habitat for Bobolink, Eastern Meadowlark, two provincially threatened grassland species, and provide foraging habitat for Barn Swallow, a special concern aerial insectivore species provincially. In addition, the overgrown meadows may provide habitat for Eastern Foxsnake, a federally and provincially endangered snake that occurs along the Lake Erie shoreline. The subject property may also provide Candidate SWH for Special Concern and Rare Wildlife Species.

The restricted nature of the proposed development within existing disturbed sites minimizes potential impacts to natural heritage features and functions. One component that was not studied as part of the 2006 ESR was the presence of SAR and SWH. Several new environmental sensitivities were identified including species at risk habitat for Bobolink, Eastern Meadowlark, and Eastern Foxsnake and SWH for special concern species, Snapping Turtle, Barn Swallow, Common Nighthawk, Grasshopper Sparrow, and Monarch. Potential negative impacts to these features can be appropriately minimized by implementing the recommended mitigation measures, particularly relating to restricting laydown area, avoiding sensitive timing windows, and enacting exclusion fencing and erosion and sediment control. Consultation with MECP is required to determine permitting requirements under the *ESA* (2007) and with LPRCA to determine permitting requirements in regulated areas. Following these recommendations and mitigation measures will ensure that the project complies with relevant federal, provincial, and municipal policy.



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Appendix A. ELC Photographs.





Photo 1. (05 July 2022). Manicured open areas adjacent to water treatment infrastructure, facing west.



Photo 2. (05 July 2022). Reed Canarygrass mineral meadow marsh along the southern property line, facing northwest.



Photo 3. (05 July 2022). Common Reed mineral meadow marsh, facing south.



Photo 4. (05 July 2022). Manicured open areas adjacent to an access road and buildings, facing northeast.



Photo 5. (07 July 2022). Mixed graminoid mineral meadow marsh, facing northeast.



Photo 6. (12 September 2022). Dry – fresh mixed meadow, facing northeast.



Photo 7. (12 September 2022). Dry – Fresh Mixed Meadow, facing north.



Photo 8. (12 September 2022). Dry – Fresh Mixed Meadow on adjacent lands, facing north.



Photo 9. (12 September 2022). Dry – Fresh Mixed Meadow and Silky Dogwood thicket swamp on Adjacent Lands, facing north.



Photo 10. (12 September 2022). Edge of treed community on Adjacent Lands, facing west from Haldimand County Road 55.

Appendix B. Plant Species List.



Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
<i>Acalypha rhomboidea</i>	Common Three-seeded Mercury	Euphorbiaceae	S5	C	0	3
<i>Acer platanoides</i>	Norway Maple	Aceraceae	SNA	IU	0	5
<i>Acer x freemanii</i>	Freeman's Maple	Aceraceae	SNA	hyb	6	-5
<i>Agrostis stolonifera</i>	Creeping Bentgrass	Poaceae	SNA	IU	0	-3
<i>Alisma triviale</i>	Northern Water-plantain	Alismataceae	S5	X	1	-5
<i>Ambrosia artemisiifolia</i>	Common Ragweed	Asteraceae	S5	C	0	3
<i>Apocynum androsaemifolium</i>	Spreading Dogbane	Apocynaceae	S5	C	3	5
<i>Arctium minus</i>	Common Burdock	Asteraceae	SNA	IC	0	3
<i>Asclepias incarnata</i>	Swamp Milkweed	Asclepiadaceae	S5	C	6	-5
<i>Asclepias syriaca</i>	Common Milkweed	Asclepiadaceae	S5	C	0	5
<i>Bromus inermis</i>	Smooth Brome	Poaceae	SNA	IC	0	5
<i>Calystegia sepium</i>	Hedge False Bindweed	Convolvulaceae	S5	X	2	0
<i>Carex aurea</i>	Golden Sedge	Cyperaceae	S5	C	4	-3
<i>Carex crinita</i>	Fringed Sedge	Cyperaceae	S5	C	6	-5
<i>Carex cristatella</i>	Crested Sedge	Cyperaceae	S5	C	3	-3
<i>Carex granularis</i>	Limestone Meadow Sedge	Cyperaceae	S5	C	3	-3
<i>Carex lurida</i>	Sallow Sedge	Cyperaceae	S4S5	C	6	-5
<i>Carex retrorsa</i>	Retrorsed Sedge	Cyperaceae	S5	C	5	-5
<i>Carex scoparia</i>	Pointed Broom Sedge	Cyperaceae	S5	C	5	-3
<i>Carex spicata</i>	Spiked Sedge	Cyperaceae	SNA	IC	0	3
<i>Carex stipata</i>	Awl-fruited Sedge	Cyperaceae	S5	C	3	-5
<i>Carex tenera</i>	Tender Sedge	Cyperaceae	S5	C	4	0
<i>Carex vulpinoidea</i>	Fox Sedge	Cyperaceae	S5	C	3	-5
<i>Carya ovata</i>	Shagbark Hickory	Juglandaceae	S5	C	6	3
<i>Cenchrus longispinus</i>	Long-spined Sandbur	Poaceae	S4	C	3	5
<i>Cichorium intybus</i>	Chicory	Asteraceae	SNA	IC	0	5
<i>Cirsium vulgare</i>	Bull Thistle	Asteraceae	SNA	IC	0	3
<i>Cornus obliqua</i>	Pale Dogwood	Cornaceae	S5	C	2	-3
<i>Cornus racemosa</i>	Gray Dogwood	Cornaceae	S5	U	2	0
<i>Crataegus monogyna</i>	English Hawthorn	Rosaceae	SNA	IC	0	3
<i>Crataegus punctata</i>	Dotted Hawthorn	Rosaceae	S5	C	4	5
<i>Daucus carota</i>	Wild Carrot	Apiaceae	SNA	IC	0	5
<i>Dianthus armeria</i>	Deptford Pink	Caryophyllaceae	SNA	IC	0	5
<i>Dipsacus fullonum</i>	Common Teasel	Dipsacaceae	SNA	IC	0	3
<i>Echinocystis lobata</i>	Wild Mock-cucumber	Cucurbitaceae	S5	C	3	-3
<i>Epilobium hirsutum</i>	Hairy Willowherb	Onagraceae	SNA	IU	0	-3
<i>Equisetum arvense</i>	Field Horsetail	Equisetaceae	S5	C	0	0
<i>Erigeron annuus</i>	Annual Fleabane	Asteraceae	S5	U	0	3
<i>Erigeron canadensis</i>	Canada Horseweed	Asteraceae	S5	C	0	3
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	Asteraceae	S5	C	1	-3
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	Asteraceae	S5	C	2	0
<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	Asteraceae	S5	C	3	-5
<i>Fragaria virginiana</i>	Wild Strawberry	Rosaceae	S5	C	2	3
<i>Fraxinus americana</i>	White Ash	Oleaceae	S4	C	4	3

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
<i>Fraxinus pennsylvanica</i>	Green Ash	Oleaceae	S4	C	3	-3
<i>Galium mollugo</i>	Smooth Bedstraw	Rubiaceae	SNA	IU	0	5
<i>Geum aleppicum</i>	Yellow Avens	Rosaceae	S5	U	2	0
<i>Hordeum jubatum</i>	Foxtail Barley	Poaceae	S5?	IC	0	0
<i>Hypericum perforatum</i>	Common St. John's-wort	Clusiaceae	SNA	IC	0	5
<i>Impatiens capensis</i>	Spotted Jewelweed	Balsaminaceae	S5	C	4	-3
<i>Inula helenium</i>	Elecampane	Asteraceae	SNA	IU	0	3
<i>Iris pseudacorus</i>	Yellow Iris	Iridaceae	SNA	IU	0	-5
<i>Juglans nigra</i>	Black Walnut	Juglandaceae	S4?	C	5	3
<i>Juncus effusus</i>	Soft Rush	Juncaceae	S5	C	4	-5
<i>Juncus tenuis</i>	Path Rush	Juncaceae	S5	C	0	0
<i>Juncus torreyi</i>	Torrey's Rush	Juncaceae	S5	U	3	-3
<i>Lactuca serriola</i>	Prickly Lettuce	Asteraceae	SNA	IC	0	3
<i>Leucanthemum vulgare</i>	Oxeye Daisy	Asteraceae	SNA	IC	0	5
<i>Lilium michiganense</i>	Michigan Lily	Liliaceae	S4	C	7	-3
<i>Linaria vulgaris</i>	Butter-and-eggs	Scrophulariaceae	SNA	IC	0	5
<i>Lolium arundinaceum</i>	Tall Fescue	Poaceae	SNA	IU	0	3
<i>Lonicera tatarica</i>	Tartarian Honeysuckle	Caprifoliaceae	SNA	IC	0	3
<i>Lotus corniculatus</i>	Garden Bird's-foot Trefoil	Fabaceae	SNA	IC	0	3
<i>Lycopus americanus</i>	American Water-horehound	Lamiaceae	S5	C	4	-5
<i>Lythrum salicaria</i>	Purple Loosestrife	Lythraceae	SNA	IC	0	-5
<i>Malus prunifolia</i>	Pear-leaved Crabapple	Rosaceae	SNA	N/A	0	5
<i>Malus pumila</i>	Common Apple	Rosaceae	SNA	IC	0	5
<i>Medicago sativa</i>	Alfalfa	Fabaceae	SNA	IC	0	5
<i>Melilotus albus</i>	White Sweet-clover	Fabaceae	SNA	IC	0	3
<i>Phalaris arundinacea var. arundinacea</i>	Reed Canary Grass	Poaceae	S5	C	0	-3
<i>Phleum pratense</i>	Common Timothy	Poaceae	SNA	IC	0	3
<i>Phragmites australis ssp. australis</i>	European Reed	Poaceae	SNA	IC	0	-3
<i>Picea glauca</i>	White Spruce	Pinaceae	S5	planted	6	3
<i>Picris hieracioides</i>	Hawkweed Oxtongue	Asteraceae	SNA	IR	0	5
<i>Pinus sylvestris</i>	Scots Pine	Pinaceae	SNA	IC	0	3
<i>Plantago lanceolata</i>	English Plantain	Plantaginaceae	SNA	IC	0	3
<i>Plantago major</i>	Common Plantain	Plantaginaceae	SNA	IC	0	3
<i>Poa compressa</i>	Canada Bluegrass	Poaceae	SNA	IC	0	3
<i>Poa pratensis ssp. pratensis</i>	Kentucky Bluegrass	Poaceae	SNA	IC	0	3
<i>Populus deltoides ssp. deltoides</i>	Eastern Cottonwood	Salicaceae	S5	C	4	0
<i>Potentilla recta</i>	Sulphur Cinquefoil	Rosaceae	SNA	IC	0	5
<i>Prunella vulgaris ssp. lanceolata</i>	Lance-leaved Heal-all	Lamiaceae	S5	C	0	0
<i>Quercus rubra</i>	Northern Red Oak	Fagaceae	S5	C	6	3
<i>Rhamnus cathartica</i>	Common Buckthorn	Rhamnaceae	SNA	IU	0	0
<i>Rhus typhina</i>	Staghorn Sumac	Anacardiaceae	S5	C	1	3
<i>Rosa multiflora</i>	Multiflora Rose	Rosaceae	SNA	IU	0	3
<i>Rubus occidentalis</i>	Black Raspberry	Rosaceae	S5	C	2	5
<i>Rumex crispus</i>	Curly Dock	Polygonaceae	SNA	IC	0	0

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
<i>Salix bebbiana</i>	Bebb's Willow	Salicaceae	S5	C	4	-3
<i>Salix eriocephala</i>	Heart-leaved Willow	Salicaceae	S5	C	4	-3
<i>Salix interior</i>	Sandbar Willow	Salicaceae	S5	C	1	-3
<i>Scirpus atrovirens</i>	Dark-green Bulrush	Cyperaceae	S5	C	3	-5
<i>Scirpus microcarpus</i>	Red-tinged Bulrush	Cyperaceae	S5	U	4	-5
<i>Solanum dulcamara</i>	Bittersweet Nightshade	Solanaceae	SNA	IC	0	0
<i>Solidago altissima</i> var. <i>altissima</i>	Eastern Tall Goldenrod	Asteraceae	S5	C	1	3
<i>Solidago canadensis</i>	Canada Goldenrod	Asteraceae	S5	C	1	3
<i>Sonchus oleraceus</i>	Common Sow-thistle	Asteraceae	SNA	IR	0	3
<i>Symphotrichum ericoides</i>	White Heath Aster	Asteraceae	S5	C	4	3
<i>Symphotrichum lanceolatum</i>	Panicked Aster	Asteraceae	S5	C	3	-3
<i>Symphotrichum novae-angliae</i>	New England Aster	Asteraceae	S5	C	2	-3
<i>Symphotrichum pilosum</i> var. <i>pilosum</i>	Old Field Aster	Asteraceae	S5	C	1	3
<i>Syringa reticulata</i> ssp. <i>reticulata</i>	Japanese Tree Lilac	Oleaceae	SNA	planted	0	0
<i>Taraxacum officinale</i>	Common Dandelion	Asteraceae	SNA	IC	0	3
<i>Tilia americana</i>	American Basswood	Tiliaceae	S5	C	4	3
<i>Toxicodendron radicans</i> var. <i>rydbergii</i>	Western Poison Ivy	Anacardiaceae	S5	C	2	0
<i>Trifolium hybridum</i>	Alsike Clover	Fabaceae	SNA	IC	0	3
<i>Trifolium pratense</i>	Red Clover	Fabaceae	SNA	IC	0	3
<i>Typha angustifolia</i>	Narrow-leaved Cattail	Typhaceae	SNA	IC	0	-5
<i>Ulmus americana</i>	American Elm	Ulmaceae	S5	C	3	-3
<i>Verbena hastata</i>	Blue Vervain	Verbenaceae	S5	C	4	-3
<i>Viburnum lentago</i>	Nannyberry	Caprifoliaceae	S5	C	4	0
<i>Viburnum opulus</i> ssp. <i>opulus</i>	Cranberry Viburnum	Caprifoliaceae	SNA	IU	0	-3
<i>Vicia cracca</i>	Tufted Vetch	Fabaceae	SNA	IU	0	5
<i>Vicia tetrasperma</i>	Four-seeded Vetch	Fabaceae	SNA	IU	0	5
<i>Vitis riparia</i>	Riverbank Grape	Vitaceae	S5	C	0	0

Appendix C. Breeding Bird List for Nanticoke Study Area.



Breeding Birds of Nanticoke Water Treatment Plant Property

Common Name	Scientific Name	Status					Locations				
		National Species at Risk COSEWIC designation ^a	National Species at Risk Species at Risk Act Designation ^a	Species at Risk in Ontario Listing ^b	Provincial breeding season SRANK ^c	Regional Status ^d	Area-sensitive (OMNR) ^e	1	2	3	4
Canada Goose	<i>Branta canadensis</i>				S5			1			
Mallard	<i>Anas platyrhynchos</i>				S5				1		
Killdeer	<i>Charadrius vociferus</i>				S5			2		1	
Mourning Dove	<i>Zenaidura macroura</i>				S5			3		1	
Hairy Woodpecker	<i>Picoides villosus</i>				S5		A	1			
Northern Flicker	<i>Colaptes auratus</i>				S4			1	1		1
Willow Flycatcher	<i>Empidonax traillii</i>				S5				2		
Eastern Kingbird	<i>Tyrannus tyrannus</i>				S4					1	
Purple Martin	<i>Progne subis</i>				S4						1
Tree Swallow	<i>Tachycineta bicolor</i>				S4			4	1	4	
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>				S4			4		2	
Barn Swallow	<i>Hirundo rustica</i>	SC	THR	THR	S4				1	2	
House Wren	<i>Troglodytes aedon</i>				S5			1		1	
Marsh Wren	<i>Cistothorus palustris</i>				S5			1			
American Robin	<i>Turdus migratorius</i>				S5			4	2	4	
Northern Mockingbird	<i>Mimus polyglottus</i>				S4			1			
Gray Catbird	<i>Dumetella carolinensis</i>				S4					1	
Cedar Waxwing	<i>Bombycilla cedrorum</i>				S5			2	1	1	
European Starling	<i>Sturnus vulgaris</i>				S5	I		9			
Warbling Vireo	<i>Vireo gilvus</i>				S5			1			1
Yellow Warbler	<i>Setophaga petechia</i>				S5			3	3	4	1
Common Yellowthroat	<i>Geothlypis trichas</i>				S5				1		2
Northern Cardinal	<i>Cardinalis cardinalis</i>				S5				1	2	
Indigo Bunting	<i>Passerina cyanea</i>				S4						2
Savannah Sparrow	<i>Passerculus sandwichensis</i>				S4		A			1	
Song Sparrow	<i>Melospiza melodia</i>				S5			2	6	4	2
Swamp Sparrow	<i>Melospiza georgiana</i>				S5				2		
Bobolink	<i>Dolichonyx oryzivorus</i>	SC	THR	THR	S4		A				3
Common Grackle	<i>Quiscalus quiscula</i>				S5			2		1	1
Brown-headed Cowbird	<i>Molothrus ater</i>				S4			1	2	2	
Orchard Oriole	<i>Icterus spurius</i>				S4					1	
Baltimore Oriole	<i>Icterus galbula</i>				S4					1	
House Finch	<i>Haemorhous mexicanus</i>				S5	I				1	1
American Goldfinch	<i>Spinus tristis</i>				S5				1	2	
House Sparrow	<i>Passer domesticus</i>				SNA	I		4			

Field Work Conducted On: June 9 and July 1, 2022 06:15-08:30 h, Wind 0-3, 13-21 C, 25-50% cloud, no precipitation

Location 1 - Sewage and WTP

Location 2 - Meadow Marsh and Swamp Thicket

Location 3 - Mixed Meadow

Location 4 - Shrub Thicket

Number of Species: 36
 Number of (provincial and national) Species at Risk: 2
 Number of S1 to S3 Species: 0
 Number of Regionally Rare Species: 0
 Number of Introduced Species: 3
 Number of Area-sensitive Species: 3

Location 1 - Sewage and WTP
 Number of Species: 19
 Number of (provincial and national) Species at Risk: 0
 Number of S1 to S3 Species: 0
 Number of Regionally Rare Species: 0
 Number of Introduced Species: 2
 Number of Area-sensitive Species: 1

Location 2 - Meadow Marsh and Swamp Thicket
 Number of Species: 17
 Number of (provincial and national) Species at Risk: 1
 Number of S1 to S3 Species: 0
 Number of Regionally Rare Species: 0
 Number of Introduced Species: 2
 Number of Area-sensitive Species: 0

Location 3 - Mixed Meadow
 Number of Species: 25
 Number of (provincial and national) Species at Risk: 2
 Number of S1 to S3 Species: 0
 Number of Regionally Rare Species: 0
 Number of Introduced Species: 2
 Number of Area-sensitive Species: 2

Common Name	Scientific Name	Status					Locations			
		National Species at Risk COSEWIC designation ^a	National Species at Risk Species at Risk Act Designation ^a	Species at Risk in Ontario Listing ^b	Provincial breeding season SRANK ^c	Regional Status ^d	Area-sensitive (OMNR) ^e	1	2	3

Location 4 - Shrub Thicket

Number of Species:	7	1
Number of (provincial and national) Species at Risk:	0	1
Number of S1 to S3 Species:	0	1
Number of Regionally Rare Species:	0	1
Number of Introduced Species:	0	
Number of Area-sensitive Species:	0	

KEY

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

b Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario)

END = Endangered, THR = Threatened, SC = Special Concern

^c SRANK for breeding status if:

S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure)

SH (historical, possibly extirpated)

SNA (Not applicable...because the species is not a suitable target for conservation activities; includes non-native species),

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available at: <http://explorer.natureserve.org>

^d Bird Checklist for Haldimand-Norfolk Counties, RA = Rare/accidental, I = Introduced species, D. Lepage 2022 <https://avibase.bsc-eoc.org/checklist.jsp?region=CAonhn&list=howardmoor>

^e Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p plus appendices.