Brown Lands

Environmental Impact Statement

Submitted to Strathburn Almonte Regional Inc.
Prepared for Evan Garfinkel, Manager, Land Development
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Project Number: 140876
July 17, 2024

Strathburn Almonte Regional Inc.

Environmental Impact Study

Brown Lands, Almonte, Ontario

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Acronyms and Abbreviations

Arcadis	Arcadis Professional Services (Canada) Inc., formerly IBI Group Professional Services (Canada) Inc.
NHS	Natural Heritage System - A key natural heritage feature, key hydrological feature, provincially significant areas, or local natural areas.
EIS	Environmental Impact Study
ELC	Ecological Land Classification
ESA	*Endangered Species Act, 2007*
FWCA	*Fish and Wildlife Conservation Act, 1997*
HDFA	Headwater Drainage Feature Assessment
HDF	Headwater Drainage Feature
ISA	International Society of Arboriculture
MBCA	*Migratory Birds Convention Act, 1994*
MBR	*Migratory Birds Regulations, 2022*
MMOP	Municipality of Mississippi Mills Official Plan (*2019*)
MNRF	Ministry of Natural Resources and Forestry
MVCA	Mississippi Valley Conservation Authority
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
OWES	Ontario Wetland Evaluation System
PPS	*Provincial Policy Statement, 2020*
SAR	Species at Risk
SARA	*Species at Risk Act, 2002*
Study Area	The Subject Site and the area within 120 m of the Subject Site
Subject Site	Defined as Parts Lot 17, Concession 9 (southern portion), within the Almonte Ward of the Municipality of Mississippi Mills
SWH	Significant Wildlife Habitat

1 Introduction

Arcadis Professional Services (Canada) Inc. (Arcadis) was retained by Regional Group Inc. to complete an update to the Scoped Environmental Impact Statement (EIS) in support of municipal planning approvals for the property known as Part Lot 17 Concession 9, in the Township of Almonte (herein referred to as "Subject Site") (**Figure 1**).

This EIS has been prepared to describe the natural heritage features within the Study Area and to evaluate the potential for environmental impacts associated with the proposed development and to recommend mitigation measures to offset those impacts. The findings in this report are based on field investigations and desktop screening results.

For this report, the Study Area includes the area within 120 metres (m) of the Subject Site to account for policy requirements and setback distances outlines in the *Provincial Policy Statement (2020)* and the accompanying *Natural Heritage Reference Manual* (MNRF 2010) (see **Figure 1-1**). As necessary, consideration will be given to wildlife occurrences (including SAR) reported up to 10 kilometres (km) away, due to the nature of desktop resources (i.e., online databases and atlases) with data presented in a 10 km x 10 km grid.

1.1 Background

Within the Municipality of Mississippi Mills (herein referred to as the Municipality), an EIS is required when a development proposal could affect certain natural heritage features or land adjacent to such features and areas. The EIS shall be prepared to support planning applications, such as official plan amendments, zoning by-law amendments, minor variances, plans of subdivision, consents, and site plan control (MMM 2019).

A preliminary Scoped Environmental Impact Statement was submitted to the Municipality the February of 2023 which outlined the supplementary field investigation to be undertaken in the spring/summer of 2023 which included:

- Ecological Land Classification (ELC), including wetland identification and delineation,
- Breeding Bird Survey,
- Marsh Monitoring for Breeding Amphibians,
- Butternut Search and Health Assessment,
- Headwater Drainage Feature Assessment,
- Snake Visual Encounter Surveys,
- Fish Habitat Assessment, and
- Pileated Woodpecker Cavity Nest Search.

The results of these field investigation are presented within this report to provide a more detailed understanding of the ecological features and functions within the Study Area.

The Study Area includes the area within 120 metres (m) of the Subject Site (**Figure 1-1**) to account for policy requirements and setback distances outlined in the *Provincial Policy Statement, 2020* and the accompanying *Natural Heritage Reference Manual* (MNR 2010). In addition, specific Species at Risk (SAR) and natural heritage features will be considered up to two kilometres (km) from the proposed development as concerns may arise with respect to specific environmental policy or legislation.

This site contains two unevaluated wetlands that drain into Wolf Grove Creek before flowing into the Mississippi River (MVCA 2022). In addition, agricultural tile drains are positioned along the western edge of both unevaluated wetlands and act as headwater drainage features (HDFs). A small segment of Significant Woodland is present within the Project Footprint. This report has been prepared to consider federal, provincial, and municipal policies and regulations that may pertain to the Project.

1.2 Property Info

The following table provides site-specific information for the Subject Site.

Table 1-1: Property Information

Owner	Regional Group
Address	286 Strathburn Street
Lot and concession	Part Lot 17, Concession 9
Zoning	Residential
Official Plan Designation (Schedule B):	Residential
Existing Land Uses	Agricultural, Pasture, Meadow, Wetland, Multi Use Pathway
Size of Subject Site	16.8 hectares

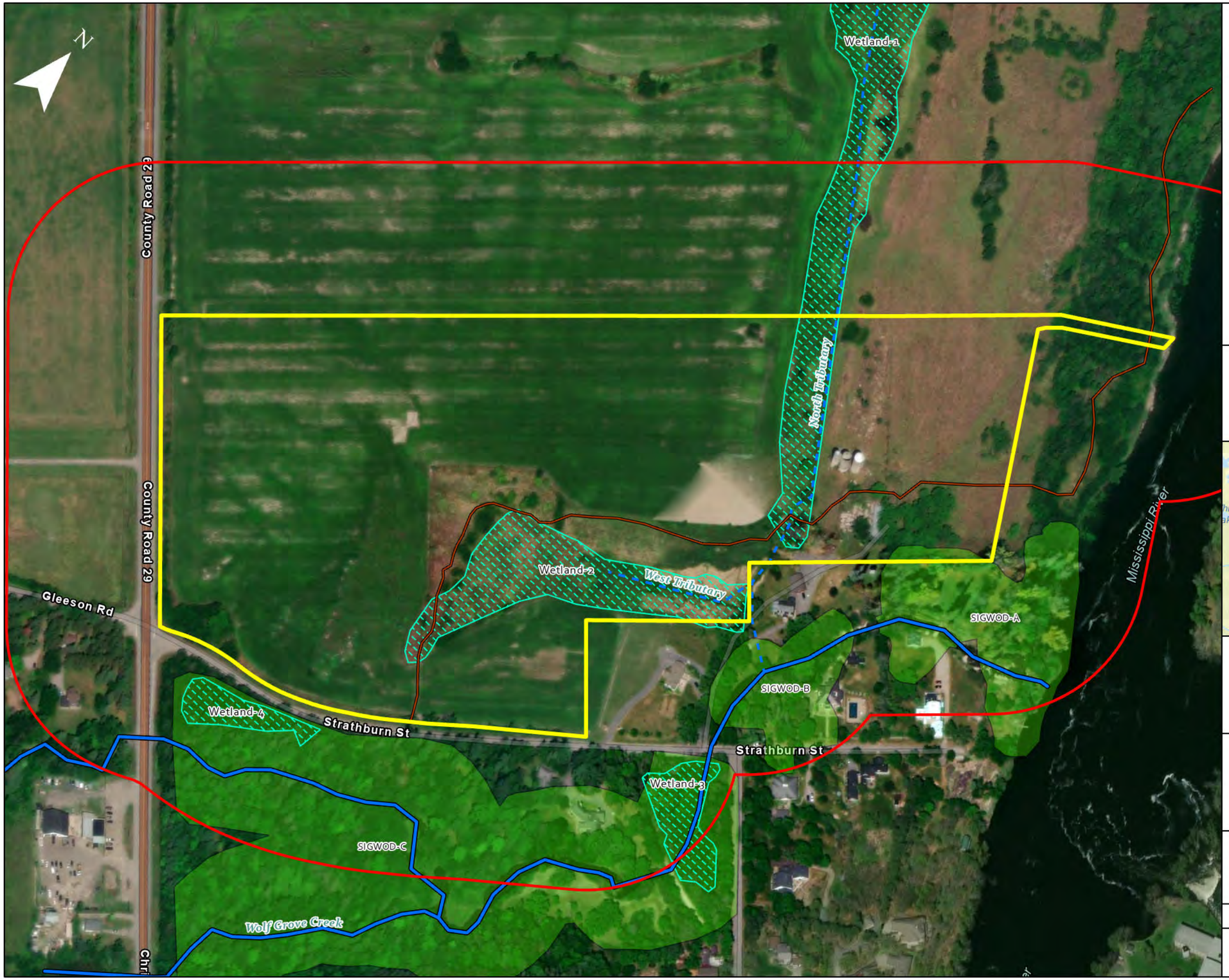
The Study Area is in the community of Almonte, Ontario adjacent to 286 Strathburn Street, northeast of the County Road 29 and Strathburn Street intersection. The property lies between agricultural fields west of County Road 29, the Mississippi River to the east, agricultural fields and meadows to the north, and a woodland on the south side of Strathburn Street (**Figure 1-1**).

The Subject Site is in the Almonte ward of Mississippi Mills. The Official Plan for Mississippi Mills designates the Study Area as Residential, with the property is zoned for Development (MMM 2019).

The Almonte Riverside Trail and associated trailhead are located on Strathburn Street and cross the Subject Site. This trail is commonly used by hikers, mountain bikers, and dog walkers. It follows the top of the slope around a mapped wetland, crossing over a watercourse and continues towards the Mississippi River.

1.3 First Nations Land Acknowledgement

Arcadis would like to acknowledge that the Subject Site in Almonte, Ontario is located on unceded traditional Algonquin territory of the Anishinaabe People and share the land of the Mohawk territory of the Haudenosaunee/Rotinonhsho'n:ni People. We acknowledge that the First Nations are land stewards and caretakers of the land and waters within this territory in perpetuity.



Legend

- Existing Almonte Riverside Trail
- Watercourse
- Wolf Grove Creek (NHIC)
- Unevaluated Wetland (MVCA)
- Significant Woodlot (MMM OP)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Study Area and
Natural Heritage Features

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 1-1

1.4 Study Approach

The following approach has been developed to provide a clear methodological direction towards characterizing the natural environment and assessing the potential for significant species and habitats within the Study Area.

Policy Framework	This section outlines the policies and legislation that apply to the protection of natural heritage features within the Study Area as it relates the Project.
Natural Heritage Screening	This section provides the detailed background information collected from a variety of publicly accessible resource databases to describe the natural heritage features and significant features that may occur within the Study Area.
Methodology	This section provides a summary of the specific protocols and methods used to evaluate potential natural heritage features and species identified within the natural heritage screening.
Survey Results	This section provides the results from the field surveys. This also includes any incidental observations or notable observations made by the field biologists.
Description of the Proposed Project	This section provides a summary of the Project, including the construction activities and other activities which may have an impact on the natural environment.
Impact Assessment and Mitigation	This section provides the assessment of potential environmental impacts associated with the Project on the natural heritage system, including the natural heritage features and species surveyed in this study. The mitigation measures proposed in this section are aimed at reducing or eliminating potential impacts to natural heritage features. Where mitigation may not be possible, compensation may be proposed. This section will also identify any future permitting or agency authorizations that may be required before the Project may proceed.
Summary and Conclusions	This section provides a summary of the Study's findings, outlines ay notable provisions, and provides Arcadis' general recommendation on whether this project should proceed as planned.

2 Relevant Policy and Legislative Framework

This study references the regulatory agencies and legislative authorities mandated to protect different elements of the NHS, features, and functions within the Municipality of Mississippi Mills, Ontario, Canada. The scope of this report evaluates the natural heritage features and SAR governed by the policies outlined in the table below. The following subsections provide a high-level summary of the policies and legislation, noting their most recent date of amendment (at this time of preparation of this report). Each subsection also contains a short description of the policy's / legislation's applicability to this specific Project.

Table 1-2:Relevant policy, legislation and background sources.

POLICY / LEGISLATION	GUIDELINES AND SUPPORTING DOCUMENTS
Federal Government of Canada	
***Migratory Birds Convention Act, 1994, S.C. 1994, c. 22* (MBCA)**	Environment and Climate Change Canada (ECCC) - Guidelines to Avoid Harm to Migratory Birds (ECCC 2022a)
***Species at Risk Act, S.C. 2002, c. 29* (SARA)**	Federal Species at Risk Public Registry - Distribution of Aquatic Species at Risk mapping (DFO 2022a) - Open Data: Range Map Extents, Species at Risk, Canada (ECCC 2022b)
Fisheries Act, R.S.C., 1985, c. F-14	Fisheries and Oceans Canada (DFO) - Distribution of Aquatic Species at Risk mapping (DFO 2022a) - Projects Near Water online resources (DFO 2022b)
Province of Ontario	
***Fish and Wildlife Conservation Act, 1997, S.O. 1997, c. 41* (FWCA)**	Wildlife Schedules (*O. Reg. 669/98*)
***Endangered Species Act, 2007, S.O. 2007, c. 6* (ESA)**	Ministry of the Environment, Conservation and Parks (MECP) - Species at Risk in Ontario (SARO) List (*O. Reg. 230.08*)
Planning Act, R.S.O. 1990, c. P.13	Provincial Policy Statement, 2020
	Ministry of Natural Resources and Forestry (MNRF) – Kemptville District
	MNRF Natural Heritage Information Centre (NHIC) Database - Species at Risk occurrence records - Species of Conservation Concern - Natural Heritage Features
	Wildlife Atlases and Databases: - Ontario Breeding Bird Atlas (BSC et al. 2006) - Ontario Reptile and Amphibian Atlas (Ontario Nature 2020) - Ontario Butterfly Atlas (TEA 2022) - iNaturalist Observation Records (iNaturalist 2022) - eBird HotSpot species lists (eBird 2022) - Atlas of the Mammals of Ontario (Dobbyn 1994)
	Significant Wildlife Habitat Technical Guide (MNR 2000): - Significant Wildlife Habitat Ecoregion 6E Criterion Schedule (MNRF 2015).
	Ecological Land Classification for Southern Ontario, First Approximation, and its Application (Lee et al. 1998)
	Protocol for Wildlife Protection During Construction (City of Ottawa 2015)
Conservation Authorities Act, R.S.O. 1990, c. C.27	Mississippi Valley Conservation Authority (MVCA): - MVCA: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (O. Reg. 153/06) - Floodplain mapping

POLICY / LEGISLATION	GUIDELINES AND SUPPORTING DOCUMENTS
	- EIS Checklist for Development Near Wetlands and Other Natural Heritage Features (MVCA 2022b)
	Toronto and Region Conservation Authority: - Evaluation, Classification and Management of Headwater Drainage Features Guidelines (TRCA and CVC 2014)
Municipality of Mississippi Mills	
Municipality of Mississippi Mills Community Official Plan (2019)	Official Plan (2019) including: - Environmental Impact Study guidelines under Section 3.1.5 - Environmental and Natural Heritage Features under Section 3.1.4
	Guidelines for Tree Conservation & Planting (MMM 2018)

2.1 Federal Policies and Legislation

2.1.1 *Migratory Birds Convention Act (1994)*

The federal MBCA was originally adopted in 1916, updated in June 1994 to strengthen the enforcement provisions and significantly increases the penalties. The MBCA was last amended in December 2017 and the associated Migratory Birds Regulations (MBR), were most recently updated in July 2022. Together then MBCA and the MBR protect migratory bird populations and individuals by regulating potentially harmful anthropogenic activities which may cause harm to the nests, eggs, and any part of a listed bird species.

Under the MBCA, protected species are listed under Article I. In general, birds not falling under federal jurisdiction within Canada include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, kingfishers, and some species of blackbirds. However, if the species identified is protected under Ontario's Endangered Species Act, 2007 or Canada's Species at Risk Act, 2002, additional restrictions may apply.

The changes in the MBR altered the protection for nests of MBCA-listed birds. With the exception of 18 species listed under Schedule 1 of the MBR, which have year-round protection, instead of safeguarding all nests of MBCA-listed birds at all time, the new MBR protect most nests only when they are "active"; i.e., when they contain a live bird or a viable egg - generally during the breeding window (Late March – Late August with some regional variation, in the southern half of Ontario).

The changes to the MBR support conservation benefits, as the nests of most MBCA-listed birds only have conservation value when they are active. The changes also provide flexibility and predictability for stakeholders to manage their compliance requirements as they undertake activities on the landscape that may affect migratory birds and/or their nests.

Harm to a MBCA-listed bird species that results from human activities that are not directed at the birds or nests is called "incidental take" because it occurs incidental to otherwise lawful activity. Incidental take is a contravention of the MBCA.

Under specific conditions, a permit or authorization for activities that would otherwise not be allowable under MBCA or MBR can be obtained from ECCC.

MBCA - Applicability to the Project

Within Canada, the MBCA applies to activities conducted by the public and all levels of government. The killing or harming of an MBCA-listed bird or destruction / disturbance of a nest and eggs is unlawful regardless of intent. As such, the MBCA applies to the entire Subject Site and Study Area. Therefore, if a protected species or their nest is encountered during Project activities, the Project must comply with the prohibitions of the MBCA. All impacts to natural habitat (e.g., ground cover, trees, or any structure with a nest) should follow appropriate timing windows and Best Management Practices.

In the case of species list under Schedule 1, targeted surveys and mitigation measures may be required to ensure nests are not impacted. Regardless of the time of year, nests of these species may only be removed with a permit from the ECCC.

2.1.1.1 Migratory Birds Regulations, 2022

The *Migratory Birds Regulations, 2022* (MBR) include special protection for 18 species of migratory birds (as identified in Schedule 1 of the MBR). These species are provided year-round nest protection until they can be deemed abandoned.

The MBR has also recently updated the protection for nests of MBCA-listed birds. Except for 18 species listed under Schedule 1 of the MBR, which have year-round protection, instead of always safeguarding all nests of MBCA-listed birds, the new MBR protect most nests only when they are “active”; i.e., when they contain a live bird or a viable egg - generally during the breeding window (Late March – Late August with some regional variation).

The changes to the MBR support conservation benefits, as the nests of most MBCA-listed birds only have conservation value when they are active. The changes also provide flexibility and predictability for stakeholders to manage their compliance requirements as they undertake activities on the landscape that may affect migratory birds and/or their nests.

Under specific conditions, a permit or authorization for activities that would otherwise not be allowable under the MBR can be obtained from ECCC.

MBR – Applicability to the Project

As per the MBR, Pileated Woodpecker have year-round nest protection, unless they have been shown to be abandoned. To be considered abandoned: 1) The Minister must be notified, via an online registration system (the Registry for Abandoned Nests), that the nest does not contain a live bird or viable egg; and 2) The nest is to remain unused by migratory birds during the designated wait time for the species that created the nest (i.e., 36 months for Pileated Woodpecker).

With respect to this Project, the only MBR Schedule 1 species with potential to nest in the Study Area is Pileated Woodpecker.

2.1.2 Species at Risk Act, 2002 (SARA)

The federal SARA was adopted in 2002 and last amended in February 2023. The purposes of SARA are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are Extirpated, Endangered, or Threatened as a result of human activity, and to manage species of Special Concern to prevent them from becoming Endangered or Threatened. Those species listed as Threatened, Endangered, or Extirpated under Schedule 1 are afforded both individual and habitat protection under SARA on federal lands. Additionally, outside of federal land, Section 58 of SARA affords protection to critical habitat of:

- Species of migratory birds protected by the Migratory Birds Convention Act, 1994 that fall under Schedule 1 of SARA; and
- Aquatic species that fall under Schedule 1 of SARA.

A permit, or authorization, for activities that would otherwise not be allowable under SARA can be obtained from ECCC.

SARA – Applicability to the Project

The Study Area is not on federal land and the Subject Site does not provide critical habitat to any federally listed bird or fish species (DFO 2023, ECCC 2023).

2.1.3 Fisheries Act, 1985

The federal *Fisheries Act* was established in 1985. On August 28, 2019, provisions of the new *Fisheries Act* came into force including new protections for fish and fish habitat in the form of standards, codes of practice, and guidelines for projects near water. The *Fisheries Act* provides protection to fish and fish habitat such that:

> *"No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat" (Section 35 (1)).*

Fish habitat is defined by the *Fisheries Act* as:

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

The *Fisheries Act* requires that any work, undertaking, or activity avoid harmful alteration, disruption, or destruction of fish habitat unless authorized by Fisheries and Oceans Canada.

Fisheries Act - Applicability to the Project

The Fisheries Act governs all fish habitat (as defined above) within Canada. The Fisheries Act applies to the Subject Site and Study Area where watercourses / drainage features provide fish habitat (as defined above).

The Subject Site contains mapped watercourses, drainage features, and wetlands which may provide direct, or indirect fish habitat. It is anticipated that alterations to watercourses will occur, and that surface water within the Subject Site will be redirected to stormwater management infrastructure that will discharge into the Mississippi River.

The Project must comply with the prohibitions of the Fisheries Act. All impacts (i.e., in-water works, clearing of vegetation etc.), and should follow appropriate timing windows and Best Management Practices. Watercourse alterations typically require a 'Request for Review' be submitted to DFO. Depending on the type, magnitude, duration, and extent of impacts a permit/authorization may be required. Otherwise, a "Letter of Advice" is issued.

2.2 Provincial Policies and Legislation

2.2.1 Fish and Wildlife Conservation At, 1997 (FWCA)

The Ontario *Fish and Wildlife Conservation Act* (FWCA) was established in 1997 and most recently amended in June 2023. The FWCA is managed by the MNRF and applies to 'wildlife' which is defined as:

> *"an animal that belongs to a species that is wild by nature and includes game wildlife and specially protected wildlife" (Section 1 (1)).*

Those species considered "specially protected wildlife" include those specially protected amphibians, birds, invertebrates, mammals, and reptiles, as identified within Schedules 6 to 11 under the FWCA.

Under the FWCA, it is also illegal to destroy, take, or possess the nests, eggs, or young of most native bird species in Ontario without a permit. This includes stick nests constructed by birds such as hawks, owls, ospreys, eagles, and herons.

A permit, or authorization, for activities that would otherwise not be allowable under the FWCA can be obtained from MNRF.

FWCA – Applicability to the Project

During the wildlife active period, typically spring through autumn, the probability of wildlife being found in the Subject Site and not leaving on their own accord is low. Handling and/or relocation of wildlife (fish) may be required for this Project.

Works that directly impact watercourses and wetlands typically require the relocation/ salvage of wildlife. Consultation with MNRF would be required to obtain the necessary permits and approvals under the FWCA.

2.2.2 Endangered Species Act, 2007 (ESA)

The Ontario ESA first came into effect on June 30, 2008 and was last amended in January 2022. Section 9 of the ESA protects members of species listed as Endangered, Threatened, or Extirpated on the Species at Risk in Ontario List. Section 10 of the ESA prohibits the damage or destruction of the habitat of species listed as Endangered or Threatened. Species listed as Special Concern provincially are not afforded protection under the ESA.

In July 2019, amendments to the ESA came into effect through the *More Homes, More Choice Act*, and changes implemented in December 2021 enabled the payment of species conservation charges to the Species at Risk Conservation Fund and streamlined certain conditional exemptions for activities impacting prescribed SAR.

A permit, or authorization, for activities that would otherwise not be allowable under Sections 9 or 10 of the ESA can be obtained from MECP.

ESA - Applicability to the Project

Results from field investigations for this project suggest there are no SAR or SAR habitat confirmed present on the site, therefore an ESA permit is not needed for the Project.

2.2.3 Planning Act, 1990

The *Planning Act* was passed into law in 1990 and was recently amended in April 2022 by the *More Homes for Everyone Act*, with the most recent amendment in 2023. The *Planning Act* is provincial legislation that sets out the ground rules for land use planning in Ontario. It describes how land uses may be controlled and who may control them.

The *Planning Act* is the foundation for creating plans that guide development at both regional and municipal levels.

Planning Act - Applicability to the Project

The Subject Site contains wetlands, and headwater drainage features (fish habitat) which is a provincially regulated natural heritage features. No linkage features are mapped within the Study Area.

As the authority on this matter the Municipality of Mississippi Mills in conjunction with the MVCA will determine the permissible impacts and compensation requirements for the impacts to natural heritage features, linkages and SWH through their municipal official plan.

2.2.3.1 Provincial Policy Statement, 2020 (PPS)

Under Section 3 of the Planning Act, the Ministry of Municipal Affairs and Housing issued the PPS. The PPS came into effect in 1995 and was most recently amended in May 2020. The PPS offers general policy guidelines about provincial concerns related to land use planning and development. Regional plans, municipal official plans, and the PPS collaborate to establish and protect natural heritage features.

The PPS identifies seven natural heritage features and provides planning policies for each under Natural Heritage, Policy 2.1. These features are:

- Significant wetlands (including coastal wetlands);
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat (SWH);
- Significant areas of natural and scientific interest;
- Significant habitat of Endangered and Threatened species; and
- Fish habitat.

Each of these features is afforded varying levels of protection subject to guidelines and/or regulations. Municipalities are the primary lead for implementing provincial policies, such as the PPS and other planning-related policies, through their official plans. Generally, special buffers and studies are prescribed based on the natural heritage features present and the land use proposed.

PPS - Applicability to the Project

The PPS, issued under Section 3 of the Planning Act by the Ministry of Municipal Affairs and Housing, applies across the province to all projects outside of federal land.

2.2.4 Conservation Authorities Act, 1990

The Conservation Authorities Act was originally legislated in 1946 but has undergone many amendments since – most recently in November 2022 when the *More Homes Build Faster Act, 2022* received Royal Assent. Additional amendments are forthcoming on a day to be named by proclamation of the Lieutenant Governor.

Currently, Section 28 Part VI of the *Conservation Authorities Act* identifies the regulation of areas over which authorities have jurisdiction. These regulations include prohibited activities in watercourses, wetlands, etc. such as development in areas that could be unsafe due to natural processes associated with flooding or erosion, and interference with, or alterations to, watercourses, wetlands, or shorelines.

Currently, each of Ontario's 36 conservation authorities has its own Section 28 Ontario Regulation (O. Reg.), which is consistent with the provisions in the current *Conservation Authorities Act* and the Province's "content regulation" for conservation authorities (*O. Reg. 97/04*).

Conservation Authorities Act - Applicability to the Project

In the Study Area, the Conservation Authorities Act is applied through the Mississippi River Conservation Authority (MVCA) Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Regulation O. Reg. 153/06. Proposed Project activities within the regulated areas will require authorization from the governing conservation authority.

Consultation and approvals from the MVCA is required were there are impacts, or encroachment, into 'regulated areas'. MVCA

2.2.4.1 Mississippi Valley Conservation Authority Regulation Policies, 2019

MVCA planning and regulation policies prohibit development in or near areas that may be affected by flooding, erosion, or dynamic beaches. This includes areas within the 100-year flood level and allowances to accommodate shoreline movements, watercourse meanders, or unstable slopes. Wetlands are regulated with a buffer zone, i.e., 120 m for PSW and 30 m for all other wetlands. The regulation allows for permits to be issued by the Conservation Authority granting permission to straighten, change, divert, or interfere with the existing channel of a river, creek, stream, or watercourse, or to change or interfere with a wetland if the opinion of the authority is that this will not affect the control of flooding, erosion, dynamic beaches, pollution, or the conservation of land (*MVCA Regulation 153/06* under *O. Reg. 97/04*).

MVCA Planning and Regulation Policies and Guidelines - Applicability to the Project

The Subject Site contains a mapped unevaluated wetland, mapped headwater drainage features, and is within the MVCA Regulated Area as seen in ***Figure 1-1****. As such, a permit / authorization will be required prior to development and site alteration in this area.*

2.3 Municipal Policies and Legislation

2.3.1 Municipality of Mississippi Mills Official Plan, 2019

Section 3.1.4 of the Municipality of Mississippi Mills Official Plan (OP) outlines the natural environment, and natural heritage features that are protected by means of land use designations. It outlines policy guidelines aimed at conserving and protecting its natural landscape through municipal processes related to land use planning and development.

Municipal official plans, and municipal guidelines relating to the Municipality's natural heritage collaborate with the PPS to establish and protect natural features.

The OP identifies 7 natural heritage features and provides planning policies for each. These features are:

- Provincially and Locally Significant Wetlands,
- Endangered or Threatened Species Habitat,
- Areas of Natural and Scientific Interest (ANSI),
- Significant Woodlands and Vegetation Cover,
- Fish Habitat,
- Wildlife Habitat, and
- Significant Valleylands.

Sections 3.1.5 of the Municipality's OP outlines the policies and requirements for Environmental Impact Studies. An EIS shall be prepared to support planning applications.

2.3.1.1 Guidelines for Tree Conservation and Planting, 2022

The Municipality requires a Conservation and Tree Planting Plan for residential, commercial, and industrial land development. This guideline document provides guidance for the development of Landscape Plans, including planting targets, tree planting guidelines, and recommended species.

Municipality of Mississippi Mills Official Plan, Policies and Guidelines - Applicability to the Project

The Municipality of Mississippi Mills Official Plan (2019) includes the Study Area. Natural Heritage Features are identified within the Subject Site including potential wetlands, and watercourses, which includes floodplains.

The proposed Project activities are expected to impact the Natural Heritage Features identified in the Municipality's OP.

In accordance with the policies of Section 3.1.5 of the Municipality's OP, "Where a development proposal could affect certain natural heritage features or land adjacent to such features and areas, an Environmental Impact Study (EIS) shall be conducted to determine whether or not the development shall have negative effects on the natural heritage features or areas."

3 Secondary Source Review

A desktop review of the existing natural environment features identified within the Study Area was completed prior to field investigations to inform the studies require for this EIS. The resources reviewed are included in **Table 1-2** above. The following subsections outline the relevant natural heritage background.

3.1 Historic Land Use

A desktop review of recent and historic aerial imagery highlights the land use within and adjacent to the Study Area and provides an understanding of the context of the natural heritage features and changes over time. From this review, it was determined that the Subject Site has predominantly been used for agricultural purposes dating back to 2005, and likely far earlier (**Figure 3-1**).

The Subject Site itself and the field to the northwest maintains a recent but steady history in agricultural practices. Residential dwellings to the southeast have remained constant between 2005-2022 and have not withstood further development or urbanization. The woodlot to the southwest has similarly remained untouched over the observed period.

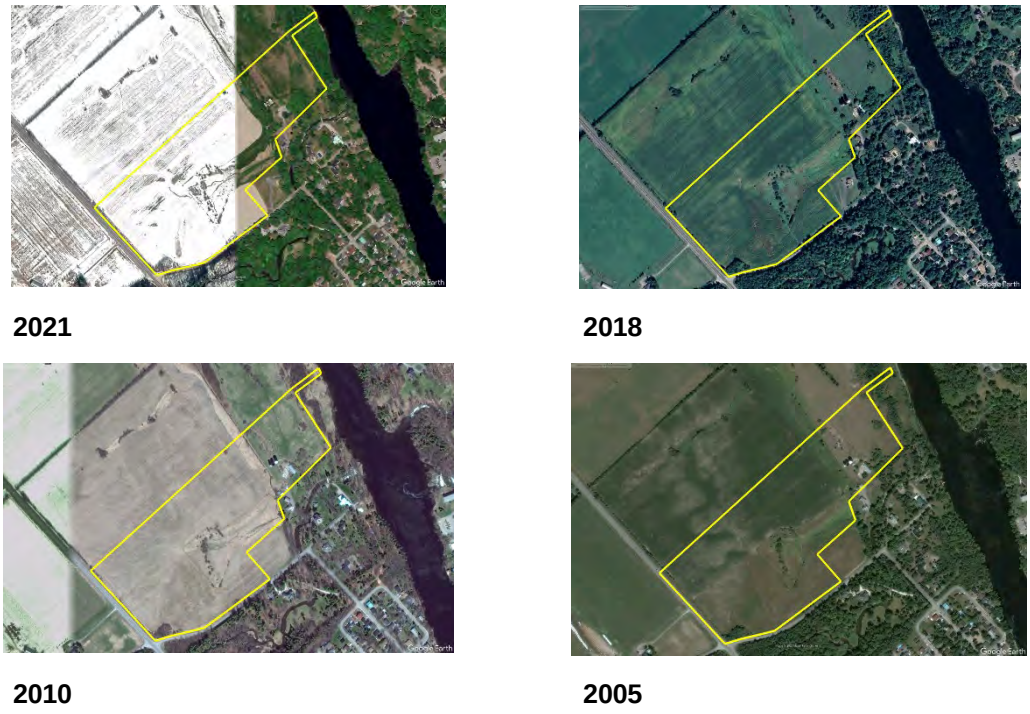


Figure 3-1: Land Use Change (Google Earth Pro 2022)

3.2 Landform, Soils and Geology

The Study Area generally gently slopes northeast towards the Mississippi River with the exception of stretches of the existing Almonte Riverside Trail that feature more exaggerated slopes. Existing entirely within the Clay Plains physiographic region (MENDM, 2007), the surficial geology of the Study Area is predominantly composed of Paleozoic Bedrock (10 ha) with an inclusion of Fine-textured Glaciomarine Deposits (5.5 ha) in the northwestern corner of the property (MENDM, 2010). The underlying bedrock of the Study Area is part of the Oxford Formation, consisting of dolomite, minor shale, and sandstone (MENDM, 2010).

Overall, the Study Area is comprised of neutral, coarsely textured materials, with layers of silty sediments. Low infiltration rates are expected within the northwestern quadrant of the Study Area due to the physiographic findings of fine-textured soils. Further information on the geology and associated influences on this project may be found within the Geotechnical report prepared by Paterson Group (January 2023).

3.3 Aquatic Environment

Within the context of this report, aquatic environment includes inland surface water and ground water, as well as the characteristics of the water and organisms / wildlife living within the water. The following subsections describe the aquatic feature at a watershed and site-specific scale.

3.3.1 Floodplain and Regulated Limit

The MVCA is the governing body that regulates zones with potential for flooding, protects associated natural features, and restores and enhances ecosystems within the Mississippi Valley watershed. Development within these regulated areas is governed by O. Reg. 153/06 Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses.

The Study Area lies within the Mississippi River – Lower Mississippi Watershed (MVCA 2022). Although this subwatershed acts as a major tributary to the Ottawa River, apart from Wolf Grove Creek, the Study Area only contains portions of ephemeral water features including two unevaluated wetlands and associated drainage features. Due to their small catchment areas, these features do not provide significant contributions to the overall watershed. Illustrations of the above listed features and corresponding MVCA regulation limits are found within **Figure 3-2**.

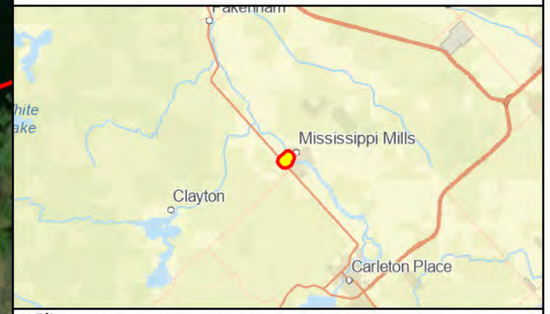
Legend

- Watercourse
- Wolf Grove Creek (NHIC)
- MVCA Regulation Limit (MVCA)
- Unevaluated Wetland (MVCA)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000



Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Mississippi Valley Conservation Authority Regulation Limit

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 3-1

3.3.2 Fish and Fish Habitat

3.3.2.1 Wolf Grove Creek

Within the Study Area, but outside of the Subject Site footprint, approximately 400 m of a tributary to Wolf Grove Creek and 600 m of Wolf Grove Creek flow eastward into the Mississippi River. Although MVCA maintains, monitors, and collects information related to water quality/quantity, fisheries resources, they did not have fisheries data for Wolf Grove Creek or its tributaries. The following fish species are present within Wolf Grove Creek based on Land Information Ontario's catch records (LIO 2018):

- Brassy Minnow *(Hybognathus hankinsoni*)
- Brook Stickleback (*Culaea inconstans*)
- Central Mudminnow (*Umbra limi*)
- Common Shiner (*Luxilus cornutus*)
- Creek Chub (*Semotilus atromaculatus*)
- Fathead Minnow (*Pimephales promelas*)
- Northern Pearl Dace (*Margariscus nachtriebi*)
- Northern Redbelly Dace (*Chrosomus eos*)
- Sculpins (*Cottus spp.*)
- White Sucker (*Catostomus commersonii*)

3.3.2.2 Mississippi River

According to the MVCA, a Walleye and Redhorse Sucker spawning area may be present where Wolf Grove Creek discharges into the Mississippi River (Mississippi Valley Conservation Authority, 2019). In addition to the small bodied species found in the Wolf Grove Creek, the Mississippi River is also known to contain larger game fish (LIO 2018), these include:

- Black Crappie (*Pomoxis nigromaculatus*)
- Bluegill (*Lepomis macrochirus*)
- Largemouth Bass (*Micropterus salmoides*)
- Northern Pike (*Esox lucius*)
- Smallmouth Bass (*Micropterus dolomieu*)
- Walleye (*Sander vitreus*)

3.3.3 Headwater Drainage Features

Mapping resources from the Municipality of Mississippi Mills (2022), NHIC (MNRF 2022), and MVCA (2022) indicate the presence of unnamed headwater drainage features within the Study Area. For the purposes of this study these features are referred to as the 'North Tributary' and the 'West Tributary' (**Figure 3-2**). To classify the features and provide appropriate management options, a headwater drainage feature assessments was completed in the spring and summer of 2023.

3.4 Designated Natural Heritage Features and Areas

Seven specific natural heritage features and areas require consideration for protection under the Ontario PPS. According to the PPS, these features and areas are important for their environmental and social values as a legacy of the natural landscapes of an area. The protection of these features is administered by the local municipality, in accordance with relevant provincial and federal legislation. These natural heritage features and areas are:

- Significant Wetlands (including significant coastal wetlands, other coastal wetlands in Ecoregions 5E, 6E and 7E);
- Fish Habitat;
- Significant Woodlands;
- Significant Valleylands;
- Habitat of Endangered Species and Threatened Species; and
- Significant Wildlife Habitat (SWH); and
- Significant Areas of Natural and Scientific Interest.

The subsections below provide a review of available background records of these seven features to determine their potential presence of these natural heritage features and areas within the Study Area. Where possible, these features and areas have been illustrated in **Figure 1-1**.

3.4.1 Wetlands

A review of the MVCA (2022b) online mapping services indicates the presence of four unevaluated wetlands within the Study Area (**Figure 1-1**). The northernmost wetland (Wetland-1) covers roughly 2.7 ha of the Study Area (5.5 ha in total) and extends to the north outside of the Study Area. Located southwest of Wetland-1, Wetland-2 covers approximately 1.23 ha of the Subject Site and is connected to Wetland-1. Wetland-3 and Wetland-4 lie outside of the envelope of the Subject Lands but remain within the Study Area. Fed by Wolf Grove Creek, Wetland-3 contains 0.36 ha of a forested region to the southeast. Similarly, Wetland-4 (0.24 ha) is bound within a forested region but lies adjacent to Wolf Grove Creek. No Provincially Significant Wetlands were identified within the Study Area.

3.4.2 Fish Habitat

A review of online provincial natural heritage mapping (NHIC) and MVCA mapping indicates the presence of fish habitat within the Study Area. A review of fish habitat can be found in Section 3.3.2 of the report.

3.4.3 Woodlands

The Municipality of Mississippi Mills Official Plan - Community Map (MMM 2022) indicates that Significant Woodlands are present within the Study Area. Three pockets of significant woodlot have been identified within the southeast section of the Study Area surrounding Wolf Grove Creek. The northernmost significant woodlot, Significant Woodland-A, encroaches 0.07 ha into the Subject Site and covers 1.47 ha of land in the Subject Area. To the southwest of Significant Woodland-A, Significant Woodland B completely resides within the Study Area covering approximately 0.85 ha. Significant Woodland C covers 4.18 ha of the Subject Lands and is situated on the southern edge of Strathburn Street.

Small Non-Significant Woodlands are found within the limits of the Subject Lands. Woodland-1 lies within the northeastern-most corner of the property and contains 0.26 ha of woodland and is partially connected to

Significant Woodland-A. Located at the south-westernmost corner of the property at the County Road 29 and Strathburn Road intersection, Woodland-3 spans 0.29 ha in total. All Non-Significant Woodlands present within the Subject Lands are smaller than the minimum 0.5 ha size requirement for Ecological Land Classification (ELC) delineation. However, all trees within the Subject Site will be subject to the Municipality's Guidelines for Tree Conservation and Planting By-Law (MMM 2018).

3.4.4 Valleylands

No Valleylands are present within the Study Area.

3.4.5 Habitat of Endangered Species and Threatened Species

A desktop review identified the potential for several Species at Risk (SAR) to occur within and adjacent to the Study Area. Under the ESA, all species listed as Threatened or Endangered in Ontario receive immediate 'general habitat protection'. This includes places that are used as dens, nests, hibernacula, or other residences. For some species, agencies have defined general habitat descriptions that provide science-based criteria for the habitat to be protected for some SAR species.

A review of aerial imagery was used to identify general candidate habitat for SAR based on the description of habitat provided. The Endangered species and Threatened species identified as having moderate or high potential to occur within the vicinity of the Study Area are included in **Table 3-1**. A complete assessment of potential for SAR and/or SAR habitat occurrence, based on the species' preferred habitat descriptions, are included in **Appendix A.**

Table 3-1: Species at Risk with Moderate-High Probability of Occurrence on the Subject Site

Common Name	Scientific Name	S-Rank	ESA Status	SARA Status
Bobolink	*Dolichonyx oryzivorus*	S3	THR	THR
Butternut	*Juglans cineara*	S2	END	END
Chimney Swift	*Chaetura pelagica*	S4	THR	THR
Eastern Meadowlark	*Sturnella magna*	S5	THR	THR

Notes:

S-Rank is an indicator of commonness in the Province of Ontario. A scale between 1 and 5, with 5 being very common and 1 being the least common.

ESA = *Endangered Species Act, 2007* Status; SARA = *Species at Risk Act, 2002* Status

END: Endangered; THR: Threatened; SC: Special Concern

3.4.6 Significant Wildlife Habitat

The MNRF has identified four categories of SWH within the SWH Criteria Schedules for Ecoregion 6E (MNRF, 2015b). They include:

- Seasonal Concentration Areas of Animals
- Rare Vegetation Communities or Specialized Habitat for Wildlife
- Habitat for Species of Conservation Concern (excluding Endangered or Threatened Species)
- Animal Movement Corridors

A preliminary assessment of candidate SWH categories to be found within the Study Area was conducted prior to field surveys to design an ecological field program for the Project. The potential for candidate SWH was reviewed

using MNRF (2015), available background information, and air-photo interpretation. Based on the preliminary assessment, there is potential for candidate SWH of: Seasonal Concentration Areas of Animals, Specialized Habitat for Wildlife, and Habitat for Species of Conservation Concern.

3.4.6.1 Seasonal Concentration Areas of Animals

Bat Maternity Colonies

The presence of mature woodlands with large cavity trees may provide suitable conditions for maternity colonies of SAR and non-SAR bats.

Reptile Hibernaculum

Rock outcrops and underground crevasses in surficial geology within the Study Area are likely to contribute to hibernating habitat for reptilian species. These features need to penetrate below the frostline to provide functional habitat.

3.4.6.2 Specialized Habitat for Wildlife

Amphibian Breeding Habitat

The presence of wet forest community, headwater drainage features, and marsh wetland communities may provide the ephemeral water may provide habitat for amphibian breeding.

3.4.6.3 Habitat for Species of Conservation Concern

The Significant Wildlife Habitat Technical Guide (MNR, 2000) defines Species of Conservation Concern as globally, nationally, provincially, regionally, or locally rare (S-Rank of S2 or S3). S-Ranks are an indicator of commonness within the province of Ontario, on a scale of 1-5. S2 represents a species that is considered imperiled within Ontario. S3 represents a species considered as vulnerable within Ontario. Species of Conservation Concern does not include SAR (listed as Endangered or Threatened under the ESA, 2007).

A review of background data suggests that candidate SWH for breeding birds and insects of Special Concern may occur within or adjacent to the Study Area. Those species identified have potential to be associated with the forest and meadow community. **Appendix A** provides a list of Species of Conservation Concern with occurrence records within and/or adjacent to the Study Area.

Table 3-2: Species of Conservation Concern with Moderate-High Probability of Occurrence on the Subject Site

Common Name	Scientific Name	S-Rank	ESA Status	SARA Status
Eastern Wood-Peewee	*Contopus virens*	S4B	SC	SC
Grasshopper Sparrow	*Ammodramus savannarum*	S2	SC	SC
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR

3.4.6.4 Animal Movement Corridors

Animal movement corridors are elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another, including but not limited to riparian zones, shorelines, wetland buffers, woodlands, fencerows, and windbreaks (MNR 2000). The Natural Heritage Component of the Provincial Policy Statement states that natural connections between natural features should be maintained and improved where possible. However, as per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015), Animal Movement Corridors should only be identified as SWH where a Confirmed or Candidate SWH has been identified by MNRF or the planning authority based on documented evidence of a habitat identified within the MNRF's Criterion Schedules or the Significant Wildlife Habitat Technical Guide (MNR 2000).

No Animal Movement Corridor SWH has been identified by MNRF or the Municipality.

3.4.7 Areas of Natural and Scientific Interest

No Areas of Natural and Scientific Interest are present within the Study Area.

3.5 Terrestrial Environment Features

3.5.1 Trees

A review of aerial imagery suggests that the Study Area contains deciduous, and mixed woodland areas in addition to smaller tree stands throughout the pastures and meadows.

3.5.2 Wildlife

In addition to the SAR noted above, a review of current and historic aerial photos of the Study Area were used to identify potential wildlife habitat. Several species of fauna common to the rural and urban areas are known to make use of the habitats present within the Study Area. These species may include, but are not limited to:

- **Mammals**: Raccoon, White-tailed Deer, Coyote, Black Bear, Eastern Gray Squirrel, and Eastern Cottontail.
- **Reptiles & Amphibians**: American Toads, Spring Peeper, Grey Tree Frog, and Eastern Gartersnake.
- **Birds**: American Crow, Black-capped Chickadee, Blue Jay, Song Sparrow, Field Sparrow, Red-Tailed Hawk, Common Raven, Wild Turkey, Pileated Woodpecker, Yellow-bellied Sapsucker, Hairy Woodpecker, and Northern Flicker.

3.5.3 Ecological Linkages

The PPS declares that ecological linkages are intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems.

A review of desktop resources and aerial photos suggests that functional ecological linkages are limited within the Study Area. Core natural areas surrounding the Subject Site are fragmented by roadways and residential buildings. Furthermore, the agricultural use within the majority of the Subject Site leaves little opportunity for connectivity to the surrounding natural heritage features. Limited connectivity is provided between the wetlands on the Subject Site, and significant woodland (**Figure 1-1**) and Wolf Grove Creek, outside the Subject Site.

4 Field Methodology

Based on the description of the existing natural environment outlined above, natural heritage surveys were scoped to assess the potential impacts of the proposed development on the natural environment. These surveys followed industry standard protocols and are intended to establish baseline conditions.

4.1 Scope of Work

Based on the description of the existing natural environment outlined above, the natural heritage surveys outlined below have been completed to assess the impacts of the proposed development on the natural environment. These surveys followed industry standard protocols and are intended to establish baseline conditions.

The results of the following surveys will be used to evaluate the potential for negative impacts from the proposed development project.

- **Aquatic Environment**
  - Headwater Drainage Feature Assessment
- **Terrestrial Environment**
  - ELC and wetland community delineation
- **Surveys for identification of potential SWH:**
  - Breeding Bird Surveys
  - Amphibian Breeding Surveys
  - Snake visual encounter surveys
  - Bat habitat assessment
  - General habitat assessment for Species of Conservation Concern
  - Incidental wildlife and wildlife habitat observations
- **Species at Risk:**
  - Identification of Species at Risk and potential Species at Risk habitat, including;
    - Butternut search and health assessment
    - Bat habitat assessment and acoustic monitoring
- **Incidental Wildlife**
  - Visual and auditory observations of wildlife

4.2 Aquatic Environment

Aquatic environment including fish community, fish habitat, and headwater drainage features will be assessed using the Toronto and Region Conservation Authority and Credit Valley Conservation protocol, '*Evaluation, Classification and Management of Headwater Drainage Features Guidelines*' (Toronto and Region Conservation Authority and Credit Valley Conservation, 2014). Field surveys were be carried out following the rapid assessment method, which utilizes the Unconstrained Headwater Sampling (Section 4, Module 11) methodology in the Ontario Stream Assessment Protocol (OSAP) (Stanfield, 2017).

Two surveys were conducted as outlined in the OSAP manual between April and August 2023 to assess baseline conditions.

4.3 Designated Natural Heritage Features

4.3.1 Wetlands

The boundary of the wetlands within the Study Area was defined using the methods described in the Ontario Wetland Evaluation System – Southern Manual (Ministry of Natural Resources and Forestry, 2022). However, wetland communities were characterized using the ELC system for Southern Ontario (Lee, et al., 1998), and described in **Section 4.4.1**.

4.3.2 Fish Habitat

Fish habitat was evaluated as per the protocols described in **Section 4.2** of this report.

4.3.3 Woodlands

As per the Comprehensive Zoning By-law (11-83) of the Town of Mississippi Mills, the Study Area is located within a zoned residential area for development. Significant woodland features were identified using digital data provided by the MNRF and will be ground checked in accordance with the *Community Official Plan* (Section 3.1.4.4). As applicable, mitigation measures will be aligned with the Significant Woodlands and Vegetation Cover General Policies which govern development and forestry resources (*Community Official Plan* Section 3.1.4.4.1).

The ELC delineation will be used to determine the size of woodlands and historic aerial imagery and tree inventories will be used to estimate the age.

4.3.4 Habitat of Endangered Species and Threatened Species

4.3.4.1 Bobolink and Eastern Meadowlark

Three diurnal breeding bird surveys conducted within the Study Area followed the methods outlined in the *Ontario Breeding Bird Atlas Guide for Participants* (Cadman et al 2007) and were completed between late May and early July. Specifically, breeding bird surveys consist of three-minute point counts that are used to establish quantitative estimates of bird abundance in habitat types within the Study Area. To supplement the surveys, area searches of the habitat are completed using binoculars to observe species presence and breeding activity. Area searches involved noting all individual bird species and their corresponding breeding evidence while traversing the habitat on foot.

4.3.4.2 Butternut

Arcadis biologists conducted systematic searches for Butternut throughout the Study Area between July and August 2023.

The surveys consist of walking throughout the Study Area and identifying Butternut specimens. Once located, qualified biologist performed a Butternut Health Assessment (BHA) and followed guidelines outlined in *Butternut Health Assessor's Field Guide* (MNRF, 2015) and *Butternut Assessment Guidelines: Assessment of Butternut Tree Health for the Purposes of the Endangered Species Act, 2007* (MNRF, 2014).

4.3.4.3 Species at Risk Bats

To assess for candidate bat maternity colony habitat, a snag/cavity tree count was conducted within the forested habitats and followed the methodology outlined in the *Bat Survey Methodology – Hibernacula and Maternity Roosts informal publication distributed by the MNRF* (Ministry of Natural Resources and Forestry, 2015).

The survey is intended to count snag/cavity trees to ascertain whether the habitat is candidate SWH for maternity colony habitat for several non-SAR bats as well as SAR bats, including Little Brown Myotis, Eastern Small-footed Myotis, Northern Myotis, and Tri-colored Bat, which are listed as Endangered, federally, and provincially.

This survey was conducted in forested areas, during the leaf-off period, using a fixed area circular plot of a 12.6 m radius, this equates to 0.05 ha. Snag/cavity trees equal to or greater than (≥) 25 cm DB in each plot are to be recorded. The formula πr2 is applied to determine the number of snags/cavity trees per ha. If the snag density within the surveyed area is calculated to be ≥10 snags per ha, then the area should be considered candidate SWH for bat maternity colony habitat.

To supplement the snag density surveys, an acoustic survey for bats were conducted using a Wildlife Acoustic's Echo Meter Touch 2 Pro ultrasonic module. The survey involves walking transects throughout the Study Area and recording bat calls with the acoustic monitor. The survey was conducted a half-hour after sunset when bats typically emerge from roosts to forage.

The results of the acoustic surveys are used to identify bat species present within the Survey Area, including SAR bats.

4.3.5 Significant Wildlife Habitat

4.3.5.1 Seasonal Concentration Areas of Animals

Bat Maternity Colonies

The presence of candidate bat maternity colony habitat will be assessed as per the protocol described in Section 4.3.4.3 of the Report.

Reptile Hibernaculum

Visual Encounter Surveys were completed following the methodology in the *Survey Protocol for Ontario's Species at Risk Snakes* (MNRF, 2016). Surveys are completed under sunny conditions when air temperature is between 10 and 25˚C, or under overcast conditions when air temperature is between 15 and 30˚C. In the spring, surveys are to be undertaken between 9 am and 5 pm. In July and August when daytimes temperatures are above 25˚C, surveys should be carried out between 8 am and 12 pm or 5 pm and 8 pm.

4.3.5.2 Specialized Habitat for Wildlife

Amphibian Breeding Habitat (Wetland)

Amphibian monitoring followed *the Marsh Monitoring Program Participant's Handbook for Surveying Amphibians protocol* (Bird Studies Canada, 2009 Edition). In accordance with the survey protocol, three different surveys were conducted between April 15th and June 30th, with at least two weeks between each visit. Surveys begin at least one-half hour after sunset during evenings with a minimum night temperature of 5ºC, 10ºC, and 17ºC for each of the three respective surveys.

Each amphibian survey involves standing at a predetermined station for three minutes and listening for frog calls. The calling activity of individuals estimated to be within 100 m of the observation point is documented. All individuals beyond 100 m are recorded as outside the count circle and calling activity was not recorded. Calling activity is then ranked using one of the three abundance code categories:

- Code 1: Calls not simultaneous, number of individuals can be accurately counted,
- Code 2: Some calls simultaneous, number of individuals can be reliably estimated, and,
- Code 3: Calls continuous and overlapping, number of individuals cannot be estimated.

In areas where candidate amphibian habitat exists, wetlans pools will be visually examined for egg masses and amphibian larvae in conjunction with other field surveys. These searches will occur between April and June when amphibians were concentrated around suitable breeding habitat.

4.3.5.3 Habitat for Species of Conservation Concern

Diurnal breeding bird surveys conducted within the Study Area followed the methods outlined in the *Ontario Breeding Bird Atlas Guide for Participants* (Cadman et al 2007) and were completed between late May and early July (three surveys). Specifically, breeding bird surveys consist of three-minute point counts that are used to establish quantitative estimates of bird abundance in habitat types within the Study Area. To supplement the surveys, area searches of the habitat are completed using binoculars to observe species presence and breeding activity. Area searches involved noting all individual bird species and their corresponding breeding evidence while traversing the habitat on foot.

4.4 Terrestrial Environment Features

4.4.1 Vegetation Communities

Communities were delineated using aerial imagery (Google, 2023) and characterized using the ELC system for Southern Ontario (Lee et al. 1998), as applicable. The ecological community boundaries were determined through the review of aerial photography and then confirmed on-site during site visits.

The ELC protocol recommends that a vegetation community be a minimum of 0.5 ha in size before they are defined as a discrete community. Unique communities less than 0.5 ha or disturbed/planted vegetation have been described to the community level only or have been described as an inclusion or complex to an existing vegetation community. In some instances, where vegetation is less than 0.5 ha, but appears relatively undisturbed and clearly fits within an ELC vegetation type, the more refined classification was used.

In 2008, the MNRF refined their original vegetation type codes to more fully encompass the vast range of natural and cultural communities across Southern Ontario. Through this process, many new codes have been added while some have changed slightly. These new ELC codes have been used for reporting purposes in this study as they are more representative of the vegetation communities within the Study Area.

4.4.1.1 Botanical Inventory

Vegetation was inventoried in tandem with ELC surveys and a corresponding vascular plant list was compiled. All other plant species identified from other survey results are also included in the list. In addition, the vascular plants observed at the time of survey have been used to screen for any provincially rare species or SAR not previously identified within the Study Area.

Scientific nomenclature, English colloquial names, and scientific binomials of plant species generally followed Newmaster et al. (2005), with updates taken from published volumes of the Flora of North America Editorial Committee (2005) and Michigan Flora Online (2015).

4.5 Incidental Observations

In addition to those species' surveys noted above, incidental wildlife observations were noted during all site visits.

4.5.1 Wildlife and Wildlife Habitat

A wildlife assessment within the property was completed through incidental observations during all site visits. Any incidental observations of wildlife as well as other wildlife evidence such as dens, tracks, and scat were documented by means of observational notes, and photographed. Such observations help validate our conclusions on the ecological function of the Study Area.

5 Survey Results

5.1 Field Surveys

Fieldwork conducted for the EIS took place between April and September 2023, when weather conditions and timing were deemed suitable based on the survey protocols being implemented. Survey points have been mapped in **Figure 5-1** Any incidental wildlife observations made during the surveys were also documented. The dates, times, surveyor names, and weather conditions for all surveys are listed in **Table 5-1.**

Table 5-1: Summary of field visits.

Purpose Of Visit	Date	Time	Staff	Weather Conditions	Air Temperature (°C)
Wetland delineation, watercourse verification, high level ELC, preliminary vegetation inventory, general site walk	06-10-2022	10:00 AM – 4:30 PM	A.Zeller, L.Jackson, B.Semmler	Overcast with slight precipitation, Gentle breeze	20
Vegetation confirmation, watercourse verification	17-10-2022	1:00 PM – 4:15 PM	B.Semmler	Light rain, overcast, gentle breeze	9
HDF#1, PIWO Cavity Search, Bat Cavity Search, Fisheries Ax	11-04-2023	8:30 AM – 3:30 PM	B.Semmler, L.Jackson	Overcast, Strong Breeze	15
MMP #1	25-04-2023	8:30 PM – 9:30 PM	B.Semmler, L.Jackson	Moderately overcast, slight breeze	14
MMP #2	15-05-2023	9:00 PM – 10:00 PM	B.Semmler, L.Jackson	clear, slight breeze	16
BBS#1, ELC, Herptofauna Visual Encounter Survey	29-05-2023	7:45 AM – 10:00 PM	B.Semmler, L.Jackson	Clear, light breeze	14
BBS#2, ELC, HDF#2	14-06-2023	6:45 AM – 12:00 PM	B.Semmler, L.Jackson	Overcast, light breeze	18
MMP#3 + Bat survey	20-06-2023	9:00 PM – 11:30PM	B.Semmler	Clear, light breeze	22
BBS#3	07-07-23	6:30 AM – 9:30AM	B.Semmler	Overcast, light air	29
Wetland mapping	04-11-2023	9:30 AM – 1:00 PM	A.Zeller, L.Jackson	Clear, light breeze	20

Legend

- Amphibian Survey
- Headwater Drainage Feature Sample Location
- Minnow Trap Location
- Snake Habitat Feature Observation
- Snake Visual Encounter (Eastern Garter Snake)
- Breeding Bird Survey
- Mapped Headwater Drainage Feature
- Wolf Grove Creek (NHIC)
- Existing Structures
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Survey Locations

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 5-1

5.2 Aquatic Environment

5.2.1 Headwater Drainage Features

The North Tributary (BR-2, BR-3, BR-4 and BR-5) is the main headwater drainage feature observed which flows south through the middle of the property (**Figure 5-2**). This feature conveys surface water from the adjacent agricultural fields and the wetlands, through the shallow mash within the Subject Site, and into Wolf Grove Creek. Within the Subject Site, this feature flows through the highly invasive Giant Mana Grass marsh limiting the ecological function of this feature to the conveyance of flow downstream. The quality of this feature is further limited by the proximity of a highly utilized cow pasture situated 2-3 meters from the eastern bank. It's likely that overland flows contaminated by cow manure are negatively affecting water quality downstream.

Reaches BR-2, BR-3, BR-4 and BR-5 are categorized as having a management recommendation of Protection as per the Headwater Drainage Features Guidelines (CVC, 2014).

The West Tributary (**BR-6, BR-7 and BR-8**) flows from west to east through the Subject Site and into the North Tributary described above (see **Figure 5-2**). BR-6 meanders through Wetland-2 which is a dense monoculture of invasive Giant Mana Grass Marsh, conveying surface water flows from tile drains at the boundary of the agricultural fields. Site visits confirmed the presence of three tile drainage features along the eastern slope of the meadow graminoid community. Most of the reach between the delineated wetland habitat and the tile drains is largely undefined.

Reaches BR-7 and BR-8 are categorized as Mitigation, whereas reach BR-6 is classified as Conservation as per the headwater Drainage Feature Guidelines (CVC, 2014).

The detailed assessment table for all headwater drainage features is located in Appendix E.

5.3 Designated Natural Heritage Features

5.3.1 Wetlands

Four unevaluated wetland features were identified in the background review using the MVCA database as illustrated in **Figure1-1**. Wetland-1 and Wetland-2 were assessed within the Subject Site and Wetland-3 and Wetland-4 are located within the Study Area but beyond the borders of the Subject Site and were not directly investigated.

Wetland-1 is an unevaluated wetland covering approximately 5.8 ha. 2.7 ha of the wetland is located within the Study Area. A review of localized topography suggest water accumulation is due to the area's low elevation point. Tile drains from the adjacent agricultural fields direct water to Wetland-1, where water then flows into Wetland-2, then to Wolf Grove Creek and the Mississippi River. Field surveys on October 6, 2022, confirmed a heavy presence of the highly invasive Giant Manna Grass (*Glyceria maxima*) within Wetland-1 and Wetland-2. The magnitude of Rough Manna Grass's occupation greatly reduces the overall ecological function and value of Wetland-1. Displacement of SWH and SAR is expected as rapid root and foliar growth of this invasive grass limits accessibility to wetland habitat. Wetland quality is further impacted by animal waste associated with the active cow pasture along the northeastern bank of north tributary and sediment (and potentially herbicide use) within the annual row crops to the southwest of the north tributary wetland.

Legend

- Headwater Drainage Feature - Protection
- Headwater Drainage Feature - Conservation
- Headwater Drainage Feature - Mitigation
- Headwater Drainage Feature Sample Location
- Field Mapped Wetland (Arcadis 2023)
- Wolf Grove Creek (NHIC)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Headwater Drainage Feature Assessment

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 5-2

Legend

- Headwater Drainage Feature - Protection
- Headwater Drainage Feature - Conservation
- Headwater Drainage Feature - Mitigation
- Headwater Drainage Feature Sample Location
- Field Mapped Wetland (Arcadis 2023)
- Wolf Grove Creek (NHIC)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Headwater Drainage Feature Assessment

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 5-2

5.3.2 Fish Habitat

Wetlands, watercourses, and headwater drainage features were assessed for the presence of fish and fish habitat during the HDFA completed in the spring of 2023. Minnow traps were set in four reaches to assess presence of fish and were supplemented by using dip nets to search undercut banks.

Fish were captured in reaches **BR-3 and BR-4,** and the assemblage present are indicative of a warm-water fisheries. There are likely spawning grounds for minnows and baitfish species within the Subject Site. However, this reach is negatively impacted by animal waste associated with the active cow pasture along the northeastern bank of north tributary. This pasture is within 2-5 metres of the watercourse throughout this reach and likely has a significant adverse effect on water quality within this watercourse.

No fish were captures within Wolf Grove Creek at the mouth of reach **BR-1**. It is to be noted that the water levels were high at the time of assessment. Due to the high velocity of water, low in-water fish cover presence, and hardened stream banks, it is unlikely that bait fish were present within this reach at the time of assessment. However, this reach is likely fish habitat. Wolf Grove Creek is classified as a warm-water stream as per the MVCA (Mississippi Valley Conservation Authority, 2019).

Wolf Grove Creek discharges directly into the Mississippi River, and the MVCA classifies this reach of the Mississippi River as Walleye and Redhorse Sucker spawning grounds (Mississippi Valley Conservation Authority, 2019).

No fish were captured in Wetland-2 or it's associated reaches (**BR-6, BR-7 and BR-8**), in both the minnow traps and using dip nets. The wetland is almost impenetrable due to the presence of dense, invasive Giant Manna Grass. The wetland is likely contributing fish habitat.

Fish captured during HDFA assessments are summarized in **Table 5-2**.

Table 5-2: Summary of fish trap results.

Reach ID	Brook Stickleback (*Culaea inconstans*)	Central Mud Minnow (*Umbra limi*)	Creek Chub (*Semotilus atromaculatus*)
BR-1	N/A	N/A	N/A
BR-6	N/A	N/A	N/A
BR-3	N/A	1	3
BR-4	2	N/A	4

5.3.3 Woodlands

As discussed in section 3.4.2, the Natural Heritage Screening section for Significant Woodlots, mapping from the Municipality identifies three woodlands of significance are located within the Study Area (**Figure 1-1**). Only A small section of Significant Woodland-A (0.07 ha) encroaches into the Subject Site.

Records from air photo interpretation and preliminary field investigations confirms that all three Significant Woodlands are likely significant based of observed tree maturity (estimated DBH) and age of woodlot (> 40 years via. arial interpretation).

Two smaller Non-Significant Woodlands were delineated by air photo interpretation and confirmed in the field (**Figure 1-1**). Woodland-1 is partially connected to significant Woodland-A according to the Municipality. However, field observations confirmed that Woodland-1 contains young to regenerative understory species with a few mature trees suggesting a younger, non-significant stand. Although the species composition within Woodland-2 is consistent with the mixed forest community, this pocket of woodland appears to be younger and more variable in nature due to the presence of younger, and more regenerative canopy and understory species.

5.3.4 Habitat of Endangered Species and Threatened Species

5.3.4.1 Bobolink and Eastern Meadowlark

The agricultural pasture and meadow habitats found within the Study Area may provide some foraging habitat for Bobolink and Eastern Meadowlark. However, these habitats do have the characteristics these species require for nesting. The agricultural pasture is managed, and utilized by grazing cattle and as such do not possess the tall grasses and relatively undisrupted environments these species require.

The meadow habitat does provide suitable grasslands for nesting, however, the area is considered too small to provide nesting, as these species generally prefer >20 ha of contiguous meadow habitat.

During breeding bird surveys, Bobolinks were observed outside of the Study Area during Breeding Bird Survey #2 foraging, however no Bobolinks were observed directly within the Study Area.

No Eastern Meadowlarks were observed during breeding bird surveys.

The Study Area does not provide suitable nesting habitat for Bobolink or Eastern Meadowlark.

A complete list of birds observed within the Study Area is in **Appendix D.**

5.3.4.2 Butternut

No Butternut trees were identified throughout the Subject Site during field investigations.

The greater Study Area may provide suitable habitat for Butternut trees; however, no Butternut trees were observed within the Study Area.

5.3.4.3 SAR Bats

The Subject Site does not contain suitable bat maternity habitat. Suitable bat habitat may be located within the greater Study Area, within the riparian area between the Mississippi River and the Subject Site, however the habitat wasn't assessed for bat maternity habitat.

Abandoned agricultural buildings were investigated for signs of bat guano. No signs of bats were observed within abandoned buildings within the Study Area.

One round of acoustic monitoring was completed and Big Brown Bat (*Eptesicus fuscus*), Hoary Bat (*Lasiurus cinereus*) and Silver Haired Bat (*Lasionycteris noctivagans)* calls were recorded.

No SAR bats were detected throughout the Study Area.

5.3.5 Significant Wildlife Habitat

5.3.5.1 Seasonal Concentration Areas of Animals

Bat Maternity Colonies

Trees within the Subject Site were evaluated for suitability for bat maternity habitat. No trees within the Subject Site contained peeling bark, or suitable cavities for bat maternity roosts.

The mixed forest community adjacent to the Subject Site contain some mature trees which could provide maternity habitat; however, this community is located outside of the Subject Site and no formal habitat assessment was completed as there are no predicted impacts to this vegetation community.

Based on the results of the field surveys, combined with data gathered from the acoustic monitoring, it is likely that the forested communities within the Study Area provide marginal bat maternity roosting habitat.

Reptile Hibernacula

Five visual encounter surveys/cover board surveys were completed within the Study Area throughout field investigations. Survey efforts were concentrated around areas with notable rock outcrops, and in sun exposed forest edges throughout the Study Area.

Rock outcrops throughout the Study Area were generally found near wetland habitat with full sun exposure. The outcrops were generally associated with agricultural dry-stone walls, and in depressions in bedrock terrain with sparse trees or shrubs with moss or grassy hummock ground cover meaning they are generally considered suitable for hibernaculum (MNRF, 2018).

Four Garter Snakes were observed during targeted field Visual Encounter Surveys.

Based on surveys conducted by Arcadis, the Study Area contains suitable foraging and basking habitat due to the presence of pastures with low canopy cover. It is likely that there is some suitable hibernaculum habitat however, there were no observations of large concentrations of snakes.

Results of surveys conducted by Arcadis suggest that it is unlikely that significant reptile hibernacula occur within the Study Area.

5.3.5.2 Specialized Habitat for Wildlife

Amphibian Breeding Habitat (Wetland)

In accordance with the Ecoregion 6E Criterion Schedule (MNRF, 2015), three amphibian breeding surveys were completed to determine the presence of Amphibian Breeding Habitat throughout the Study Area. Amphibian Breeding Surveys were conducted for ephemeral and permanent water features that occurred within the 120 m Study Area.

Four stations were monitored on three separate occasions for frog calls to determine abundance of breeding frog populations. Species observed during these auditory surveys included four species: Spring Peepers, Grey Tree Frog, Green Frogs and Northern Leopard Frogs. A summary of species recorded, and call abundance can be found in **Table 5-3**.

Field visits confirmed the presence of an abundance of adult Northern Leopard Frogs within the Study Area.

Candidate significant wetland amphibian breeding habitat is described as the presence of a wetland (ELC Code SW, MA, FE, BO, OA and SA) greater than 500 m^2, typically isolated (>120 m) from woodland ecosites. Studies confirmed that there was the presence of three of the listed frog species (Gray Treefrog, Northern Leopard Frog and Green Frog) within the Ecoregion 6E Criterion Schedule (MNRF, 2015b). Call level codes of 3 were heard for Spring Peepers at Station MMP-1.

Based on these findings this wetland is not considered significant in accordance with the defined criteria for significant wetland amphibian breeding habitat (Ministry of Natural Resources and Forestry, 2015).

Table 5-3: Summary of amphibian breeding survey results.

Station ID	Survey Number	Species	Call Level
MMP-1	1	Spring Peeper	2
		Northern Leopard Frog	1
	2	Spring Peeper	1
	3	Grey Tree Frog	2
		Green Tree Frog	1
MMP-2	1	N/A	N/A
	2	N/A	N/A
	3	N/A	N/A
MMP-3	1	N/A	N/A
	2	N/A	N/A
	3	N/A	N/A
MMP-4	1	N/A	N/A
	2	N/A	N/A
	3	N/A	N/A

5.3.5.3 Habitat for Species of Conservation Concern

Potential habitat for the following four Species of Conservation Concern (SCC) were confirmed during the ELC assessment. Results of suitable habitat and the presence / absence of SCC within the Study Area include:

- Monarch: Areas of meadow and pasture containing marginal amounts milkweed were recorded within the Subject Site. Limited breeding and feeding habitat are located within the Study Area.

5.4 Terrestrial Habitat

5.4.1 Vegetation Communities

The ELC survey identified a total of eight vegetation communities within the Study Area, in addition to two communities that is associated with transportation and residential use.

The prominent vegetation communities within the Study Area are agricultural, forests, wetlands, and residential. All vegetation communities identified within the Study Area are considered common within Ontario. The communities documented during the preliminary ELC surveys are outlined with summaries of the abundant vegetation cover in **Table 5-4** below. The location, type, and boundaries of vegetation communities are delineated in **Figure 5-3**. Reference photos for the vegetation communities are included in **Appendix B**.

5.4.1.1 Botanical Inventory

The vegetation survey identified 119 vegetation species within the Survey Area. 58% of the species identified were evaluated as being common within Ontario, having S-Ranks of S4 or S5. 42% of the species identified are considered as non-native or invasive in Ontario.

28% of the species identified within the Subject Site had a coefficient of wetness between -3 and -5. This means that these plants are either facultative wetland plants that usually occur in wetlands, or obligate wetland plants that almost always occur withing wetlands.

Vascular plant species observed within the Study Area are listed in **Appendix C.**

5.5 Incidental Observations

The following incidental wildlife observations were made during 2022 and 2023 site visits:

- Barn Swallow (*Hirundo rustica*),
- Northern Leopard Frog (*Lithobates pipiens*), and
- Northern Harrier (*Circus hudsonius*).

Table 5-4: Summary of ELC species composition.

ELC Type	Total Area (ha)	Community Description
Mixed Forest (FOM)		
FOMM4-3 Dry-Fresh White Cedar Hardwood Mixed Forest	5.6	This community's canopy dominated by mature Eastern White Cedar, Swamp White Oak, American Basswood, and Sugar Maple trees. The sub-canopy features Eastern White Pine and Balsam Fir. Common Buckthorn prevails in the understory, alongside Balsam Fir, Green Ash, Sugar Maple, and Eastern White Cedar. Ground cover species include New England Aster, White Heath Aster, Canada Wild-ginger, Wild Sarsaparilla, Panickled Aster, and Star-flowered False Solomons Seal.
FOM Mixed Forest	1.0	Young to mid stages of regeneration. Canopy coverages include Trembling Aspen, American Basswood, Scots Pine, and Sugar Maple. Within the subcanopy, species such as American Elm, Common Buckthorn, and Glossy Buckthorn. The understory of this community mirrors the sub-canopy assemblages, with the addition of Common Juniper, Maple-leaved Viburnum, Scots Pine, Amur Honeysuckle, Common Prickly-ash, Virginia Creeper, and Black Walnut. Ground cover species include Common Juniper, Common Vetch, Canada Thistle, Spiny Plumeless Thistle, Spotted Deadnettle, Red-root Amaranth, and Red Fescue.
Graminoid Meadow (MEG)		
MEGM3-7 Timothy Graminoid Meadow	2.2	Timothy and other grasses, along with sub-canopy and understory shrubs such as Nannyberry, Black Walnut, Trembling Aspen, Common Buckthorn, Amur Honeysuckle, and Manitoba Maple. Graminoid groundcover species like Smooth Brome, Fringed Brome, and Fowl Bluegrass dominate, with occasional occurrences of forb species including Arctic Sweet Coltsfoot, Common Vetch, Canada Thistle, Butter and Eggs, Field Sow-thistle, and Common Burdock interspersed among the shrubbery.
Graminoid Mineral Shallow Marsh (MAS)		
MASM1-15 Giant Manna Grass Mineral Shallow Marsh	1.3	Central portions of this wetland are completely dominated by dense patches of Rough Manna Grass, a highly invasive species of concern within Ontario. This ecosite holds minimal species diversity due to the intrusive nature of Rough Manna Grass and exists as a threat to local biodiversity. Wetland and moisture tolerant vascular plant species were found bordering the dense patches of Giant Manna Grass and were inclusive of Swamp Thistle, Reed Canary Grass, Broad-leaved Cattail, Grass-leaved Goldenrod, Blue Vervain, Sensitive Fern, Fringed Brome, and Purple Loosestrife.
Deciduous Woodland (WOD)		
WODM-4 Dry-Fresh Deciduous Woodland Ecosite	2.4	This community contains young regenerative and invasive species such as Common Buckthorn, Trembling Aspen, Manitoba Maple, and Green Ash. The sub-canopy and understory of this community contain dense concentrations of Common Buckthorn, Amur Honeysuckle, Tartarian Honeysuckle, Black Locust, and Prickly Ash. Ground cover plants such as Red Fescue, Creeping Wild Rye, Wild Strawberry, Red-root Amaranth, Prickly Gooseberry, Virginia Creeper, Common Dandelion, and Common Red Raspberry
Open Agriculture (OAG)		
OAGM1 Annual Row Crops	20.3	Agricultural land use includes soybean row crops.

ELC Type	Total Area (ha)	Community Description
Open Pasture (OAGM4)		
OAGM4 Open Pasture	5.2	Species found at this location are predominantly non-native to invasive species with small occurrences of native vegetation. This community is composed of Northern Bedstraw, stonecrop species, Common Vetch, Spiny Plumeless Thistle, Common Dandelion, Common Viper's Bugloss, Smooth Brome, and Creeping Wildrye.
Transportation and Utilities (CVI)		
CVI_1 Transportation	1.7	This community represents a section of Strathburn Street, Malcolm Street, Gleeson Road, and Christian Street (Highway 29).
Residential (CVR)		
CVR_1 Low Density Residential	3	This area consists of home dwellings with large and irregular lot sizes.
Open Water (OA)		
OA Open Water	1.2	A portion of the Mississippi River.

Legend

- Giant Manna Grass Mineral Shallow Marsh (MASM1-15)
- Timothy Graminoid Meadow (MEGM3-7)
- Annual Row Crops (OAGM1)
- Open Pasture (OAGM4)
- Mixed Forest (FOM)
- Transportation-Highways & Roads (CVI_1)
- Low Density Residential (CVR_1)
- Dry-Fresh White Cedar Hardwood Mixed Forest (FOMM4-3)
- Dry-Fresh Deciduous Woodland Ecosite (WODM4)
- Open Water (OAW)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Ecological Land Classification

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 5-4

6 Description of the Project

Strathburn Almonte Regional Inc. is proposing to develop a mixed residential development including single family homes, bungalow townhomes, and two-story townhomes with a central park area and pump station, adjacent to the existing watercourse and wetland feature. The limit of development, proposed block plan, and other key infrastructure is illustrated on **Figure 6-1**.

As illustrated, the proposed plan has been developed to minimize impacts on natural features within and adjacent to the limit of development.

6.1 Construction Activities

It is assumed the development of this property will include the following major project components:

- Surveying and staking out the development.
- Clearing, excavation, and grading property to accommodate construction.
- Installation of storm water drainage network, and related infrastructure.
- Excavation to accommodate underground utilities including water, sanitary sewer, gas, and hydro.
- Installation of a storm water outlet into the Mississippi River (with associated multi-use path).
- Construction of a road crossing over the North Tributary
- Construction of buildings, driveways, and access roads.
- Landscaping and fencing.
- On-going usage and maintenance.

Legend

- Wolf Grove Creek (NHIC)
- Mapped Headwater Drainage Feature
- Sanitary Line (Approximate Location)
- Road Crossing
- Sanitary Pump Station (Approximate Location)
- Draft Plan of Development (July, 2024)
- Draft Plan Building Area (July, 2024)
- Proposed Storm Water Outlet (To be confirmed in Detailed Design)
- Subject Property
- Study Area

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Draft Plan of Subdivision

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 6-1

7 Impact Assessment and Mitigation

The following sections describe the anticipated environmental impacts associated with the proposed development and the general measures that should be considered to mitigate the associated impacts. The impact assessment and associated mitigation considers both temporary (i.e. construction related) impacts and permanent impacts associated with the occupation of the development. The anticipated impacts are illustrated in **Figure 7-1**.

7.1 Aquatic Environment

7.1.1 Mississippi River

The site plan for the proposed residential development (**Figure 6-1**) has identified the requirement for a storm water outlet into the **Mississippi River** northeast of the Subject Site**.** While the detail design and precise alignment of this required infrastructure has yet to be determined, it is expected that some negative impacts may occur along the shoreline of the Mississippi River. These include:

- The permanent installation of a storm water outlet may impact documented spawning grounds for Redhorse Sucker, and Walleye.
    - The permanent installation of a storm water headwall or similar outlet structure may cause potential direct and indirect and permanent physical impacts on aquatic and riparian habitat. However, these impacts are expected to be localized to a small area along the shoreline and is not expected limit habitat availability within this reach of the river. At this time this infrastructure associated with this feature is not expected to encroach beyond the normal highwater mark – this will be reassessed during detailed design.
    - The indirect, temporary impacts, associated with construction activities along the shoreline of the Mississippi River are also expected. Specifically, those impacts caused by erosion and sedimentation during construction. There is not expected to be an increase in erosion potential post-construction.
- A permanent contribution of storm water flows into the Mississippi River is expected to result in an increase of flows directly to the river during the 25 mm, 2-year, 5-year, and 100-year rain events (Novatech, 2024). However, given the minor contribution of this flow relative to the size of the Mississippi River, quantity control is not required.
- The direct contribution of storm water flows to the Mississippi River from the proposed development is expected to result in a net improvement in water quality. Under the existing conditions, runoff from the agricultural fields and cow pastures likely contribute a significant nutrient load to the watercourse. In the post-development condition these overland flows may still contain pollutants associated with urban runoff (e.g. road salt), however the heavy nutrient load is not expected. This change is expected to be an overall improvement. The storm water management design will be required to provide 80% total suspended solids (TSS) removal for piped storm water leaving the site.

Legend

- Study_Area_July2024
- Subject Property
- Sanitary Line (Approximate Location)
- Headwater Drainage Feature - Removal [270 m]
- Headwater Drainage Feature - Retention & Enhancement [340 m]
- Woodland Removal [0.48 ha]
- Meadow Removal [2.03 ha]
- Wolf Grove Creek (NHIC)
- Habitat Compensation Area [0.76 ha]
- Habitat Enhancement Area [1.06 ha]
- Wetland Removal [0.36 ha]
- Existing Farm Structures - Removal
- Draft Plan of Development (July, 2024)
- Draft Plan Building Area (July, 2024)

0 25 50 100 150 200

Meters

Scale: 1:3,000

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Impact Assessment

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 7-1

Proposed Mitigation Measures – Planning and Design Stage

- ✓ A Fisheries Act 'Request for Review' will be required at the detailed to address the fisheries impacts associated with the storm water outlet, specifically as is related to spawning habitat for Redhorse Sucker and Walleye. This should be completed following detailed design stage as required by DFO. At this time it is expected that the outflow and associated infrastructure will not encroach into the River, below the normal high water mark.
- ✓ Site grading should explore opportunities to supplement flows into the enhanced wetlands features associated with the North Tributary during detailed design.
- ✓ A 'Habitat Enhancement and Monitoring Plan' should be considered to reinstate areas that have been impacted by construction.
    - o The plan should include native vegetation plantings, invasive species removal, and habitat feature construction.
    - o The plan can be a subset of the required landscape plan or a stand-alone document.
    - o Plantings should include an appropriate native wetland seed mix interspersed with some potted or bare root shrub plantings around the edge of the Mississippi River.

Proposed Mitigation Measures – Construction Implementation

The following general mitigation measures are recommended to address impacts on the aquatic habitat adjacent to the development area:

- ✓ An Erosion and Sediment Control Plan should consider the specific construction related impacts from the storm water outlet on the Mississippi River.
- ✓ In water works should not be undertaken between March 15th to July 15th.
- ✓ Light-duty silt fencing (OPSD 219.110) and / or other equivalent erosion and sediment control measures should be installed at the limit of the proposed watercourse to clearly demarcate the development area and prevent erosion and sedimentation into adjacent habitats (i.e., the slope between the construction site and the Mississippi River along the northeastern property edge). Erosion and sediment control measures should be monitored weekly to ensure they are functioning properly and if issues are identified should be dealt with within 48 hours of notification.
- ✓ Construction related impacts to the watercourses or riparian habitats should be reinstated upon completion of works.
- ✓ Stockpiling of excavated material should not occur outside the delineated work area. If stockpiling is to occur outside of this area, double-row silt fencing and straw bales shall be used to contain any spoil piles to prevent sedimentation into adjacent areas.
- ✓ A spill response plan shall be developed by the contractor and implemented as required.

Proposed Mitigation Measures – Post-Construction

- ✓ All ESC measures shall remain in place until vegetation is re-established, or as directed by the environmental monitor.

Mississippi River – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, impacts from the proposed development on the Mississippi River is expected to be permanent, but negligible in the context of the greater watershed.

7.1.2 Headwater Drainage Features

The North Tributary (BR-3, BR-4) is the primary headwater drainage feature that bisects the Subject Site. This feature has been classified as **Protection** following the HDF Assessment Guidelines. This categorization means the feature should be maintained, and/or enhanced along with its riparian corridor. Based on the provided site plan, the feature will be retained within its existing channel and riparian corridor. It is understood that no net change in flow, pre- to post-development, is anticipated (Novatech, 2024). However, a road crossing of this watercourse is required to access lots in the eastern portion of the proposed development. This crossing is expected to span the full width of the feature and replace two known informal culvert crossings further downstream. The installation is not expected to have a significant impact on the aquatic habitat and may ultimately result in improved fish (and wildlife) passage. In addition, it is understood that the proposed Stone-dust Multi-use Pathway will be located at the top of the of a natural rise in elevation. As such direct impacts on the watercourse are not anticipated.

The Western Tributary conveys overland flow from the agricultural fields to the west, through the associated Giant Manna Grass mineral shallow marsh, and ultimately into Wolf Grove Creek and the Mississippi River and is made up of three reaches (**BR-6, BR-7, and BR-8**). Two reaches originating from the tile drains (**BR-7 and BR-8**) are categorized as **Mitigation** under HDF Assessment Guidelines. This categorization means the feature can be removed, but the functions of the feature should be retained through enhanced lot level conveyance measures such as vegetate swales and other LID features.

Reach **BR-6** is classified as **Conservation** under the HDF Assessment Guidelines. This categorization means the feature and its riparian corridor can be relocated and/or enhanced, and that on-site flows must be maintained or replaced using mitigation measures, or wetland creation. The drainage feature that is replicated must connect to downstream and must be replaced using natural channel design.

The proposed residential development and expected construction activities will require the permanent removal of all tile drains within the Subject Site and the proposed development of a community park, resulting in the following anticipated impacts:

- The removal of the tile drains and the capture of overland flows by the storm water infrastructure is expected to result in a permanent 50% loss of flow into this feature downstream of the proposed park (Novatech, 2024).
- The removal of approximately 250 m of stream length (**Mitigation**) whose function will be replicated using lot level controls.

Through consultation with the MVCA, it has been established that impacts to watercourses will be mitigated by enhancing approximately 350 m of watercourse length.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ A Fisheries Act 'Request for Review' will be required to address the fisheries impacts associated with enhancement of the North Tributary, the proposed stream crossing of the North Tributary, and the removal of the West Tributary. This should be completed following detailed design stage as required by DFO.
- ✓ A permit under *O.Reg 153/06* from the MVCA will be required to address the impacts within the regulated limit associated with enhancement of the North Tributary, the proposed stream crossing of the North Tributary, and the removal of the West Tributary.
- ✓ A minimum of a 45m corridor should be established to protect impacts to the watercourse. This is width is based on a 30m setback from the southwest bank and a 15 meters setback from the existing creek location to reflect effects of the pasture.
    - o As this reach is proposed to be restored, a minimum of a 15m setback from the restored channel to the future development shall be maintained as illustrated in **Figure 7-2**. This is to accommodate natural channel design within the 45m corridor established above. It is expected that approximately 350m of watercourse will be restored.
- ✓ The realigned and enhanced watercourse shall incorporate natural channel design principles, including; meanders, natural substrates, instream habitat, riparian plantings, etc.
- ✓ A qualified biologist shall review the detailed landscape and grading plans as it relates to the proposed multi-use pathway. If, during detailed design, the location of the multi-use path changes or grading changes which may have a potential negative effect on the watercourse, alternative design shall be implemented to avoid potential direct impacts.
- ✓ Site grading should explore opportunities to supplement flows into the enhanced wetlands features associated with the North Tributary during detailed design.
- ✓ The road and trail crossing of the North Tributary should be reviewed by a qualified biologist at detailed design to ensure the proposed structure does not impede fish (and wildlife) passage. Wildlife guidance fencing should be added to guide wildlife under the roadway.
- ✓ A 'Habitat Enhancement and Monitoring Plan' is required to facilitate the design, construction, and monitoring of the enhanced wetland habitat. This plan will outline the design criteria and objectives, the type and quantity of native vegetation plantings, the approach to invasive species removal, the measures of success, and the design details for any habitat or recreational features.
    - o The plan can be a subset of the required landscape plan or a stand-alone document depending on the extent of the proposed works.
    - o Plantings should include an appropriate native wetland seed mix interspersed with some potted or bare root shrub plantings around the edge of the enhanced watercourse feature.
    - o An Environmental Monitoring Program will be prepared and included as an appendix to the above noted plan. This program framework shall ensure the watercourse and wetland enhancement area is monitored for 5 years post-construction (year 1, 3, & 5). "SMART" goals will be developed to ensure that all desired outcomes and conservation targets can be evaluated.

Proposed Mitigation Measures – Construction Implementation

- ✓ An Erosion and Sediment Control Plan should consider the specific construction related impacts from the storm water outlet on the Mississippi River.

- ✓ In water works should not be undertaken between March 15th to July 15th. This applies to the storm water outlet, the North Tributary crossing, and any other construction activities within or directly adjacent to the watercourses.
- ✓ Light-duty silt fencing (OPSD 219.110) and / or other equivalent erosion and sediment control measures should be installed at the limit of the proposed watercourse to clearly demarcate the development area and prevent erosion and sedimentation into adjacent habitats (i.e., the slope between the construction site and the Mississippi River along the northeastern property edge). Erosion and sediment control measures should be monitored weekly to ensure they are functioning properly and if issues are identified should be dealt with within 48 hours of notification.
- ✓ Construction related impacts to the watercourses or riparian habitats should be reinstated as per the recommendations outlined in section 7.2.2, below.
- ✓ Stockpiling of excavated material should not occur outside the delineated work area. If stockpiling is to occur outside of this area, double-row silt fencing and straw bales shall be used to contain any spoil piles to prevent sedimentation into adjacent areas.
- ✓ A spill response plan shall be developed by the contractor and implemented as required.

Proposed Mitigation Measures – Post-Construction

- ✓ All ESC measures shall remain in place until vegetation is re-established, or as directed by the environmental monitor.

Headwater Drainage Features – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, impacts from the proposed development on the headwater drainage features is expected to be permanent, but negligible in the context of the greater watershed due to the proposed enhancement of the existing watercourse.

7.2 Designated Natural Heritage Features

7.2.1 Wetlands

The two Giant Manna Grass mineral shallow marsh wetland features identified within the Subject Site (Wetland-1 and Wetland-2) provide negligible ecological value as they contain dense monocultures of highly invasive Giant Manna Grass. Field observations confirmed that this grass has displaced most of the native wetland species and likely limits the biodiversity associated with these features.

Nevertheless, these wetland features continue to provide a flood control/storage function within the watershed. As noted above, the proposed residential development will require the permanent removal of all tile drains within the Subject Site. The removal of these tile drains is expected to result in a permanent, 50% loss of flow into the remaining portion of Wetland-2 due to the implementation of stormwater infrastructure (Novatech, 2024). This reduction in flows is expected to have a negative impact on Wetland-2 and associated hydrologic function. However, given that the predominant function of the wetland is water attenuation and flood storage, this impact can be mitigated through on-site storm water management.

Given the limited ecological value associated with Wetland-1, the impact on this feature is expected to be negligible. The one notable direct impact on this feature is associated with the construction of the road and trail crossing over

the North Tributary which will require the removal of approximately 0.02 ha of wetland, a portion of which is currently covered by an existing agricultural crossing.

The proposed residential development and expected construction activities will require the permanent removal of approximately 0.34 ha of Wetland-2, resulting in the following anticipated impacts:

- The removal of the tile drains and the capture of overland flows by the storm water infrastructure is expected to result in a permanent 50% loss of flow into Wetland-2 downstream of the proposed park (Novatech, 2024).
- Approximately 0.36 ha of wetland habitat, dominated by invasive grasses, will be removed from the Subject Site.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ A minimum of a 45m corridor should be established to protect impacts to the North Tributary and associated wetlands. This is width is based on a 30m setback from the watercourse to the southwest and a 15 meters setback from the watercourse to the northeast, reflecting negative effects of the existing cow pasture.
    - As this corridor is proposed to be restored, a minimum of a 15m setback from the restored obligate wetland planting zone to the future development shall be maintained as illustrated in **Figure 7-2**. A seasonally flooded planting zone will occupy much of the remaining restoration area.
- ✓ A 2:1 wetland compensation ratio is required to offset the loss wetland associated with the West Tributary.
    - As this restoration will include both Habitat Enhancement (restoration occurring within the Subject Property) and Habitat Compensation (restoration occurring outside of the Subject Property), the 2:1 compensation ratio shall be calculated based on the following:
        - The total habitat compensation area outside of the subject property shall be two (2) times greater than the removed wetland habitat; AND
        - The total restored wetland habitat planting zone, within both the Habitat Compensation area and the Habitat Enhancement area, shall be two (2) times greater than the removed wetland habitat.
- ✓ A 'Habitat Enhancement and Monitoring Plan' is required to facilitate the design, construction, and monitoring of the enhanced wetland habitat. This plan will outline the design criteria and objectives, the type and quantity of native vegetation plantings, the approach to invasive species removal, the measures of success, and the design details for any habitat or recreational features. It is expected that plantings will include an appropriate native wetland seed mix interspersed with some potted or bare root shrub plantings around the edge of the tributary to stabilize the channel and provided shade. The soil containing the invasive manna grass will be reused on site as fill and capped to prevent the grass from re-establishing and spreading. The plan should include native vegetation plantings, invasive species removal, and habitat feature construction.
    - An Environmental Monitoring Program will be prepared and included as an appendix to the above noted plan. This program framework shall ensure the watercourse and wetland enhancement area is monitored for up to 5 years post-construction (year 1, 3, & 5). The 5th year will only be required to monitor any interventions completed following monitoring years 1 & 3. If no interventions are required following routine post-construction monitoring, monitoring on year 5 will also not be required.

- "SMART" goals will be developed to ensure that all desired outcomes and conservation targets can be evaluated.

✓ During detailed design stormwater conveyance and site grading should explore opportunities to supplement overland flows into Wetland-1). This may include additional rear-yard drainage or hydrating the marsh through flows from the North Tributary.

✓ A permit for the removal of wetland habitat will be required from the Conservation Authority (MVCA).

Proposed Mitigation Measures – Construction Implementation

✓ Orange snow fencing or other suitable fencing should be used to delineate the construction limits from the above noted wetland setbacks. This will prevent encroachment of construction activities into the adjacent natural features.

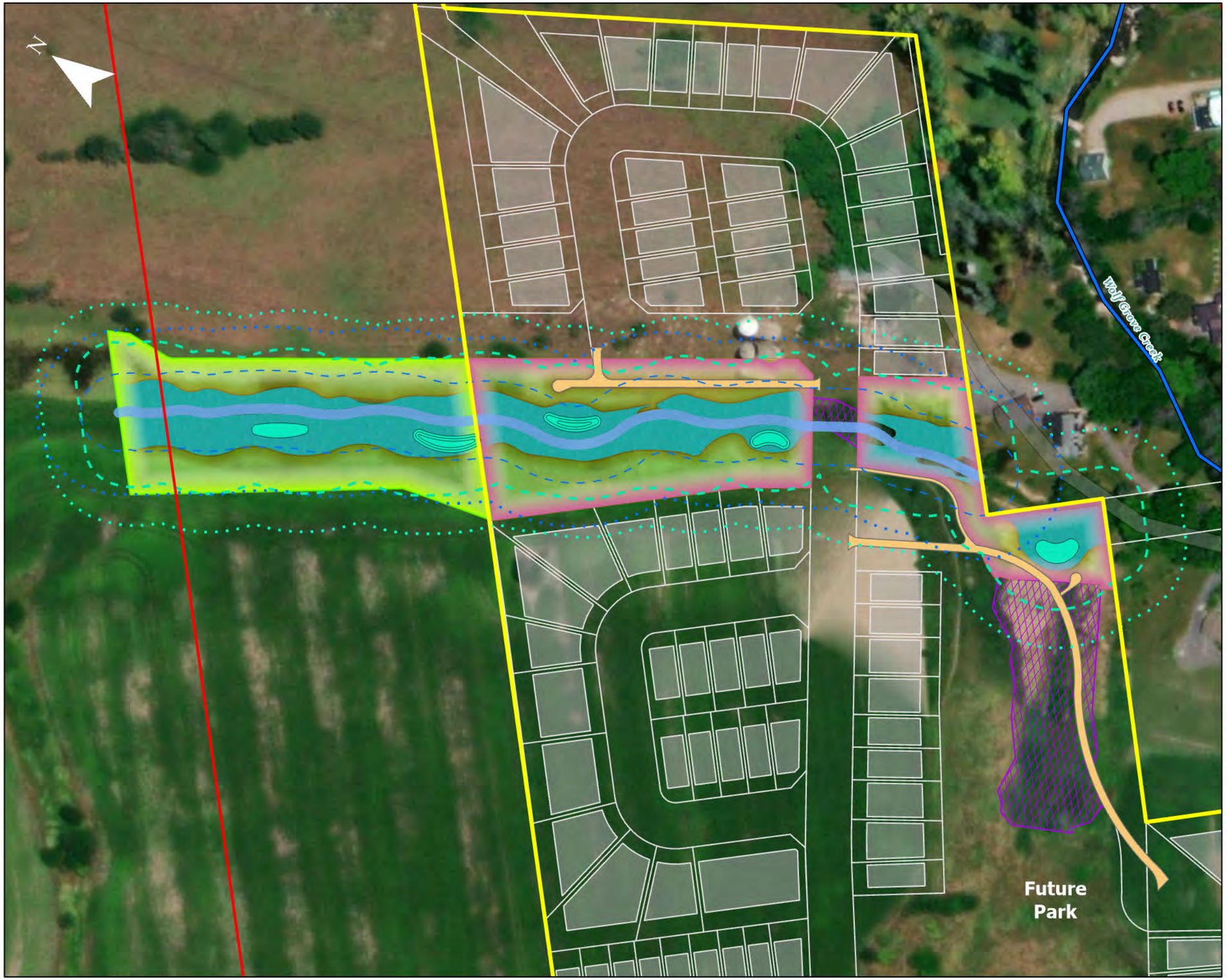
✓ Erosion and sediment control measures should be implemented to prevent sedimentation outside of work areas, specifically within the natural areas.

Proposed Mitigation Measures – Post-Construction

✓ All ESC measures shall remain in place until vegetation is re-established, or as directed by the environmental monitor.

Wetlands – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, impacts from the proposed development on the wetland features is expected to be permanent, but beneficial in the context of the greater watershed due to the proposed enhancement, and compensation of the existing wetland.



Legend

- Study Area
- Subject Property
- Draft Plan of Development (July, 2024)
- Draft Plan Building Area (July, 2024)
- Wolf Grove Creek (NHIC)
- 30m Setback from Restored Wetland Planting
- 15m Wetland Setback
- 30m Setback From Restored Watercourse
- 15m Setback From Restored Watercourse
- Restored Watercourse (4m Corridor) [0.14 ha]
- Proposed Vernal Pools (NAK, May 2024)
- Stone Dust Pathway (NAK, May 2024)
- Restoration Wetland Habtiat (NAK, May 2024) [0.75 ha]
- Restoration Seasonally Flooded Habitat (NAK, May 2024) [0.92 ha]
- Habitat Compensation Area [0.76 ha]
- Habitat Enhancement Area [1.06 ha]
- Wetland Removal [0.36 ha]

0 12.5 25 50 75 100

Meters

Scale: 1:1,500

Client:

Strathburn Almonte Regional Inc.

Title:

Brown Lands:
Habitat Enhancement and Compensation Concept

Prepared By:

ARCADIS

Project: 140876

Date: 2024-07-19

Figure: 7-2

7.2.2 Woodlands

Woodland-1 will require removal to accommodate the proposed development plan (See **Figure7-1**). Woodland-1 forms part of a larger significant woodland (SIGWOD-A) located south of the Subject Site and is associated with the Wolf Grove Creek corridor. Field investigations confirmed that this mixedwood forest community contains mature White Cedar, Eastern White Pine, Green Ash, Poplar Species, Basswood, and White Oak. Given the extent of forested lands within the landscape, the removal of this feature will have a minor permanent impact on woodland forest cover within the area. Indirect impacts on the remaining significant woodland (SIGWOD-A) may include the encroachment of invasive species.

In addition to those woodlands directly impacted by the proposed residential development, a portion of the deciduous forest located adjacent to the Mississippi River will also be impacted to accommodate the storm water outlet as discussed above. The required outlet will require a ~20 m wide corridor cleared down to the Mississippi River (see **Figure 6-1**). However, the precise location of this infrastructure will be determined during detailed design. At this time the clearing is expected to stop at the normal highwater mark.

The Significant Woodlands (SIGWOD-A, B, & C) delineated by in the Municipal Official Plan are located outside the Subject Site, but within the Study Area. Direct impacts to these features are expected to be negligible and generally temporary in nature. However, the woodlands may be subject to indirect impacts associated with nearby construction activities which may affect the fauna and connectivity within the landscape. These indirect impacts may include:

- A general decrease in local biodiversity in the area.
- Temporary increase in dust from earth works and other construction activities.
- Erosion and sedimentation into adjacent habitats.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ Impacts on the woodland should be considered when determining the specific location of the storm water outlet in advance of detailed design. This alignment can be staked in the field with the support of a qualified biologist.
- ✓ A Forest Edge Management Plan should be prepared during detailed design where development encroaches into the forest habitat.
- ✓ Grading plans should match new grades to the existing grades of the woodlot up to the Critical Root Zone (CRZ) of the edge trees were possible.

Proposed Mitigation Measures - Construction Stage

The following general mitigation measures are recommended to address impacts on the woodlands within the proposed development blocks:

- ✓ General project landscaping plans should consider use of appropriate native species to offset loss of species, biodiversity, and canopy cover from vegetation removals.
- ✓ General mitigation for vegetation removals as described in Section 7.4.1.

Woodlands – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, impacts from the proposed development on the woodland features is expected to be permanent, but negligeable.

7.2.3 Habitat of Endangered Species and Threatened Species

BOBOLINK AND EASTERN MEADOW LARK

It is anticipated that the proposed project will have no direct impacts on Bobolink, Meadowlark, or their critical/important habitat. Preliminary site investigation completed in October 2022 suggested that there no suitable nesting habitat within the Subject Site. However, there may be a negligible, non-limiting, loss of stopover and incidental foraging habitat. It is also possible that vegetation clearing may result in the displacement, injury, or death of Bobolink or Eastern Meadowlark which may be in the area incidentally.

Proposed Mitigation Measures – Construction Implementation

The following measures are intended avoid harm to grassland birds within the proposed project area:

- ✓ Vegetation clearing should be avoided between April 15th and August 15th to avoid potential physical harm to Bobolink and Eastern Meadowlark.
- ✓ Construction awareness training package should be provided to contractors working on-site. This is intended to make workers aware of potential presence of SAR and protocols if SAR are found incidentally during work activities.

Bobolink and Easten Meadowlark – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, no direct impacts are anticipated on Bobolink and Eastern Meadowlark. To ensure no incidental harm to grassland birds, work should be conducted within appropriate timing windows.

SAR BATS

Based on the habitat observed during the field investigations, it is expected that the proposed development will have no negative impacts to SAR bats within the Study Area due to loss of habitat. The clearing of Woodland-1 will likely disturb candidate foraging habitat over the course of construction. Additional impacts to bats may include:

- — Permanent, but minor, loss of candidate roost trees within forest habitat from vegetation removals.
- — Permanent, but minor, loss of naturalized foraging area within meadow and riparian habitat from vegetation removals and construction activities.
- — Potential for accidental displacement, injury, or death of bats that may be using woodlands as temporary roosting habitat during roosting period.

Mitigation During Construction

- ✓ Clearing of large trees and woodland woodlands should be avoided during the general active and maternity roosting periods for bats (May 1st to October 15th).
- ✓ Construction areas should be pre-stressed during clearing to allow SAR bats to safely leave the area.
- ✓ Environmental awareness training and materials should be provided to construction staff by a qualified biologist to make construction staff aware of safety protocols should SAR be encountered directly during construction activities.

SAR Bats – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, no direct impacts are anticipated on SAR Bats and any impacts to SAR Bat habitat will be non-limiting. To ensure no incidental harm to SAR bats, work should be conducted within appropriate timing windows.

7.2.4 Significant Wildlife Habitat

BREEDING BIRDS

It is expected that the above noted removal and disturbance to forest, thicket, and meadow within the proposed development area will result in a loss of potential nesting and foraging habitat for breeding birds. The following direct and indirect impacts on breeding birds are a possible result of the proposed development:

- The permanent loss of nesting and foraging habitat will likely result from the clearing of vegetation within the property.
- Potential physical harm to birds or birds' nests during clearing and construction activities.
- Reduced composition, distribution, and abundance of a bird species within the area.
- Predation by domestic cats during occupation.
- The increased potential for fatal bird collisions associated with building windows following construction.

Proposed Mitigation Measures – Planning and Design Stage

"Bird-friendly" building design principals should be considered in the design of the development. Potential measures may include the following:

- ✓ Bird friendly design should be incorporated as described in the City of Ottawa's bird-friendly design guidelines (City of Ottawa, 2020) or other similar standards.
- ✓ Enhanced tree planting and reforestation measures should consider bird breeding and foraging habitat within the Subject Site.

Proposed Mitigation Measures – Construction Implementation

The following mitigation measures are intended to address potential impacts to breeding birds resulting from the proposed development:

- ✓ Clearing of vegetation should be avoided during the breeding bird season, between April 15th and August 15th. Should any clearing be required during the breeding bird season, nest searches shall be conducted by a qualified person must be completed 48 hours prior to clearing activities. If nests are found, an appropriate setback will be established by the qualified professional. No work will be permitted within this setback in accordance with the federal Migratory Birds Convention Act (MBCA) (Government of Canada, 1994).
- ✓ A qualified bird rehabilitation centre should be contacted if any birds are injured or found injured during construction activity. Injured birds should be transported to a qualified for care with a small donation of money to help pay for the care (a local facility is the *Ottawa Valley Wild Bird Care Centre*).
- ✓ The construction area should be pre-stressed prior to any vegetation clearing within the proposed development area.

Breeding Birds – Impacts and Mitigation Summary

With the successful implementation of the recommended mitigation, a permanent site-wide loss of breeding and foraging habitat for birds is expected.

REPTILE HIBERNACULA

Based on preliminary observations made during field investigations, the proposed development may directly impact candidate Reptile Hibernacula for snakes. Old dry-stone walls, and rocky outcrops were observed within the open pasture and likely provide suitable habitat for snake hibernation. It's likely that other suitable hibernation habitat exists within local landscape and the removal of these features may not be limiting.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ A 'Habitat Restoration and Monitoring Plan' could consider the installation of an artificial snake hibernacula within or adjacent the development area if a suitable location can be identified. These features generally consist of burying rock and rubble below the frost line with access to the surface (i.e., PVC pipes). Snake hibernaculum should be constructed following the Ministry of Natural Resources *Best Management Practices for Identifying, Managing and Creating Habitat for Ontario's Species at Risk Snakes*.

  Note: high groundwater table and shallow bedrock may limit the installation of an artificial snake hibernacula.

Proposed Mitigation Measures – Construction Implementation

- ✓ Pre-stress the area on a regular basis leading up to construction to encourage snakes to leave the area before construction starts. Other recommendations for pre-stressing are outlined in the *Protocol for Wildlife Protection During Construction* (City of Ottawa 2015).
- ✓ Construction crews working on site should be educated on local wildlife and take appropriate measures for avoiding wildlife.

Reptile Hibernacula – Impacts and Mitigation Summary

With the successful implementation of the recommended mitigation, a permanent site-wide loss of marginal reptile hibernaculum may occur.

BAT MATERNITY COLONY SWH

Based on the concept plan and anticipated removal of removal of Woodland #1 and Woodland #2, it is expected that there will be a negligible permanent loss of available roost habitat. In addition, the preliminary field investigation identified several agricultural buildings that may provide roost habitat for bats. However, given the extent and proximity of suitable habitat in adjacent woodlands and habitats along the Mississippi River, this impact is not expected to be habitat limiting for bats in this region and the impacts are expected to be localized.

The following impacts on bat roost habitat is possible:

- Permanent loss of candidate roost trees within forested habitat from vegetation removals.
- Permanent loss of candidate foraging area within meadow habitat from vegetation removals and construction activities.
- Accidental displacement, injury, or death of bats which may be using woodlands as temporary roosting habitat during roosting period.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ Planting of native deciduous trees within the parks and opens spaces should be considered during the landscape design. Native deciduous trees provide suitable roosting habitat upon reaching maturity.
- ✓ Installation of artificial roosting structures such as large bat boxes (two per post); should considered in open areas adjacent to the restored wetland habitat. A total of 4 bat boxes (on 2 posts) is recommended.

Proposed Mitigation Measures – Construction Implementation

- ✓ Clearing of vegetation should be avoided during the general active and maternity roosting periods for bats (May 1st to October 15th).

Bat Maternity Colony – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, it is anticipated that the proposed development will result in a negligible impact to bats and bat habitat within the Study Area.

HABITAT FOR SPECIES OF CONSERVATION CONCERN

Habitat for three (3) Species of Conservation Concern (SCC) (Monarch, Grasshopper Sparrow, Eastern Wood Pewee) were encountered on-site during field investigations and candidate habitat for five (5) other SCC was identified within the Study Area. The following impacts to SCC may occur:

- Disturbance or removal of suitable breeding and feeding habitat for SCC.
- Accidental harm or injury to SCC during construction activities.

Proposed Mitigation Measures – Construction Implementation

- ✓ Clearing of vegetation should be avoided between April 15th and September 15th, to avoid potential physical harm to Monarch and Species of Conservation Concern birds during breeding and foraging seasons.
- ✓ Construction areas should be pre-stressed during clearing to allow Species of Conservation Concern to safely leave the area as per the City of Ottawa's Protocol for Wildlife Protection during Construction.

Proposed Mitigation Measures – Post-Construction

- ✓ Pesticide use should be limited, or avoided, in landscape maintenance to reduce risk of exposure to Monarch.
- ✓ The creation and distribution of an 'environmental awareness handbook' should be considered to educate homeowners about the sensitive wildlife within and adjacent to the proposed development.

Species of Conservation Concern – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, it is anticipated that there will be minimal impacts to Species of Conservation Concern.

7.3 Terrestrial Habitat

7.3.1 Vegetation Communities

To accommodate the construction of the proposed residential development, it is anticipated that the permanent removal of approximately 16 ha of native vegetation is required (**Figure 7-1**). **Table 7-1** provides a summary of the vegetation removal required to accommodate the proposed residential development.

Table 7-1: Summary of ELC communities impacted by the proposed development.

ELC COMMUNITY	VEGETATION REMOVAL (ha)
Meadow Habitats	2.03
Woodland Inclusions	0.48
Giant Manna Grass Mineral Shallow Marsh	0.36
Agricultural Communities (Row Crops and Pasture)	13

Two specific areas of clearing are required beyond what is needed for the construction of houses. The first area is a narrow (~5 m) band of 'dry-fresh graminoid meadow' (MEGM3) around the wetland area. This will be a temporary impact to accommodate the permanent installation of a 250mm sanitary line (see **Figure 6-1**). It is understood that this area will be developed as parkland with mowed grass following construction. The precise location of this underground infrastructure will be determined during detailed design.

The second specific area of vegetation removal is required to accommodate storm water infrastructure within the deciduous woodland adjacent to the Mississippi River. In this area a 15-20 m wide path needs to be cleared of vegetation to accommodate the required storm water outlet (see **Figure 7-1**). As above, the precise location of this infrastructure will be determined during detailed design.

In addition to the direct impacts noted above, the following indirect impacts associated with vegetation removal may include:

- The permanent loss of habitat for wildlife dependent upon the terrestrial communities.
- Decreased biodiversity, reduced number of species, or abundance of species.
- Erosion and sedimentation into adjacent vegetation communities.
- Permanent loss of native vegetation due to increased potential for non-native and invasive vegetation species after development.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ The impact on native vegetation should be considered when determining the precise location of the storm water outlet in advance of detailed design. This alignment should be staked in the field with the support of a qualified biologist.
- ✓ The reinstatement of native vegetation associated with the installation of the sanitary line is required. The native meadow seed mix used should be approved by a qualified biologist.
- ✓ Landscaping plans should incorporate native trees and vegetation where feasible. Opportunities for enhanced natural landscape features should be considered during detailed design. These features may include, but are not limited to, naturalized pollinator gardens, rain gardens, native vegetation adjacent to roadways, etc.
- ✓ A Forest Edge Management Plan should be prepared during detailed design in areas where development encroaches into the forest habitat. This includes the path cleared to accommodate the required storm water outlet. This is intended to re-instate the forest edge with native trees and shrubs. This should include the monitoring of the establishment of non-native and invasive species.

Proposed Mitigation Measures – Construction Implementation

The following general mitigation measures are recommended to address impacts on the terrestrial environment adjacent to the development area:

- ✓ Orange snow fencing or other suitable security fencing should be used to delineate the construction limits from the adjacent natural habitats that will be retained. This is intended to prevent encroachment of construction activities into the adjacent natural features. It is expected that this will be installed at the following specific locations:
    - o adjacent to forest habitat at the eastern limit of the Subject Site.
    - o On either side of the construction corridor required for the installation of the stormwater outlet.
    - o At the setback limits for wetlands-1 and 2, and along the setbacks associated with the North Tributary.

  The final location of the fencing shall be established during detailed design.
- ✓ Erosion and sediment control measures should be installed where necessary to prevent erosion and sedimentation outside of work areas, specifically adjacent to natural areas.
- ✓ Landscaping plans shall make use of appropriate native species where practical to offset the loss of native vegetation and biodiversity.
- ✓ Invasive species should be removed within areas being reinstated using species-appropriate methods to limit further spread and comply with invasive species legislation.
- ✓ Machinery will arrive on site in clean condition and will be free of fluid leaks, invasive species, and noxious weeds as issued through the Clean Equipment Protocol for Industry.
- ✓ Construction machinery should remain within the limit of development and stored in an area that is isolated from the Natural Heritage Feature to ensure that no deleterious substances enter the adjacent watercourses or wetlands.
- ✓ All excess construction material shall be removed from site upon project completion as required.

Proposed Mitigation Measures – Post-Construction

- ✓ Installation of garbage bins in public spaces is recommended adjacent to the development area.
- ✓ 'No Littering' (or similar) signage is recommended in parks and public spaces.
- ✓ The creation and distribution of an 'Environmental Awareness Handbook' should be considered to educate homeowners about the sensitive features and habitats within and adjacent to the proposed development.

Vegetation – Impacts and Mitigation Summary

With the successful implementation of the mitigation measures outlined above, a permanent decrease in low-quality, native terrestrial vegetation is anticipated.

7.4 Incidental Wildlife

The proposed development is expected to have negative impact on local wildlife due to the general loss of natural habitat and direct impacts related to construction activities. Potential impacts to wildlife resulting from the proposed development include the following:

- Displacement, injury, or death resulting from contact with heavy equipment during clearing and grading activities.
- Loss of general natural habitat suitable for the life processes of common urban and rural wildlife.
- Disturbance to wildlife resulting from noise associated with construction activities, particularly during breeding periods.
- Conflict between wildlife and humans following development, including mortality from vehicles.

Proposed Mitigation Measures – Planning and Design Stage

- ✓ Wildlife Guidance fencing should be included in the detailed design of the road crossing over the North Tributary to ensure small and medium sizes animals are passing safely under the roadway and away from road hazards.

Proposed Mitigation Measures – Construction Implementation

The best practices outlined in the *Protocol for Wildlife Protection during Construction* (City of Ottawa 2022) provides a reasonable basis to manage wildlife impacts during all construction activities associated with the development. The following measures are consistent with the protocol:

- ✓ Pre-stress the area on a regular basis leading up to construction to encourage wildlife to leave the area before construction starts. Other recommendations for pre-stressing are outlined in the *Protocol for Wildlife Protection During Construction* (City of Ottawa 2015).
- ✓ Orange snow fencing should be installed around the perimeter of the work area to clearly demarcate the development area and prevent wildlife from entering the construction zone. Fencing should be monitored regularly to ensure they are functioning properly and if issues are identified should be dealt with promptly.
- ✓ Perimeter fencing should not prevent wildlife from leaving the site during clearing activities by clearing the area prior to installing the fence.
- ✓ Wildlife within the construction area can be relocated to an area outside of the development into an area of appropriate habitat.
- ✓ Avoid vegetation clearing during sensitive times of year for local wildlife (e.g., spring and early summer).
- ✓ Construction crews working on site should be educated on local wildlife and take appropriate measures for avoiding wildlife.
- ✓ A qualified wildlife rehabilitation centre should be contacted if any animals are injured or found injured during construction. Injured animals should be transported to an appropriate wildlife rehabilitation centre for care with a small donation of money to help pay for the care (a local facility is the Rideau Valley Wildlife Sanctuary).

Incidental Wildlife – Impacts and Mitigation Summary

With the mitigation measures outlined above, it is anticipated that the proposed development will result in a negligible loss of rural wildlife habitat.

7.5 Cumulative Impacts

The proposed development is located within a rural area in the Municipality of Mississippi Mills and cumulative impacts must be considered in the context of the local and regional environment in which the site is situated. Much of the land surrounding the Study Area is a mix of agricultural and low-density/rural residential. The Subject Site's main land use is currently agricultural, including cropped land, and cow pastures.

Based on field assessments and available information, the removal of the natural heritage features within the Subject Property will have a moderate impact on the natural heritage system. Potential cumulative impacts to the natural heritage system resulting from the proposed development include the following:

- General loss of available habitat.
- Loss of 0.3 ha of wetland habitat features.
- Loss of 251 m of headwater drainage feature length
- Enhancement of 1 ha of wetland habitat.
- Compensation of 0.7 ha of wetland habitat.
- Increase in impervious surfaces increasing runoff potential.

Proposed Mitigation Measures – Planning and Design Stage

In addition to the mitigation measures listed above, the following mitigation should be considered to address the cumulative impacts resulting from the proposed development:

- ✓ Landscaping plans should intend to compensate for the removal of natural heritage features and vegetation; and,
- ✓ Promote the use of low-impact development practices, including permeable landscaping materials and rain capture systems like rain gardens and permeable pavers.

8 Summary and Conclusions

This report provides an evaluation of the anticipated impacts associated with the construction and long-term occupation proposed residential development located in the Municipality of Mississippi Mills, Ontario (**Figure 1-1**). The environmental impacts and mitigation are based off field investigations completed in 2022 and 2023, and a review of available desktop and background information.

Notable observations during Arcadis's field investigations include the presence of **Headwater Drainage Features** (HDF) of the Study Area, contributing to Wolf Grove Creek, and ultimately the Mississippi River. It is understood that pre-development flows are to be maintained to downstream reaches.

The SAR study confirmed the presence of habitat for three Species of Conservation Concern (Monarch, Grasshopper Sparrow, Eastern Wood Pewee). Monarch habitat was observed was recorded in the meadows throughout the Study Area. Eastern Wood-Peewees are likely using the adjacent woodlots for nesting and foraging. Pileated Woodpeckers were observed foraging throughout the Study Area; however, no nests were observed within the Study Area during field surveys.

Significant Woodlands are present within the Study Area based on the Significant Woodlands mapping from the Municipality of Mississippi Mills. Woodland patches within the Subject Site are composed of non-native and invasive species and are not considered to be significant. No impacts are predicted to Significant Woodlands within the Subject Site.

The ELC survey noted seven vegetation communities, plus an additional two that are associated with cultural uses. All the ELC communities identified are common within Ottawa. The vegetation survey results indicate an abundance of non-native species within the property in concentrated areas, invasive and non-native species comprise approximately 42% of the vegetation species recorded.

Based on this evaluation, there are opportunities for habit enhancement, particularly adjacent to the watercourses and their associated setbacks.

This includes the following:

- A minimum of a 45m corridor should be established to protect impacts to the North Tributary and associated wetlands.
- A 2:1 wetland compensation ratio is required to offset the loss wetland associated with the West Tributary. The 2:1 compensation ratio shall be calculated based on the following:
    - The total habitat compensation area outside of the subject property shall be two (2) times greater than the removed wetland habitat; AND
    - The total restored wetland habitat planting zone, within both the Habitat Compensation area and the Habitat Enhancement area, shall be two (2) times greater than the removed wetland habitat.
- In accordance with the above compensation requirement, the loss of 0.36 of wetland habitat, will be offset through the restoration of 0.75 ha of facultative wetland habitat within the 45+ m corridor and the restoration of 0.76 ha of Compensation Habitat located outside of the Subject Property. The total restoration area, including habitat Compensation and Enhancement Areas, will be 1.82 ha. (see **Figure 7-2**)
- It is expected that approximately 350m of the North Tributary will be restored or enhanced following natural channel design within the 45m corridor as illustrated in **Figure 7-2**.
- Prioritizing the retention of mature trees (DBH 30 cm or greater) where possible along the edge of Subject Site.
- Creation of pollinator habitat through the implementation of low-impact development practices such as vegetated swales where possible, to enhance habitat for wild bees and other pollinators species as well as provide opportunity for infiltration.

In addition to those measures noted above, the following supporting deliverables referenced within this EIS are required to facilitate the proposed development:

- DFO Request for Review [Required]
- MVCA alteration of watercourse permit [Required]
- MVCA Wetland Permit [Required]
- Habitat Enhancement and Monitoring Plan [Required]
- Forest Edge Management Plan [Required]
- Environmental Awareness Handbook [Recommended]

The mitigation and compensation measures described in this report have been developed to avoid or limit negative environmental impacts associated with the proposed development. This study was completed by Lindsay Jackson, HBSc., and reviewed by Alex Zeller, MSc. with technical and field assistance provided by; Brittany Semmler. HBSc. Resumes of key staff are included in **Appendix F**. The results and findings of this study have been reported without bias or prejudice. The conclusions of this study are based on our own professional opinion, substantiated by the findings of this study, and have not been influenced in any way.

Written by:

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Sr. Ecologist

Reviewed by:

Alex Zeller, M.Sc.

Associate | Manager, Natural Systems

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Appendix A – Species at Risk and Species of Special Concern Tables

Table A-5 – Species of Conservation Concern with records of occurrence within the Study Area.

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
Birds									
Bald Eagle	*Haliaeetus leucocephalus*	Require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching; sensitive to toxic chemicals.	NA	NA	SC	S2N,S4B	OBBA, eBird	No	Large tracks of continuous forest habitat adjacent to sizeable lakes and rivers are not present within the Study Area, resulting in less than suitable roosting and nesting habitat for Bald Eagles.
Barn Swallow	*Hirundo rustica*	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	THR	SC	SC	S5B	OBBA	Yes	Preferred structures for nesting and bodies of water are present within this property.
Common Nighthawk	*Chordeiles minor*	Requires open and partially open habitats, including forest openings and post-fire habitats, prairies, bogs, and rocky or sandy natural habitats, as well as disturbed areas.	THR	SC	SC	S4	OBBA	Yes	Open sandy substrate with little low-lying vegetative coverage is located within the western portion of the Subject Area.
Eastern Wood-Pewee	*Contopus virens*	Usually found in clearings and forest edges, this species breeds in nearly any type of wooded habitat including mature woodlands, urban shade trees, roadsides, and orchards, but typically prefers deciduous forest and to a lesser extent, open pine woodlands of the south and mixed hardwood-conifer forest of the north (CLO 2023).	SC	SC	SC	S5	OBBA	Yes	The mixed forest community within Significant Woodland-C may contain minimal understory vegetation ideal for this species habitation. Clearings, edges, farm woodlots and open spaces are present surrounding the Woodland.
Evening Grosbeak	*Coccothraustes vespertinus*	Mature mixed conifer forests dominated by either spruce, firs, or trembling aspens; areas with high concentrations of Spruce Budworm.	SC	SC	SC	S4	OBBA	No	No accounts of mature spruce for feeding preferences were found within the Study Area.
Grasshopper Sparrow	*Ammodramus savannarum*	Well-drained grassland or prairie with low cover of grasses, taller weeds on sandy soil; hayfields or weedy fallow fields;	SC	SC	SC	S2	OBBA	Yes	Low grass coverage with taller weeds ideal for perching were

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
		uplands with ground vegetation of various densities; perches for singing; requires tracts of grassland > 10 ha.							found in the western portion of unevaluated wetland-2. Fallow fields are also present within the property.
Rusty Blackbird	*Euphagus carolinus*	Openings in coniferous woodlands bordering bodies of water; tree- bordered marshes, beaver ponds, muskegs, bogs, fens, or wooded swamps; stream borders with alder, willow; wooded islands on lakes.	SC	SC	SC	S4B	OBBA	No	Wetland corridors present within the Study Area do not provide suitable habitat. Furthermore, no coniferous forests exist within the Study Area.
Wood Thrush	*Hylocichla mustelina*	Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m	THR	THR	SC	S4	OBBA	No	Minimal interior forest habitat is present, a lack of dense understory vegetation, or tracks of forest with trees higher than 12 m exist on this property.
Reptiles									
Eastern Musk Turtle	*Sternotherus odoratus*	Aquatic, except when laying eggs; shallow slow-moving water of lakes, streams, marshes and ponds; hibernate in underwater mud, in banks or in muskrat lodges; eggs are laid in debris or under stumps or fallen logs at waters edge; often share nest sites; sometimes congregate at hibernation sites; not readily observed.	SC	SC	SC	S3	ON	Yes	Aquatic habitat is not present within the Subject Property. Slow-moving water within the back-water areas Wolf Grove Creek may be suitable with appropriate nest sites on the banks
Midland Painted Turtle	*Chrysemys picta marginata*	quiet, warm, shallow water with abundant aquatic vegetation such as ponds, large pools, streams, ditches, swamps, marshy meadows; eggs are laid in sandy places, usually in a bank or hillside, or in fields; basks in groups; not territorial	SC	SC	N/A	S4	ON	No	Although the Study Area features a vegetation covered channelized waterway, and is flanked by sandy meadows, the Study Area provides no suitable turtle basking habitat and is contained by steep walls.
Northern Map Turtle	*Graptemys geographica*	Large bodies of water with soft bottoms, and aquatic vegetation; basks on logs or rocks or on beaches and grassy edges, will bask in groups; uses soft soil or clean dry	SC	SC	SC	S3	ON	No	Large bodies of water do not occur within the Study Area, resulting in a property that is

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
		sand for nest sites; may nest at some distance from water; home range size is larger for females (about 70 ha) than males (about 30 ha) and includes hibernation, basking, nesting and feeding areas; aquatic corridors (e.g., stream) are required for movement.							unsuitable for Northern Map Turtles.
Snapping Turtle	*Chelydra serpentina*	permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha	SC	SC	SC	S4	ON	Yes	Permanent and semi-permanent freshwater marshes occur within the Subject Property. This species may use the Study Area due to watercourse connectivity to the Mississippi River, but there is more preferred habitat for this species within the Study Area, outside the Subject Property.
Insects									
Monarch	*Danaus plexippus*	The habitat is typically a combination of field and forest and provides the butterflies with a location to rest. Caterpillars eat exclusively milkweed and adults require the nectar of wildflowers to feed.	SC	END	SC	S2	BA	Yes	Meadow communities within the Study Area contain milkweed plants that provide feeding and breeding habitat for the species. A targeted survey for milkweed abundance is required.

Notes

Orange highlighted species are protected and/or have protected critical habitat within the Study Area (i.e., the species is Threated, Endangered under the ESA, and/or the Threatened or Endangered species' critical habitat is present – including ferally listed migratory birds and fish)

1 Habitat description is sourced from the OMNR (2000) *Significant Wildlife Habitat Technical Guide*, unless otherwise cited.

2 Conservation Status:

SC = Special Concern; THR = Threatened; END = Endangered; NA = Not at Risk

Federal SARA = *Species at Risk Act, 2002* Schedule 1 unless otherwise noted. The protection and/or conservation measures afforded by SARA apply only to species listed under Schedule 1.

Federal COSEWIC = In the case that a species is not listed under Schedule 1 of SARA, but has a status recommended by the Committee on the Status of Endangered Wildlife in Canada, the uplisting of the species to Schedule 1 of SARA may be imminent.

Provincial ESA = *Endangered Species Act, 2007*.

Provincial (or Subnational) S-Rank: Subnational ranks are assigned and maintained by state or provincial NatureServe network programs.

S1 – Critically Imperiled; S2 – Imperiled; S3 - Vulnerable; S4 - Apparently Secure; S5 - Secure; B - Breeding; N - Non-breeding; ? - Uncertainty,

3 Source as listed in Table A1-1

Table A-6: Threatened or Endangered Species with records of occurrence within the Study Area.

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
Birds									
Bobolink	*Dolichonyx oryzivorus*	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha.	THR	THR	THR	S4B	NHIC, OBBA	Yes	Grassland, meadowed, and agricultural habitat is present within the Study Area. Soy fields on the property do not offer an optimal environment for the breeding and nesting of Bobolink.
Chimney Swift	*Chaetura pelagica*	Commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water	THR	THR	THR	S5	NHIC	Yes	Large structures suitable for Chimney Swift habitation are present on the property. Additionally, small rock crevices and open water are present within the Study Area.
Eastern Meadowlark	*Sturnella magna*	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	THR	THR	THR	S4B	NHIC, OBBA, eBird	No	Open grassland area greater than 10 ha is present withing the Study Area.
Eastern Whip-poor-will	Antrostomus vociferus	Dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaflitter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population.	THR		THR	S4	OBBA	No	Study Area does not contain >100 ha of forest ecosites.
Golden Eagle	*Aquila chrysaetos*	wild, arid plateaus, deeply cut by streams and canyons or sparsely treed slopes and rock crags	NAR	NAR	END	S2B	iNaturalist	No	No canyons or sparsely treed slopes with rock crags are present within the Study Area.

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm DBH; require about 4 ha for a territory	END	END	END	S4B	OBBA	Yes	The mixed forest composition of Significant Woodland-C is greater than 4 ha in size and may contain trees greater than 40 cm in DBH.
Reptiles									
Blanding's Turtle	*Emydoidea blandingii*	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft, muddy bottoms and aquatic vegetation; they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed.	END	END	THR	S3	ON	No	Study Area does not provide connectivity to hibernating habitat, nor does the Study Area contain shallow water marshes, bogs, ponds, or coves of larger lakes.
Mammals									
Little Brown Myotis	*Myotis lucifugus*	Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges.	END	END	END	S3	BCI	Yes	Study Area contains deciduous forests with large diameter trees with cavities suited for roosting, and forest edges for feeding habitat.
Northern Myotis	*Myotis septentrionalis*	Hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy.	END	END	END	S3	BCI	Yes	Study Area contains deciduous forests with large diameter trees with cavities and loose bark, suited for roosting, and forests for feeding habitat.
Tricolored Bat	*Perimyotis subflavus*	Generally solitary, females may form small colonies (< 35 individuals) during pup-rearing season. Roosts include tree cavities, caves, rock crevices, culverts, and buildings. Across most of their range, they hibernate primarily in caves and culverts. Some northern populations might migrate to southern hibernating locations (BCI 2023).	END	END	END	S3?	BCI	Yes	Study Area contains open woods near water suited for roosting and foraging.
Plants									

Common Name	Scientific Name	Habitat Description[1]	Conservation Status[2]				Source of Occurrence Record[3]	Habitat within Study Area?	Rationale for Determination of Habitat Presence
			Federal SARA	Federal COSEWIC	Provincial ESA	Provincial S-Rank			
Butternut	*Juglans cineara*	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges.	END	END	END	S2	NHIC	Yes	Moist, well-drained soil and stream banks are present within the Subject Property.

Notes

Orange highlighted species are protected and/or have protected critical habitat within the Study Area (i.e., the species is Threated, Endangered under the ESA, and/or the Threatened or Endangered species' critical habitat is present – including ferally listed migratory birds and fish)

[1] Habitat description is sourced from the OMNR (2000) *Significant Wildlife Habitat Technical Guide*, unless otherwise cited.

[2] Conservation Status:

SC = Special Concern; THR = Threatened; END = Endangered; NA = Not at Risk

Federal SARA = *Species at Risk Act, 2002* Schedule 1 unless otherwise noted. The protection and/or conservation measures afforded by SARA apply only to species listed under Schedule 1.

Federal COSEWIC = In the case that a species is not listed under Schedule 1 of SARA, but has a status recommended by the Committee on the Status of Endangered Wildlife in Canada, the uplisting of the species to Schedule 1 of SARA may be imminent.

Provincial ESA = *Endangered Species Act, 2007*.

Provincial (or Subnational) S-Rank: Subnational ranks are assigned and maintained by state or provincial NatureServe network programs.

S1 – Critically Imperiled; S2 – Imperiled; S3 - Vulnerable; S4 - Apparently Secure; S5 - Secure; B - Breeding; N - Non-breeding; ? - Uncertainty,

Appendix B – Photo Record

Photo 1: Eastern side of the Almonte Riverside Trail within the Timothy Graminoid Meadow Ecosite (MEGM3-7). The Annual Row Crop community (OAGM1) and the Dry-Fresh White Cedar Hardwood Mixed Forest (FOMM4-3); (outside of the Subject Property) are visible in the background.

Photo 2: Headwater Drainage Feature Br1 on April 11, 2023. Looking downstream at the intersection between the drainage feature and Wolf Grove Greek.

Photo 3: A segment of Br-3 looking upstream on April 11th, 2023. This Headwater Drainage Feature lies within the Field Mapped Wetland and runs under the existing Almonte Riverside Trail. This feature is dominated by Rough Manna Grass..

Photo 4: A segment of Br-3 looking upstream on June 14th, 2023. This feature is dominated by Rough Manna Grass

Photo 5: A northern segment of Br-4 looking upstream on April 11th, 2023.

Photo 6: A segment of Br-5 looking upstream on April 11th, 2023. This feature is situated in Wetland-1.

Photo 7: A segment of Br-5 looking upstream on June 23rd, 2023. New growth of Rough Manna Grass dominates the feature.

Photo 8: A segment of Br-6 looking upstream on April 11th, 2023. Slow moving water saturates the feature, which runs through Wetland-2.

Photo 9: A segment of Br-6 looking upstream on June 23rd, 2023. Slow moving water remains in the feature, which runs through Wetland-2 (Giant Manna Grass Mineral Shallow Marsh-MASM1-15).

Photo 10: A segment of Br-7 looking downstream on April 11th, 2023. Water for this feature originates from tile drains from the Annual Row Crop (OAGM1) Community to the west. Shown in this photo is some of the scrubland within the Timothy Graminoid Meadow (MEGM3-7). Glossy Buckthorn, Hawthorn Spp.'s, Nannyberries, and Honeysuckles can be observed within this community.

Photo 11: A southern segment of Br-7 looking downstream on April 11th, 2023. Slow moving water is present and accumulates in the Timothy Graminoid Meadow Community (MEGM3-7) before flowing into Wetland-2 (Giant Manna Grass Mineral Shallow Marsh-MASM1-15).

Photo 12: A pocket of Rough Manna Grass within a low-lying area with clay soil was found at the base of a hill in the Dry - Fresh Graminoid Meadow Ecosite (MEGM3). Invasive Common Buckthorn and other sub-canopy vegetation is found in small inclusions across this community.

Photo 13: Tile drains diverge water from the Annual Row Crop (OAGM1) Community into Wetland-2. Observed on April 11th, 2023.

Photo 14: A small pond located northwest of the Subject Site but still within the Study Area. Seen in the background is the Giant Manna Grass Mineral Shallow Marsh (MASM1-15) and Annual Row Crop (OAGM1) Communities.

Photo 15: Giant Manna Grass Mineral Shallow Marsh Type (MASM1-15) is visible on the right, with the Timothy Graminoid Meadow Ecosite (MEGM3-7) on the left. Topography of the hill is visible.

Photo 16: Dense monocultures of Giant Manna Grass are present within the Giant Manna Grass Mineral Shallow Marsh Type (MASM1-15)

Photo17: Dense monocultures of Giant Manna Grass are present within the Giant Manna Grass Mineral Shallow Marsh Type (MASM1-15).

Photo 18: A portion of the Almonte Riverside Trail located near the top of the hill while looking southeast. The Timothy Graminoid Meadow Ecosite (MEGM3-7) is visible on both sides of the trail.

Photo 19: Decommissioned structures are present within the property. Structures such as this have potential to house birds species such as Barn Swallow.

Photo 20: Large silos may provide habitat for SAR birds such as Chimney Swift.

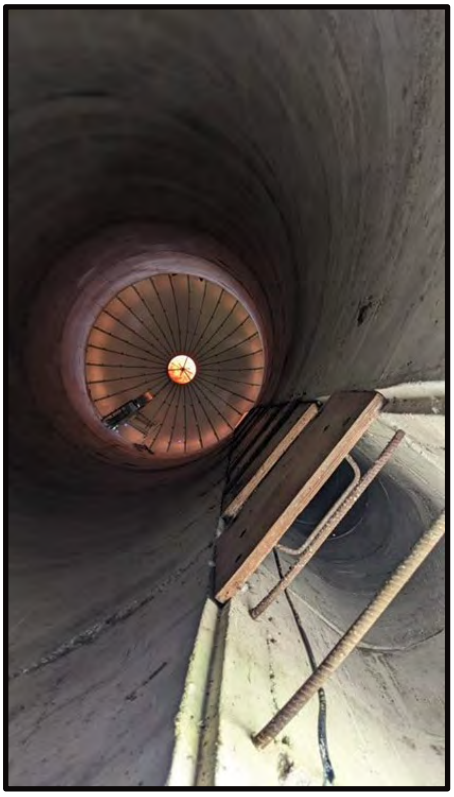

Photo 21: A pair of nesting Red Tailed Hawks were observed during the breeding bird season in 2023.

Photo 22: Eastern edge of Giant Manna Grass Mineral Shallow Marsh Type (MASM1-15) and Open Pasture (OAGM4) features a hard line of ELC division. An abundance of Prickly Ash (Zanthoxylum Americanum) divided the two ELC's.

Photo 23: Open Pasture (OAGM4) community and the property edge. Cows were observed grazing in this community.

Photo 24: Northern Leopard Frogs (Lithobates pipiens) were found around the northwestern wetland channel.

Photo 25: Eastern Garter Snakes were located under debris during Snake Visual Encounter Surveys. Located in the Open Pasture Community (OAGM4)

Photo 26: Potential herpetofauna hibernaculum is present within the Open Pasture (OAGM4) community.

Photo 27: Four ELC sites are visible from the top of the Almonte Riverside Trail looking east. Timothy Graminoid Meadow Ecosite (MEGM3-7) is present within the forefront, Giant Manna Grass Mineral Shallow Marsh Type (MASM1-15) lies behind, the Annual Row Crop community (OAGM1) is slightly beyond, and the Mixed Forest Community (FOM; outside of the Subject Property).

Photo 28: Timothy Graminoid Meadow Ecosite (MEGM3-7) from the top of the Almonte Riverside Trail looking east..

Photo 29: Annual Row Crop community (OAGM1) in the northwest of the Subject Property.

Photo 30: Tile drains pointed northeast towards the wetland within the Timothy Graminoid Meadow Ecosite (MEGM3-7).

Appendix C

Common Name	Scientific Name	SARA	SARO	S-Rank	Coefficient of Conservation	Coefficient of Wetness
American Basswood	*Tilia americana*	-	-	S5	4	3
American Elm	*Ulmus americana*	-	-	S5	3	-3
American Water-horehound	*Lycopus americanus*	-	-	S5	4	-5
Amur Honeysuckle	*Lonicera maackii*	-	-	SNA	-	5
Arctic Sweet Coltsfoot	*Petasites frigidus*	-	-	S5	8	-3
Balsam Fir	*Abies balsamea*	-	-	S5	5	-3
Balsam Poplar	*Populus balsamifera*	-	-	S5	4	-3
Biennial Wormwood	*Artemisia biennis*	-	-	SNA	-	-3
Black Ash	*Fraxinus nigra*	-	-	S4	7	-3
Black Cherry	*Prunus serotina*	-	-	S5	3	3
Black Hawthorn	*Crataegus douglasii*	-	-	S4?	7	0
Black Locust	*Robinia pseudoacacia*	-	-	SNA	-	3
Black Walnut	*Juglans nigra*	-	-	S4?	5	3
Bladder Campion	*Silene vulgaris*	-	-	SNA	-	5
Blue Vervain	*Verbena hastata*	-	-	S5	4	-3
Blunt Spikerush	*Eleocharis obtusa*	-	-	S5	5	-5
Broad-leaved Cattail	*Typha latifolia*	-	-	S5	1	-5
Butter-and-eggs	*Linaria vulgaris*	-	-	SNA	-	5
Canada Anemone	*Anemonastrum canadense*	-	-	S5	3	-3
Canada Goldenrod	*Solidago canadensis*	-	-	S5	1	3
Canada Thistle	*Cirsium arvense*	-	-	SNA	-	3
Canada Wild-ginger	*Asarum canadense*	-	-	S5	6	5
Catnip	*Nepeta cataria*	-	-	SNA	-	3
Choke Cherry	*Prunus virginiana*	-	-	S5	2	3
Common Buckthorn	*Rhamnus cathartica*	-	-	SNA	-	0
Common Burdock	*Arctium minus*	-	-	SNA	-	3
Common Dandelion	*Taraxacum officinale*	-	-	SNA	-	3
Common Juniper	*Juniperus communis*	-	-	S5	4	3
Common Lady Fern	*Athyrium filix-femina*	-	-	S5	4	0
Common Lilac	*Syringa vulgaris*	-	-	SNA	-	5
Common Milkweed	*Asclepias syriaca*	-	-	S5	0	5
Common Motherwort	*Leonurus cardiaca*	-	-	SNA	-	5
Common Mullein	*Verbascum thapsus*	-	-	SNA	-	5
Common Plantain	*Plantago major*	-	-	SNA	-	3
Common Prickly-ash	*Zanthoxylum americanum*	-	-	S5	3	3
Common Ragweed	*Ambrosia artemisiifolia*	-	-	S5	0	3
Common Red Raspberry	*Rubus idaeus*	-	-	S5	2	3
Common Timothy	*Phleum pratense*	-	-	SNA	-	3
Common Vetch	*Vicia sativa*	-	-	SNA	-	3

Common Name	Scientific Name	SARA	SARO	S-Rank	Coefficient of Conservation	Coefficient of Wetness
Common Viper's Bugloss	*Echium vulgare*	-	-	SNA	-	5
Creeping Wildrye	*Elymus repens*	-	-	SNA	-	3
Curly Dock	*Rumex crispus*	-	-	SNA	-	0
Dame's Rocket	*Hesperis matronalis*	-	-	SNA	-	3
Downy Hawthorn	*Crataegus mollis*	-	-	S4S5	4	0
Drummond Phlox	*Phlox drummondii*	-	-	SNA	-	5
Early Goldenrod	*Solidago juncea*	-	-	S5	3	5
Eastern White Cedar	*Thuja occidentalis*	-	-	S5	4	-3
Eastern White Pine	*Pinus strobus*	-	-	S5	4	3
Fall Phlox	*Phlox paniculata*	-	-	SNA	-	3
Field Bindweed	*Convolvulus arvensis*	-	-	SNA	-	5
Field Horsetail	*Equisetum arvense*	-	-	S5	0	0
Field Mustard	*Brassica rapa*	-	-	SNA	-	5
Field Sow-thistle	*Sonchus arvensis*	-	-	SNA	-	3
Fowl Bluegrass	*Poa palustris*	-	-	S5	5	-3
Foxtail Sedge	*Carex alopecoidea*	-	-	S4	6	-3
Fringed Brome	*Bromus ciliatus*	-	-	S5	6	-3
Glossy Buckthorn	*Frangula alnus*	-	-	SNA	-	0
Goldenrod spp.	*Solidago spp.*	-	-	-	-	-
Goutweed	*Aegopodium podagraria*	-	-	SNA	-	0
Grass-leaved Goldenrod	*Euthamia graminifolia*	-	-	S5	2	0
Green Ash	*Fraxinus pennsylvanica*	-	-	S4	3	-3
Jointed Rush	*Juncus articulatus*	-	-	S5	5	-5
Kentucky Bluegrass	*Poa pratensis*	-	-	S5	0	3
Lesser Duckweed	*Lemna minor*	-	-	S5?	5	-5
Manitoba Maple	*Acer negundo*	-	-	S5	0	0
Maple-leaved Viburnum	*Viburnum acerifolium*	-	-	S5	6	5
Marsh Thistle	*Cirsium palustre*	-	-	SNA	-	-3
Mosquito Bulrush	*Scirpus hattorianus*	-	-	S4	6	-3
Nannyberry	*Viburnum lentago*	-	-	S5	4	0
New England Aster	*Symphyotrichum novae-angliae*	-	-	S5	2	-3
Nodding Beggarticks	*Bidens cernua*	-	-	S5	2	-5
Northern Bedstraw	*Galium boreale*	-	-	S5	7	0
Northern Red Currant	*Ribes rubrum*	-	-	SNA	-	5
Norway Maple	*Acer platanoides*	-	-	SNA	-	5
Old-field Cinquefoil	*Potentilla simplex*	-	-	S5	3	3
Orange Daylily	*Hemerocallis fulva*	-	-	SNA	-	5
Ostrich Fern	*Matteuccia struthiopteris*	-	-	S5	5	0

Common Name	Scientific Name	SARA	SARO	S-Rank	Coefficient of Conservation	Coefficient of Wetness
Oxeye Daisy	*Leucanthemum vulgare*	-	-	SNA	-	5
Panicled Aster	*Symphyotrichum lanceolatum*	-	-	S5	3	-3
Panicled Bulrush	*Scirpus microcarpus*	-	-	S5	4	-5
Pineappleweed	*Matricaria discoidea*	-	-	SNA	-	3
Poison Ivy	*Toxicodendron radicans*	-	-	S5	2	0
Prickly Gooseberry	*Ribes cynosbati*	-	-	S5	4	3
Purple Loosestrife	*Lythrum salicaria*	-	-	SNA	-	-5
Red clover	*Trifolium pratense*	-	-	SNA	-	3
Red Fescue	*Festuca rubra*	-	-	S5	-	3
Red-root Amaranth	*Amaranthus retroflexus*	-	-	SNA	-	3
Reed Canary Grass	*Phalaris arundinacea*	-	-	S5	0	-3
Rock Elm	*Ulmus thomasii*	-	-	S4	6	0
Rough Mannagrass	*Glyceria maxima*	-	-	SNA	-	-5
Rugosa Rose	*Rosa rugosa*	-	-	SNA	-	3
Scots Pine	*Pinus sylvestris*	-	-	SNA	-	3
Self-heal	*Prunella vulgaris*	-	-	S5	0	0
Sensitive Fern	*Onoclea sensibilis*	-	-	S5	4	-3
Slender Mannagrass	*Glyceria melicaria*	-	-	S4	10	-5
Smooth Brome	*Bromus inermis*	-	-	SNA	-	5
Speckled Alder	*Alnus incana ssp. rugosa*	-	-	S5	6	-3
Spiny Plumeless Thistle	*Carduus acanthoides*	-	-	SNA	-	5
Spotted Dead-nettle	*Lamium maculatum*	-	-	SNA	-	5
Star-flowered False Solomon's Seal	*Maianthemum stellatum*	-	-	S5	6	0
Stinging Nettle	*Urtica dioica*	-	-	S5	2	0
Stonecrop Spp.	*Sedum spp.*	-	-	-	-	-
Sugar Maple	*Acer saccharum*	-	-	S5	4	3
Sulphur Cinquefoil	*Potentilla recta*	-	-	SNA	-	5
Swamp Thistle	*Cirsium muticum*	-	-	S5	8	-5
Swamp White Oak	*Quercus bicolor*	-	-	S4	8	-3
Tall Buttercup	*Ranunculus acris*	-	-	SNA	-	0
Tartarian Honeysuckle	*Lonicera tatarica*	-	-	SNA	-	3
Trembling Aspen	*Populus tremuloides*	-	-	S5	2	0
Virginia Creeper	*Parthenocissus quinquefolia*	-	-	S4?	6	3
Water Smartweed	*Persicaria amphibia*	-	-	S5	5	-5
White Ash	*Fraxinus americana*	-	-	S4	4	3
White Clover	*Trifolium repens*	-	-	SNA	-	3
White Heath Aster	*Symphyotrichum ericoides*	-	-	S5	4	3
White Spruce	*Picea glauca*	-	-	S5	6	3

Common Name	Scientific Name	SARA	SARO	S-Rank	Coefficient of Conservation	Coefficient of Wetness
Wild Red Raspberry	*Rubus idaeus ssp. strigosus*	-	-	S5	2	3
Wild Sarsaparilla	*Aralia nudicaulis*	-	-	S5	4	3
Wild Strawberry	*Fragaria virginiana*	-	-	S5	2	3
Yellow Goat's-beard	*Tragopogon dubius*	-	-	SNA	-	5

[1]S-Rank (Provincial Status (NHIC))	S1: Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province. S2: Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province. S3: Vulnerable – Vulnerable in the nation or province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation. S4: Apparently Secure – Uncommon but not rare; some cause for long term concern due to declines or other factors. S5: Secure – Common, widespread, and abundant in the province. SU: Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. SNA: Not Applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities.	
[2]Coefficient of Conservatism *Oldham, M. J., W. D. Bakowsky and D. A. Sutherland. 1995. Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Centre, Ministry of Natural Resources. Peterborough, Ontario.*	Coefficient of Conservatism. Rank of 0 to 10 based on plants degree of fidelity to a range of synecological parameters: (0-3) Taxa found in a variety of plant communities; (4-6) Taxa typically associated with a specific plant community but tolerate moderate disturbance; (7-8) Taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance; (9-10) Taxa with a high fidelity to a narrow range of synecological parameters.	
[3]Coefficient of Wetness *Oldham, M. J., W. D. Bakowsky and D. A. Sutherland. 1995. Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Centre, Ministry of Natural Resources. Peterborough, Ontario.*	-5	Obligate Wetland - Occurs almost always in wetlands under natural conditions (99% probability)
	-4, -3, -2	Facultative Wetland - Usually occurs in wetlands, but occasionally found in non-wetlands (67-99%)
	-1, 0, 1	Facultative - Equally likely to occur in wetlands or non-wetlands (34-66%)
	2, 3, 4	Facultative Upland - Occasionally occurs in wetlands, but usually occurs in non-wetlands (1-33%)
	5	Upland - Occurs almost never in wetlands under natural conditions (<1%)

Appendix D – Breeding Bird List

Common Name	Scientific Name	Conservation Status		
		Federal (SARA, 2002)	Provincial (ESA, 2007)	S-Rank[1]
American Crow	*Corvus brachyrhynchos*	-	-	S5B
American Goldfinch	*Spinus tristis*	-	-	S5B
American Robin	*Turdus migratorius*	-	-	S5B
Black-capped Chickadee	*Poecile atricapillus*	-	-	S5
Blue Jay	*Cyanocitta cristata*	-	-	S5
Bobolink	*Dolichonyx oryzivorus*	THR	THR	S4B
Brown Thrasher	*Toxostoma rufum*	-	-	S4B
Canada Goose	*Branta canadensis*	-	-	S5
Chestnut-sided Warbler	*Setophaga pensylvanica*	-	-	S5B
Chipping Sparrow	*Spizella passerina*	-	-	S5B
Common Grackle	*Quiscalus quiscula*	-	-	S5B
Common Yellowthroat	*Geothlypis trichas*	-	-	S5B
Eastern Meadowlark	*Sturnella magna*	THR	THR	S4B
Eastern Phoebe	*Sayornis phoebe*	-	-	S5B
European Starling	*Sturnus vulgaris*	-	-	SNA
Gray Catbird	*Dumetella carolinensis*	-	-	S4B
Great Crested Flycatcher	*Myiarchus crinitus*	-	-	S4B
House Finch	*Haemorhous mexicanus*	-	-	SNA
House Wren	*Troglodytes aedon*	-	-	S5B
Killdeer	*Charadrius vociferus*	-	-	S5B,S5N
Mallard	*Anas platyrhynchos*	-	-	S5
Mourning Dove	*Zenaida macroura*	-	-	S5
Northern Cardinal	*Cardinalis cardinalis*	-	-	S5
Northern Flicker	*Colaptes auratus*	-	-	S4B
Pine Warbler	*Setophaga pinus*	-	-	S5B
Red-eyed Vireo	*Vireo olivaceus*	-	-	S5B
Red-tailed Hawk	*Buteo jamaicensis*	-	NAR	S5
Red-winged Blackbird	*Agelaius phoeniceus*	-	-	S4
Rock Pigeon	*Columba livia*	-	-	SNA
Savannah Sparrow	*Passerculus sandwichensis*	-	-	S4B
Song Sparrow	*Melospiza melodia*	-	-	S5B
Swamp Sparrow	*Melospiza georgiana*	-	-	S5B
Tree Swallow	*Tachycineta bicolor*	-	-	S4B
Turkey Vulture	*Cathartes aura*	-	-	S5B
Vesper Sparrow	*Pooecetes gramineus*	-	-	S4B
Warbling Vireo	*Vireo gilvus*	-	-	S5B
Yellow Warbler	*Setophaga petechia*	-	-	S5B
Yellow-bellied Sapsucker	*Sphyrapicus varius*	-	-	S5B

Appendix E – Headwater Drainage Feature Assessment Table

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4	HDFA Management Recommendation
	Hydrology	**Modifiers**	**Riparian**	**Fish Habitat**	**Terrestrial Habitat**	
BR-1	**Function: Important (Perennial)** Provides waterflow throughout the year. Organic substrate present.	**Agriculture:** Annual Row Crops (Soy); Open Pasture (Cows).	**Function: Contributing** The feature is surrounded by lawn on either side.	**Function: Important** Fish species observed in the spring. Water was present at all times of evaluation.	**Function: Contributing** Feature is located southeast of wetland habitat and flows into Wolf Grove Creek. No breeding amphibians were observed.	**Protection**
BR-2	**Function: Important (Perennial)** Provides waterflow throughout the year. Silt substrate present.	**Agriculture:** Annual Row Crops (Soy); Open Pasture (Cows).	**Function: Important** Scrubland and Wetland habitat is present along the edge of the feature.	**Function: Important** Fish species observed in the spring. Water was present at all times of evaluation.	**Function: Valued** Feature is located adjacent to wetland habitat and north of Wolf Grove Creek. No breeding amphibians were observed.	**Protection**
BR-3	**Function: Important (Perennial)** Provides waterflow throughout the year. Silt substrate present.	**Agriculture:** Annual Row Crops (Soy); Open Pasture (Cows).	**Function: Important** The feature is located within a mapped wetland.	**Function: Important** Fish species observed in the spring. Water was present at all times of evaluation.	**Function: Valued** Feature is located within mapped wetland and is situated north of Wolf Grove Creek. No breeding amphibians were observed.	**Protection**
BR-4	**Function: Important (Perennial)** Provides waterflow throughout the year. Silt substrate present.	**Agriculture:** Annual Row Crops (Soy); Open Pasture (Cows).	**Function: Important** The feature is located within a mapped wetland. Wetland habitat is present within riparian zone.	**Function: Important** Fish species observed in the spring. Water was present at all times of evaluation.	**Function: Important** Feature is located within mapped wetland and is situated north of Wolf Grove Creek. Breeding amphibians present.	**Protection**
BR-5	**Function: Contributing (Ephemeral)** Tile drainage from agricultural fields allows for ephemeral water input.	**Agriculture:** Annual Row Crops (Soy).	**Function: Important** This feature is located within a wetland.	**Function: Contributing** No fish species present within this reach.	**Function: Valued** Feature is located within a wetland. No breeding amphibians were observed.	**Conservation**

BR-6	**Function: Valued (Intermittent)** Water present during the spring, and are still flowing in June, but surface-damp by July.	**Agriculture:** Annual Row Crops (Soy).	**Function: Important** This feature is located within a wetland.	**Function: Contributing** No fish species present within this reach.	**Function: Valued** Feature is located within a wetland. No breeding amphibians were observed.	**Conservation**
BR-7	**Function: Contributing (Ephemeral)** Tile drainage from agricultural fields allows for ephemeral water input.	**Agriculture:** Annual Row Crops (Soy).	**Function: Valued** This feature is located within a meadow.	**Function: Contributing** No fish species present within this reach.	**Function: Limited** This feature provides no connectivity to important terrestrial habitat.	**Mitigation**
BR-8	**Function: Contributing (Ephemeral)** Tile drainage from agricultural fields allows for ephemeral water input.	**Agriculture:** Annual Row Crops (Soy).	**Function: Valued** This feature is located within a meadow.	**Function: Contributing** No fish species present within this reach.	**Function: Limited** This feature provides no connectivity to important terrestrial habitat.	**Mitigation**

Appendix F – Curriculum Vitae

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