Environmental Impact Study

Draft Plan of Subdivision Application
Part of Lot 13, Concession 5 and
Parcel North of Fallis Line
Township of Cavan-Monaghan
County of Peterborough

Vargas Properties Inc.

18 April 2022

The Power of Commitment

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	V2	Katherine Ryan, Stacey Zwiers, Amanda Smith, and Lee Scholl	Amanda Smith		Chris Ellingwood		April 18, 2022

Executive Summary

In early 2018, GHD Limited (formerly Niblett Environmental Associates Inc.) was retained to complete an Environmental Impact Study (EIS) for a draft plan of subdivision in the Village of Millbrook, Township of Cavan-Monaghan. The study area is located on a) the east side of Tupper Street (County Road 10), described as Part of Lot 13, Concession 5, and b) the parcel north of Fallis Line, described as Lot 13, Concession 6, in the Township of Cavan Monaghan. These properties contain open field, woodland, wetland and an unnamed tributary to Baxter creek, as well as accessible portions of adjacent natural features.

The Environmental Impact Study is required because the proposed development is within 30 meters of a wetland, contains woodlands, an identified natural heritage system and is within 30 metres of a tributary to Baxter Creek. The report must meet the requirements of the Provincial Policy Statement (2020), the Growth Plan for the Greater Golden Horseshoe (2020), the Township of Cavan Monaghan Official Plan and Otonabee Region Conservation Authority (ORCA) policies.

The focus of this EIS report is to confirm the natural features identified on the property, study the functions and features of the wetlands, watercourses and woodlots and make recommendations to prevent impacts to these features from the proposed development. The EIS will describe potential impacts of the development to natural features and identify appropriate buffers and mitigation measures to satisfy the Township of Cavan-Monaghan Official Plan (2016) and ORCA.

Twenty-three vegetation communities were identified within the study area. Each community is described in Section 3.2.1 and illustrated on Figure 1.1. During field surveys, 162 plant species were identified. The dominant species in each community are described in Section 3.2.1 and a complete plant list is found in Appendix A. During breeding bird surveys, 43 bird species were identified. These are discussed in Section 3.2.2 and listed in Appendix D. Four (4) amphibian species were detected during surveys and are listed in Appendix E. Six (6) species of mammals were detected and are listed in Section 3.2.4 of this report.

Seven wetland ELC vegetation types were identified in the study area. These were Community 5 (MAM2-10), Community 6 (SWD4-3), Community 10 (SWC1-2), Community 11 (SWD2-1), Community 14 (SWC1-1), Community 16 (MAM3-9) and Community 18 (SWD4-3). The characteristics of each of these communities are described in Section 3.2.1.2. Various policy documents recommend minimum 30m buffer areas (or set-backs) in order to protect the ecological functions of wetlands. A 30-meter buffer has been depicted on the various wetlands as an area of constraint (Figure 2.1).

Woodland vegetation types were found across much of the study area. The boundaries of these woodland communities were delineated in the field and are depicted on Figure 1.1. The contiguous woodland area that would be considered a significant woodland includes all numbered communities except Community 1 (CUM1-1), 2 (CUM1-1), 3 (No code), 21 (CUW1), 22 (CUW1), 23 (CUM1-1) and the Agricultural corn and built-up areas.

An analysis of the functions provided by the significant woodland can be found in Section 4.5, Table 8. The Official Plan of the Township of Cavan-Monaghan prohibits development or site alteration in and adjacent to 30 metres of the base of the outermost tree trunks of significant woodlands. A 30-meter buffer has been depicted on the significant woodland as an area of constraint (Figure 2.1).

The woodlands, wetlands and associated buffers will act as valuable cover for wildlife, maintain water quality and provide water storage across the landscape. The buffer should remain as natural self-sustaining vegetation.

Two types of significant wildlife habitat were identified in the study area. These types (seeps and springs and habitat for special concern and rare wildlife species) fall within the natural communities and/or buffers afforded to wetlands, woodlands and the watercourse to Baxter creek with the exception of the proposed watercourse crossing.

The tributary of Baxter Creek with the study area was classified into three (3) habitat zones. Habitat zones are determined and differentiated based on presence of barriers, substrate composition, channel morphology, riparian habitat, percent in-stream cover, hydrological connection and unique features. The habitat zone locations have been illustrated in Figure 1.1 and attributes are provided in Table 3.5.

The watercourse to Baxter Creek has a cold water thermal regime and provides both direct and indirect fish habitat within the study area. Specifically, the habitat provides sources of hydrological connections, cover and feeding

habitat, breeding and nursery habitat, overwintering habitat, nutrients and sediments, and food supply to fish. These attributes are important for the sustainability of the cold water fish community of the watercourse. During fish community sampling two (2) fish species were observed.

Two headwater drainage features were identified within the study area (Habitat Zones 2 and 3). They both provided indirect fish habitat. Specifically, seasonal hydrological connection, sources of nutrients, sediments and food supply inputs to the downstream fish habitat.

Fish habitat in Ontario is managed federally by the Minister of Fisheries and Oceans Canada and therefore, the Fisheries Act applies to the subject lands. No critical habitat for Aquatic Species at Risk (DFO, 2019) or sensitive spawning habitat was identified within the study area (OMNR, 2012).

The natural feature form and function of Baxter Creek and its headwater drainage features will be protected by a minimum 30 m natural buffer from the high-water mark, with the exception the proposed road crossing and 23.1m long concert box culvert and stormwater outfall (Appendix I). The proposed in-water works have the potential to cause the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat project review will be required under the *Fisheries Act* by the Department of Fisheries and Oceans (DFO). A condition of approval for the draft plan is recommended to ensure that permits are obtained from DFO and ORCA and that the development is in compliance with the Fisheries Act and Conservation Authorities Act.

Eastern meadowlark and bobolinks were identified during field surveys in the northernmost portion of the study area in Community 23. These species are considered provincially threatened. Suitable habitat exists for both species in this area and extends off of the property to the north. The proposed development will result in a loss of Category 1, 2 & 3 habitat. As a result, a permit and/or other authorization under the Endangered Species Act will be required. The Ministry of the Environment, Conservation and Parks (MECP) will be contacted for guidance. The loss of habitat and an appropriate off-site compensation site will be discussed with MECP. A condition of approval for the draft plan is recommended to ensure that appropriate permits are obtained from MECP and that the development is in compliance with the Endangered Species Act.

This Environmental Impact Assessment report was prepared to address potential environmental issues associated with an application to develop a property located at Part Lot 13, Concession 5 in the Township of Cavan-Monaghan, County of Peterborough. Within this area GHD staff confirmed the boundaries of key natural features, confirmed their ecological functions, assessed Species at Risk habitat and have recommended appropriate buffers (setbacks) and other mitigation measures to prevent impacts from the proposed development.

The proposed development will not result in negative impacts on identified natural heritage features or their functions, provided the mitigation measures described in Sections 5 and 7 are implemented, including obtaining the relevant permits from DFO, ORCA and MECP. Recommendations have been made to address potential impacts to natural features (identified wetlands, woodlands, watercourses and fish habitat, wildlife habitat, Species at Risk) and/or their functions during the site preparation, construction and post-construction period.

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1. Introduction

1.1 Background

GHD Limited (formerly Niblett Environmental Associates Inc.) was retained by Vargas Properties Inc. to complete an Environmental Impact Study (EIS) to fulfil the requirements of the Township of Cavan-Monaghan Official Plan (2016) and Otonabee Conservation (ORCA) for the approval of a draft plan of subdivision in the Village of Millbrook. There are a number of natural heritage features associated with the Site including a tributary to Baxter Creek, evaluated, however non-provincial wetland, woodlands and Natural Heritage System. The report must meet the requirements of the Provincial Policy Statement (2020), The Growth Plan for the Greater Horseshoe (2020), and the Township of Cavan Monaghan Official Plan and ORCA policies.

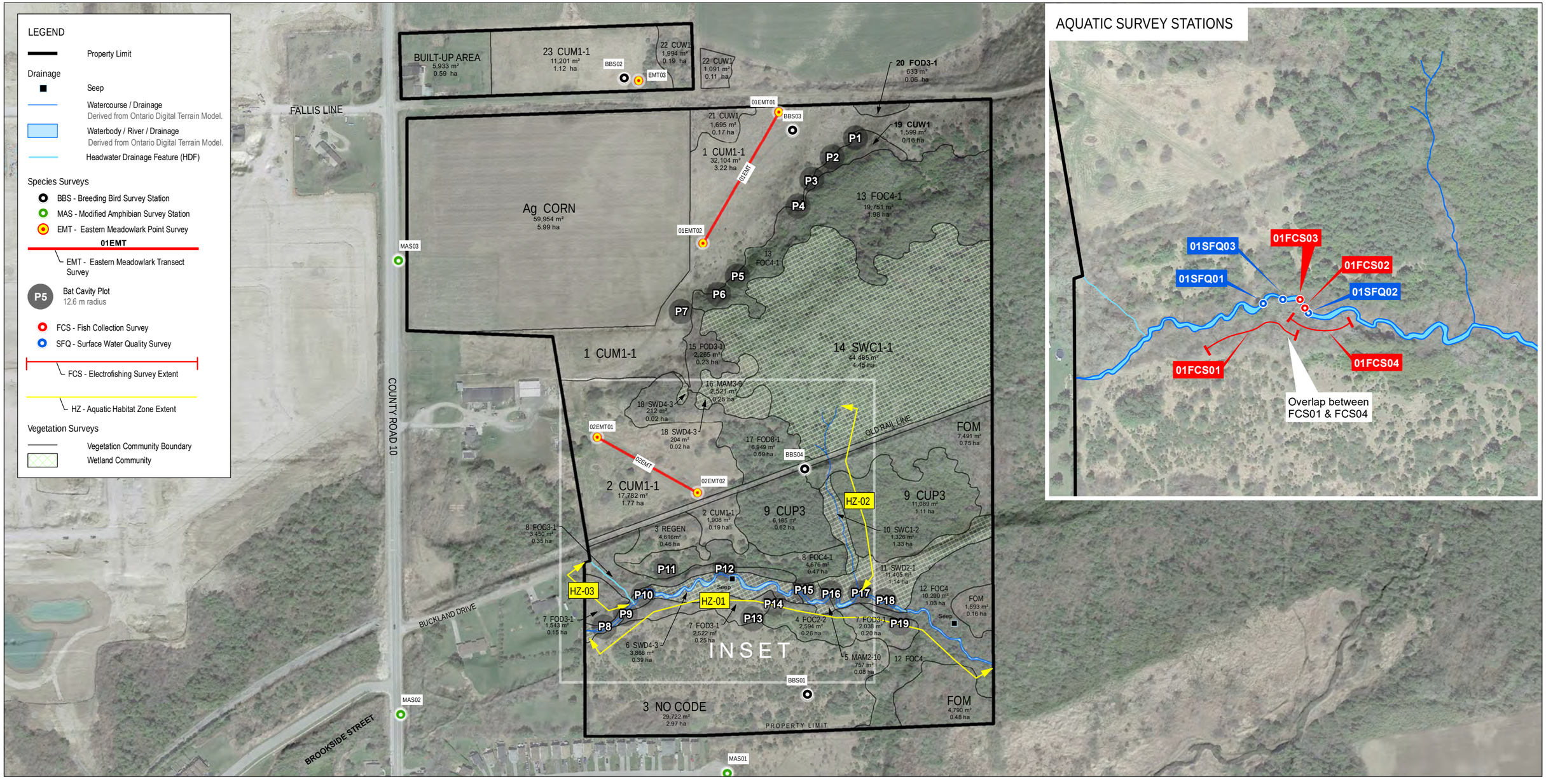
1.2 Location and Study Area

The properties are located on: a) the east side of Tupper Street (County Road 10), described as Part of Lot 13, Concession 5; and b) parcel north of Fallis Line, described as Lot 13, Concession 6, in the Township of Cavan Monaghan, Ontario. The study area includes both subject properties, which contain open field, woodland, wetland and an unnamed tributary to Baxter Creek, as well as accessible portions of adjacent natural features.

1.3 Study Rationale

The following policies apply to the property and the development planned, based on a review of the natural features on and adjacent to (those within 120 m) the site. The applicable policies have been included below.

- Department of Fisheries and Oceans (DFO)-*Fisheries Act* (2019)
- Provincial Policy Statement (2020)
- Growth Plan for the Greater Golden Horseshoe (2020)
- Township of Cavan-Monaghan Official Plan (amendments to October 2020)
- County of Peterborough Official Plan (amendments to March 2020)
- Otonabee Region Conservation Authority Regulations and Policies



ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application

ELC CODE	ECOSITE/VEG TYPE DESCRIPTION
CUM1-1	Dry-Moist Old Field Meadow
CUP3	Coniferous Plantation
CUW1	Mineral Cultural Woodland
FOC2-2	Dry-Fresh White Cedar Coniferous Forest
FOC4	Fresh-Moist White Cedar Coniferous Forest
FOC4-1	Fresh-Moist White Cedar Coniferous Forest
FOD3-1	Dry-Fresh Poplar Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
MAM2-10	Forb Mineral Meadow Marsh
MAM3-9	Forb Organic Meadow Marsh
SWC1-1	White Cedar Mineral Coniferous Swamp
SWC1-2	White Cedar-Conifer Mineral Coniferous Swamp
SWD2-1	Black Ash Mineral Deciduous Swamp
SWD4-3	White Birch-Poplar Mineral Deciduous Swamp

CITATIONS

- Central Lake Ontario Conservation Authority (CLOCA). Drainage and Natural Heritage Systems. Open Data.
- Lee. H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S, McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch.
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Ontario Digital Terrain Model. 2016-2018.
- Imagery obtained via Google, 2021. (Imagery date not verified).

REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2012-12-18	Initial map creation.	C.E.
1	W.P.	2021-12-14	Updated to reflect aquatic surveys.	S.Z.

DATA DISCLAIMER(S)

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 38 meters

0 25 50 75 100
Meters

Vargas Propoerties Inc.
Pt Lot 13, Con 5, Township of Cavan-Monaghan
County of Peterborough
Otonabee Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY

NATURAL FEATURES, VEGETATION COMMUNITIES & SURVEYS

Project No. 11214484
Revision No. 01
Date 16/04/2021

FIGURE 1.1

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Print date: 14 Dec 2021 - 09:58

1.3.1 Federal Legislation

Fisheries Act

The purpose of the Fisheries Act, Fish and Fish Habitat Program is to help conserve and protect fisheries and aquatic ecosystems. Specifically, the fish and fish habitat protection provisions are intended to prevent projects taking place in and around fish habitat from causing the death of fish or the harmful alternation, disruption or destruction (HADD) to fish habitat. In addition, the Act administers relevant provision of the Species at Risk Act.

If death of fish or the harmful alteration, disruption or destruction of fish habitat are likely to result from a project, an authorization is required from the Minister of Fisheries, Oceans and the Canadian Coast Guard as per Paragraph 34.4(2)(b) or 35(2)(b) of the Fisheries Act Regulations.

Migratory Birds Convention Act, 1994 (S.C. 1994, c.22)

The purpose of the Migratory Birds Convention Act (MBCA 1994) is to implement the Convention by protecting and conserving migratory birds — as populations and individual birds — and their nests.

No work is permitted to proceed that would result in the destruction of active nests (i.e., nests with eggs or young birds), or the wounding or killing of bird species protected under the MBCA and/or Regulations under that Act.

1.3.2 Provincial Legislation

Provincial Policy Statement (2020)

The Provincial Policy Statement, 2020 (herein referred to as PPS 2020) was issued under Section 3 of the Planning Act and came into effect May 1, 2020. It replaces the Provincial Policy Statement that was issued April 30, 2014. The PPS 2020 provides overall policy direction on matters of provincial interest related to land use planning and development (Government of Ontario, 2020). It applies province-wide, except in those cases where the PPS 2020 or another provincial plan state otherwise (Government of Ontario, 2020).

The extent of Natural Heritage features found on or adjacent to the study area have been investigated within this EIS (Figure 1.1) and portions of Sections 2.1.4 to 2.1.8 of the Provincial Policy Statement (2020) apply to this project and thus act as triggers for the preparation of this EIS.

2.1.4 Development and site alterations shall not be permitted in:

a. significant wetlands in Ecoregions 5E, 6E and 7E;

2.1.5 Development and site alteration shall not be permitted in:

b. significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);

c. significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and St. Marys River)

d. significant wildlife habitat;

e. significant areas of natural and scientific interest;

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

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

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

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions

Endangered Species Act (2007)

The Ontario Endangered Species Act (ESA 2007) serves to:

2. To identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge.
3. To protect species that are at risk and their habitats, and to promote the recovery of species that are at risk.
4. To promote stewardship activities to assist in the protection and recovery of species that are at risk. 2007, c. 6, s. 1.

The ESA clearly defines the five classifications of species status as *extinct, extirpated, endangered, threatened*, or *special concern*, and provides guidelines on the process of species status determination.

Regulations made under this act include: Ontario Regulation 230/08 and 242/08.

Ontario Regulation 230/08 provides the list of Species at Risk (SAR) in Ontario, which is updated regularly. This list was most recently consolidated on June 2, 2017. Species status provided in the list is assessed by an independent body, the Committee on the Status of Species at Risk in Ontario (COSSARO), based on the best-available science and Aboriginal Traditional Knowledge.

General habitat protection is afforded to all species listed as *endangered* or *threatened.* General habitat descriptions are technical, science-based documents that have been developed for some of the species that are most likely to be affected by human activity. Further information including a *Recovery Strategy* or *Management Plan* is required for each listed species, on a timeline dictated by the species status.

Ontario Regulation 242/08 explains possible exemptions to the ESA and details on how the purpose of the ESA is to be carried out.

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020)

The Growth Plan for the Greater Golden Horseshoe (2020) (also referred to as the "Growth Plan") was approved under the authority of the *Places to Grow Act, 2005* by the Lieutenant Governor in Council of the Province of Ontario, and came into full force and effect on June 16th, 2006. Amendment 1 to the Growth Plan came into effect on August 28, 2020, replacing the Growth Plan from 2019. The Growth Plan for the Greater Golden Horseshoe 2020 is a strategic, long-range, comprehensive, and integrated approach to guide future growth in Ontario. It includes planning for infrastructure, land use, economic development, and population health (Government of Ontario).

The subject properties fall within the Growth Plan area however as the subject property is within the Settlement Area within the Village of Millbrook Sections 4.2.2-4.2.4 don't apply.

1.3.3 Local and Other Regulatory Bodies

Township of Cavan-Monaghan Official Plan (Amendments to October 14, 2020)

Schedules 'A' and 'A-1' (Land Use) show the property includes Natural Heritage System designations of Natural Core Area and Natural Linkage Area in addition to Commercial and Residential designations. Schedules 'B' and 'B-1' (Natural Heritage System and Environmental Constraints) show the property as containing significant woodlands and wetlands.

Sections 6.3.2 and 6.4.2 outline the permitted uses within both Natural Core Areas and Natural Linkage Areas, which include:

g) Single-detached dwellings and accessory uses on existing lots of record if it is demonstrated that:

i. There is no alternative and the expansion, alteration or establishment is directed away from the feature to the maximum extent possible;

ii. The impact of the expansion or alteration on the feature and its functions is minimized to the maximum extent possible; and,

iii. The expansion or alteration is not located in a floodplain or erosion hazard area.

The Township of Cavan Monaghan Zoning By-law 2018-58 Schedule 'A' Zoning By-Law mapping indicates the property contains Community Commercial (C5), Future Development (FD), Natural Core (NC) and Natural Linkage (NL) designations. Sections 5.2 (Commercial Zones), 10.2 (Other Zones), and 8.2 (Natural System Zones) of the Zoning By-Law provide an explanation of the permitted uses and regulations that apply to each of these designations.

Otonabee Region Conservation Authority Regulations and Policies

The study area is located with the regulated lands of the Otonabee Region Conservation Authority (ORCA). Under the Conservation Authorities Act, Ontario Regulations 167/06 *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* applies to the proposed development. A permit is required from ORCA for development that is within 30 m of an unevaluated wetland or within 30 m of a watercourse or waterbody.

There are three ways through which Conservation Authorities address wetlands within the regulations.

They regulate:

- activities within wetlands to ensure that they do not interfere with its natural features and hydrologic and ecological functions;
- development within wetlands to ensure that it does not impact the control of flooding, erosion, dynamic beaches, pollution or the conservation of land; and
- development adjacent to a wetland to ensure that the hydrologic function of the adjacent wetland is not affected.

1.4 Other Resources Referenced

Prior to field surveys, background information for the study area and surrounding lands from a variety of sources were reviewed to provide context for the setting and sensitivity of the site. Background information sources include:

1.4.1 Data Sources

- Recent Aerial imagery (County of Peterborough, 2018)
- MNRF Land Information Ontario (LIO) database mapping
- Natural Heritage Information Centre (NHIC) Make a Map tool
- Ontario Breeding Bird Atlas data (Bird Studies Canada (BSC) 2001-2005 field data)
- Ontario Reptile and Amphibian Atlas (Ontario Nature)
- Ontario Ministry of Natural Resources Aquatic Resource Area, Fish Species List (OMNR, 2012);
- Department of Fisheries and Oceans (DFO) Aquatic Species at Risk Mapping (DFO, 2019)

1.4.2 Literature and Resources

- Natural Heritage Reference Manual (MNRF, 2010)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNRF, 2015)

Other relevant documents were reviewed for the site which included the Geotechnical Investigation Report (GHD, 2022) and the Functional Servicing Report (Valdor Engineering Inc., 2022).

1.5 Description of Development

The proposal development is for commercial mixed use, townhouses and single lots and parklands. Specifically, it includes commercial blocks (1.3 ha), street townhouses and single detached homes (7.52 ha), stormwater management pond (1.62 ha), road widening and right of way (3.22 ha), parkland and trails (0.36 ha) and natural heritage systems (15.46 ha), and a road crossing over Baxter Creek for a trunk sanitary sewer, storm sewer, and watermain (Appendix I).

The proposed watercourse crossing is required to accommodate the trunk sanitary sewer (525 mm size). The trunk sanitary sewer was constructed at the south limit of the existing development of Coldbrook Drive and the intended purpose is for it to be extended northerly through the proposed development to service this proposed subdivision and future residential/industrial/commercial development north of Fallis Line down to Larmer Road. The trunk sanitary sewer leads to the Millbrook waste water treatment facility to the south.

Due to grading limitations, the sanitary sewer cannot cross under the creek and requires a means to cross over the creek to accommodate the pipe. In addition to the sanitary sewer, the watermain system requires looping to ensure adequate water quality and flow pressure. The watermain requires extension from Coldbrook Drive to the Fallis Line watermain to the north, requiring it to also cross the watercourse.

The stormwater pond is located at the lowest area of the development and has been designed to capture the development area south of the watercourse. The storm sewers also must cross above the watercourse from the north to south to access the stormwater pond. Major flows collected on the municipal road from north of the watercourse require discharge into the stormwater management pond.

1.6 Scope of Report

The Township of Cavan-Monaghan Official Plan (2020) and Otonabee Conservation (ORCA) require the completion of an EIS prior to the approval of a plan of subdivision and issuing a permit.

The focus of this EIS report is to confirm the natural features identified on the property, study the functions and features of the wetlands, watercourses and woodlots and make recommendations to prevent impacts on these features by the proposed development. The EIS will describe potential impacts of the development of natural features and identify appropriate buffers other appropriate mitigation measures to satisfy the Township of Cavan-Monaghan Official Plan (2016) and ORCA.

2. Study Methods

2.1 General Approach

Our approach to preparation of the EIS consisted of several distinct phases.

In the first phase, GHD collected and reviewed available information on the site. Additionally, agency consultation occurred, and a Terms of Reference was prepared. The Terms of Reference document was sent to ORCA for input (August 2018). Subsequently, GHD staff conducted site visits by to confirm the data collected in the literature review and collect new site-specific data, including records of Species at Risk from the various sources.

The second phase included completion of multi-season and multi-year field studies in 2018 and 2020 that covered all portions of the property. Those are described in detail below.

The third phase was the preparation of the EIS that includes specific mitigation measures for protecting any sensitive species and other natural features on or adjacent to the study site and recommendations regarding the creek and woodlands, including buffers and setbacks.

This report only deals with the suitability of the site from a biological perspective and the constraints due to the presence of the creek and wetlands. Other approvals or constraints due to zoning, official plans, MDS, flood and fill regulations, archaeology, health regulations or other approvals are not addressed in this report.

2.2 Site Study Methodology

Surveys included multi-season field visits that encompassed breeding bird surveys, amphibian surveys, Ecological Land Classification (ELC) mapping, vegetation community boundary delineation (woodlands and wetlands), Significant Wildlife Habitat, fish and fish habitat assessments and determination and identification of the presence of provincially and federally listed significant species including SAR bird species.

2.2.1 Physical Site Characteristics

Site characteristics were assessed during our field visits. These included general documentation of existing disturbances, current usage, age of vegetation cover, access lanes, general topography and soils.

2.2.2 Biophysical Inventory

2.2.2.1 Vegetation

ELC Survey Method

Background information was collected from the Ministry of Natural Resources and Forestry (MNRF), LIO make-a-map. Preliminary mapping was completed via desktop analysis of air photos to identify vegetation communities (in particular wetlands) within the study area. The most recent aerial photographs were used to determine general habitat types and location of wetland areas including examining the landscape for linkages and corridors, prior to conducting field investigations. These polygons were targeted and verified in the field to characterize the Ecological Land Classification (ELC) code and vegetation type. Particular effort was made to identify where field effort needed to examine options for a suitable building envelope, especially where wetland pockets, open areas and potential vernal pools might be present.

In the second stage, field surveys were conducted. Detailed inventories were made of the plant species present in each community within the study area. Community boundaries and descriptions delineated on air photos were ground-truthed. The location of wetland communities was determined for the property. Photographs and/or specimens were collected of plant species requiring verification of identification. ELC code classifications were determined for all communities within the property boundary and study area. Naming of the vegetation community types was based on the Ecological Land Classification for Southern Ontario (ELC), First Approximation (Lee et al., 1998) and was done to the community type level. Possible constraints were also identified and confirmed in the field.

General notes on disturbance, topography, soil types, soil moisture and state of each community were also compiled.

The presence of rare, significant or unusual species was noted. Species significance or rarity on a national, provincial, regional and local level was based on published literature and standard status lists. These included COSEWIC (2020), COSSARO (2018), OMNR (1993, 1994, 2000 and 2002), SARA (2020), Oldham et al (1999).

2.2.2.2 Birds

Breeding Bird Surveys

Breeding bird surveys were conducted during the breeding season. Surveys were timed to coincide with the dawn chorus and within acceptable weather parameters.

Survey stations were positioned across different habitat types across the entire site and surveyed twice over a 2 week period. The stations covered natural edges, wetlands and adjacent natural areas. At the same time breeding evidence codes were added based on the codes used for the second Ontario Breeding Bird Atlas project.

Surveys included searches for stick nests and cavity trees. Specific effort was made to identify habitat for Species at Risk and presence-absence.

A breeding bird species list was generated from the Atlas of the Breeding Birds of Ontario (Cadman et al., 1987) and Bird Studies Canada (2005) for the 10 x 10 km atlas square that contains the study area (17QJ09). The data was reviewed to determine if any sensitive or significant breeding bird species have been recorded in the broad vicinity of the development. Records of any special concern, threatened or endangered species were also solicited from MNRF's NHIC database.

Significance on a national, provincial or regional level will be based on SARA (2020), COSEWIC (2020), SARO (2018), ESA (2008), MNRF (1993) and Bird Studies Canada (2005).

2.2.2.3 Targeted Species at Risk Surveys – Eastern Meadowlark and Bobolink

Based on preliminary scoping of the study area, it was determined that targeted surveys for grassland birds (eastern meadowlark and bobolink) should be designed and implemented to confirm presence/absence of suitable habitat in the northern portion of the property. Three grassland bird surveys were carried out by experienced wildlife biologists, following the survey protocol for Eastern Meadowlark established by MNRF, which was also used to survey for Bobolink:

- Surveys were repeated (3) times during the determined survey period;
- Survey dates were evenly spaced throughout the survey period and repeated no sooner than one week (7 days) apart;
- Surveys began at dawn and may continue until no later than 9 am;
- Surveys were conducted with no precipitation, no or low wind speed and good visibility;
- Pre-determined point counts and transect routes were established, with each point count being surveyed for ten minutes, and each transect walked at a pace sufficient to record all observations;
- Where Eastern Meadowlark or Bobolink are observed or heard, the observer shall take a compass bearing on the bird, record the time and estimate the distance to the bird.
- Record general notes on habitats and conditions of the area within each transect and location.

Three point-count surveys were conducted between mid-May and mid-June, with each survey separated by a week or more from previous surveys. Habitat was documented including general field conditions where the locations of the bobolinks/eastern meadowlarks were observed. Habitat descriptors such as height of vegetation and dominant vegetation species were recorded. Photographs of the site were taken. Searches for nest sites were not completed.

Area Searches

In addition to Breeding Bird Point Counts, birds encountered/identified while on site were recorded along with a breeding evidence code. The area of these surveys included all of the vegetation communities within the study area.

2.2.2.4 Amphibians

Marsh Amphibian Surveys

Amphibian surveys were conducted between April and June following Environment Canada's Marsh Monitoring Protocol (MMP, 2013) to capture the various breeding cycles of frogs and toads. Surveys were conducted on three separate dates as per the protocol. Surveys were conducted by road targeting the wetland and creek.

Surveys were completed at least 30 minutes after sunset and completed by midnight. Field conditions were recorded upon arrival (cloud cover, temperature, wind, precipitation). Observations at each station were sustained for five (5) minutes where Call level codes were recorded. The strength of the chorus was indicated by a numeric code as follows:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated.

Whether the species were located within or outside of 100 meters of the survey station was also recorded.

2.2.2.5 Mammals and other wildlife

Candidate Bat Maternity Roost Surveys

Area searches for candidate bat maternity roost cavity trees on the subject property were completed on May 14, 2020. Candidate trees were marked with a hand-held GPS unit and parameters were recorded such as tree

species, dbh, tree height, number of cavities, cavity heights, decay code and whether there was any loose bark present.

Incidental Observations

Area searches for mammals, reptiles and amphibians were made during all site visits. Observations included direct sightings and indirect evidence such as calls, tracks, scat, shed skins (snakes), burrows, dens and browse (Dobbyn, 1994).

Areas of potential suitable habitat for reptile species (i.e. wetlands, rocky areas) were investigated during field studies to check for the presence of significant species. Logs and rocks were turned over on all habitats to check for salamanders and snakes. Specific effort was made to conduct field visits to coincide with suitable basking days to document the presence of snakes and turtles. Particular effort for targeted species such as species at risk was made by looking in suitable habitat and at times of year when they would be most active.

Species significance on a national, provincial, regional and local level was based on COSEWIC (2020), COSSARO (2018), SARA (2020) and MNR (1993 update 2002).

2.2.2.6 Significant Wildlife Habitat (SWH)

The identification of Significant Wildlife Habitat in completed in several stages. As part of the background review, aerial photography was used to examine natural areas on and adjacent to the subject property. A candidate list of SWH features was then developed based on the Significant Wildlife Criteria Schedules for Ecoregion 6E (Ontario Ministry of Natural Resources and Forestry, January 2015) and the natural areas that appeared to be present.

During the field visit, searches were made for evidence of the candidate features (i.e., presence/absence) and, where present, the features were assessed (e.g., notes are made of their geographic location, size and function). For this particular property, GHD biologists looked for rock piles, stone fences and other evidence of reptile hibernacula, large stick nests and other evidence of woodland raptors, seeps and springs, and bat tree cavities as well as other habitat that might be present. After the field inventories had been completed, GHD biologists analyzed the information collected and determined which SWH features could be confirmed based on the habitats on site and any additional surveys (e.g., area sensitive bird breeding).

2.2.2.7 Wetland Boundary

The wetland boundary was delineated in two phases. The first phase was to review recent aerial photographs and the wetland/regulated area mapping provided by ORCA. Recent MNRF GIS database layers and County of Peterborough GIS database were also reviewed. As part of the workplan, the presence of wetland and confirmation of a wetland boundary was confirmed in the field using the methodologies in the Ontario Wetland Evaluation System, third edition, version 3.2, southern Ontario manual (2013) and ORCA definitions. The entire property was walked and the plant species, soils and soil moisture checked. The boundary of the wetland was delineated in the field using a handheld Trimble unit. The different wetland community and types were delineated within the overall wetland boundary.

2.2.2.8 Significant Woodlots

The boundary of the significant woodland as depicted in Schedule ‘B’ Natural Heritage System and Environmental Constraints map of the Cavan-Monaghan Official Plan was also confirmed and delineated in the field as well as conducting an assessment of its ecological functions. The dripline of the outer trees on the main woodland was identified by GPS in the field. A site walk with ORCA may be requested to confirm that line.

2.2.2.9 Fish and Aquatic Habitat

Aquatic Habitat Assessment

Aquatic habitat assessments were conducted using standardized provincial aquatic protocols (OSAP, MTO). Aquatic habitat was quantified and characterized based on local substrate composition, vegetation, flow influence and condition, sediment transport, cover, channel morphology, groundwater indicators, riparian habitat, barrier presence and form, land use and landscape influences, human modifications and unique features.

Surface water quality was collected by GHD biologists during assessments. Measured parameters included dissolved oxygen (mg/L), conductivity (us/cm), total dissolved solids (mg/L) and water temperature (°C) using a handled YSI Pro2030 System. The pH was recorded with a handheld waterproof pH meter and turbidity was recorded with a handheld LaMotte2020.

The Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2002) and the Provincial Water Quality Objectives (PWQO) were used to interpret water quality data (Energy, 1994).

Fish Community

Fish community sampling was conducted by GHD using multiple gear types including minnow traps, dip nets and Smith-Root Model 24 backpack electrofisher. It should be noted that minnow traps and dip nets were only used as GHD was still waiting for the MNRF fish collection permit.

The minnow traps are wire baskets with torpedo shaped openings measuring 0.4 m in length with a 2.6 cm opening. The traps were set in water depths that measured 0.3 m. The minnow traps were only set for approximately 2 to 2.5 hours. The Smith-Root Model 24 backpack electrofisher using the single pass technique (Stanfield, 2017). The single pass survey technique allowed biologists to characterize the fish community and provide a qualitative assessment of species abundance at the site. This method requires a high shocking intensity (7-15 sec/m2) and typically captures 60% of the population when all habitats are sampled (Stanfield, 2017). At each site, the total length (mm) and weight (g) were recorded for the first ten individuals of each species at each site. The remaining individuals for each species were counted and weighed in bulk.

3. Survey Results

3.1 Physical Site Characteristics

3.1.1 General

The property was bounded to the west by County Road 10 (Tupper Street) and neighbouring properties to the north, east and south. The study area abutted the northern edge of the Village of Millbrook. The highest elevations on the site were located at the north end, declining as one moved south and dropping off fairly steeply into the forest/wetland areas. A more gradual decline southward was observed through the wetland to the south end of the subject property. The majority of the developable land on the subject property was either active agricultural field or cultural meadow, however, the study area itself was quite diverse, containing cultural woodland, coniferous and mixed forests, coniferous and deciduous swamps and meadow marsh in the east and southeastern portions.

3.2 Biological Inventories

3.2.1 Vegetation

3.2.1.1 Introduction and Level of Effort

The vegetation communities were delineated within the study area by GHD biologists according to methodologies outlined in Section 2.2.2.1. Surveys were conducted on July 26th and July 31st, 2018 and May 14th, 2020 (Table 3.1).

Table 3.1 Vegetation Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	End Time
July 26, 2018	Ecological Land Classification, OWES Wetland Delineation	20°C, Cloud cover-0, Wind scale-1, Precipitation-1	11:15 a.m.	2 hrs x 3 biologists
July 31, 2018	Ecological Land Classification, OWES Wetland Delineation	22°C, Cloud cover-80%, Wind scale-2, Precipitation-none	9:15 a.m.	5 hrs x 2 biologists
May 14, 2020	Delineation of Woodland Boundary	12°C, Cloud cover-100%, Wind scale-2, Precipitation-none	9:30 a.m.	1 hr x 2 biologists

3.2.1.2 ELC Code Descriptions

A total of twenty-three (23) vegetation communities were identified within the study. Each community is described below and illustrated on Figure 1.1.

A total of 158 plant species were identified during the field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix A

Community 1 Cultural Field Meadow (ELC Code: CUM1-1)

This community was identified on the east and south side of the agricultural field. The community was dominated by grass species including orchard grass (*Dactylis glomerata*) and timothy (*Phleum pratense*). Other species identified on the ground included a variety of forbs such as common milkweed (*Asclepias syriaca*), king devil hawkweed (*Hieracium x florbundum*), red clover (*Trifolium pratense*), goats-beard (*Tragopogon dubius*) and cow vetch (*Vicia cracca*).

Photo 1: Edge of Open Field Meadow (July 26, 2018)

Community 2 Cultural Field Meadow (ELC Code: CUM1-1)

Community 2 was identified along the west central part of the subject property. This area was bordered by forest to the north east and south. Similar vegetation composition to Community 1 was identified here with a little more diversity and around 10% tree composition. Ground vegetation was dominated by grass species including awnless brome (*Bromus inermis ssp. inermis*) and orchard grass and timothy. A few sparsely growing tree species were identified throughout the meadow including Manitoba maple (*Acer negundo*) and eastern white cedar (*Thuja occidentalis*).

Photo 2: Cultural Field Meadow (July 31, 2018)

Community 3 Regenerating Field (No ELC Code Applicable)

This community was identified on the southern edge of the subject property just north of the houses on Nina Court. This area was a regenerating old field meadow with typical field meadow species, including chiccory (*Chichorium intybus*), timothy, yarrow (*Achillea millefolium*), heal-all (*Prunella vulgaris*), black-eyed susan (*Rudbeckia hirta*), red top (*Agrostis gigantea*) and Queen-Annes lace (*Daucus carota*). The area was regenerating in scots pine (*Pinus sylvestris*) with scattered eastern white cedar and eastern red cedar (*Juniperus virginiana*) growing throughout. The trees were young and dbh ranged from 2cm to 10cm.

Photo 3: Edge of Regenerating Field (No Code) (July 26, 2018)

Community 4 Dry-Fresh White Cedar Coniferous Forest (ELC Code: FOC2-2)

This community was found along the southern edge of the tributary to Baxter Creek. This conifer forest was dominated in eastern white cedar which comprised 100% of the canopy. The subcanopy was composed of a few younger cedars along with common buckthorn (*Rhamnus cathartica*).

Photo 4: Cedar Coniferous Forest (July 26, 2018)

Community 5 Forb Mineral Meadow Marsh (ELC Code: MAM2-10)

Community 5 was identified as a small wetland pocket within the floodplain of the tributary to Baxter Creek. This small irregularly shaped meadow marsh contained various herbaceous plants including field horsetail (*Equisetum arvense*), fringed loosestrife (*Lysimachia ciliata*), yellow avens (*Geum alleppicum*), spotted joe-pyeweed (*Eupatorium maculatum*), bitter nightshade (*Solanum dulcamara*) and spotted jewelweed (*Impatiens capensis*). Green ash (*Fraxinus pennsylvanica var. subintege*), balsam poplar (*Populus balsamifera*) and eastern white cedar were the tree species identified here.

Photo 5: Meadow Marsh (July 26, 2018)

Community 6 White Birch-Poplar Mineral Deciduous Swamp (ELC Code: SWD4-3)

Vegetation was recorded along the entire length of the tributary to Baxter Creek that ran through the southern portion of the property. Vegetation recorded here was characteristic of floodplain areas. As the tributary ran through the forest, a canopy of trees was often identified drooping over the watercourse and included balsam poplar (*Populus balsamifera*), green ash and American elm (*Ulmus americana*) along with some common buckthorn throughout. Some of the herbaceous species identified were enchanter's nightshade (*Circaea Lutetiana L. ssp. canadensis*), helleborine (*Epipactus helleborine*) and bloodroot (*Sanguinaria canadensis).*

Photo 6: Riparian Vegetation along Tributary (July 26, 2018)

Community 7 Dry-Fresh Poplar Deciduous Forest (ELC Code: FOD3-1)

Community 7 was an upland forest that was located on a knoll upslope of the floodplain area (Community 6). A good diversity of trees were identified , though the dominant species was trembling aspen (*Populus tremuloides*). Other tree species identified included American elm, green ash, sugar maple (*Acer saccharum*), and eastern white cedar. The ground contained a number of herbaceous plants including zig-zag goldenrod (*Solidago flexicaulis*), chicory (*Cichorium intybus*), false Solomon's seal (*Smilasina racemosa*), virginia creeper (*Parthenocissus inserta*), calico aster (*Symphyotrichum lateriflorum var lateriflorum*) and black-eyed susan.

Photo 7: Dry-Fresh Poplar Deciduous Forest (July 26, 2018)

Community 8 Fresh-Moist White Cedar Coniferous Forest (ELC Code: FOC4-1)

This community was identified just north of community 7 and was dominated by eastern white cedar with some scots pine scattered throughout. The groundcover was dominated by calico aster (*Symphyotrichum lateriflorum var lateriflorum*), virginia creeper (*Parthenocissus inserta*) and heal-all.

Photo 8: Fresh-Moist White Cedar Coniferous Forest (July 26, 2018)

Community 9 Coniferous Plantation (ELC Code: CUP3)

Two pockets of old plantation were identified in the south-central portion of the study area. These woodlots were not managed and contained a good amount of vegetation growth in the understory. They were dominated by scots pine and white pine.

Community 10 White Cedar-Conifer Mineral Coniferous Swamp (ELC Code: SWC1-2)

Community 10 was a small wetland pocket identified between the two old plantations. This swamp followed the bottom of an incised tributary and was approximately 4-9 meters in width. Several herbaceous plants were identified here including enchanters nightshade, sensitive fern, scouring rush (*Equisetum hyemale*), western poison ivy (*Rhus rhydbergii*), spotted jewelweed and ostrich fern (*Matteuccia struthiopteris*).

Photo 9: White Cedar-Conifer Mineral Coniferous Forest (July 26, 2018)

Community 11 Black Ash Mineral Deciduous Swamp (ELC Code: SWD2-1)

This community was identified in the southeastern quarter of the property in the floodplain of the tributary of Baxter Creek. Standing water was present in the early part of the year. This community was dominated by black ash (*Fraxinus nigra*) of various ages. The ground vegetation was typical of wetland conditions including spotted jewelweed (*Impatiens capensis*), bulbet bladder fern (*Cystopteris bulbifera*), sensitive fern (*Onoclea sensibilis*) and ostrich fern (*Matteuccia struthiopteris*).

Photo 10: Black Ash Mineral Deciduous Swamp (July 26, 2018)

Community 12 Fresh-Moist White Cedar Coniferous Forest (FOC4)

Community 12 was identified just south of community 11. This upland community contained a mixture of tree species including eastern white cedar and American basswood (*Tilia americana*). The subcanopy was primarily composed of eastern white cedar. The groundcover was primarily dominated by spotted jewelweed and yellow avens (*Geum aleppicum*).

Community 13 Fresh-Moist White Cedar Coniferous Forest (ELC Code: FOC4-1)

This community was a large, forested area that was located between the large conifer swamp (Community 14) and open fields (Community 1) in the northeast corner of the property. This mature forest was quite dense and had little understory or ground cover. Little light penetrated through the forest canopy and lots of deadfall was observed here. The canopy was dominated by eastern white cedar with lesser amounts of white birch. Scattered ground vegetation in isolated areas included jack-in-the-pulpit (*Arisaema triphyllum*), wild grape (*Vitus riparia*) and western poison ivy.

Photo 11: White Cedar Conifer Forest Facing North (July 31, 2018)

Community 14 White Cedar Mineral Coniferous Swamp (ELC Code: SWC1-1)

A clearly defined boundary could be seen between this cedar swamp community and Community 13 (the upland cedar forest). The boundary was delineated based on a gradual decline in elevation as well as a sudden change in ground vegetation composition and soil make up. The dominant canopy species was eastern white cedar. Groundcover included spotted jewelweed, bitter nightshade (*Solanum dulcamara*), field horsetail (*Equisetum arvense*), wood horsetail (*Equisetum sylvantican*) and sensitive fern.

Photo 12: Cedar swamp (July 31, 2018)

Community 15 Dry-Fresh Poplar Deciduous Forest (ELC Code: FOD3-1)

Community 15 was identified in the central portion of the property. This small forest pocket was situated adjacent the cedar forest community 13. Dominated by balsam poplar (*Populus balsamifera*), other deciduous tree species found here included white ash (*Fraxinus americana*), sugar maple, Manitoba maple (*Acer negundo*) and white birch. Ground species detected included Canada goldenrod (*Solidago canadensis*), field horsetail, Canada anemone (*Anemone canadensis*) and false Solomon's seal (*Maianthemum racemosum*).

Photo 13: Dry-Fresh Poplar Forest (July 31, 2018)

Community 16 Forb Organic Meadow Marsh (ELC Code: MAM3-9)

This community was identified south and adjacent to Community 15. The marsh contained a variety of different forb species. The wetland began on the edge of a slope where a small ponded area was situated and cattails identified. This wetland continued downslope into a larger open meadow marsh which contained spotted joe-pyeweed (*Eupatorium maculatum*), black bulrush (*Scirpus atrovirens*), soft-stem bulrush (*Scirpus validus*), curled dock (*Rumex crispus*), common lake sedge (*Carex lacustris*) and northern lady fern (*Athyrium filix-femina*).

Photo 14: Forb Meadow Marsh (July 31, 2018)

Community 17 Fresh-Moist Poplar Deciduous Forest (ELC Code: FOD8-1)

Community 17 was centrally located on the property, just north of the old railline and was dominated by trembling aspen (*Populus tremuloides*). Eastern white cedar, white ash and black walnut (*Juglans nigra*) were other trees identified in the canopy and subcanopy layers. A dense understory layer of European buckthorn was identified throughout the community. A variety of herbaceous plants were identified on the ground layer including sensitive fern, helleborine (*Epipactus helleborine*) and Canada mayflower (*Maianthemum canadense*).

Photo 15: Poplar Deciduous Forest (July 31, 2018)

Community 18 White Birch-Poplar Mineral Deciduous Swamp (ELC Code: SWD4-3)

Community 18 was identified as a small remnant swamp extending from the meadow marsh (Community 16) adjacent to it. This community contained numerous dead standing snags however was dominated by white birch and trembling aspen. Other wetland species commonly found throughout other wetland communities on site and identified here included blue vervain (*Verbena hastata*), spotted joe-pye-weed, and spotted jewelweed.

Community 19 Mineral Cultural Woodland (ELC: CUW1)

Community 19 was identified as an edge community found along the border of the cedar forest (Community 13) and the open field meadow (Community 1). This community was regenerating in Scot's pine (*Pinus sylvestris*) and eastern white cedar. Staghorn sumac was also identified in abundance, a location where vegetation would receive full sun for the majority of the day. The ground was dominated in field meadow species, similar to those identified within Community 1. These included Timothy (*Phleum pratense*), common milkweed (*Asclepias syriaca*), tall goldenrod (*Solidago altissima*), western poison ivy (*Rhus rydbergii*), Queen Anne's lace (*Daucus carota*), yarrow (*Achillea millefolium*) and common strawberry (*Fragaria virginiana*).

Photo 16: Regenerating Field Facing South-East (July 31, 2018)

Community 20 Dry-Fresh Poplar Deciduous Forest (ELC Code: FOD3-1)

Community 20 was a small woodlot identified on the north eastern edge of the study area. This woodlot bordered the existing farm lane and road allowance. The dominant canopy layer was trembling aspen, with other deciduous trees species present such as American elm (*Ulmus americana*), American basswood, American beech (*fagus grandifolia*) and black cherry (*Prunus serotina*). Ground species identified here included spreading dogbane (*Apocynum androsaemifolium*), timothy, orchard grass (*Dactylis glomerata*), poverty oatgrass (*Danthonia spicata*), heal-all (*Prunella vulgaris ssp. Lanceolata*), Philadelphia fleabane (*Erigeon philadelphicus ssp. philadelphicus*) and Canada goldenrod.

Photo 17: Poplar Deciduous Forest (July 31, 2018)

Community 21 Cultural Woodland (ELC Code: CUW1)

Community 21 was identified on the northern borders of the property and abutted the agricultural field on the west side. This cultural woodland was essentially a hedgerow that bordered the farm lane. The majority of species were non-native. The canopy was dominated by black locust (*Robinia pseudoacacia*) with European buckthorn comprising of 60% of the understory. Swallow-wort (*Cynanchum rossicum*) had taken over the ground cover choking out native species.

Photo 18: Cultural Woodland Facing South-West (July 31, 2018)

Community 22 Cultural Woodland (ELC Code: CUW1)

Community 22 was identified as a cultural woodland with a variety of established tree species. The dominant species identified here were Scot's pine and crack willow (*Salix fragilis*) which made up 75% canopy cover. European buckthorn was identified in the understory as the dominant species covering approximately 80%. The ground cover contained swallow-wort and western poison-ivy as the dominant species.

Photo 19: Cultural Woodland Facing West (July 31, 2018)

Community 23 Cultural Field Meadow (ELC Code: CUM1-1)

This community was identified in the north-western corner of the study area north of the road allowance. This open field which was not currently being used for farming purposes. Dominated by grass species (redtop (*Agrostis gigantea*), quack grass (*Elymus repens*), timothy (*Phleum pratense*), awnless brome grass (*Bromus inermis ssp inermis*)) and goldenrods (tall goldenrod (*Solidago altissima*) and Canada goldenrod (*Solidago canadensis*)). A variety of other field species were identified here including cow vetch (*Vicia cracca*), white sweet clover (*Melilotus alba*), red clover (*Trifolium pratense*), wild asparagus (*Asparagus officinalis*) common milkweed (*Asclepias syriaca*) and Queen-Anne's Lace.

Photo 20: Cultural Field Meadow Facing West (July 31, 2018)

3.2.2 Birds

3.2.2.1 Introduction and Level of Effort

Surveys for breeding birds and targeted species at risk were conducted within the study by GHD biologists according to the methodologies outlined in Section 2.2.2.2. A summary of the level of effort and environmental conditions have been provided in Table 3.2.

Table 3.2 Bird Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs)
May 11, 2018	Eastern Meadowlark/Bobolink Surveys	4°C, Wind-4, Cloud Cover-10%, Precipitation-None	7:41	1.5 hrs X 2 Biologists
May 30, 2018	Breeding Bird Survey	15°C, Wind-0, Cloud Cover-30%, Precipitation-None	7:06	1 hr 40 mins X 2 Biologists
May 30, 2018	Eastern Meadowlark/Bobolink Surveys	17°C, Wind-1, Precipitation-None	7:25	1 hr 15 minutes X 2 Biologists
June 20, 2018	Breeding Bird Survey	Wind-0, Cloud cover-70%, Precipitation-None	7:01	1h15 min X 2 Biologists
June 20, 2018	Eastern Meadowlark/Bobolink Surveys	12°C, Wind-1, Cloud Cover-80%, Precipitation-None	7:01	30 minutes

3.2.2.2 Breeding Bird Surveys

A total of 43 bird species were identified during breeding bird surveys. Four survey stations were established in the study area and more in the potential development envelope. These stations were located to cover the fields, forests, regenerating meadow and wetland areas (Figure 1.1).

From the first point count station (01BBS), conducted within community 2 (regenerating field) both species characteristic of early successional edge and forest interior were detected. These species included American goldfinch (*Spinus tristis*), blue jay (*Cyanocitta cristata*), chipping sparrow (*Spizella passerina*), Baltimore oriole (*Icterus galbula*) song sparrow (*Melospiza melodia*) ovenbird (*Seiurus aurocapilla*) and wood thrush (*Hylocichla mustelina*).

From the second point count station (02BBS), situated in adjacent to Community 23, species characteristic of early successional habitats and open areas (e.g., fields) were detected. These included eastern meadowlark (*Sturnella magna*), song sparrow (*Melospiza melodia*), bobolink (*Dolichonyx oryzivorus*), killdeer (*Charadrius vociferus*), barn swallow (*Hirundo rustica*) and yellow warbler (*Setophaga petechia*).

Station 3 (03BBS) was identified on the northern border of the property within community 1 (field meadow). A diversity of species were detected here including field and forest species such as field sparrow, indigo bunting, cedar waxwing (*Bombycilla cedrorum*) and black-capped chickadee (*Poecile atricapillus*).

Station 4 (04BBS) captured the forested and swamp habitats (community 13 and 14). Birds detected here included scarlet tanager (*Piranga olivacea*), ovenbird (*Seiurus aurocapilla*), wood thrush, eastern wood-pewee (*Contopus virens*) and black and white warbler (*Mniotilta varia*). A list of birds detected at each point count station, along with their breeding evidence codes, can be found in Appendix C.

3.2.2.3 Targeted SAR Surveys for Eastern Meadowlark and Bobolink

Old field and meadow, which are the preferred habitats of eastern meadowlark and bobolinks, were present in the northern and northwestern portions of the study site. As a result, three surveys targeting these species were conducted in the study area by GHD biologists according to the methodologies outlined in Section 2.2.2.3. Three transects and one survey station were established. Table 3 shows the dates and level of effort of these surveys, while Figure 1.1 illustrates the survey locations.

Eastern meadowlarks and bobolinks were observed in the northern portion of the study area from survey station 3 (03EM). They were not detected at any location along transect 1 or transect 2. A single eastern meadowlark was detected well north of the property (>200m) on the first survey date (May 11, 2018). On the second survey date (May 30, 2018), both an eastern meadowlark and bobolink were detected closer to survey station (i.e., 50m west and ~100m to the north-northwest, respectively). On the third visit (June 20, 2018), a single bobolink was detected from the survey station (~100m to the north-northwest).

3.2.2.4 Area Searches

Many of the bird species detected during the breeding bird surveys were also observed while GHD biologists were on-site conducting other wildlife and vegetation surveys. Four (4) additional bird species were detected outside of the breeding bird surveys and targeted eastern meadowlark/bobolink surveys. These were: turkey vulture (*Cathartes aura*), broad-winged hawk (*Buteo platypterus*), northern flicker (*Colaptes auratus*) and gray catbird (*Dumetella carolinensis*). A comprehensive summary of all of the birds observed on site, along with their breeding evidence codes can be found in Appendix D.

3.2.3 Amphibians

3.2.3.1 Introduction and Level of Effort

Three amphibian surveys were conducted within the study area by GHD biologists according to the methodologies outlined in Section 2.2.2.4. A summary of the level of effort and environmental conditions have been provided in Table 3.3.

Table 3.3 Amphibian Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs)
April 24, 2018	Marsh Amphibian Survey	11°C, Beaufort wind scale = 0, 100% cloud, no precipitation	20:38	0.5
May 28, 2018	Marsh Amphibian Survey	22°C, Beaufort wind scale = 0, 80% cloud, no precipitation	21:22	0.5
June 28, 2018	Marsh Amphibian Survey	22°C, Beaufort wind scale = 0, 20% cloud, no precipitation	21:18	0.5

3.2.3.2 Amphibian Surveys (Modified Marsh Monitoring Protocol)

Three amphibian species were detected during the surveys for calling amphibians (Appendix E). During the first round of surveys, spring peepers (*Pseudacris crucifer*) were detected from survey stations 1 (01MAS) and 3 (03MAS). During the second round of surveys, gray treefrogs (*Hyla versicolor*) were detected from all three stations, while spring peepers were heard calling from survey station 1 and American toads (*Anaxyrus americanus*) were detected from survey station 2. On the third visit, no frogs were detected from any of the survey stations.

3.2.3.3 Incidental Observations

One additional amphibian species was detected in the study area outside of the dedicated marsh amphibian surveys. This species, the wood frog (*Lithobates palustris*) was detected on July 26 and 31, 2018 in meadow marsh Community 5 and the deciduous swamp Community 6.

3.2.4 Mammals and Other Wildlife

3.2.4.1 Incidental Observations

No reptiles, or evidence of habitat use by reptiles, were detected by GHD staff in the study area. Six species of mammals were detected (Appendix F). These species were: white-tailed deer (*Odocoileus virginianus*), red squirrel (*Tamiasciurus hudsonicus*), eastern chipmunk (*Tamias striatus)*, coyote (*Canis latrans*), raccoon (*Procyon lotor*) and black bear (*Ursus americanus*).

3.2.4.2 Candidate Bat Maternity Roost Surveys

Bat cavity tree searches were conducted on May 19th, 2020 in the woodland communities within the study area. nineteen (19) plots were established to conduct these tree cavity surveys. Eight trees were found within these plots that were considered potentially suitable for bat maternity nesting. These trees were found in vegetation communities 3, 7, 13 and 15.

3.2.5 Significant Wildlife Habitat

In Ecoregion 6E, OMNRF has developed criteria that can be used to confirm five broad categories of Significant Wildlife Habitat: seasonal concentration areas of animals, rare vegetation communities, specialized habitat for wildlife, habitat for species of conservation concern (not including endangered or threatened species), and animal movement corridors. Within each category, there can be more than one specific type of significant wildlife habitat (for example, seeps and springs are considered one type of specialized habitat for wildlife, which is a category of SWH).

GHD biologists identified the following as candidate categories of significant wildlife habitat as being potentially present in the study area: seasonal concentration areas (potential bat maternity roosts), specialized wildlife habitat (seeps and springs, amphibian breeding habitat, area-sensitive bird breeding habitat) and habitat for species of conservation and concern. No rare vegetation communities were found in the study area.

3.2.6 Wetlands

Seven wetland ELC vegetation types were identified in the study area. These were Community 5 (MAM2-10), Community 6 (SWD4-3), Community 10 (SWC1-2), Community 11 (SWD2-1), Community 14 (SWC1-1), Community 16 (MAM3-9) and Community 18 (SWD4-3). The characteristics of each of these communities are described in Section 3.2.1.2.

3.2.7 Woodlands

GHD's Terrestrial and Wetland biologists determined that the woodlands were found across much of the study area. The boundary of these woodland communities was delineated in the field and is depicted on Figure 1.1. The contiguous woodland area that would be considered a significant woodland includes all numbered communities except Community 1 (CUM1-1), 2 (CUM1-1), 3 (No code), 21 (CUW1), 22 (CUW1), 23 (CUM1-1) and the Agricultural corn and built-up areas. An analysis of the functions provided by the significant woodland can be found in Section 4.5, Table 8.

3.2.8 Fish and Aquatic Habitat

3.2.8.1 Introduction and Level of Effort

The fish and aquatic habitat was assessed on June 12th and August 15th, 2018 and on June 4th and August 15th, 2020 within the tributary to Baxter Creek and associated headwater drainage features located on the subject property (Figure 1.1). Surveys were conducted following the methodologies outlined in Section 2.2.2.9. The level of effort and environmental conditions have been provided in Table 3.4.

It should be noted that the 2018 proposed development plan details had changed in 2020, which included a different location for the proposed road crossing. Therefore biologist conducted additional fish community surveys and surface water quality samples at the new proposed road crossing location. The new proposed site plan also

identified several watercourse features within the subject property. During the 2020 field assessments GHD staff verified what features were present and which were not. Only the existing watercourse features have been illustrated on Figure 1.1.

Table 3.4 Fish and Aquatic Habitat Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs)
June 12th 2018	Aquatic Habitat Assessments	Sunny (20% cloud cover), BWS 0-1, no precipitation during surveys, air temperature 23°C and water temperature 12.4-13.0°C.	10:15am	4.5 (x2 staff)
August 15th 2018	Fish Community Sampling, Surface Water Quality and Aquatic Habitat Assessments	Sunny (0% cloud cover), humid, BWS 0, no precipitation during surveys, air temperature 28 and water temperature 16.9°C.	11:30am	5.5. (x2 staff)
June 4th 2020	Fish Community Sampling and Surface Water Quality	Clear with cloudy periods (60% overcast), BWS 0-1, no precipitation, air temperature 22.6 °C and water temperature 17.2 °C.	09:00am	4 (x2 staff)
August 11th 2020	Fish Community Sampling and Surface Water Quality	Overcast (100 % cloud cover), BWS 0-1, no precipitation, air temperature 25 °C and water temperature 16.2 °C.	09:00am	3 (x2 staff)
*Note: BWS Beaufort wind scale (Government of Canada, 2017).				

3.2.8.2 Aquatic Habitat Assessments

The watercourses within the study area were classified into three habitat zones. Habitat zones are determined and differentiated based on presence of barriers, substrate composition, channel morphology, riparian habitat, percent in-stream cover, hydrological connection and unique features. The habitat zone locations have been illustrated in Figure 1.1 and attributes have been provided in Table 3.5.

Habitat Zone 1 was a 442 m section of the unnamed tributary to Baxter Creek that entered the property from the west and flowed east outside of the subject property. The tributary eventually flows into Baxter Creek mainstem approximately 380 m downstream (northeast) (Figure 1.1). The unnamed tributary to Baxter Creek from here on will be referred to as “watercourse”. The watercourse had defined natural channels and appeared to have permanent flow sourced by groundwater. Several seep areas were identified within this zone during the 2018 field assessments and have been illustrated in Figure 1.1.

The in-water substrate was dominated by sand and gravel. The average water depth was 0.08 m and the average wetted width was 1.27 m. Instream cover was composed of large and small woody debris with some undercut banks and boulders. The canopy cover was relatively high, covering 75-100% of the water’s surface. The overhead cover was composed of trees, shrubs, woody debris and overhanging banks (Table 3.5). Refer to Section 3.2.1 Vegetation Communities for full riparian vegetation details.

Photo 21: Habitat Zone 1, photo showing watercourse and riparian habitat within the proposed road crossing location, photo facing downstream (east) (Photo Date: August 11th, 2020).

Habitat Zone 2 was a headwater drainage feature (HDF) that was comprised of a main segment and two small segments that connected to the main segment on the west side. The total length of the HDF was 353 m. The HDF originated from the north flowed south until it outletted into the main watercourse (Habitat Zone 1) (Figure 1.1). The HDF had defined natural channels and appeared to be a permanent watercourse, however additional site visits in the summer and fall would be required to confirm. The in-water substrate was dominated by fine organics and sand. The average water depth was 0.04 m with an average wetted width of 0.04 m. Instream cover was dominated by large and small woody debris with some undercut bank. The canopy cover was high, covering 75-100% of the water's surface. The overhead cover comprised of shrubs, trees, and woody debris (Table 3.5). Refer to Section 3.2.1 Vegetation Communities for full riparian vegetation details.

Photo 22: Habitat Zone 2, photo showing the headwater drainage feature and riparian habitat, photo facing upstream (north) (Photo Date: June 12th, 2018).

Habitat Zone 3 was also a HDF that originated on the southwestern portion of the property directly north of Habitat Zone 1 and east of Buckland Drive. The HDF flowed southeast for approximately 72 m until it outletted into the main watercourse (Habitat Zone 1) (Figure 1.1). The HDF had a defined natural channel and was likely an intermittent watercourse that would likely flow during base flow conditions and after a large rain event. The in-water substrate was dominated by sand. The average water depth was 0.03 m with an average wetted width of 0.25 m. Instream cover was low and composed of large and small woody debris with some undercut banks. The canopy cover was low covering 0-24% of the water's surface. The overhead cover was comprised of non-woody vegetation, trees and some shrubs (Table 3.5). Refer to Section 3.2.1 Vegetation Communities for full riparian vegetation details.

Photo 23: Habitat Zone 3, photo showing headwater drainage feature and riparian habitat (Photo Date: August 15th, 2018).

Table 3.5 Aquatic Habitat Zone Descriptions

Habitat Zone	Substrate Composition	Instream Cover	Canopy Cover (Percent)	Overhead Cover	Channel Morphology	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
1	30% sand 30% gravel 15% cobble 10% boulder 10% fine organics 5% clay	20% large woody debris 10% small woody debris 5% undercut bank 2% boulders	75-100	20% woody debris 5% trees 5% shrubs 10% overhanging bank 1% crossing	35% run 35% pool 15% riffle 14% flats 1% inside culvert	0.08	1.27	442
2	40% sand 40% fine organics 15% gravel 4% cobble 1% boulder	15% large woody debris 10% small woody debris 2% undercut bank	75-100	20% shrubs 10% trees 20% woody debris 1% overhanging banks 1% non woody vegetation 2% crossing	40% run 20% pool 20% riffle 18% flats 2% inside culvert	0.04	0.53	353
3	50% sand 40% silt 10% gravel	5% large woody debris 5% small woody debris 2% undercut bank	0-24	20% non-woody vegetation 10% trees 5% shrubs 5% woody debris	95% run 5% pool	0.03	0.25	72

Surface water quality was collected in Habitat Zone 1 on August 15th, 2018, June 4th and August 11th, 2020 in Habitat Zone 1 (Figure 1.1). Samples were collected between 0.2m to 0.5 m below the surface of the water. A summary of results and information on the parameter specifics has been provided in Table 3.6.

Table 3.6 Surface Water Quality Results

Water Quality Parameters	Sample Number			Accepted Parameter Range
	01	02	03	
Date (dd/mm/yy)	15/08/18	04/06/20	11/08/20	N/A
Time (hh:mm)	11:50	12:36	11:35	N/A
Weather conditions	Warm, humid, clear (0% cloud cover) and BWS 2	Warm, partly clear (60% overcast) and BWS 0-2	Overcast (100% cloud cover), no precipitation	N/A
Sample Depth (m)	0.5	0.3	0.2	N/A
Air Temperature (□C)	28	26.9	25	N/A
Water Temperature (□C)	16.9	17.2	16.2	N/A
Dissolved Oxygen (mg/L)	8.98	8.94	8.89	8-10
Total Dissolved Solids (mg/L)	326.95	324.35	221	N/A
Conductivity (SPC·us/cm)	502.4	499	340.8	N/A
Salinity (ppt)	0.24	0.24	0.16	N/A
pH	8.16	8.25	8.44	6.5-8.5**
Turbidity (NTU)	1.5	5.77	6.24	Normal**
Note: BWS=Beaufort wind scale (Government of Canada, 2017), N/A= not applicable and/or specific guidelines not available. *lowest acceptable range for cool water biota (Canadian Council of Ministers of the Environment, 2002).				

3.2.8.3 Fish Community

GHD conducted fish community sampling in the Habitat Zone 1 on August 15th, 2018, June 4th and August 11th, 2020. In 2018, fish sampling was carried out by electrofishing within the area of the proposed road crossing. As previously noted, the location of the proposed road crossing had changed in 2020, therefore GHD staff conducting additional fish community surveys using minnow traps, dip nets and electrofishing within the new road crossing location (Figure 1.1).

The environmental site conditions, level of effort and results have been provided in Table 6. A total of 13 individual fish were collected within the watercourse during the 2018 and 2020 surveys. Fish species collected include: Western blacknose dace (*Rhinichthys obtusus*) and brown trout (*Salmo trutta*) (Photo 24). Both species inhabit cool and coldwater habitats (Table 3.7).

A review of the historical fish species documented in Baxter Creek has been provided as context for contributing fish habitat value (Appendix H).

Photo 24: Photo showing brown trout collected in Habitat Zone 1 (Photo Date: August 11th, 2020).

Table 3.7 Fish Community Sampling Data

Family Name	Common Name	Scientific Name	Thermal Regime	Spawning Season	Sample Number			
					1	2	3	4
Cyprinidae	Western Blacknose Dace	Rhinichthys obtusus	Coolwater	Spring (May-June)	3	0	0	9
Salmonidae	Brown Trout	Salmo trutta	Coldwater	Fall (October-November)	0	0	0	1
Catch Summary								
				Abundance	3	0	0	10
				Species Diversity	1	0	0	2
Environmental Conditions								
				Air Temperature (□C)	28	22.6	22.6	25
				Stream Temperature (□C)	16.9	17.2	17.2	16.2
Sample Attributes								
				Date (dd-mmm-yy)	15-Aug-18	04-Jun-20	04-Jun-20	11-Aug-20
				Gear Type	EF	MT/DP	MT/DP	EF
				Frequency (hertz)	30	N/A	N/A	30
				Voltage	150	N/A	N/A	80
				Site Length (m)	35	N/A	N/A	53.3
				Average Width (m)	1.3	N/A	N/A	1.62
				Shocker Seconds	1036	N/A	N/A	905
				Effort sec/m²	22.7	N/A	N/A	10.5
				Effort (duration)	N/A	2 hrs (MT)/15 min (DP)	2 hrs (MT)/15 min (DP)	N/A

Note: The thermal regime and spawning season for each fish species was obtained from *Ontario Freshwater Fishes Life History Database* (Eakins, Ontario Freshwater Fishes Life History Database, 2019). N/A=not applicable, MT=Minnow Trap, DP=Dip Net and EF=Electrofisher

4. Discussion and Analysis

4.1 Physical Site Characteristics

4.1.1 Soils

The northern portion of the study area is mainly comprised of Otonabee loam, a high lime, moderately stony material. The steep slopes were identified as Otonabee loam-steep phase, a shallow soil over calcareous stony loam, with variable surface texture (Ontario Soil Survey). Organic soils were identified throughout the cedar swamp (Community 14).

4.2 Species and Communities

4.2.1 Vegetation

GHD biologists found one species, black ash that is considered to be nationally and/or provincially significant (SARA 2020; COSEWIC 2020; COSSARO 2018) (Appendix B). Black ash, which is listed as threatened (COSEWIC 2020) was found in vegetation communities 6, 10, 11 and 12. In addition, three species considered to be regionally rare (Oldham, 1999) were identified in the study area. These species were: black walnut, English hawthorn (*Crataegus monogyna*) and sweetbrier rose (*Rosa rubiginosa*). Black walnut has been planted outside of its natural range and is now common in the local area. English hawthorn and sweetbrier rose are not native to Canada but have been planted outside of its natural range and is now common in the area.

None of the ecological community types identified on the property are considered provincially rare (OMNRF, 2015).

4.2.2 Birds

Seven (7) species detected during GHD's surveys are considered to be significant at the national (SARA 2020; COSEWIC 2020) or provincial level (COSSARO 2018) (Appendix D). These species were: eastern wood-pewee (*Contopus virens*), barn swallow (*Hirundo rustica*), wood thrush (*Hylocicla mustelina*), golden-winged warbler (*Mniotilta varia*), grasshopper sparrow (*Ammodramus savannarum*), bobolink (*Dolichonyx oryzivorus*) and eastern meadowlark (*Sturnella magna*).

The eastern wood-pewee is considered a species of special concern nationally and provincially (COSEWIC 2020; COSSARO 2018). It lives in the mid-canopy layer of deciduous and mixed forest clearings and edges, particularly if these forests have little understory vegetation. Suitable habitat for this species could be found in the central and southern portions of the study area, such as in Communities 7, 15 and 17.

The barn swallow is listed as a threatened species in both the national and provincial levels (COSEWIC 2020; COSSARO 2018). This species nests in structures such as barn or sheds, and prefers open country foraging habitats, such as grasslands and old fields. The property contained appropriate foraging habitat. Suitable nest habitat may exist in barns to the west and north of the subject property. There were no nesting sites found on the subject property.

The wood thrush is listed provincially as a species of special concern (COSSARO 2018) and is considered a nationally threatened species (COSEWIC 2020). This species breeds in mature deciduous and mixed forests with large trees, a well-developed understory and abundant leaf litter for foraging. They prefer large forests, particularly where there are abundant sugar maple or beech, but will also use smaller stands of trees. There is suitable habitat for this species on the subject property in the southeastern portion of the woodland delineated in the field.

The golden-winged warbler (*Vermivora chrysoptera*) is listed as a species of special concern provincially (COSSARO, 2018) and threatened nationally (COSEWIC 2020). This species nests in early successional habitats with young shrubs provided such areas also have mature forest nearby. Suitable locations include hydro or utility right-of-ways, recently logged areas and field edges. This species was detected in the northeastern portion of the study area near Community 19.

The grasshopper sparrow (*Ammodramus savannarum*) is listed as a special concern species at both the national and provincial levels (COSEWIC 2020; COSSARO 2018). This species nests on the ground in grasses. Grasshopper sparrows are found in open grasslands, hayfields, prairies, and alvars with sandy, well-drained soils and sparse vegetation. This species was detected in the far northern portion of the study area.

Bobolinks and eastern meadowlarks are both listed as threatened species at the provincial and national levels (COSSARO 2018; COSEWIC 2020). These species prefer grassy meadows and pastures with tall, dense grasses. Suitable habitat for these species was found in the northernmost portion of the study area and extended onto the neighbouring property.

Three (3) species, black-throated green warbler (*Dendroica virens*), ovenbird (*Seirus aurocapillus*) and scarlet tanager (*Piranga olivacea*) were detected during field inventories and are considered to be area sensitive. Area sensitive species are species that require a minimum area of suitable habitat to successfully breed. The black-throated green warbler was detected from breeding bird station 3, and the ovenbird and scarlet tanager from stations 1 and 4.

Records obtained from the Ontario Natural Heritage Information Centre (2021), indicate two bird Species at Risk occurred within the 1km x 1 km squares overlapping the property (17QJ0392, 17QJ0492, 17QJ0493 and 17QJ0393). These records were of the eastern meadowlark and bobolink. The most recent records of these species were from 2011. Both species were observed in 2018 during GHD field work and suitable habitat was present in the study area.

The Ontario Breeding Bird Atlas for the 10km x 10km square that includes the property (17QJ09) includes 22 bird species that are provincially (COSSARO 2018) or nationally (COSEWIC 2020) significant: northern bobwhite (*Colinus virginianus*), least bittern (*Ixobrychus exilis*), king rail (*Rallus elegans*), black tern (*Chlidonias niger*), short-eared owl (*Asio flammeus*), common nighthawk (*Chordeiles minor*), eastern whip-poor-will (*Antrostomus vociferous*), chimney swift (*Chaetura pelagica*), red-headed woodpecker (*Melanerpes erythrocephalus*), olive-sided flycatcher (*Contopus cooperi),* eastern wood-pewee, loggerhead shrike (*Lanius ludovicianus migrans*), bank swallow (*Riparia riparia*), barn swallow, wood thrush, golden-winged warbler, cerulean warbler (*Setophaga cerulea*), Canada warbler (*Wilsonia canadensis*), grasshopper sparrow, bobolink, eastern meadowlark and evening grosbeak (*Coccothraustes vespertinus*).

As has been previously mentioned, old field meadows at the northernmost edge of the subject property provided appropriate breeding habitat for grassland species such as grasshopper sparrow, eastern meadowlark and bobolink. Additionally, deciduous and mixed forests in the southern and eastern portions of the property provided appropriate breeding habitat for wood thrush and eastern wood-pewee. The golden-winged warbler was detected in early successional habitat adjacent to the large contiguous forest block, which also appeared to be suitable habitat for the species. It is also possible that aerial foraging birds such as barn swallows, bank swallows and common nighthawks might find suitable feeding habitat over the fields and meadows on the property; however, only barn swallows were detected during GHD's survey efforts.

4.2.3 Amphibians and Reptiles

None of the amphibian species detected by GHD staff are nationally and/or provincially significant (SARA 2020; COSEWIC 2020; COSSARO 2018). No reptile species were detected in the study area. One herpetofaunal species at risk was listed among the records obtained from the Ontario Natural Heritage Information Centre (2021) for the 1km-by-1km squares overlapping the property. Snapping turtle (*Chelydra serpentina*) is listed as being present in squares 17QJ0392 and 17QJ0493.

The snapping turtle is listed both federally and provincially as special concern (SARA 2020; COSSARO 2018). Snapping turtles spend most of their lives in shallow waters with only their noses exposed to the surface to breathe. During the nesting season, females travel overland in search of suitable nesting sites, usually gravelly or sandy areas along streams or along railway lines and shoulders of roadways. No evidence of nesting turtles was detected by GHD biologists.

The Ontario Reptile and Amphibian Atlas (Ontario Nature 2019) records for the 10 km x 10 km square that overlaps the property (17QJ09) include three species that are considered significant at either the provincial (COSSARO 2018) or national (SARA 2020; COSEWIC 2020) level. These records were for snapping turtle, eastern hog-nosed snake and western chorus frog.

The eastern hognose snake is designated as a threatened species provincially and federally (COSSARO 2018; SARA 2020). This species prefers sandy, well-drained habitats including beaches and dry woods. Wet areas such as swamps are utilized by this species for foraging. The vegetation communities on site might provide suitable foraging habitat for hognose snake but not hibernaculum sites or denning areas. Beaches and dry woods were absent from the subject property.

The western chorus frog is listed federally as threatened (SARA 2020). It inhabits forest openings around woodland ponds and can also be found in or near damp meadows, marshes, bottomland swamps and temporary ponds in open country environments. The species was not detected by GHD surveys.

4.2.4 Mammals and other Wildlife

No significant species of mammal were detected during field surveys. No Species at Risk mammals were listed among the records obtained from the Ontario Natural Heritage Information Centre (2021) for the 1km x 1 km squares overlapping the property.

Eight trees that were considered potentially suitable for bat maternity nesting were found within the nineteen plots established to conduct tree cavity surveys. These trees were found in vegetation communities 3, 7, 8, 11, 13 and 15. Cavity height varied between 4 and 15 metres above the ground. Decay code varied between 1 and 6, with some trees having very shaggy bark and others individual cavities. Tree species were yellow birch, poplars and American elm (Appendix G). Potential roost trees identified in Community 13 may not present the best roosting habitat for bats since these trees were in dense conifer stands that would impede flight paths of bats entering and exiting cavities.

Candidate roost trees located in the south portion of the study site may offer roosting bats far greater opportunities for foraging and roosting due to the open deciduous nature of this section, in addition to the close proximity to the watercourse and flight corridor (predominantly the thoroughfare of Community 11).

4.3 Significant Wildlife Habitat

In the Provincial Policy Statement (2020) wildlife habitat is defined as, "… areas of the natural environment where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations." These documents also state, "specific wildlife habitats of concern may include areas where the species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory and non-migratory species."

Significant Wildlife Habitat often occurs within other natural heritage features and areas covered by Policy 2.1 of the Provincial Policy statement (e.g., significant wetlands and significant woodlands). Therefore, it has been suggested that identification and evaluation of SWH is best undertaken after other natural heritage features have been identified (Natural Heritage Reference Manual, 2010).

GHD biologists analyzed the information collected from the ecological communities on the subject property using the criteria for Significant Wildlife Habitat in Ecoregion 6E (2015) and confirmed two types of significant wildlife habitat in the study area: seeps and springs and habitat for species of conservation concern. Four additional candidate SWH types were identified as potentially present but were not confirmed based on the field work GHD conducted in the study area: amphibian breeding habitat (woodland), amphibian breeding habitat (wetland), bat maternity roosts and area-sensitive bird breeding habitat. All potential habitats are described in Table 7, along with a note of whether they have a high, moderate or low probability of occurring. The identified SWH are shown on Figure 1.1.

Table 4.1 Candidate Significant Wildlife Habitat Potentially Present in the Study Area

Seasonal Concentration Areas			
1. Areas where wildlife species occur annually in aggregations at certain times of the year. **2. Areas may have high concentrations of a specific species, or several species in a small area.** **3. Migratory species may congregate in the spring or fall.** **4. Some species congregate in certain areas to overwinter.**			
Candidate Wildlife Habitat	**Habitat Criteria and Requirements for Confirmation**	**Was SWH Confirmed?**	**Probability of Occurrence & Explanation**
Bat Maternity Colonies	Maternity colonies can be found in tree cavities, vegetation and often in buildings Maternity colonies are located in mature deciduous or mixed forest stands >10/ha large diameter wildlife trees	No – but possible	Although potential cavity trees were identified, no evidence of bat use was detected.

Specialized Wildlife Habitats			
1. Areas that support wildlife species with highly specific habitat requirements **2. Areas with exceptionally high species diversity or community diversity** **3. Areas that provide habitat that greatly enhances a species' survival**			
Candidate Wildlife Habitat	**Habitat Criteria and Requirements for Confirmation**	**Was SWH Confirmed?**	**Probability of Occurrence & Explanation**
Seeps and springs	Areas where ground water comes to the surface. Such areas are important drinking and feeding areas, especially in the winter. To confirm: Presence of a site with 2 or more seeps/springs should be considered SWH. The area of the ELC forest ecosite with the seeps or springs is SWH.	Yes	Seepage areas were documented in Community 7 and Community 12.
Amphibian Breeding Habitat (Woodland)	Presence of a wetland, pond or woodland pond (including vernal pools) ≥500m^2 within or adjacent to a woodland. Woodlands with ponds containing water until mid-July are more likely to be used. To confirm: presence of breeding population of 1 or more listed salamander/newt species or 2 or more of the listed frog/toad species with either 20 individuals or a Call Level Code of 3.	No – not present	Not SWH – Although two (2) of the listed frog/toad species were detected during GHD's surveys (gray treefrog and spring peeper), only the spring peeper was abundant enough to meet the criterion.
Amphibian Breeding Habitat (Wetlands)	Wetlands and pools >500m^2 supporting high species diversity. To confirm: presence of breeding population of 1 or more listed salamander/newt species or 3 or more of the listed frog/toad species with at least 20 individuals, a call Level Code of 3, or wetlands with confirmed breeding bullfrogs.	No – not present	Not SWH – Only one (1) of the listed frog/toad species was detected during GHD's surveys (gray treefrog).
Area-Sensitive Bird Breeding Habitat	Habitats where interior forest birds are breeding, typically large mature forest stands or woodlots.	No – not present	Although singing males of three (3) of the listed species were detected, nesting and/or

Specialized Wildlife Habitats			
1. Areas that support wildlife species with highly specific habitat requirements **2. Areas with exceptionally high species diversity or community diversity** **3. Areas that provide habitat that greatly enhances a species' survival**			
Candidate Wildlife Habitat	**Habitat Criteria and Requirements for Confirmation**	**Was SWH Confirmed?**	**Probability of Occurrence & Explanation**
	Interior forest habitat is at least 200m from the forest edge. Presence of nesting or breeding pairs of 3 or more of the listed wildlife species.		breeding pairs were not found.

Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)			
1. Areas that support wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. **2. Excludes the habitats of Endangered or Threatened Species.**			
Candidate Wildlife Habitat	**Habitat Criteria and Requirements for Confirmation**	**Was SWH Confirmed?**	**Probability of Occurrence & Explanation**
Special Concern and Rare Wildlife Species	Presence of special concern and provincially rare (S1-S3, SH) plant or wildlife species. Assessment must be conducted in the peak breeding season for those species.	Yes - confirmed	The eastern wood-pewee and wood thrush were detected in the mixed forest just south of the old rail line in the south-central portion of the property. It appears that suitable habitat is present in the deciduous and mixed forests in that portion of the property. The golden-winged warbler was detected in Community 19. It appears that suitable habitat is present in this portion of the study area. The grasshopper sparrow was detected in the northern portion of the property near Community 23. Appropriate breeding habitat for this species is found in the area.

4.4 Wetlands

Seven wetland ELC vegetation types were identified in the study area. These wetlands are not currently considered to be provincially significant. Nevertheless, the Township of Cavan-Monaghan OP recognizes the important functions that these wetlands perform and prohibits development within 30 metres of any part of these features. Evaluated and unevaluated wetlands are part of the Township Natural Heritage System.

4.5 Woodlands

Woodlands are defined in the Township of Cavan-Monaghan Official Plan (Office Consolidation October 2020) as, "treed areas, woodlots or other forested areas, other than cultivated fruit or nut orchards or plantations established for the purpose of producing Christmas trees." Significant woodlands are one of natural heritage feature listed under Section 6 (Natural Heritage System) of the Township of Cavan-Monaghan Official Plan (Office Consolidation October 2020). A significant woodland means, "in regard to woodlands, an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history." (Township of Cavan-Monaghan Official Plan Office Consolidation October 2020).

The OP prohibits development or site alteration in and adjacent to (within 30 metres of the base of the outermost tree trunks of) significant woodlands, subject to Section 6.7.1 (g) and (h) if a natural heritage evaluation is required. Schedule B-1 illustrates significant woodlands have been identified on the subject property. GHD staff used the Natural Heritage Reference Manual Second Edition (OMNRF 2010) to assess the significance of woodlands in the study area. GHD's analysis indicates that the woodlands would meet more than one of the criteria used to confer significance (Table 8). GHD staff delineated the boundary of the woodlands on site.

Table 4.2 Application of Significant Woodland Criteria & Standards (NHRM, 2010)

Recommended Significant Woodland Criteria & Standards (NHRM, 2010)		
Criteria	**Comments & Standards**	**Met (Yes/No)**
Size	Size value is related to scarcity of woodland in the landscape derived on a municipal basis. Where woodlands cover is about 15-50% of the land cover, woodlands less than 20ha in size or larger should be considered significant.	Yes, woodlands on property are part of a contiguous woodland block >20ha in size.
Woodland Interior	Interior habitat more than 100m from the edge is important for some species. Woodlands should be considered significant if: they have 2ha or more of interior habitat where woodlands cover is about 15-30% of the land cover.	Yes, woodland on the eastern part of the property contributes to a woodland with interior habitat >100m from the edge.
Proximity	Woodlands should be considered significant if: a portion of the woodland is located within a specified distance (e.g. 30m) of a significant natural feature or fish habitat likely receiving ecological benefit from the woodland and the entire woodland meets the minimum area threshold.	Yes
Linkages	Woodlands should be considered significant if they: are located within a defined natural heritage system or provide a connecting link between two other significant features, each of	Yes, the woodland is identified as part of the Township of Cavan Monaghan's Natural Heritage system.

Recommended Significant Woodland Criteria & Standards (NHRM, 2010)		
Criteria	**Comments & Standards**	**Met (Yes/No)**
	which is within a specified distance (e.g., 120 m) *and meets minimum area thresholds (e.g., 1–20 ha, depending on circumstance)*	
Water protection	Woodlands should be considered significant if they: are located within a sensitive or threatened watershed or a specified distance (e.g., 50 m or top of valley bank if greater) of a sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse or fish habitat and meet minimum area thresholds (e.g., 0.5–10 ha, depending on circumstance)	Yes
Woodland Diversity	Woodlands should be considered significant if they have: - a naturally occurring composition of native forest species that have declined significantly south and east of the Canadian Shield and meet minimum area thresholds (e.g., 1–20 ha, depending on circumstance) -a high native diversity through a combination of composition and terrain (e.g., a woodland extending from hilltop to valley bottom or to opposite slopes) and meet minimum area thresholds (e.g., 2–20 ha, depending on circumstance	No
Uncommon Characteristics	Woodlands should be considered significant if they: - have a unique species composition - are a provincially rare vegetation community - habitat of a rare, uncommon or restricted woodland species - have characteristics of older woodlands/woodlands with large tree structure	No
Economic and Social Functions	Woodlands should be considered significant if they: - are highly productive in terms of economically valuable products; - have a high value in special services such as recreation; - have important identified appreciation, education, cultural or historical value	No

4.6 Other Natural Features

There are no provincially significant Areas of Natural and Scientific Interest (ANSI) located within 120m of the subject property. The nearest Life Science ANSI (Ganaraska Forest West of Carmel) is located more than 3km to the southwest of the subject property. No provincially significant wetlands or valleylands have been previously identified in the study area.

GHD's site visits confirmed the presence and location of the tributary to Baxter's Creek. This feature extended across the southern portion of the study area. For more information about this feature and its functions, refer to Section 3.2.8 and 4.7.1 of this EIS report.

4.7 Fish and Aquatic Habitat

4.7.1 Aquatic Habitat

The tributary to Baxter Creek (Habitat Zone 1) provides direct fish habitat within the subject study area to a coldwater fish community (Brown Trout and Eastern Blacknose Dace). Specifically, the habitat provides sources of hydrological connections, cover and feeding habitat, overwintering habitat, breeding and rearing habitat, nutrients and sediments, and food supply to fish. These attributes are important for the sustainability of a cold water fish community.

The associated headwater drainage features (Habitat Zones 2 and 3) provide indirect fish habitat to the downstream to the watercourse (Habitat Zone 1). Specifically, it provides seasonal hydrological and groundwater connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat.

Fish habitat in Ontario is managed federally by the Minister of Fisheries and Oceans Canada and therefore, the Fisheries Act applies to the subject lands. No critical habitat for Aquatic Species at Risk (DFO, 2019) or sensitive spawning habitat was identified within the study area (OMNR, 2012).

4.7.2 Fish Community

Two (2) fish species were collected in the main tributary (Habitat Zone 1), Brown Trout and Eastern Blacknose Dace. Both species prefer cold water thermal regimes and are common to groundwater sourced systems such as Backer Creek watershed.

Generally, the Baxter Creek watershed supports a diverse fish community composed of sport and bait fish species that prefer cold and warm water thermal regimes. Cumulatively, 11 fish species have been documented in the watershed and are composed of the following families; *Catostomidae, Cottidae, Cyprinidae, Gasterosteidae, Salmonidae* (OMNR, 2012). (Appendix H). GHD fish sampling results coincide with the literature review of species found within the watercourse. The fish community observed within the study area are common and widely distributed throughout southern Ontario.

5. Impact Assessment and Recommendations

The following section provides a description of the predicted impacts that may result from the proposed development. It also identifies mitigation measures to be implemented to avoid and/or minimize adverse effects to the natural environment features within or near the project. A summary of the impact assessment and recommendations can be found in Table 5.1.

5.1 Wetlands

Several unevaluated wetlands were identified in the study area. Among the wetlands for which detailed vegetation assessments were conducted were Communities 5, 6, 10, 11, 14, 16 and 18. Under the Ontario Wetland Evaluation System 3rd edition, they would be called meadow marsh (5 and 16), hardwood swamp (11 and 18) and coniferous swamp (10 and 14). Under the ELC system, they were forb mineral meadow marsh (5), white birch-poplar mineral deciduous swamp (6), white cedar-conifer mineral coniferous swamp (10), black ash mineral deciduous swamp (11), white cedar mineral coniferous swamp (14), forb organic meadow marsh (16) and white birch-poplar mineral deciduous swamp (18).

The wetland area shown as part of Official Plan Schedules only showed a small area of wetland in the woodland on the east side and a section along the creek. The surveys and mapping completed by GHD show that the wetland is considerably larger and covers over 6.0 hectares of land.

The wetland areas are associated with either the creek floodplain or are within the interior of the large woodland. As such the buffers recommended from the wetlands is not the main constraint identified to the development envelope.

Various policy document recommends minimum 30-meter buffer areas (or set-backs) in order to protect the ecological functions of wetlands. A 30-meter buffer was used as an area of constraint in Figure 2.1. The 30-meter buffers will protect the various functions of these wetlands, including the provision of water storage, water quality and wildlife cover. The installation of heavy-duty silt fencing along the perimeter of the development envelope will protect the features and functions and maintain the buffers' integrity. The buffer should remain as natural self-sustaining vegetation.

The large wetland (community 14) is associated with the low-lying areas of the woodland and is predominantly cedar swamp. Surface water, seeps and groundwater likely all contribute the saturated soil conditions. The development of the site is not anticipated to impact on those treed wetland communities. Drainage from the backyards of the lots, as well as the large area of the property being retained in tree cover will maintain the hydrological functions of the wetlands. The protection of the surrounding forest, along the east side of the development envelope will maintain the isolated conditions and protect the wetland from effects such as wind damage.

The wetlands associated with the creek are present due to the spring flooding, saturated soil conditions and surface and groundwater inputs. The species are typical of bottomland areas and riparian areas. The results of the Geotechnical investigation (GHD, 2022) identified *the proposed development area is generally comprised of topsoil underlain by silty sand over silty clay or glacial till*. GHD also indicated in the Geotechnical Investigation *The groundwater seepage was identified at depths ranging from 1.8 to 4.0 m. The overall shallow groundwater flow direction is to the southeast towards tributaries that lead to Baxter Creek* (GHD, 2022).

These wetlands will not be impacted by the proposed development with the exception of the proposed watercourse crossing. A buffer has been recommended from the creek, the wetlands and the top of bank. As such several features that surround the creek increase the width of the buffer. The road crossing will impact on a section of the creek and the associated wetlands. As part of any compensation measures and DFO restoration works that may be required, we will include wetland as a key component.

A compensation plan will be prepared and submitted for ORCA's approval with the extent of any disturbance to wetlands and/or their buffer. Preliminary mapping of the extent of the woodlands/wetlands can be identified in Figure 3.1. Discussions with ORCA staff and details of the wetland removal and compensation options will be

detailed in the Compensation Plan. GHD will work with ORCA to ensure a net gain in wetland on site to satisfy ORCA policies 7.1 (7) and 7.2 (8)

5.2 Significant Woodlands

The majority the western portion of the study area are part of a contiguous forest block that meets MNRF's criteria for Significant Woodlands. The ecological functions of the woodland include water protection (e.g., along the tributary to Baxter's Creek and identified seepage areas) and as a linkage area for wildlife movement and migration. That woodland was identified as part of the Natural Heritage System. The woodland area shown as part of Official Plan Schedules only showed a small area of woodland on the east side and a block north of the creek. The surveys and mapping completed by GHD show that the woodland is considerably larger and covers over 6.5 hectares of land plus the conifer swamp areas (4.5 ha). The shape of the woodland is also very different than found during the field surveys and as mapped on Figure 1.1.

GHD biologist delineated the boundary of the woodland, by the dripline, on aerial photos and then on the ground with a GPS. This has not been verified by ORCA through a site walk and staking.

As the boundary of the woodland and the various communities that make it up are very sinuous, GHD has made some modifications to the line. Figure 1.1 shows the exact edge of all the ELC communities and Figure 2.1 shows a generic 30 m buffer from that linework. Based on the type of vegetation, health, storm damage and age of the edges of some of those younger communities, we have adjusted that buffer line.

There are several areas where the line creates wider buffer areas and some where it is slightly less than 30 m. Our recommendation is to plant all the buffer areas with native vegetation. This will create an 'average 30 m buffer' with several areas with greater opportunities for restoration and plantings.

GHD does recommend that an edge management plan and buffer planting plan be prepared to address any areas where the development envelope encroaches on wooded areas or narrow buffer areas. There are also some opportunities where invasive species management may also be beneficial. Managing for swallowwort (dsv), black locust and buckthorn may benefit some of the communities in the southern part of the property.

The proposed development has been placed outside of the woodland areas providing these functions. Development is not proposed within 30-meters of the coniferous or deciduous forests that have been delineated in the study area. Further discussion with the agencies will define areas where restoration or denser plantings are needed.

5.3 Significant Wildlife Habitat

Two types of significant wildlife habitat were confirmed to occur in the study area: seeps and springs and habitat for special concern and rare wildlife species. Four additional candidate SWH types were identified as possibly occurring in the study area but were not confirmed. The best mitigation measure to reduce the potential impacts of the proposed development on all types of significant wildlife habitat is to avoid having the development encroach into identified features.

Seeps/springs are important feeding and drinking areas, especially in the winter and will typically support a variety of plant and animal species. Two seepage areas were identified in the southern portion of the study area, in Communities 7 and 12. As these seeps fall within the boundary of the significant woodland identified on site, they will be protected from development by a minimum 30-meter buffer from the woodland edge.

Two of the special concern species detected in the study area, the eastern wood-pewee and wood thrush, were also located within the significant woodland on the subject property. As a result, their habitat too will be protected by the 30-meter buffer afforded the significant woodland.

Similarly, the golden-winged warbler's habitat falls within 30-metres of the significant woodland edge in the northern portion of the study area and will not be subject to development or site alteration. The habitat for grasshopper sparrow will be compensated for as part of any compensation agreement as required under the ESA for eastern meadowlark and bobolink (see Section 5.5).

Although no cavity trees were identified within the woodlands, confirmation with MECP on whether additional surveys (i.e. acoustic surveys) would be required to determine the presence or absence of bat habitat.

5.4 Fish and Aquatic Habitat

The tributary of Baxter Creek within the study area provides direct and indirect fish habitat to the local fish community. The natural feature form and function will be protected by a 30 m natural buffer from the high-water mark for any new developments, with the exception the proposed road crossing and stormwater outlet (Appendix I). All other development will be located outside the 30 m buffer. Development includes houses, pools, lawns or accessory buildings.

The headwater drainage features located in Habitat Zone 2 and 3 provide indirect fish habitat and will also be protected by a 30 m buffer from the high-water mark.

The proposed Municipal road crossing over the Habitat Zone 1 is required to accommodate the project services including trunk sanitary sewer, storm sewer, and watermain. The proposed crossing structure is a 23.1m long concert box culvert (2.4m x 1.5m) (Appendix I). Creation of the new road crossing will require the realignment of approximately a 23m length of Habitat Zone 1. The concrete box culvert will be embedded 0.3m ensure fish passage and accommodate placement of native substrates. The channel realignment work has the potential to cause harmful alternation, disruption or destruction (HADD) to fish habitat. Therefore, the project must be review by the Department of Fisheries and Oceans to determine if an Authorization is required. It is recommended that a DFO Request for Review document is submitted as soon as possible to initiate DFO consultation early on in the process.

Individual fish should be protected throughout the construction phase by implementation of a fish rescue from all in-water work areas. A site specific fish rescue plan is to be developed by a professional biologist for the site. Fish will be further protected by restricting all in-works to the NDMNRF timing windows in the spring (March 15th to July 15th) to protect Eastern Blacknose Dace and the fall (Oct 1st to May 31st) to protect Brown Trout sensitive life history processes. Therefore, in-water work will only be permitted between July 15th and Oct 1st of any year.

A detailed sediment and erosion control plan must be reviewed by a professional biologist to ensure the proposed construction activities to ensure disturbed soils are not transported off-site to the watercourse negatively impacting aquatic life, fish and fish habitat.

To further protect the watercourses of Baxter Creek and ensure project compliance with the PPS, additional recommendations have been provided in Section 7.0 for incorporation into the final site plan.

The final development plan and stormwater management design must be reviewed by a professional biologist to ensure the watercourse crossing, infrastructure installation, the stormwater management facility are designed to avoid or minimize impacts fish and fish habitat.

5.5 Stormwater

There will be an increase in impervious surface flow through construction of the townhouse buildings and associated parking facilities. Stormwater will be discharged from the subject lands and provide contributing flows to the watercourse. It is typically recommended that stormwater outlets are located outside of the 30 m buffer, however, site conditions do not support this setback, please refer to the Functional Servicing Report, 2022 (Valdor Engineering Inc., 2022). To avoid point source erosion, the outfall to the watercourse should be designed to minimize impacts, such a bioswale planted with native shrubs and non-woody vegetation.

The stormwater design must incorporate mitigation measures to minimize impacts of discharged waters into the watercourse to protect the habitat for the fish species present in the watercourse and downstream in Baxter Creek. The design must be designed to provide MOE “Enchanted” level of stormwater treatment as defined in the MOE SWM.

A multiple treatment approach should be used to manage stormwater onsite. A combination of lot level conveyance and end-of-pipe treatments should be incorporated where possible. Low impact development (LID) practices should be considered to manage run-off through runoff prevention by minimizing impervious cover, incorporating rainwater collection systems and stormwater infiltration practices, and maintain existing vegetation where possible.

A detailed erosion and sediment control (ESC) plan must be prepared and reviewed by a professional biologist to ensure disturbed soils from construction activities are not transported off-site and into the watercourses, negatively

impacting downstream aquatic life and aquatic habitat. GHD has provided additional SEC mitigation measures to be incorporated into the plan in Section 7.0 of this report

The final stormwater management design must be reviewed by a professional biologist to ensure the outlet location and structure comply with the *Fisheries Act*.

5.6 Species at Risk

5.6.1 Eastern Meadowlark/Bobolink

Eastern meadowlark and bobolinks were identified during field surveys in the northernmost portion of the study area in Community 23. Suitable habitat exists for both species in this area and extends off the property to the north. It is assumed that territories would overlap across the entire field areas.

The proposed development will result in a loss of Category 1, 2 & 3 habitat. As a result, a permit and/or other authorization under the Endangered Species Act will be required. The Ministry of the Environment, Conservation and Parks (MECP) will be contacted for guidance. The loss of habitat and an appropriate off-site compensation site will be discussed with MECP. A condition of approval for the draft plan is recommended to ensure that appropriate permits are obtained from MECP and that the development complies with the Endangered Species Act.

5.6.2 Barn Swallow

Barn swallows were detected flying over and foraging in Communities 1, 2 and 23. It is thought that these species may be nesting in barns located to the north and west of the study area. Discussions with MECP would determine compliance requirements of the Endangered Species Act for any Category 2 and 3 habitats surrounding a barn structure.

5.6.3 Golden-winged warbler, Wood Thrush and Eastern Wood-pewee

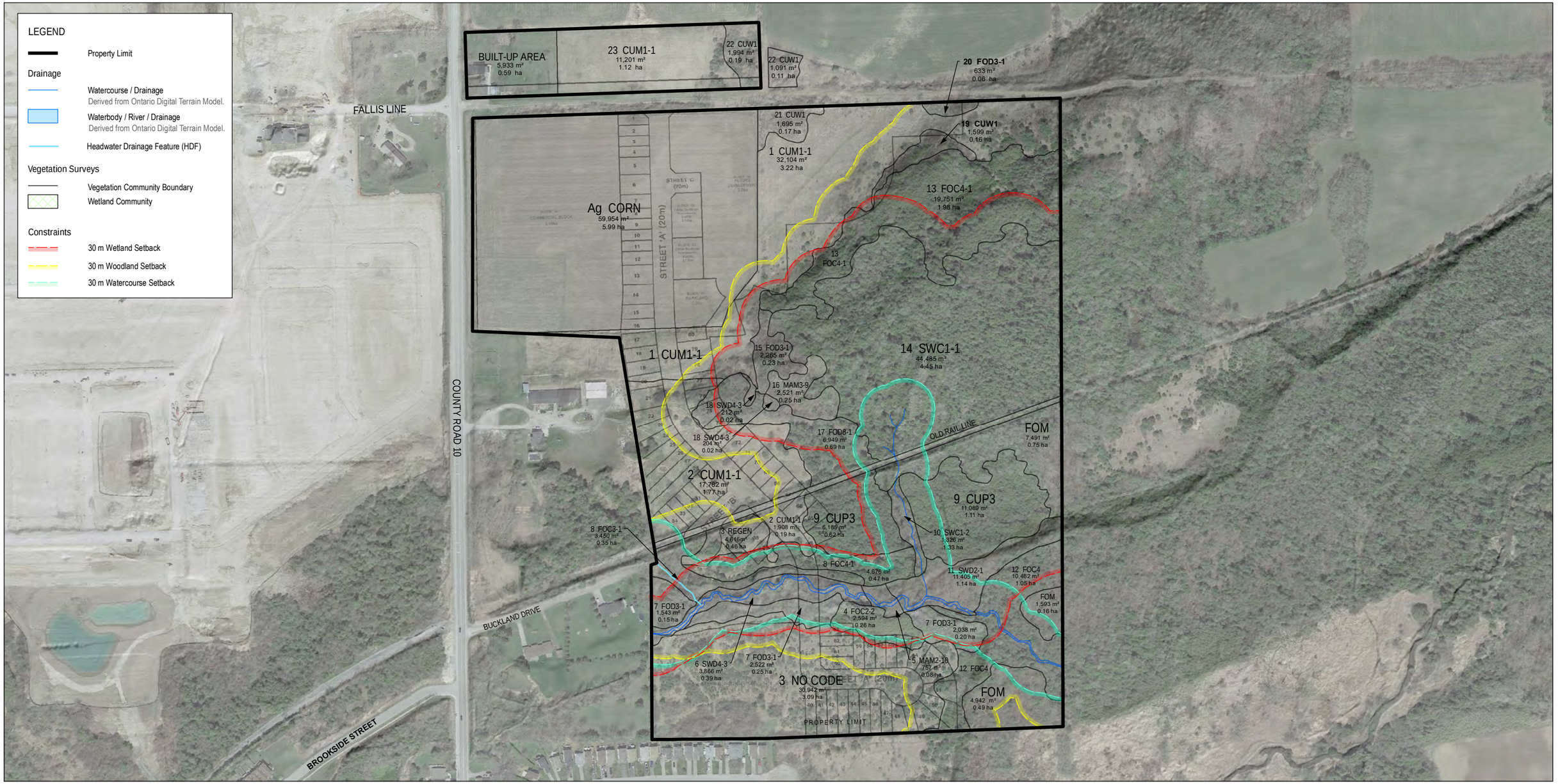
A single golden-winged warbler was detected singing and foraging in Community 19. The wood thrush and eastern wood-pewee were detected singing from the mixed forest community south of the old rail line in the study area. All three species are listed as special concern provincially. As a result, there is no constraint to development posed by the detection of these species by GHD as they were outside of the development envelope and the 30 m buffers from the woodland and wetland. That said, the locations that these species were observed either are within or adjacent to the significant woodland block identified in the study area. As a result, their habitat is protected by the 30-meter buffer associated with the significant woodland.

Table 5.1 Impact Assessment and Recommendations Summary

Feature or Function	Impact to Feature or Function	Mitigation	Residual Effect
Unevaluated wetlands	Potential loss of wetland area. Potential changes to moisture regime due to vegetation clearing and construction on adjacent lands. Potential release of contaminants via surface runoff.	30-metre buffer from the boundary of wetlands as per Figure 2.1 Buffers to be retained as native vegetation. Heavy-duty silt-fencing to be installed around the active development area, to prevent sediment/silt flowing into the wetlands. LID approaches to be incorporated into the development plan.	None
Significant Woodland	Potential loss of woodland area. Potential loss of function as habitat and linkage area. Potential loss of water protection function.	30-metre buffer from the boundary of woodlands as per Figure 2.1 Buffers to be maintained as self-sustaining vegetation. Discussions with agencies regarding restoration, plantings and buffer requirements. Preparation of an edge management plan and buffer landscape plan recommended.	None
Significant Wildlife Habitat: Seeps and Springs	Potential loss or negative impact to function.	30-metre buffer from the boundary of woodlands and wetlands where seeps/springs were identified (Figure 2.1). Buffers to be maintained as self-sustaining vegetation.	None
Significant Wildlife Habitat: Habitat of Special Concern and Rare Wildlife Species – Eastern wood-pewee, wood thrush and golden-winged warbler	Potential loss of function as habitat.	30-metre buffer from the boundary of woodlands as per Figure 2.1 Buffers to remain as self-sustaining vegetation.	None
Significant Wildlife Habitat: Habitat of Special Concern and Rare Wildlife Species – Grasshopper Sparrow	Loss of breeding and feeding habitat for grassland birds	Compensation off-site as part of MECP permit for eastern meadowlark and bobolink habitat compensation	No net loss of habitat with compensation
Species at Risk – Eastern meadowlark and bobolink	Loss of breeding and feeding habitat for eastern meadowlark and bobolink	Compensation off-site required under an ESA permit (see Section 5.5.1)	No net loss of habitat with compensation

Feature or Function	Impact to Feature or Function	Mitigation	Residual Effect
Fish and Aquatic Habitat- Habitat Zone 1 (Watercourse to Baxter Creek)	Alteration of fish habitat from SWM facility.	No development within the 30 buffer with the exception of the road crossing and integrated SWM outlet. Detailed sediment and erosion control plan to be developed. Plans to be review by a professional biologist (see Section 7.0 for SEC details). Outlet channel to be naturalized with native plantings and minimize bank erosion.	Low
	Loss of fish habitat from proposed watercourse crossing (23.1m length of watercourse)	Apply NDMNRF spring and fall timing window restrictions March 15th - July 15th and Oct 1st -May 31st Fish passage to be maintained with embedded culvert design. Detailed sediment and erosion control plan to be developed. Plans to be review by a professional biologist (see Section 7.0 for SEC details). Site specific fish rescue plan to be developed for in-water work areas.	Moderate Compensation/Offsetting Plan to be developed for fish habitat. DFO and ORCA consultation required.
Fish and Aquatic Habitat- Habitat Zone 2 and 3 (HDF)	No impact anticipated	No in-water work HDF protected by 30m natural buffer. Detailed sediment and erosion control plan to be developed. Plans to be review by a professional biologist (see Section 7.0 for SEC details).	None
Fish and Aquatic Habitat- Stormwater Management Facilities	Stormwater management, change to water quality	Stormwater ponds to remain outside of the 30 m buffer from Baxter Creek No in-water works Stormwater management should have a multiple treatment approach and	Moderate

Feature or Function	Impact to Feature or Function	Mitigation	Residual Effect
		include low impact development features Stormwater pond outlet should have finishing treatment though a bioswale feature Features to minimize thermal pollution and reduce the temperature of discharged waters to Baxter's Creek. Final design to be assessed by a professional biologist and comply with the *Fisheries Act*.	



ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application

ELC CODE	ECOSITE/VEG TYPE DESCRIPTION
CUM1-1	Dry-Moist Old Field Meadow
CUP3	Coniferous Plantation
CUW1	Mineral Cultural Woodland
FOC2-2	Dry-Fresh White Cedar Coniferous Forest
FOC4	Fresh-Moist White Cedar Coniferous Forest
FOC4-1	Fresh-Moist White Cedar Coniferous Forest
FOD3-1	Dry-Fresh Poplar Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
MAM2-10	Forb Mineral Meadow Marsh
MAM3-9	Forb Organic Meadow Marsh
SWC1-1	White Cedar Mineral Coniferous Swamp
SWC1-2	White Cedar-Conifer Mineral Coniferous Swamp
SWD2-1	Black Ash Mineral Deciduous Swamp
SWD4-3	White Birch-Poplar Mineral Deciduous Swamp

CITATIONS

- Central Lake Ontario Conservation Authority (CLOCA). Drainage and Natural Heritage Systems. Open Data.
- Lee. H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch.
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Ontario Digital Terrain Model. 2016-2018.
- Imagery obtained via Google, 2021. (Imagery date not verified).

REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2021-04-19	Initial map creation.	C.E.
1	W.P.	2021-11-12	Proposed plan added and changes to study area, vegetation and setbacks.	C.E.
2	W.P.	2021-12-14	Updates constraints based on drainage and addition of HDF.	S.Z.
3	W.P.	2022-02-01	Updated CAD.	C.E.
4	W.P.	2022-02-18	Updated CAD.	A.S.

GHD

DATA DISCLAIMER(S)

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 38 meters

0 25 50 75 100
Meters

Vargas Propoerties Inc.
Pt Lot 13, Con 5, Township of Cavan-Monaghan
County of Peterborough
Otonabee Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY

DEVELOPMENT CONSTRAINTS

Project No. 11214484
Revision No. 04
Date 22/11/2021

N

FIGURE 2.1

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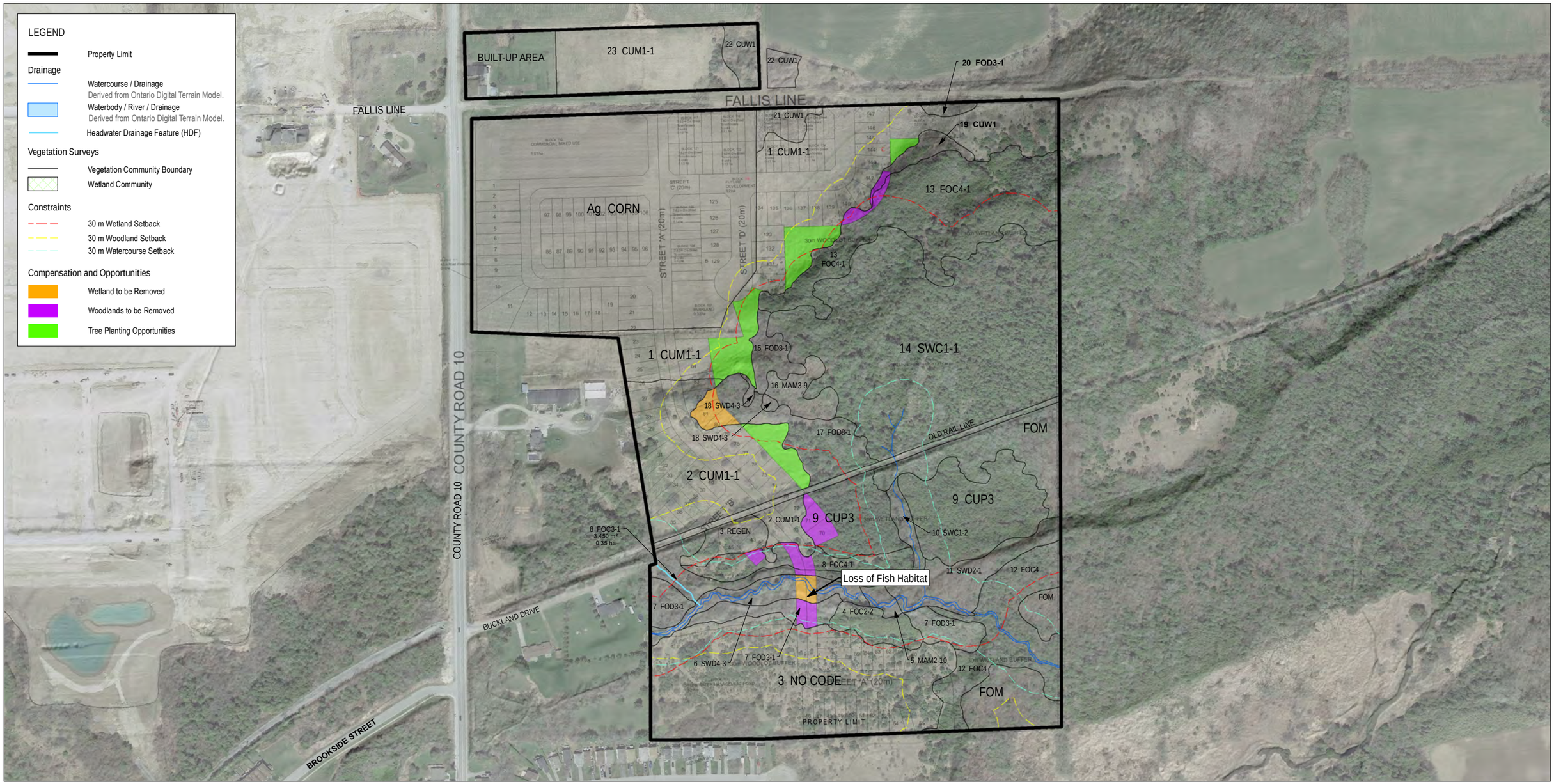

ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application

ELC CODE	ECOSITE/VEG TYPE DESCRIPTION
CUM1-1	Dry-Moist Old Field Meadow
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FOC4-1	Fresh-Moist White Cedar Coniferous Forest
FOD3-1	Dry-Fresh Poplar Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
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MAM3-9	Forb Organic Meadow Marsh
SWC1-1	White Cedar Mineral Coniferous Swamp
SWC1-2	White Cedar-Conifer Mineral Coniferous Swamp
SWD2-1	Black Ash Mineral Deciduous Swamp
SWD4-3	White Birch-Poplar Mineral Deciduous Swamp

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- Central Lake Ontario Conservation Authority (CLOCA). Drainage and Natural Heritage Systems. Open Data.
- Lee. H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S, McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch.
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Ontario Digital Terrain Model. 2016-2018.
- Imagery obtained via Google, 2021. (Imagery date not verified).

REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2022-04-18	Initial map creation.	C.E.

GHD

DATA DISCLAIMER(S)

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 38 meters

0 25 50 75 100
Meters

Vargas Propoerties Inc.
Pt Lot 13, Con 5, Township of Cavan-Monaghan
County of Peterborough
Otonabee Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY

PRELIMINARY COMPENSATION & ENHANCEMENT OPPORTUNITIES

Project No. 11214484
Revision No.
Date 22/11/2021

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FIGURE 3

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Print date: 18 Apr 2022 - 09:58

6. Policies and Legislative Compliance

The following section describes how the proposed development will be in conformance with the relevant federal, provincial and other regulatory legislation, policies, official plans and OP amendments that are applicable and relevant to the study area and the immediate vicinity.

6.1.1 Federal Legislation

Fisheries Act

The proposed works cannot fully meet the Department of Fisheries and Oceans (DFO) measures to protect fish and fish habitat. The scope of work is not covered under the standards and code of practice and will likely result in the harmful alteration, disruption and destruction (HADD) of fish habitat. It is recommended that a DFO Request for Review document is submitted to initiate project review under the Fisheries Act.

Migratory Birds Convention Act

The core breeding period in Ontario for migratory birds under the MBCA for Bird Conservation Region 13 (i.e., the one the subject property lies within) extends from April 15th to August 15th (Environment and Climate Change Canada, 2014). As such clearing of the trees and other vegetation for the development cannot occur during this timing window.

6.1.2 Provincial Legislation

Endangered Species Act

In order to maintain compliance with Section 23.2 of the Endangered Species Act, a number of steps are required. These steps include:

- preparing a development plan in accordance with subsection 23.2(3) of the Act;
- submitting this plan to MECP;
- not carrying out any development activity that is likely to destroy the habitat of bobolink or eastern meadowlark between May 1 and July 31 of any year;
- upon receiving MECP approval, proceeding with development in accordance with the development plan;
- creating habitat within 12 months of the commencement of the activity.

GHD is able to prepare the necessary documentation and submit to the MECP for review and approval. This would include submission of an application under the Endangered Species Act.

Provincial Policy Statement (2020)

The subject property does not contain any provincially significant coastal wetlands, provincially significant wetlands, valleylands, or ANSIs. As a result, Sections 2.1.4 a), b) and 2.1.5 a) c) e) and f) of the Provincial Policy Statement would not apply. As fish habitat, significant wildlife habitat and the habitat of threatened species have been identified in the study area, the following PPS Sections are applicable: 2.1.5 b) and d), 2.1.6, 2.1.7, and 2.1.8.

Section 5.2 (Significant Woodlands), Section 5.3 (Significant Wildlife Habitat), Section 5.5 (Species at Risk) and Section 5.4 (Fish and Aquatic Habitat) of this EIS report contain recommendations, including buffers and mitigation measures that show the proposed development would not a negative impact on those natural heritage features and their ecological functions.

A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2020

The study area falls within an identified settlement area associated with the Village of Millbrook. It is located within a recognized Growth Centre that has specific policies under the Township of Cavan-Monaghan Official Plan. As a result, Sections 4.2.2, 4.2.3, and 4.2.4 of the GPGGH 2020 are not applicable in the study area.

6.1.3 Local and Other Regulatory Bodies

Township of Cavan-Monaghan Official Plan (Amendments to October 14, 2020)

In this EIS report, Section 5.1 (Wetlands), Section 5.2 (Significant Woodlands), Section 5.3 (Significant Wildlife Habitat), Section 5.4 (Fish and Aquatic Habitat) and Section 5.5 (Species at Risk) describe measures that would permit the proposed development to proceed in a manner consistent with the Township of Cavan-Monaghan Official Plan. Provided these measures are followed, there will be no negative impacts on natural heritage or hydrologic features or their functions. In addition, connectivity between these features would be maintained.

Otonabee Region Conservation Authority (ORCA) and Ontario Regulation 167/06

In this EIS report, Section 5.1 (Wetlands) and Section 5.4 (Fish and Aquatic Habitat) describe measures that would permit the proposed development to proceed in a manner that complies with ORCA policies and Ontario Regulation 167/06. Permitting will be required for the proposed watercourse crossing.

Recommendations have also been included (in section 7.0) that will prevent any impacts to natural features or functions.

7. Summary of Recommendations

1. The construction envelope must be clearly defined and delineated. A line must be staked and clearly marked in the field prior to any construction activities occurring in the study area.
2. Prior to any site preparation activities (grading, placement of fill) erosion and sediment control measures should be installed along the construction envelope to ensure sediment laden runoff does not enter interfere with adjacent water bodies or natural features. The silt fence should be inspected and maintained throughout the construction phase and remain in place until the soils are stabilized and re-vegetated.
3. Client to obtain relevant permits from the Municipality of Cavan-Monaghan, Otonabee Region Conservation Authority and the Ministry of the Environment, Conservation and Parks.
4. A broad-spectrum extended timing window of no tree clearing from April 1 to November 1 to protect birds, bats and turtles. Timing windows will be confirmed with MECP (Species at Risk) and NDMNRF (fish) prior to the commencement of work.
5. The Project Manager and Contractor are obliged to ensure that all mitigation measures are strictly observed.
6. Buffer implemented from the dripline of the Significant Woodland
7. Enhancement of the buffer areas with plantings or leave buffers to naturally regenerate through a Planting Plan and edge management plan
8. A compensation plan will be prepared and submitted for ORCA's approval with the extent of any disturbance to wetlands/woodlands and/or their buffer. GHD will work with ORCA to ensure a net gain in wetland/woodland on site to satisfy ORCA policies
9. Construction should be undertaken during normal weather conditions, to the extent possible, and the project shall be designated to appropriate specifications to withstand variable weather conditions.
10. No in-water works except with approval from DFO and ORCA.
11. The final development plan shall be reviewed by a professional biologist and the Department of Fisheries and Oceans (DFO) to ensure the project complies with the Fisheries Act.

7.1 Woodlands and Associated Wildlife Habitat

1. Natural vegetation cover shall be allowed to grow wild, with downed woody debris (i.e., fallen sticks, logs) not being removed from woodland habitats on site.
2. Tree cutting shall be kept to a minimum so as to retain the function of the area for migratory land birds and other wildlife.

7.2 Species at Risk

1. Should any Species at Risk (SAR) be encountered during work-related activities, or if there is potential to negatively affect SAR, or wildlife more generally, contact MECP immediately for guidance on how to proceed.
2. MECP must be consulted to obtain the required permissions/permits for eastern meadowlark and bobolink under the Endangered Species Act.

7.3 Sediment and Erosion Control

1. The sediment and erosion control (SEC) plan will be review by a professional biologist.
2. Compost organic sock or equivalent will be installed and maintained along development envelope boundary as a perimeter control. Perimeter controls help prevent the transportation of sediments off-site into the watercourse and lake. This line should be surveyed and staked in the field prior to any site preparation activities.
3. Grading of the site and removal or addition of fill will be restricted to the area outside of buffers, with the expectation of the watercourse crossing. Functioning sediment control measures must be in place prior to and during the construction phase, and remain in place until all bare or exposed soils have become stabilized.
4. Track pads, concrete wash stations, refueling stations, and stock pile locations should be identified on the SEC plan and isolated using sediment control materials.
5. All sediment and erosion control products will be selected for the site based on the manufacturer's product specifications. Only biodegradable products will be used. Product installation and maintenance will follow the manufactures guidelines.
6. Sediment control measures shall be installed prior to the commencement of work, and shall be maintained throughout the project to prevent the entry/outward flow of sediment into a waterbody.
7. All sediment and erosion control measures shall be inspected daily during the construction phase and periodically thereafter to ensure they are functioning properly, maintained, and upgraded as required.
8. In the event that sediment and erosion control measures are not functioning, the construction supervisor shall order the work to be stopped. No further work shall be carried out until the construction methods and/or the sediment control plan is adjusted to address the sediment/erosion problem(s).
9. The Project Manager/Contractor shall not allow any deleterious substances as defined in the Canadian Fisheries Act (such as silt), caused by the work, to enter or re-enter the watercourse or lake.
10. Disturbed soils will be immediately stabilized and re-vegetation with native species suitable for the site.
11. All construction materials will be removed from site upon project completion.

7.4 Operation of Machinery

1. Check heavy equipment, machinery and tools prior to entering the work site to ensure they are clean, free of leaks, invasive species and noxious weeds.
2. All heavy equipment, machinery, and tools required for the work will be regularly inspected and maintained to avoid leakage of fuels and liquids, and will be stored in a manner that prevents any deleterious substance from entering the soil, or nearby any waterbody.
3. All heavy equipment, machinery, and tools used or maintained for the purpose of this project will be operated in a manner that prevents any deleterious substance from entering soil, or nearby any waterbody.
4. Vehicle and equipment refuelling and/or maintenance shall be conducted within a defined staging area 30 m from any waterbody. If 30 m is not achievable a portable spill containment berm may be used. Portable spill containment berms can be rented by companies such as Wise Environmental Solution Inc (W.I.S.E, 2017).
5. Machinery will not enter any waterbody.

7.5 Concrete Leachate

1. Concrete leachate is alkaline and highly toxic to fish and aquatic life. Measures will be taken to prevent any incidence of concrete or concrete leachate from entering any waterbody.
2. Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into any waterbody.
3. All concrete, sealants or other compounds used for this project shall be utilized according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.

7.6 Fish Protection (DFO measures to protect fish and fish habitat, outside crossing footprint)

1. No work in-water work.
2. Avoid killing fish by means other than fishing.
3. No development within the 30m buffer. The buffer will maintain riparian vegetation between areas of land activity and the high watermark of the watercourses.
1. No use of explosives in or near water.
2. Maintain riparian vegetation around wetland.
3. Carry out all works and activities by avoiding all work in or near water. No placement of fill or the temporary or permanent structures below the high-water mark.
4. No disturbance of bank material or building structures in the area than may result in erosion or scouring.
5. Prevent soil compaction using mats and pads.
6. Should work conditions change such that it is possible that fish or fish habitat may potentially be negatively impacted, all works shall cease until the problem has been corrected or authorization has been obtained from the appropriate authorities.
7. The Project Manager/Contractor shall not allow any deleterious substances as defined in the Canadian Fisheries Act (such as silt), caused by the work, to enter or re-enter the watercourse or lake. See Sediment and Erosion Control.

7.7 Watercourse Crossing

1. Respect NDMNRF timing windows in the spring (March 15th to July 15th) to protect Eastern Blacknose Dace and the fall (Oct 1st to May 31st) to protect Brown Trout sensitive life history processes. Therefore, in-water work will only be permitted between July 15th and Oct 1st of any year.
2. Site specific fish salvage plan to be prepared by a fisheries biologist.
3. Watercourse crossings to be designed to minimize impacts to fish and fish habitat.
4. Bridge approaches to be constructed perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
5. Perform bridge construction activities well away from the waterbody, if possible (i.e. preparation of piers, footings and abutments, painting, concrete mixing, sandblasting). Ensure all appropriate measures are taken to prevent deleterious substances from entering the waterbody.
6. Machinery fording the waterbody to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and shall occur only if an existing crossing at another location is not available or practical to use.
7. Stormwater runoff from the bridge deck, side slopes and approaches shall be directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity and prevent sediment and other deleterious substances from entering the waterbody.

8. Respects the local MNRF In-Water Work Timing Windows.
9. Maintain fish passage and existing channel morphology.

7.8 Stormwater

1. Development including stormwater features will be located outside of the 30 m buffer from the watercourse, with the exception of the outlet.
2. To avoid point source erosion, the outfall to all watercourse shall be designed to minimize impacts, such as a bioswale planted with native shrubs and non-woody vegetation.
3. A multiple treatment approach should be used to manage stormwater onsite.
4. Low impact development (LID) practices should be considered to manage run-off.
5. Stormwater management features to minimize thermal pollution and reduce the temperature of discharged waters to the watercourse to protect cool and warm water fish species.

7.9 Contaminant and Spill Management

1. A spill management plan will be developed for future development. The plan will provide direction for implementation actions immediately in the event of a sediment release or spill of a deleterious substance.
2. An emergency spill kit shall be kept on site, and employed immediately should a spill occur. In the case of a spill, the Ontario Spill Action Center shall be notified immediately at 1-800-268-6060; all provincial and federal regulations shall be adhered to.
3. Refueling and maintenance of equipment shall be conducted off slopes and away from water bodies on impermeable pads to allow full containment of spills at a recommended distance of a minimum of 30 m from the shoreline. If 30 m is not achievable a portable spill containment berm may be used.
4. Materials classified as potential contaminants (e.g. paint, primers, gas, oil, degreasers, grout, or other chemicals) will be used a minimum of 30 m from the watercourse. If 30 m is not achievable a portable spill containment berm should be used.

8. Conclusion

This Environmental Impact Study has been prepared to address potential environmental issues associated with an application to develop a property located at Part Lot 13, Concession 5, Parcel North of Fallis Line (Lot 13, Concession 6) in the Township of Cavan-Monaghan, County of Peterborough. Within this area, GHD staff confirmed the boundaries of key natural features (e.g., woodlands, wetlands, watercourses), confirmed their ecological functions, assessed Species at Risk habitat and have recommended appropriate mitigation measures, including buffers (setbacks) to prevent impacts on natural features from the proposed development.

The proposed development will not result in negative impacts on identified natural heritage features or their functions *provided* the mitigation measures described in Sections 5 and 7 are implemented. These recommendations have been made to address potential impacts to natural features (identified wetlands, woodlands, watercourses, wildlife habitat and Species at Risk habitat) and/or their functions during the site preparation, construction and post-construction period. Permitting and compensation will likely be required from DFO, ORCA and MECP.

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Appendices

Appendix A

Plant Species by Community

APPENDIX **A (part 1)** Plant Species by Community

Families and genera for the plant species found in this appendix are listed in taxonomic order. The species are listed alphabetically by scientific name within each genus.

Three standard reference works were used for the botanical nomenclature and taxonomy (Newmaster et. al., 1998; Gleason and Cronquist 1991; Voss 1980; 1985). Other published works for botanical names included; ferns (Cody and Britton 1989); grasses (Dore and McNeill 1980); orchids (Whiting and Catling 1986); shrubs (Soper and Heimburger 1982) and trees (Farrar 1995).

Total: Number of communities where plant species was recorded
X : Plant species recorded

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PEAT MOSS FAMILY	*SPHAGNACEAE*																
sphagnum moss species	*Sphagnum spp.*	1													X		
HORSETAIL FAMILY	*EQUISETACEAE*																
field horsetail	*Equisetum arvense*	6				X	X						X		X	X	X
scouring rush	*Equisetum hyemale*	1										X					
wood horsetail	*Equisetum sylvaticum*	1														X	
ROYAL FERN FAMILY	*OSMUNDACEAE*																
royal fern	*Osmunda regalis var.spectabilis*	1														X	

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WOOD FERN FAMILY	*DRYOPTERIDACEAE*																
northern lady fern	*Athyrium filix-femina*	3													X	X	
bulbet bladder fern	*Cystopteris bulbifera*	3											X	X		X	
spinulose wood-fern	*Dryopteris carthusiana*	1												X			
evergreen wood-fern	*Dryopteris intermedia*	1											X				
marginal wood-fern	*Dryopteris marginalis*	1													X		
oak fern	*Gymnocarpium dryopteris*	1													X		
ostrich fern	*Matteuccia struthiopteris*	2										X	X				
sensitive fern	*Onoclea sensibilis*	6										X	X	X		X	
PINE FAMILY	*PINACEAE*																
eastern white pine	*Pinus strobus*	2								X							
Scot's pine	*Pinus sylvestris*	4			X					X							
CYPRESS FAMILY	*CUPRESSACEAE*																
common juniper	*Juniperus communis var. depressa*	1	X														
eastern red cedar	*Juniperus virginiana*	2			X												
eastern white cedar	*Thuja occidentalis*	13		X	X	X	X		X	X		X		X	X	X	
BUTTERCUP FAMILY	*RANUNCULACEAE*																
red baneberry	*Actaea rubra*	1						X									
Canada anemone	*Anemone canadensis*	3			X												X
thimbleweed	*Anemone virginiana*	2			X				X								
marsh marigold	*Caltha palustris*	3					X								X	X	
tall buttercup	*Ranunculus acris*	3		X	X										X		
tall meadow rue	*Thalictrum pubescens*	2											X	X			
POPPY FAMILY	*PAPAVERACEAE*																
bloodroot	*Sanguinaria canadensis*	1						X									
ELM FAMILY	*ULMACEAE*																
American elm	*Ulmus americana*	9			X			X	X	X		X	X				
NETTLE FAMILY	*URTICACEAE*																
American stinging nettle	*Urtica dioica ssp. Gracilis*	1										X					

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WALNUT FAMILY	*JUGLANDACEAE*																
black walnut	*Juglans nigra*	1															
BEECH FAMILY	*FAGACEAE*																
American beech	*Fagus grandifolia*	3													X	X	
red oak	*Quercus rubra*	1			X												
BIRCH FAMILY	*BETULACEAE*																
yellow birch	*Betula alleghaniensis Britt.*	2													X	X	
white birch	*Betula papyrifera*	6												X	X	X	X
BUCKWHEAT FAMILY	*POLYGONACEAE*																
lady's thumb	*Polygonum persicaria*	1										X					
curled dock	*Rumex crispus*	2															
great water dock	*Rumex orbiculatus*	1					X										
ST. JOHN'S-WORT FAMILY	*GUTTIFERAE*																
common St. John's-wort	*Hypericum perforatum*	4			X												
LINDEN FAMILY	*TILIACEAE*																
American basswood	*Tilia americana*	4												X	X		
GOURD FAMILY	*CUCURBITACEAE*																
wild cucumber	*Echinocystis lobata*	1					X										
WILLOW FAMILY	*SALICACEAE*																
balsam poplar	*Populus balsamifera*	4					X	X									X
large-toothed aspen	*Populus grandidentata*	1		X													
trembling aspen	*Populus tremuloides*	9		X	X				X	X					X		X
crack willow	*Salix fragilis*	1															
MUSTARD FAMILY	*BRASSICACEAE*																
watercress	*Nasturtium officinale*	1					X										
field penny-cress	*Thlapsi arvense*	2								X			X				
PRIMROSE FAMILY	*PRIMULACEAE*																
fringed loosestrife	*Lysimachia ciliata*	2					X						X				

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
GOOSEBERRY FAMILY	*GROSSULARIACEAE*																	
prickly gooseberry	*Ribes cynosbati*	2						X				X						
skunk currant	*Ribes glandulosum*	1					X											
ROSE FAMILY	*ROSACEAE*																	
agrimony	*Agrimonia gryposepela*	3			X		X					X						
English hawthorn	*Crataegus monogyna*	1																
hawthorn species	*Crataegus spp.*	2		X	X													
common strawberry	*Fragaria virginiana*	2							X									
yellow avens	*Geum aleppicum*	3		X			X							X				
apple	*Malus domestica*	4	X	X	X													
black cherry	*Prunus serotina*	2							X									
choke cherry	*Prunus virginiana*	4		X	X													
sweetbrier rose	*Rosa rubiginosa*	1																
wild red raspberry	*Rubus idaeus*	1			X													
dwarf raspberry	*Rubus pubescens*	1																
PEA FAMILY	*FABACEAE*																	
hog-peanut	*Amphicarpa bracteata*	3			X		X							X				
crown-vetch	*Coronilla varia*	1																
black medick	*Medicago lupulina*	3	X		X													
white sweet-clover	*Melilotus alba*	2																
black locust	*Robinia pseudo acacia*	2																
red clover	*Trifolium pratense*	5	X	X	X													
white clover	*Trifolium repens*	1		X														
cow vetch	*Vicia cracca*	5	X		X													
EVENING PRIMROSE FAMILY	*ONAGRACEAE*																	
Canada enchanter's nightshade	*Circaea lutetiana L. ssp.canadensis*	6					X	X	X			X	X				X	
DOGWOOD FAMILY	*CORNACEAE*																	
alternate-leaf dogwood	*Cornus alternifolia*	1							X									
red-osier dogwood	*Cornus stolonifera*	2			X													

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BUCKTHORN FAMILY	*RHAMNACEAE*																
European buckthorn	*Rhamnus cathartica*	15	X	X	X	X	X	X		X					X	X	X
GRAPE FAMILY	*VITACEAE*																
Virginia creeper	*Parthenocissus inserta*	11			X		X	X	X	X		X			X		X
wild grape	*Vitis riparia*	11			X	X	X	X							X		X
MAPLE FAMILY	*ACERACEAE*																
Manitoba maple	*Acer negundo*	3		X													X
sugar maple	*Acer saccharum ssp.saccharum*	3							X				X				X
CASHEW FAMILY	*ANACARDIACEAE*																
western poison-ivy	*Rhus rydbergii*	8			X							X		X	X	X	X
staghorn sumac	*Rhus typhina*	5		X													
WOOD-SORREL FAMILY	*OXALIDACEAE*																
European wood-sorrel	*Oxalis stricta*	1											X				
GERANIUM FAMILY	*GERANIACEAE*																
herb Robert	*Geranium robertianum*	3					X							X	X		
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*																
spotted jewelweed	*Impatiens capensis*	7					X					X	X	X		X	
GINSENG FAMILY	*ARALIACEAE*																
wild sarsaparilla	*Aralia nudicaulis*	2													X	X	
CARROT FAMILY	*APIACEAE*																
spotted water hemlock	*Cicuta maculata*	1												X			
Queen-Anne's lace	*Daucus carota*	6	X	X	X				X								
hemlock water parsnip	*Sium suave*	1										X					
DOGBANE FAMILY	*APOCYNACEAE*																
spreading dogbane	*Apocynum androsaemifolium*	1															
MILKWEED FAMILY	*ASCLEPIADACEAE*																
common milkweed	*Asclepias syriaca*	7	X	X	X					X							
swallow-wort	*Cynanchum rossicum*	11	X	X	X					X					X	X	

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NIGHTSHADE FAMILY	*SOLANACEAE*																
bitter nightshade	*Solanum dulcamara*	5					X						X		X	X	
BORAGE FAMILY	*BORAGINACEAE*																
Virginia stickweed	*Hackelia virginiana*	1										X					
true forget-me-not	*Myosotis scorpioides*	1					X										
VERVAIN FAMILY	*VERBENACEAE*																
blue vervain	*Verbena hastata*	2										X					
white vervain	*Verbena urticifolia*	2										X					
MINT FAMILY	*LAMIACEAE*																
motherwort	*Leonurus cardiaca*	1															
American water-horehound	*Lycopus americanus*	1														X	
wild marjoram	*Origanum vulgare*	1			X												
heal-all	*Prunella vulgaris ssp. Lanceolata*	8			X	X	X	X	X	X					X		
PLANTAIN FAMILY	*PLANTAGINACEAE*																
narrow-leaved plantain	*Plantago lanceolata*	1			X												
broad-leaved plantain	*Plantago major*	3		X	X								X				
OLIVE FAMILY	*OLEACEAE*																
white ash	*Fraxinus americana*	4								X							X
black ash	*Fraxinus nigra*	4						X				X	X	X			
green ash	*Fraxinus pennsylvanica var. subinteg*	4					X	X	X			X					
lilac	*Syringa vulgaris*	2															
FIGWORT FAMILY	*SCROPHULARIACEAE*																
common mullein	*Verbascum thapsus*	2		X											X		
American brooklime	*Veronica americana*	1					X										
HAREBELL FAMILY	*CAMPANULACEAE*																
Indian tobacco	*Lobelia inflata*	1														X	
great lobelia	*Lobelia siphilitica*	2										X				X	
MADDER FAMILY	*RUBIACEAE*																
marsh bedstraw	*Galium palustre*	1										X					

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*																	
common elderberry	*Sambucus canadensis*	1					X											
high bush cranberry	*Viburnum trilobium*	2						X	X									
ASTER FAMILY	*ASTERACEAE*																	
common yarrow	*Achillea millefolium*	2			X													
common ragweed	*Ambrosia artemisiifolia L.*	1							X									
common burdock	*Arctium minus*	1							X									
ox-eye daisy	*Chrysanthemum leucanthemum*	3	X	X	X													
chicory	*Cichorium intybus*	3		X	X				X									
Canada thistle	*Cirsium arvense*	1		X														
bull thistle	*Cirsium vulgare*	3			X				X				X					
daisy fleabane	*Erigeron annuus*	1										X						
Philadelphia fleabane	*Erigeron philadelphicus ssp. philadel*	5			X		X		X									
spotted joe-pyeweed	*Eupatorium maculatum*	4		X			X											
boneset	*Eupatorium perfoliatum*	2										X						
large-leaved aster	*Eurybia macrophylla*	1				X												
king devil hawkweed	*Hieracium x florbundum*	1	X															
pineapple weed	*Matricaria matricarioides*	1		X														
black-eyed Susan	*Rudbeckia hirta*	3		X	X				X									
tall goldenrod	*Solidago altissima*	4		X	X													
Canada goldenrod	*Solidago canadensis*	6		X	X													X
zig-zag goldenrod	*Solidago flexicaulis*	2						X	X									
spiny-leaved sow thistle	*Sonchus asper*	3							X						X	X		
calico aster	*Symphyotrichum lateriflorum var.later*	3			X				X	X								
New England aster	*Symphyotrichum novae- angliae*	4	X	X	X							X						
common dandelion	*Taraxacum officinale*	1			X													
goat's-beard	*Tragopogon dubius*	1	X															
coltsfoot	*Tussilago farfara*	2					X									X		

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ARUM FAMILY	*ARACEAE*																
Jack-in-the-pulpit	*Arisaema triphyllum*	2											X		X		
RUSH FAMILY	*JUNCACEAE*																
path rush	*Juncus tenuis*	3		X	X											X	
SEDGE FAMILY	*CYPERACEAE*																
golden-fruited sedge	*Carex aurea*	1													X		
yellow sedge	*Carex flava*	1														X	
common lake sedge	*Carex lacustris*	3													X	X	
few-fruited sedge	*Carex oligocarpa*	1											X				
Pennsylvania sedge	*Carex pensylvanica*	1										X					
retrorse sedge	*Carex retrorsa*	1															
awl-fruited sedge	*Carex stipata*	1														X	
straw sedge	*Carex tenera Dewey*	1														X	
black bulrush	*Scirpus atrovirens*	3		X												X	
softstem bulrush	*Scirpus validus*	1															
GRASS FAMILY	*POACEAE*																
redtop	*Agrostis gigantea*	2			X												
awnless brome grass	*Bromus inermis ssp.inermis*	5	X	X	X												
Japanese brome	*Bromus japonicus*	1															
orchard grass	*Dactylis glomerata*	3	X	X													
poverty oatgrass	*Danthonia spicata*	1															
quack grass	*Elymus repens*	1															
rice cut grass	*Leersia oryzoides*	1															
timothy	*Phleum pratense*	7	X	X	X												
Kentucky blue grass	*Poa pratensis*	1		X													

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LILY FAMILY	*LILIACEAE*																
asparagus	*Asparagus officinalis*	3															
Canada mayflower	*Maianthemum canadense*	3														X	X
false Solomon's seal	*Smilacina racemosa*	1							X								
rose-twisted stalk	*Streptopus roseus*	1						X									
ORCHID FAMILY	*ORCHIDACEAE*																
helleborine	*Epipactis helleborine*	7					X	X	X	X		X	X				
Total Number of Plant Species	158		16	33	46	6	28	16	25	14	0	26	20	14	27	29	15
			Number of Plant Species Per Commu														

APPENDIX A (part 2) Communities 16-23

			COMMUNITY NUMBER							
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
PEAT MOSS FAMILY	*SPHAGNACEAE*									
sphagnum moss species	*Sphagnum spp.*	1								
HORSETAIL FAMILY	*EQUISETACEAE*									
field horsetail	*Equisetum arvense*	6								
scouring rush	*Equisetum hyemale*	1								
wood horsetail	*Equisetum sylvaticum*	1								
ROYAL FERN FAMILY	*OSMUNDACEAE*									
royal fern	*Osmunda regalis var.spectabilis*	1								
WOOD FERN FAMILY	*DRYOPTERIDACEAE*									
northern lady fern	*Athyrium filix-femina*	3	X							
bulbet bladder fern	*Cystopteris bulbifera*	3								
spinulose wood-fern	*Dryopteris carthusiana*	1								
evergreen wood-fern	*Dryopteris intermedia*	1								
marginal wood-fern	*Dryopteris marginalis*	1								
oak fern	*Gymnocarpium dryopteris*	1								
ostrich fern	*Matteuccia struthiopteris*	2								
sensitive fern	*Onoclea sensibilis*	6	X	X						
PINE FAMILY	*PINACEAE*									
eastern white pine	*Pinus strobus*	2				X				
Scot's pine	*Pinus sylvestris*	4				X			X	
CYPRESS FAMILY	*CUPRESSACEAE*									
common juniper	*Juniperus communis var. depressa*	1								
eastern red cedar	*Juniperus virginiana*	2				X				
eastern white cedar	*Thuja occidentalis*	13	X	X		X				

			COMMUNITY NUMBER							
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
BUTTERCUP FAMILY	*RANUNCULACEAE*									
red baneberry	*Actaea rubra*	1								
Canada anemone	*Anemone canadensis*	3							X	
thimbleweed	*Anemone virginiana*	2								
marsh marigold	*Caltha palustris*	3								
tall buttercup	*Ranunculus acris*	3								
tall meadow rue	*Thalictrum pubescens*	2								
POPPY FAMILY	*PAPAVERACEAE*									
bloodroot	*Sanguinaria canadensis*	1								
ELM FAMILY	*ULMACEAE*									
American elm	*Ulmus americana*	9				X	X		X	
NETTLE FAMILY	*URTICACEAE*									
American stinging nettle	*Urtica dioica ssp. Gracilis*	1								
WALNUT FAMILY	*JUGLANDACEAE*									
black walnut	*Juglans nigra*	1		X						
BEECH FAMILY	*FAGACEAE*									
American beech	*Fagus grandifolia*	3					X			
red oak	*Quercus rubra*	1								
BIRCH FAMILY	*BETULACEAE*									
yellow birch	*Betula alleghaniensis Britt.*	2								
white birch	*Betula papyrifera*	6			X				X	
BUCKWHEAT FAMILY	*POLYGONACEAE*									
lady's thumb	*Polygonum persicaria*	1								
curled dock	*Rumex crispus*	2	X							X
great water dock	*Rumex orbiculatus*	1								
ST. JOHN'S-WORT FAMILY	*GUTTIFERAE*									
common St. John's-wort	*Hypericum perforatum*	4						X	X	X
LINDEN FAMILY	*TILIACEAE*									
American basswood	*Tilia americana*	4					X		X	

			COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
GOURD FAMILY	*CUCURBITACEAE*									
wild cucumber	*Echinocystis lobata*	1								
WILLOW FAMILY	*SALICACEAE*									
balsam poplar	*Populus balsamifera*	4	X							
large-toothed aspen	*Populus grandidentata*	1								
trembling aspen	*Populus tremuloides*	9		X	X		X			
crack willow	*Salix fragilis*	1							X	
MUSTARD FAMILY	*BRASSICACEAE*									
watercress	*Nasturtium officinale*	1								
field penny-cress	*Thlapsi arvense*	2								
PRIMROSE FAMILY	*PRIMULACEAE*									
fringed loosestrife	*Lysimachia ciliata*	2								
GOOSEBERRY FAMILY	*GROSSULARIACEAE*									
prickly gooseberry	*Ribes cynosbati*	2								
skunk currant	*Ribes glandulosum*	1								
ROSE FAMILY	*ROSACEAE*									
agrimony	*Agrimonia gryposepela*	3								
English hawthorn	*Crataegus monogyna*	1				X				
hawthorn species	*Crataegus spp.*	2								
common strawberry	*Fragaria virginiana*	2				X				
yellow avens	*Geum aleppicum*	3								
apple	*Malus domestica*	4				X				
black cherry	*Prunus serotina*	2					X			
choke cherry	*Prunus virginiana*	4		X			X			
sweetbrier rose	*Rosa rubiginosa*	1				X				
wild red raspberry	*Rubus idaeus*	1								
dwarf raspberry	*Rubus pubescens*	1		X						
PEA FAMILY	*FABACEAE*									
hog-peanut	*Amphicarpa bracteata*	3								

			COMMUNITY NUMBER							
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
crown-vetch	*Coronilla varia*	1						X		
black medick	*Medicago lupulina*	3							X	
white sweet-clover	*Melilotus alba*	2							X	X
black locust	*Robinia pseudo acacia*	2						X	X	
red clover	*Trifolium pratense*	5				X				X
white clover	*Trifolium repens*	1								
cow vetch	*Vicia cracca*	5				X			X	X
EVENING PRIMROSE FAMILY	*ONAGRACEAE*									
Canada enchanter's nightshade	*Circaea lutetiana L. ssp.canadensis*	6								
DOGWOOD FAMILY	*CORNACEAE*									
alternate-leaf dogwood	*Cornus alternifolia*	1								
red-osier dogwood	*Cornus stolonifera*	2								X
BUCKTHORN FAMILY	*RHAMNACEAE*									
European buckthorn	*Rhamnus cathartica*	15		X		X	X	X	X	
GRAPE FAMILY	*VITACEAE*									
Virginia creeper	*Parthenocissus inserta*	11		X				X	X	
wild grape	*Vitis riparia*	11		X		X	X		X	X
MAPLE FAMILY	*ACERACEAE*									
Manitoba maple	*Acer negundo*	3						X		
sugar maple	*Acer saccharum ssp.saccharum*	3								
CASHEW FAMILY	*ANACARDIACEAE*									
western poison-ivy	*Rhus rydbergii*	8				X			X	
staghorn sumac	*Rhus typhina*	5				X	X		X	X
WOOD-SORREL FAMILY	*OXALIDACEAE*									
European wood-sorrel	*Oxalis stricta*	1								
GERANIUM FAMILY	*GERANIACEAE*									
herb Robert	*Geranium robertianum*	3								
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*									
spotted jewelweed	*Impatiens capensis*	7	X		X					

		COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
GINSENG FAMILY	*ARALIACEAE*									
wild sarsaparilla	*Aralia nudicaulis*	2								
CARROT FAMILY	*APIACEAE*									
spotted water hemlock	*Cicuta maculata*	1								
Queen-Anne's lace	*Daucus carota*	6				X				X
hemlock water parsnip	*Sium suave*	1								
DOGBANE FAMILY	*APOCYNACEAE*									
spreading dogbane	*Apocynum androsaemifolium*	1					X			
MILKWEED FAMILY	*ASCLEPIADACEAE*									
common milkweed	*Asclepias syriaca*	7				X			X	X
swallow-wort	*Cynanchum rossicum*	11		X		X	X	X	X	
NIGHTSHADE FAMILY	*SOLANACEAE*									
bitter nightshade	*Solanum dulcamara*	5	X							
BORAGE FAMILY	*BORAGINACEAE*									
Virginia stickweed	*Hackelia virginiana*	1								
true forget-me-not	*Myosotis scorpioides*	1								
VERVAIN FAMILY	*VERBENACEAE*									
blue vervain	*Verbena hastata*	2			X					
white vervain	*Verbena urticifolia*	2						X		
MINT FAMILY	*LAMIACEAE*									
motherwort	*Leonurus cardiaca*	1						X		
American water-horehound	*Lycopus americanus*	1								
wild marjoram	*Origanum vulgare*	1								
heal-all	*Prunella vulgaris ssp. Lanceolata*	8					X			
PLANTAIN FAMILY	*PLANTAGINACEAE*									
narrow-leaved plantain	*Plantago lanceolata*	1								
broad-leaved plantain	*Plantago major*	3								
OLIVE FAMILY	*OLEACEAE*									
white ash	*Fraxinus americana*	4		X	X					

			COMMUNITY NUMBER							
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
black ash	*Fraxinus nigra*	4								
green ash	*Fraxinus pennsylvanica var. subintege*	4								
lilac	*Syringa vulgaris*	2						X	X	
FIGWORT FAMILY	*SCROPHULARIACEAE*									
common mullein	*Verbascum thapsus*	2								
American brooklime	*Veronica americana*	1								
HAREBELL FAMILY	*CAMPANULACEAE*									
Indian tobacco	*Lobelia inflata*	1								
great lobelia	*Lobelia siphilitica*	2								
MADDER FAMILY	*RUBIACEAE*									
marsh bedstraw	*Galium palustre*	1								
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*									
common elderberry	*Sambucus canadensis*	1								
high bush cranberry	*Viburnum trilobium*	2								
ASTER FAMILY	*ASTERACEAE*									
common yarrow	*Achillea millefolium*	2				X				
common ragweed	*Ambrosia artemisiifolia L.*	1								
common burdock	*Arctium minus*	1								
ox-eye daisy	*Chrysanthemum leucanthemum*	3								
chicory	*Cichorium intybus*	3								
Canada thistle	*Cirsium arvense*	1								
bull thistle	*Cirsium vulgare*	3								
daisy fleabane	*Erigeron annuus*	1								
Philadelphia fleabane	*Erigeron philadelphicus ssp. philadelp*	5					X			X
spotted joe-pyeweed	*Eupatorium maculatum*	4	X		X					
boneset	*Eupatorium perfoliatum*	2	X							
large-leaved aster	*Eurybia macrophylla*	1								
king devil hawkweed	*Hieracium x florbundum*	1								
pineapple weed	*Matricaria matricarioides*	1								

			COMMUNITY NUMBER							
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
black-eyed Susan	*Rudbeckia hirta*	3								
tall goldenrod	*Solidago altissima*	4				X				X
Canada goldenrod	*Solidago canadensis*	6					X		X	X
zig-zag goldenrod	*Solidago flexicaulis*	2								
spiny-leaved sow thistle	*Sonchus asper*	3								
calico aster	*Symphyotrichum lateriflorum var.later*	3								
New England aster	*Symphyotrichum novae- angliae*	4								
common dandelion	*Taraxacum officinale*	1								
goat's-beard	*Tragopogon dubius*	1								
coltsfoot	*Tussilago farfara*	2								
ARUM FAMILY	*ARACEAE*									
Jack-in-the-pulpit	*Arisaema triphyllum*	2								
RUSH FAMILY	*JUNCACEAE*									
path rush	*Juncus tenuis*	3								
SEDGE FAMILY	*CYPERACEAE*									
golden-fruited sedge	*Carex aurea*	1								
yellow sedge	*Carex flava*	1								
common lake sedge	*Carex lacustris*	3	X							
few-fruited sedge	*Carex oligocarpa*	1								
Pennsylvania sedge	*Carex pensylvanica*	1								
retrorse sedge	*Carex retrorsa*	1	X							
awl-fruited sedge	*Carex stipata*	1								
straw sedge	*Carex tenera Dewey*	1								
black bulrush	*Scirpus atrovirens*	3	X							
softstem bulrush	*Scirpus validus*	1	X							
GRASS FAMILY	*POACEAE*									
redtop	*Agrostis gigantea*	2								X
awnless brome grass	*Bromus inermis ssp.inermis*	5							X	X
Japanese brome	*Bromus japonicus*	1						X		

			COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
orchard grass	*Dactylis glomerata*	3					X			
poverty oatgrass	*Danthonia spicata*	1					X			
quack grass	*Elymus repens*	1								X
rice cut grass	*Leersia oryzoides*	1	X							
timothy	*Phleum pratense*	7				X	X	X		X
Kentucky blue grass	*Poa pratensis*	1								
LILY FAMILY	*LILIACEAE*									
asparagus	*Asparagus officinalis*	3				X	X			X
Canada mayflower	*Maianthemum canadense*	3		X						
false Solomon's seal	*Smilacina racemosa*	1								
rose-twisted stalk	*Streptopus roseus*	1								
ORCHID FAMILY	*ORCHIDACEAE*									
helleborine	*Epipactis helleborine*	7		X						
Total Number of Plant Species	158		14	13	6	22	18	12	21	18

Number of Plant Species Per Community

Appendix B

List of Significant Plant Species

APPENDIX B List of Significant Plant Species

Plant species observed by NEA with significant status on national, provincial and relevant regional lists are listed with status codes and where applicable the most current year of publication. Three standard reference works were used for the botanical nomenclature and taxonomy (Newmaster et. al., 1998; Gleason and Cronquist 1991; Voss 1980; 1985). Other published works for botanical names included; ferns (Cody and Britton 1989); grasses (Dore and McNeill 1980); orchids (Whiting and Catling 1986); shrubs (Soper and Heimburger 1982) and trees (Farrar 1995).

NATIONAL RANKING **Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Government of Canada**
Species at Risk Act (SARA), SCHEDULE 1 (Subsections 2(1), 42(2) and 68(2)), Government of Cana

PROVINCIAL RANKING **Species at Risk in Ontario (COSSARO), Government of Ontario**
Provincial Rank (SRANK), Natural Heritage Information Center, Government of Onta

REGIONAL RANKING **Peterborough** Oldham, M.J. 1999

STATUS CODES

COSEWIC **COSSARO** **SARA**	**END *** - Endangered Species **THR *** - Threatened Species **SC *** - Species of Concern	***Year of Status Publication included in Code**
SRANK	**S1** - Extremely Rare **S2** - Very Rare **S3** - Rare to Uncommon	**Other national or provincial codes not listed**
Regional Lists	**R** - Rare native species **RS** -Regional significant **EXP** - Extirpated native species	**Other Regional codes not listed**

			NATIONAL RANKINGS		PROVINCIAL RANKINGS		REGIONAL RANKINGS				
Common Name	**Scientific Name**		**COSEWIC**	**SARA**	**COSSARO**	**SRank**	**Peterborough**				
black walnut	Juglans nigra						R				
English hawthorn	Crataegus monogyna						R				
sweetbrier rose	Rosa rubiginosa						R				
black ash	Fraxinus nigra		THR Nov/18								
Plants with Ranking	**Total:** 4	**Status List Totals**	1	0	0		3	0	0	0	0

Appendix C

Bird Status Report by Station

APPENDIX C Bird Status Report by Station

Bird species observed by GHD within each survey station are listed in the order followed the American Ornithologists' Union (AOU) Check-list of North American birds (7th edition, 1999, 47th Supplement). Common and scientific nomenclature are based on those used by AOU. Breeding status and breeding evidence code are listed when observed. Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :

END - endangered	A wildlife species facing imminent extirpation or extinction.
END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:

COSEWIC	The Committee on the Status of Endangered Wildlife in Canada, May 2018.
COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2018.
SARA	Species At Risk Act, Schedule 1, Government of Canada, 2018.
Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000
Region 6	Southern Ontario Wetland Evaluation Appendix 11B, Version 3.2, March 2013

Breeding Status: (Observed By NEA)

B -species observed in breeding season in suitable habitat with some evidence of breeding (confirmed, probable or possible as per Ontario Breeding Bird Atlas, 2002).
F -species observed in breeding season but no evidence of breeding or suitable nest sites available on the study site (includes flyovers, migrants and foraging colonial breeders).
M -species observed outside of breeding season for that species and in area outside of the known breeding range for that species.

Breeding Evidence Code: (Observed By NEA)

OBSERVED
X -species observed in its breeding season (no evidence of breeding).

POSSIBLE BREEDING
H -species observed in its breeding season in suitable nesting habitat
S -singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat

PROBABLE BREEDING
P -pair observed in their breeding season in suitable nesting habitat
T -permanent territory presumed through registration of territorial song on at least 2days, a week or more apart, at the same place
D -courtship or display between a male and a female or 2 males, including courtship feeding or copulation
V -visiting probable nest site
A -agitated behaviour or anxiety calls of an adult
B -brood patch on adult female or cloacal protuberance on adult male
N -nest-building or excavation of nest hole

CONFIRMED BREEDING
DD -distraction display or injury feigning
NU -used nest or egg shell found (occupied or laid within the period of study)
FY -recently fledged young or downy young, including young incapable of sustained flight
AE -adults leaving or entering nest site in circumstances indicating occupied nest
FS -adult carrying fecal sac
CF -adult carrying food for young
NE -nest containing eggs
NY -nest with young seen or heard

SOURCE: Ontario Breeding Bird Atlas March 2001

Station No.: 01EM01												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
BLJA	Blue Jay	*Cyanocitta cristata*	B	H				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BRTH	Brown Thrasher	*Toxostoma rufum*	B	P				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BTGW	Black-throated Green War	*Dendroica virens*	B	S				Yes				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**7**	**No. of Breeding Species Observed in Station:**	**7**		**0**	**0**	**0**	**1**	**0**	**0**	**0**	

Station No.: 01EM02												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
AMWO	American Woodcock	*Scolopax minor*	B	H				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	H				No				
No. of Species Observed in Station:	**2**	**No. of Breeding Species Observed in Station:**	**2**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 02EM01												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
MODO	Mourning Dove	*Zenaida macroura*	B	H				No				
HAWO	Hairy Woodpecker	*Picoides villosus*	B	H				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
WBNU	White-breasted Nuthatch	*Sitta carolinensis*	B	X				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	H				No				
COGR	Common Grackle	*Quiscalus quiscula*	B	H				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**10**	**No. of Breeding Species Observed in Station:**	**10**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 02EM02												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
RUGR	Ruffed Grouse	*Bonasa umbellus*	B	None				No				
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 03EM											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
GRSP	Grasshopper Sparrow	*Ammodramus savannaru*	B	S	SC	SC	SC	No			
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	THR	THR	THR	No			
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**3**	**No. of Breeding Species Observed in Station:**	**3**		**3**	**3**	**3**	**0**	**0**	**0**	**0**

Station No.: 01BB												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No				
WOTH	Wood Thrush	*Hylocichla mustelina*	B	S	THR	SC	THR	No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes				
SCTA	Scarlet Tanager	*Piranga olivacea*	B	S				Yes				
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No				
BAOR	Baltimore Oriole	*Icterus galbula*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**12**	**No. of Breeding Species Observed in Station:**	**12**		**1**	**1**	**1**	**2**	**0**	**0**	**0**	

Station No.: 02BB												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
KILL	Killdeer	*Charadrius vociferus*	B	S				No				
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	S				No				
BARS	Barn Swallow	*Hirundo rustica*	B	H	THR	THR	THR	No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
GRSP	Grasshopper Sparrow	*Ammodramus savannaru*	B	S	SC	SC	SC	No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
INBU	Indigo Bunting	*Passerina cyanea*	B	P				No				
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	THR	THR	THR	No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
No. of Species Observed in Station:	**12**	**No. of Breeding Species Observed in Station:**	**12**		**4**	**4**	**4**	**0**	**0**	**0**	**0**	

Station No.: 03BB												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
WITU	Wild Turkey	*Meleagris gallopavo*	B	S				No				
ROPI	Rock Pigeon	*Columbia livia*	B	None				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	S				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	S				No				
GWWA	Golden-winged Warbler	*Vermivora chrysoptera*	B	S	THR	SC	THR	No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BTGW	Black-throated Green War	*Dendroica virens*	B	S				Yes				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
INBU	Indigo Bunting	*Passerina cyanea*	B	P				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**17**	**No. of Breeding Species Observed in Station:**	**17**		**1**	**1**	**1**	**1**	**0**	**0**	**0**	

Station No.: 04BB											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EWPE	Eastern Wood-Pewee	*Contopus virens*	B	S	SC	SC	SC	No			
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No			
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No			
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No			
WOTH	Wood Thrush	*Hylocichla mustelina*	B	S	THR	SC	THR	No			
AMRO	American Robin	*Turdus migratorius*	B	S				No			
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	S				No			
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No			
OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes			
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No			
SCTA	Scarlet Tanager	*Piranga olivacea*	B	S				Yes			
FISP	Field Sparrow	*Spizella pusilla*	B	S				No			
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No			
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No			
BAOR	Baltimore Oriole	*Icterus galbula*	B	S				No			
No. of Species Observed in Station:	**15**	**No. of Breeding Species Observed in Station:**	**15**		**2**	**2**	**2**	**2**	**0**	**0**	**0**

TOTAL BIRD SPECIES OBSERVED DURING STATION SURVEYS: 39

Appendix D

Bird Status Report - Comprehensive

APPENDIX D Bird Status Report - Comprehensive

Bird species observed by GHD are listed in the order followed the American Ornithologists' Union (AOU) Check-list of North American birds (7th edition, 1999, 47th Supplement). Common and scientific nomenclature are based on those used by AOU. Breeding status and breeding evidence code are listed when observed. Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :	**END - endangered**	A wildlife species facing imminent extirpation or extinction.
	END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
	THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
	SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
	YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:	**COSEWIC**	The Committee on the Status of Endangered Wildlife in Canada, May 2018.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2018.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, 2018.
	Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000
	Region 6	Southern Ontario Wetland Evaluation Appendix 11B, Version 3.2, March 2013

Breeding Status: (Observed By NEA)

B -species observed in breeding season in suitable habitat with some evidence of breeding (confirmed, probable or possible as per Ontario Breeding Bird Atlas, 2002).
F -species observed in breeding season but no evidence of breeding or suitable nest sites available on the study site (includes flyovers, migrants and foraging colonial breeders).
M -species observed outside of breeding season for that species and in area outside of the known breeding range for that species.

Breeding Evidence Code: (Observed By NEA)

OBSERVED
X -species observed in its breeding season (no evidence of breeding).

POSSIBLE BREEDING
H -species observed in its breeding season in suitable nesting habitat
S -singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat

PROBABLE BREEDING
P -pair observed in their breeding season in suitable nesting habitat
T -permanent territory presumed through registration of territorial song on at least 2days, a week or more apart, at the same place
D -courtship or display between a male and a female or 2 males, including courtship feeding or copulation
V -visiting probable nest site
A -agitated behaviour or anxiety calls of an adult
B -brood patch on adult female or cloacal protuberance on adult male
N -nest-building or excavation of nest hole

CONFIRMED BREEDING
DD -distraction display or injury feigning
NU -used nest or egg shell found (occupied or laid within the period of study)
FY -recently fledged young or downy young, including young incapable of sustained flight
AE -adults leaving or entering nest site in circumstances indicating occupied nest
FS -adult carrying fecal sac
CF -adult carrying food for young
NE -nest containing eggs
NY -nest with young seen or heard

SOURCE: Ontario Breeding Bird Atlas March 2001

AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
RUGR	Ruffed Grouse	*Bonasa umbellus*	B	None				No			
WITU	Wild Turkey	*Meleagris gallopavo*	B	S				No			
TUVU	Turkey Vulture	*Cathartes aura*	B	None				No			
BWHA	Broad-winged Hawk	*Buteo platypterus*	B	None				No			
KILL	Killdeer	*Charadrius vociferus*	B	S				No			
AMWO	American Woodcock	*Scolopax minor*	B	H				No			
ROPI	Rock Pigeon	*Columbia livia*	B	None				No			
MODO	Mourning Dove	*Zenaida macroura*	B	H				No			
HAWO	Hairy Woodpecker	*Picoides villosus*	B	H				No			
NOFL	Northern Flicker	*Colaptes auratus*	B	None				No			
EWPE	Eastern Wood-Pewee	*Contopus virens*	B	S	SC	SC	SC	No			
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No			
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No			
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No			
AMCR	American Crow	*Corvus brachyrhynchos*	B	S				No			
BARS	Barn Swallow	*Hirundo rustica*	B	H	THR	THR	THR	No			
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No			
WBNU	White-breasted Nuthatch	*Sitta carolinensis*	B	X				No			
WOTH	Wood Thrush	*Hylocichla mustelina*	B	S	THR	SC	THR	No			
AMRO	American Robin	*Turdus migratorius*	B	S				No			
GRCA	Gray Catbird	*Dumetella carolinensis*	B	None				No			
BRTH	Brown Thrasher	*Toxostoma rufum*	B	P				No			
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	S				No			
GWWA	Golden-winged Warbler	*Vermivora chrysoptera*	B	S	THR	SC	THR	No			
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No			
BTGW	Black-throated Green War	*Dendroica virens*	B	S				Yes			
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No			

OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes			
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No			
SCTA	Scarlet Tanager	*Piranga olivacea*	B	S				Yes			
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No			
FISP	Field Sparrow	*Spizella pusilla*	B	S				No			
GRSP	Grasshopper Sparrow	*Ammodramus savannaru*	B	S	SC	SC	SC	No			
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No			
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No			
INBU	Indigo Bunting	*Passerina cyanea*	B	P				No			
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	THR	THR	THR	No			
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No			
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
COGR	Common Grackle	*Quiscalus quiscula*	B	H				No			
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	S				No			
BAOR	Baltimore Oriole	*Icterus galbula*	B	S				No			
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No			
TOTAL SPECIES OBSERVED:	**43**	**BREEDING SPECIES OBSERVED:**	**43**		**7**	**7**	**7**	**3**	**0**	**0**	**0**

Appendix E

Herpetozoa Status Report

APPENDIX E Herpetozoa Status Report

Project ID: 11214484

Herpetozoa (amphibian and reptile) species observed by GHD are listed by class then by family taxonomic grouping. These species are identified by the common and scientific name used by the Natural heritage information Centre (NHIC). Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :	**END - endangered**	A wildlife species facing imminent extirpation or extinction.
	END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
	THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
	SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
	YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:	**COSEWIC**	The Committee on the Status of Endangered Wildlife in Canada, May 2017.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2017.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, 2017.
	Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000

Amphibian

Common Name	Scientific Name	COSEWIC	COSSARO	SARA	Area Sensitive
Toads	*Bufonidae*				
American Toad	*Anaxyrus americanus*				No
Treefrogs	*Hylidae*				
Spring Peeper	*Pseudacris crucifer*				No
Gray Treefrog	*Hyla versicolor*				No
True Frogs	*Ranidae*				
Wood Frog	*Lithobates sylvatica*				No
No. of Species Observed: 4		**0**	**0**	**0**	**0**

No. of Species Observed in Projec 4

Appendix F

Mammal Status Report

APPENDIX F Mammal Status Report

Mammal species observed by GHD are listed. These species are identified by the common and scientific name used by the Natural heritage information Centre (NHIC). Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :	**END - endangered**	A wildlife species facing imminent extirpation or extinction.
	END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
	THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
	SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
	YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:	**COSEWIC**	The Committee on the Status of Endangered Wildlife in Canada, 2017.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, 2017.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, 2017.
	Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000

Common Name	Scientific Name	COSEWIC	COSSARO	SARA	Area Sensitive
White-tailed Deer	*Odocoileus virginianus*				No
Red Squirrel	*Tamiasciurus hudsonicus*				No
Eastern Chipmunk	*Tamias striatus*				No
Coyote	*Canis latrans*				No
Common Raccoon	*Procyon lotor*				No
Black Bear	*Ursus americanus*				No
No. of Species Observed in Projec 6		**0**	**0**	**0**	**0**

Appendix G

Potential Snag and Cavity Detailed Report

Appendix H

Fish Species List for Baxter Creek

Appendix G - Project Snag and Cavity Detailed Report

ProjectID: 11214484

Community No.: 7

ELC Code: FOD3-1

Soil Condition:

PlantNo: 007

Common Name: trembling aspen
ObsID: 137806
Date: 5/14/2020
Start Time: 5/14/2020
UTM Zone: 17
Northing: 4892755
Easting: 704173
Tree Hgt (m): 15
Cavity No: 1
DecayCode: 5
Loose Bark Evident: ☐

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
02	0	0	8	Unknown	Unknown

Comments:

PlantNo: 008

Common Name: trembling aspen
ObsID: 137807
Date: 5/14/2020
Start Time: 5/14/2020
UTM Zone: 17
Northing: 4892755
Easting: 704180
Tree Hgt (m): 10
Cavity No: 5
DecayCode: 4
Loose Bark Evident: ☑

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
01	0	0	5	Unknown	Unknown

Comments: Cluster of cavities at 5m off ground

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
02	0	0	5	Unknown	Unknown

Comments: Cluster of cavities at 5m off ground

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
03	0	0	5	Unknown	Unknown

Comments: Cluster of cavities at 5m off ground

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
04	0	0	5	Unknown	Unknown

Comments: Cluster of cavities at 5m off ground

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
05	0	0	5	Unknown	Unknown

Comments: Cluster of cavities at 5m off ground

Community No.: 8

ELC Code: FOC4-1

Soil Condition:

PlantNo: 006

Common Name: trembling aspen

ObsID: 137805

Date: 5/14/2020

Start Time: 5/14/2020

UTM Zone: 17

Northing: 4892736

Easting: 704138

Tree Hgt (m): 25

Cavity No: 1

DecayCode: 1

Loose Bark Evident: ☐

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
01	0	0	15	Unknown	Unknown

Comments: Within FOC4-1, likely not good bat habitat tree

Community No.: 11

ELC Code: SWD2-1

Soil Condition:

PlantNo: 004

Common Name: American elm

ObsID: 137803

Date: 5/14/2020

Start Time: 5/14/2020

UTM Zone: 17

Northing: 4892689

Easting: 704088

Tree Hgt (m): 15

Cavity No: 0

DecayCode: 3

Loose Bark Evident: ☑

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
0	0	0	0	N/A	N/A

Comments: Very shaggy bark

Community No.: 13 ELC Code: FOC4-1
Soil Condition:

PlantNo: 001

Common Name: yellow birch Date: 5/14/2020 UTM Zone: 17 Tree Hgt (m): 10
ObsID: 137800 Start Time: 5/14/2020 Northing: 4893132 Cavity No: 1
Easting: 704157 DecayCode: 4
Loose Bark Evident: ☐

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
01	0	0	4	Unknown	Unknown

Comments: Within dense FOC, likely not good bat habitat

PlantNo: 002

Common Name: yellow birch Date: 5/14/2020 UTM Zone: 17 Tree Hgt (m): 15
ObsID: 137801 Start Time: 5/14/2020 Northing: 4893132 Cavity No: 1
Easting: 704152 DecayCode: 6
Loose Bark Evident: ☑

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
01	0	0	7	Unknown	Unknown

Comments: Within dense FOC, likely not good bat habitat

Community No.: 15 ELC Code: FOD3-1
Soil Condition:

PlantNo: 003

Common Name: trembling aspen Date: 5/14/2020 UTM Zone: 17 Tree Hgt (m): 8
ObsID: 137802 Start Time: 5/14/2020 Northing: 4892993 Cavity No: 1
Easting: 704070 DecayCode: 6
Loose Bark Evident: ☑

CavNo.	Horizontal Dimension (m)	Vertical Dimension (m)	CavHgt (m)	Possible Constructing Species	Possible Species Occupant
01	0	0	7.5	Unknown	Unknown

Comments:

Appendix I

Preliminary Site Servicing and Grading Plan (Valdor Engineering Inc., 2022)

BLOCK 115
NATURAL HERITAGE SYSTEM
14.31ha

STREET 'A'
STREET 'C'
STREET 'D'
STREET 'E'
STREET 'F'
NINA COURT
FALLIS LINE
COUNTY ROAD 10
BUCKLAND DRIVE

BLOCK 148 COMMERCIAL
BLOCK 110 COMMERCIAL MIXED USE
BLOCK 111 4.5m ROAD WIDENING
BLOCK 114 WALKWAY
BLOCK 90 WALKWAY
BLOCK 116 SWM POND
BLOCK 117 NATURAL HERITAGE SYSTEM
BLOCK 118 4 UNIT
BLOCK 119 5 UNIT
BLOCK 120 4 UNIT
BLOCK 121 5 UNIT
BLOCK 122 5 UNIT
BLOCK 123 5 UNIT
BLOCK 134 4 UNITS
BLOCK 135 5 UNITS
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MILLBROOK SOUTH EAST SUBDIVISION

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PRELIMINARY SITE SERVICING AND GRADING PLAN

Surveyed by:	Checked by: P.S.Z.	Project No.	19121
Drawn by: V.L.	Approved by: D.G.		
Designed by: V.L.	Date:	Drawing No.	PSG-1
Scale: 1:750		Sheet No.	

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