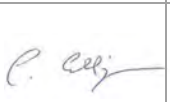
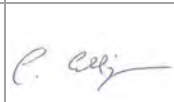
Environmental Impact Assessment

Tower Road Plan of Subdivision, Part of Lot 26, Concession 7, Town of Lakefield, Township of Selwyn, County of Peterborough

Triple T Holdings Inc.

30 June 2023

→ **The Power of Commitment**

Project name		Tower Road Plan of Subdivision, Part of Lot 26, Concession 7, Town of Lakefield, Township of Selwyn, County of Peterborough					
Document title		Environmental Impact Assessment | Tower Road Plan of Subdivision, Part of Lot 26, Concession 7, Town of Lakefield, Township of Selwyn, County of Peterborough					
Project number		11214535					
File name		11214535-03-RPT-Tower Rd Lakefield Subdivision Amended EIA					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	1	Stacey Zwiers/Katherine Ryan	Chris Ellingwood		Chris Ellingwood		October 16, 2020
S4	2	Stacey Zwiers/Katherine Ryan	Chris Ellingwood		Chris Ellingwood		February 17, 2023
S4	3	Stacey Zwiers/Katherine Ryan	Stacey Zwiers		Chris Ellingwood		, May 2024

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Executive Summary

In early 2018, GHD Limited (formerly Niblett Environmental Associates Inc.) was retained to complete an Environmental Impact Assessment for a draft plan of subdivision in Lakefield. The proposed development has been broken into three Areas (Area 1, Area 2 and Area 3).

The study area is located south of County Road 29 (Lakefield Road) on Part of Lot 26, Concession 6 and Part of Lot 27, Concession 7 in the Township of Selwyn, County of Peterborough. It is bounded to the west and north by residential lots along County Road 29 in the Town of Lakefield. Area 1 is adjacent to the Lakefield water tower and is found to the north and south of the Ontario Speed Skating track. Area 2 surrounds Rays Creek and is located to the south of Seaforth Crescent. Several lots are proposed on Seaforth Crescent and Lakefield Road as well. The northern extent of Area 3 is located approximately 185m south of the Town of Lakefield's water tower. Area 3 extends to the east south of Coyle Crescent and south to the existing lots of 7th Line. The three study areas' locations have been illustrated on Figure 1.1.

The scope of this EIA report with regard to the entire study area (Area 1, Area 2 and Area 3) is: to confirm the boundaries of key natural features (e.g. the wetlands, woodlands and watercourses) in the study area; to confirm and identify the ecological function of any such features; to determine whether any Species at Risk and/or their habitats occur on the subject property; and, to develop appropriate buffers and mitigation measures to prevent impacts of the development on these features and their functions.

Forty vegetation communities were identified within the Area 1, 2 and 3. Each community is described below and illustrated on Figure 1.1.

A total of 162 plant species were identified during field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix B.

Several unevaluated wetlands were identified in both Area 1 and Area 2. Among the wetlands for which detailed vegetation assessments were conducted in Area 1 were Communities 8, 9, 11, 14 and 15.

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 various wetlands within Area 1 and Area 2 as an area of constraint (Figure 1.1).

A 15 m buffer around the retained headwater drainage feature and riparian wetland in the southwest portion of Area 2 has been recommended. The development envelope, stormwater ponds and servicing have been revised to protect that feature and its hydrologic functions.

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

This Environmental Impact Assessment report was prepared to address potential environmental issues associated with an application to develop a property located at Part Lot 26, Concession 7 in the Township of Selwyn, 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. In particularly obtaining the relevant permits from ORCA and MECP. These recommendations have been made to address potential impacts to natural features (identified wetlands, woodlands, watercourses and 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

In early 2018, GHD Limited (formerly Niblett Environmental Associates Inc.) was retained to complete an Environmental Impact Assessment for a draft plan of subdivision in Lakefield. The proposed development has been broken into three Areas (Area 1, Area 2 and Area 3).

The Area 1 property is located within the boundaries of the Lakefield Secondary Plan area in the southwest portion of the Town of Lakefield. Key Natural Heritage Features on the property, or within 120 m (area of influence) of the property included:

– Woodland
– Possible habitat for threatened or endangered species (butternut, grassland birds)
– High groundwater recharge area
– Watercourses (Rays Creek and headwater drainage features) and fish habitat
– Unevaluated wetlands
– Provincially Significant Wetlands upstream and downstream (off-site)
– Natural Heritage System and EP zoning

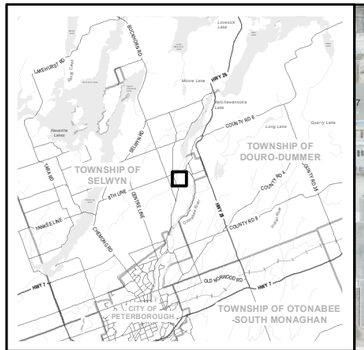
A Terms of Reference was completed by GHD outlining the survey methods, timing and content of the report. The Terms of Reference was submitted to Otonabee Region Conservation Authority (ORCA) on May 1st, 2018 and approved on May 8th, 2018.

The Area 2 and Area 3 study areas are also located within the boundaries of the Lakefield Secondary Plan area in the southwest portion of the Town of Lakefield. Key Natural Heritage Features on the property or within 120 m (area of influence) of these zones include:

– Unevaluated wetlands
– Provincially Significant Wetlands upstream and downstream (off-site)
– Woodland
– Possible habitat for threatened or endangered species (e.g., butternut (*Juglans cinerea)* and grassland birds)
– High groundwater recharge area
– Watercourses (Rays Creek and headwater drainage features) and fish habitat

1.2 Location and Study Area

The study area is located south of County Road 29 (Lakefield Road) on Part of Lot 26, Concession 6 and Part of Lot 27, Concession 7 in the Township of Selwyn, County of Peterborough. It is bounded to the west and north by residential lots along County Road 29 in the Town of Lakefield. Area 1 is adjacent to the Lakefield water tower and is found to the north and south of the Ontario Speed Skating track. Area 2 surrounds Rays Creek and is located to the south of Seaforth Crescent. Several lots are proposed on Seaforth Crescent and Lakefield Road as well. The northern extent of Area 3 is located approximately 185m south of the Town of Lakefield's water tower. Area 3 extends to the east south of Coyle Crescent and south to the existing lots of 7th Line. The three study areas' locations have been illustrated on Figure 1.1.



ELC TYPES - 1ST APPROXIMATION

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

ELC CODE	ECOSITE/VEG TYPE DESCRIPTION
CUM	Cultural meadow
CUM1-1	Dry-moist old field meadow
CUT	Cultural thicket
CUT1	Mineral cultural thicket
CUT1-1	Sumac cultural thicket
CUW1	Mineral cultural woodland
FOC2-2	Dry-fresh white cedar coniferous forest
FOC4-1	Fresh-moist white cedar coniferous forest (Type)
FOD	Deciduous forest
FOD4	Dry-fresh deciduous forest
FOD7-2	Fresh-moist ash lowland deciduous forest
MAM2	Mineral meadow marsh
MAS2-1	Cattail mineral shallow marsh
SWC1-1	White cedar mineral coniferous swamp
SWD2-1	Black ash mineral deciduous swamp
SWM6	Birch-poplar organic mixed swamp
SWT2	Mineral thicket swamp
SWT2-2	Willow mineral thicket swamp
SWT2-5	Red-osier mineral thicket swamp

VILLAGE OF LAKEFIELD

SMITH STREET
MURRAY ST
COYLE CR
PEACOCK ROAD
BUILT-UP AREA 18,759 m²
7TH LINE
8TH LINE
SEAFORTH CRESCENT
YOUNGS POINT ROAD
LAKEFIELD ROAD
Ray's Creek
STUDY LIMIT (TATHAM ENGINEERING 2019)
AREA 1
AREA 2
AREA 3
AREA 3 LIMIT
AREA 2 LIMIT
LAKEFIELD SOUTH COMPLEX PSW
LAKEFIELD SOUTH COMPLEX PSW

33 HEDGEROW
35 CUM (PLOWED) 31,577 m²
39 SWT 1,020 m²
38 SWALE 35,716 m²
36 CUT 35,716 m²
33 HEDGEROW 1,500 m²
39 SWT2-5 2,845 m²
35 CUM (PLOWED) 115,372 m²
33 HEDGEROW 2,241 m²
40 CUT1 5,760 m²
37 CUM1-1 35,716 m²
35 CUM (PLOWED) AREA 3
34 CUT1 61,771 m²
33 HEDGEROW 2,020 m²
13 CUW1 2,397 m²
1 CUM1-1 36,940 m² AREA 1
12 FOC4-1 2,332 m²
10 CUW1
10 CUW1 5,762 m²
9 SWT2-2 817 m²
9 SWT2-2 168 m²
11 SWC1-1 10,710 m²
15 RIPARIAN 1,440 m²
12 FOC4-1 5,245 m²
1 CUM1-1
14 MAM3-9 333,907 m²
11 SWC1-1
12 FOC4-1 4,827 m²
9 SWT2-2 2,376 m²
BERM 1,424 m²
2 CUT1 4,829 m²
3 CUT1-1 7,181 m²
4 HEDGEROW 721 m²
5 CUT1 18,452 m²
6 CUT1 678 m²
7 CUW1 3,728 m²
8 SWD2-1 1,464 m²
1 CUM1-1
16 CUM1 1,833 m²
29 FOD 3,099 m²
20 FOC4-1 10,564 m²
21 SWD2-1 6,074 m²
18 FOC4-1 7,027 m²
18 FOC4-1 804 m²
16 CUM1
22 CUT1 2,973 m²
18 FOC4-1 32,640 m²
16 CUM1 2,423 m²
18 FOC4-1 3,225 m²
30 CUW1 1,153 m²
26 FOC4-1 15,491 m²
25 CUT1 13,854 m²
24 MAM2 1,129 m²
27 SWD2-1 509 m²
26 FOC4-1 9,565 m²
25 CUT1
23 MAS2-1 6,269 m²
31 CUT1 11,508 m²
18 FOC4-1 1,048 m²
32 SWM6 641 m²
19 SWT
32 SWM6 748 m²
16 CUM 40,994 m²
18 FOC4-1 761 m²
18 FOC4-1 3,550 m²
19 SWT2 4,520 m²
33 HEDGEROW 1,424 m²
BUILT-UP AREA 320 m²
17 CUT1 1,410 m²
01MLS01
01MLS02
01BBS
02MLS01
02MLS02
02MLS
02MLS03
07BBS
08BBS
03MLS01
03MLS
03MLS02
03MLS03
04MLS01
04MLS02
04MLS03
09BBS
MLS04
MLS03
01MAS
02MAS
02BBS
05BBS
05MAS
06BBS
04MAS
03BBS
03MAS
001
002
003
BBS12
06MAS
WSS04
WSS06
WSS02
WSS05
WSS07
10BBS
WSS08
WSS09
WSS10
11BBS
04BBS
07MAS
08MAS

Legend

- Butternut Health Assessment
- WWS - Wetland Soil Survey
- BBS - Breeding Bird Survey Station
- MAS - Modified Amphibian Survey Station
- MLS - Eastern Meadowlark/Bobolink Survey Station
- MLS - Eastern Meadowlark/Bobolink Survey Transect
- Setback, Multi-Value (See Report for Details)
- Watercourse, Field Verified (GHD, 2017)
- Study Limit (Tatham Engineering, 2019)
- Wetland, Evaluated-Provincial
- Vegetation Communities
- Wetland Communities
- Forest Communities

1 cm = 46 meters

0 30 60 90 120

Meters

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

Paper Size ANSI B

N

GHD

Triple T. Holdings Limited
Pt Lot 26, Con 7, Township of Smith
Town of Lakefield
Environmental Impact Study

Natural Features, Vegetation Communities, Surveys & Constraints

Project No. 11214535
Revision No.
Date May 10, 2024

Figure 1

Q:\GIS\PROJECTS\11214000s\11214535\Layouts\202008_RPT001\11214535_20220830_GIS001 - Natural Features, Vegetation Communities, Surveys and Constraints.mxd
Print date: 10 May 2024 - 10:43

Data source: Image © County of Peterborough, 2018.

1.3 Study Rationale

This section identifies federal, provincial and other regulatory legislation, policies, official plans (OP) and OP amendments that are applicable and relevant to the study area and the immediate vicinity. This includes policies that triggered the study. These documents may identify natural features, Species at Risk and other habitat as well as other features relevant to this study.

1.3.1 Federal Legislation

1.3.1.1 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 of 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.

1.3.1.2 Migratory Birds Convention Act

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

1.3.2.1 Endangered Species Act

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

1. To identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge.
2. To protect species that are at risk and their habitats, and to promote the recovery of species that are at risk.
3. To promote stewardship activities to assist in the protection and recovery of species that are at risk. 2007, c. 6, s. 1. (Government of Ontario, 2019)

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 August 1, 2018 (Government of Ontario, 2019b). 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 (Government of Ontario 2019c). 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.

1.3.2.2 Provincial Policy Statement (2020)

The Provincial Policy Statement, 20202 (PPS) is the statement of the Ontario government's policies on land use planning. It applies province-wide (in the province of Ontario) and provides provincial policy direction on land use planning. Municipalities use the PPS to develop their official plans and to guide and inform decisions on other planning matters. The PPS is issued under Section 3 of the Planning Act and all decisions affecting land use planning matters `shall be consistent with' the Provincial Policy Statement (Government of Ontario, 2014).

The extent of Natural Heritage features found on or adjacent to the study area have been investigated within this EIA and portions of Sections 2.1.4 to 2.1.8 of the Provincial Policy Statement (2014) apply to this project.

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);

d) significant wildlife habitat; 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

1.3.2.3 A Place to Grow: Growth Plan for the Greater Golden Horseshoe 2019

A Place to Grow: Growth Plan for the Greater Golden Horseshoe 2019 came into effect on May 16, 2019 replacing the Growth Plan for the Greater Golden Horseshoe 2017 (OMMAH 2019). The 2019 Growth Plan for the Greater Golden Horseshoe (GPGGH) 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 (OMMAH 2019).

The study area falls within an identified settlement area associated with the Town of Lakefield. It is located within a recognized Growth Centre that has specific policies under the County of Peterborough's Official Plan. As a result, Sections 4.2.2, 4.2.3, and 4.2.4 of the GPGGH 2019 are not applicable in the study area.

1.3.3 Local and Other Regulatory Bodies

1.3.3.1 County of Peterborough Official Plan (Consolidated to July 2019) and Township of Lakefield Land Use Plan (Schedule A1-1)

The County of Peterborough sets the context for planning in the County and also functions as the lower tier Official Plan for four local municipalities, one of which is the Township of Selwyn. The County has identified four different land use designations in the study area (Peterborough County – Public GIS, 2019).

1. Portions of the study area adjacent to Ray's Creek are designated as Environmental Constraint Areas. These areas are to be maintained in their natural state in order to maintain the hydraulic capacity of Ray's Creek and its related flood plain (Section 6.2.15.1 County of Peterborough Official Plan). Section 6.2.15 of the County of Peterborough Official Plan describes the policies associated with such areas.

2. Lands within 120 metres of the Ray's Creek Linkage Wetland, not already identified as Environmental Constraint Areas, are designated as a "Site Specific Policy Area". The policies of Section 6.3.3.7 apply to this designation.
3. Portions of the study area adjacent to the Coyle Crescent residential subdivision have been designated Recreational – Open Space. The policies of Section 6.2.14 apply to this designation.
4. The remaining lands in the study area have been designated low density residential and are subject to Section 6.2.2.3 of the Official Plan. Section 6.3.3.7 - Site Specific Special Policy Area for Lakefield South Development Area also applies to the study area.

Section 4.1 of the County of Peterborough Official Plan (Consolidated to July 2019) recognizes that wetlands and fish habitat, such as those found on the subject property, are Natural Heritage Features. Although Section 4.1.3.1 prohibits "*development and site alterations within provincially significant wetlands and in significant portions of the habitat of endangered or threatened species,*" it also states: "…*with the exception of the Oak Ridges Moraine Policy, development or site alteration such as filling, grading and excavating may be permitted within or adjacent to other natural heritage features listed in Section 4.1 of this Plan, provided that it has been demonstrated by an Environmental Impact Assessment that there will be no negative impacts on the natural features or ecological functions for which the area is identified."* Guidelines for the preparation of EIA are also described in Section 4.1.3.1.

Section 4.1.3.4 of the County of Peterborough Official Plan (Consolidated to July 2019) states, "*Development and site alterations will not be permitted in fish habitat except in accordance with provincial and federal requirements."* It also states, "*Development and site alterations shall not be permitted on adjacent lands to the natural heritage features and areas* [listed in Section 4.1.3.1] *unless the ecological function of the adjacent lands has been evaluated in accordance with an environmental impact assessment as described in Section 4.1.3.1 and it has been determined that there will be no new negative impacts on the natural features or on their ecological functions."*

Section 7.5.2 indicates;

For any development proposals within the Township, including plans of subdivisions, runoff form the development shall be minimized and the impact of any proposed development on local and area-wide drainage patterns shall be identified. In addition, stormwater management plans are required by the Ministry of Transportation for all development that abuts or impacts upon a provincial highway prior to any development and or/grading being undertaken on site. A suitable method of handling surface runoff shall be development and implemented as a condition of approval according to the policies in this section.

1.3.3.2 Otonabee Region Conservation Authority Regulations and Policies

The Conservation Authority whose jurisdiction the study area falls under is 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* is applicable. A permit is required from ORCA for regulated areas to complete any works that are within 120 m of a Provincially Significant Wetland or within 30 metres 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

- Aerial imagery
- OMNRF Land Information Ontario (LIO) database mapping and Natural Heritage Information Centre (NHIC) Make a Map tool (2018)
- Ontario Breeding Bird Atlas data (Bird Studies Canada, 2007)
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2018)
- Ontario Ministry of Natural Resources Aquatic Resource Area, Fish Species List (OMNR, 2012);
- DFO Aquatic Species at Risk Mapping (Department of Fisheries and Oceans)

1.4.2 Literature and Resources

- Natural Heritage Reference Manual (MNRF, 2010)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. Peterborough, 38pp. (OMNRF, 2015)
- Lakefield Wetland South Complex Evaluation (MNRF 2000)

1.5 Description of Development

1.5.1 Area 1

The proposed plan of subdivision would see construction of four 30-unit apartment buildings on the northern portion of the area and two 30-unit buildings plus approximately 50 single family dwellings on the southern portion of the project. Parking, roads, a stormwater management facility and other infrastructure to accommodate the development are proposed. Details are shown in Appendix A Preliminary Site Grading Plan and Stormwater Management (Tathum Engineering, Drawing SG-1).

1.5.2 Area 2

The proposed concept plan would include the creation of several lots, some of which would be accessed from Seaforth Crescent, while the remaining would be accessed from Lakefield Road (Appendix A). The creation of the proposed lots may require the potential modification or relocation of headwater drainage features. An extension to Seaforth Crescent would be required for access to three of the proposed lots. The concept plan also includes the creation of a stormwater management facility. It also includes a large block of lots between the stormwater pond #2 and the south property line. An open space block at the south property line (south of the South Collector) will be retained for a wetland/LID/watercourse block.

1.5.3 Area 3

The proposed concept plan for this area includes condominium buildings, multi-unit buildings, and approximately 400 single-family dwellings. One stormwater management (SWM #3) facility, parking lots, some commercial and an extension of Water Tower Road and additional new roads are proposed as part of the development. The creation of the SWM facility will require the modification or relocation of a portion of the headwater drainage feature (Appendix A).

1.6 Scope of Report

The scope of this EIA report with regard to the entire study area (Area 1, Area 2 and Area 3) is: to confirm the boundaries of key natural features (e.g. the wetlands, woodlands and watercourses) in the study area; to confirm and identify the ecological function of any such features; to determine whether any Species at Risk and/or their habitats occur on the subject property; and, to develop appropriate buffers and mitigation measures to prevent impacts of the development on these features and their functions.

2. Study Methods

2.1 General Approach

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

2.1.1 Area 1

In the first phase, GHD collected and reviewed available information about the study area including recent air photography, key natural features GIS mapping, wetland mapping, Official plan schedules and other correspondence or files available from Peterborough County, previous EIA studies completed in the area by GHD, other consultants, and the Ministry of Natural Resources. Records of Species at Risk for this area were derived from our GIS database and inquiries with the MNRF Natural Heritage Information Centre.

The second phase consisted of site visits by our aquatic, terrestrial and wetland biologists to confirm the data collected in the literature review and records of Species at Risk from the various sources. Surveys included multi-season field visits that encompassed breeding bird surveys, amphibian surveys, Ecological Land Classification (ELC) mapping, vegetation community boundaries, fish and aquatic habitat assessments, fish community surveys and presence of significant species including Species at Risk.

The third phase was the preparation of a draft EIA that included specific mitigation measures for protecting any sensitive species and other natural features on or adjacent to the study area as well as recommendations regarding the creek and wetland including buffers and setbacks.

2.1.2 Area 2

In the fourth phase, GHD collected and reviewed available information on this new study area including recent air photography, key natural features GIS mapping, wetland mapping, Official plan schedules and other correspondence or files available from Peterborough County. Also considered was previous field work completed by GHD in Area 1 that would be applicable to Area 2.

The fifth phase consisted of site visits by our aquatic, terrestrial and wetland biologists to confirm the data collected in the literature review. The specific focus was on wetlands, watercourses and other hydrologic features. Surveys included multi-season field visits that encompassed breeding bird surveys, amphibian surveys, Ecological Land Classification (ELC) mapping, vegetation community boundaries, and presence of significant species including Species at Risk. A full headwater drainage feature (HDF) assessment was conducted on the watercourses, this typically involves three visits.

2.1.3 Area 3

In the sixth phase, GHD collected and reviewed available information about this third study area including recent air photography, key natural features GIS mapping, wetland mapping, Official plan schedules and other correspondence or files available from Peterborough County. Also considered was previous field work completed by GHD as part of Area 1 and 2 studies that might apply to Area 3.

The seventh phase consisted of site visit by our aquatic biologist and terrestrial biologists to conduct a full headwater drainage feature assessment on the watercourse. Other surveys included multi-season field visits that encompassed breeding bird surveys, amphibian surveys, Ecological Land Classification (ELC) mapping, vegetation community boundaries, and presence of significant species including Species at Risk.

Subsequently, GHD produced this EIA report that includes specific mitigation measures for protecting identified natural features and hydrologic features either on or adjacent to the study areas (i.e., Area 1, 2 and 3). Recommendations include setbacks and buffers. This report will be reviewed by the Selwyn Township, County of Peterborough, and Otonabee Region Conservation Authority (ORCA).

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, archaeology, MDS, flood and fill regulations, health regulations or other approvals are not addressed in this report.

2.2 Site Study Methodology

2.2.1 Physical Site Characteristics

Site characteristics were assessed during GHD's field visits. These included general documentation of existing disturbances, age of vegetation cover, accessibility, topography, watercourse form and function and other natural features.

2.2.2 Biophysical Inventory

2.2.2.1 Vegetation

ELC Survey Method

Area 1

All vegetation encountered in the study area was inventoried during the site visits. Delineation and classification of the vegetation community types were based on the Ecological Land Classification for Southern Ontario (Lee et al., 1998). General notes on disturbance, topography, soil types, soil moisture and state of each community were also compiled.

Rare, significant or unusual species were searched for. Species significance or rarity on a national, provincial, regional and local level is based on published literature and standard status lists. These included SARA (2019), COSEWIC (2019), COSSARO (2018), Ontario Endangered Species Act (2007) and Oldham (1999).

Areas 2 and Area 3

Dominant vegetation forms in the study area were recorded during site visits. Delineation and classification of the vegetation communities were based on the Ecological Land Classification for Southern Ontario (Lee et al., 1998). Delineation was done to the Community Series or Ecosite level, as appropriate. Soil surveys were conducted in locations where delineation of communities could not occur using vegetation attributes (i.e., the 50% rule for wetlands).

Butternut Health Assessments

Butternut health assessments were conducted by one of our OMNRF certified Butternut Health Assessors using the most recent MNRF manuals and forms (2014). Assessments were conducted on June 20, 2020. All trees were documented with GPS coordinates.

2.2.2.2 Birds

Breeding Bird Survey BBS Survey

Bird surveys were conducted following the protocols of the Ontario Breeding Bird Atlas (OBBA) point count. Two surveys were conducted in peak breeding season (May 24th -July 10th) approximately 10-15 days apart. All birds seen or heard within each five-minute station period were documented and breeding evidence codes recorded. Surveys were conducted in the early morning between dawn and 9 am. Survey stations were established in the portions of Area 1 both north and south of the Olympic Speed Skating Oval. These stations were established within coniferous forest, coniferous swamp and old-field habitats in order to adequately survey birds using all habitats within Area 1. The placement of these stations was such that much of the habitat in Area 2 was also surveyed.

Areas 2 and 3

Like Area 1, bird surveys were conducted following the protocols of the Ontario Breeding Bird Atlas (OBBA) point count system. Two surveys were conducted in peak breeding season (May 24th -July 10th) in 2020, approximately 10-15 days apart. All birds seen or heard within each five-minute station period were documented and breeding evidence codes recorded. Surveys were conducted in the early morning between dawn and 9 am. Three stations were established in Area 2, capturing the numerous habitats found there, included old fields, wetlands and forests. One station in Area 2 also captured breeding birds in Area 3.

Three stations were also established in Area 3 to capture breeding birds throughout field, thicket and wetlands.

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.

Targeted Species at Risk Surveys – Bobolink and Eastern Meadowlark

Surveys were conducted according to the protocol developed by the OMNRF for eastern meadowlark (*Sturnella magna*) and bobolink (*Dolichonyx oryzivorus*). Transects and point counts were established in appropriate habitat for these species (i.e., old field habitats with tall grasses). GPS locations were recorded at each point count station. The placement of these transects and survey stations in Area 1 was such that the portion of Area 3 just south of Area 1 were also surveyed. In Area 3, three transects and survey stations were created to capture the maximum habitat available to eastern meadowlarks and bobolinks. Area 2 was not surveyed for meadowlark due to improper habitat.

Surveys began at dawn and continued until no later than 9am. Each point contained a ten- minute observation period specifically focusing on detection of the target species (either bobolink or eastern meadowlark). The information recorded included variables such as species observed (by site or sound), species location, direction, distance, and interactions with other bird species.

2.2.2.3 Amphibians

Amphibian Surveys (MMP)

Targeted spring surveys for breeding amphibians were completed in the evening to record any calling breeding frogs or toads. Surveys were conducted following a modified marsh monitoring program protocol (MMP). Some of the parameters of this protocol included:

- Stations being placed so that calling amphibians from all wetland and adjacent upland habitats could be detected.
- Stations being visited between April 1st and June 30th with a minimum of 15 days between visits.
- The timing for the surveys was such that surveyors recorded observations no earlier than 30 minutes after sunset and no later than midnight. Field conditions were recorded upon arrival (cloud cover, temperature, wind, precipitation).
- Surveys were conducted when evening temperatures were a minimum of 5ºC and 10ºC.
- Surveys were conducted for 3 minutes per survey time period.
- Protocol from Environment Canada's Marsh Monitoring Program was utilized using associated call level codes:

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.

Surveyors noted whether any species detected were within (or outside of) 100 meters of the survey station.

2.2.2.4 Other Wildlife

Incidental observations of any other wildlife (e.g., amphibians, reptiles and mammals) encountered while surveyors were on site were recorded. Documentation included notes about the species, location and type of observation (e.g., direct sightings and indirect evidence such as calls, tracks, scat, burrows, dens and browse).

2.2.2.5 Wetlands

The presence of wetlands in the study area were confirmed in the field by GHD staff familiar with the methodologies described in the Ontario Wetland Evaluation System Southern Manual, Third Edition (OMNR, 2014 and updates, version 3.3). Subsequently the boundaries of these wetlands were delineated using a high-accuracy hand-held Trimble unit.

2.2.2.6 Woodlands

The treed communities that are on the property were evaluated according to the Significant Woodland Evaluation Criteria and Standards in Table 7-2 of OMNR's Natural Heritage Reference Manual. The boundaries of these woodlands and associated woodland characteristics were confirmed by GHD biologists in the field.

2.2.2.7 Significant Wildlife Habitat (SWH)

SWH Site Assessment

Prior to site visits, a candidate list of Significant Wildlife Habitat (SWH) features was created using the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E, 2015. During site visits, the confirmation (presence/absence) of those natural features was conducted. In particular, GHD biologists looked for: tree cavities or other evidence of bat maternity colonies; rock piles, stone fences and other evidence of reptile hibernacula; large stick nests and other evidence of woodland raptors; seeps and springs; vernal pools, ponds and other potential amphibian habitat in woodlands and wetlands. All field survey data was reviewed and assessed to determine if additional candidate SWH are present the study area. A thorough SWH assessment of Areas 1, 2 and 3 was completed.

2.2.2.8 Fish and Aquatic Habitat

Aquatic Habitat

Area 1

Aquatic habitat assessments were conducted using standardized provincial aquatic protocols. Specifically, the Ontario Stream Assessment Protocol, Section 4, Module 11 (Stanfield, 2017) was used for all Headwater Drainage Features (HDF). The Ontario Ministry of Transportation (MTO) Environmental Guide for Fish and Fish Habitat Protocol Section 4.0 (MTO, 2009) was used for all watercourses within the subject property that were not considered to be an HDF in Area 1. 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.

It should be noted that based on the results from the first two HDF site assessments, ORCA did not require a third HDF assessment on all HDFs within Area 1.

Area 2

The aquatic habitat in Area 2 was assessed following Ontario Stream Assessment Protocol, Section 4, Module 11 (Stanfield, 2017) for all Headwater Drainage Features (HDF). A full HDF assessment was completed only on the HDFs that will be directly impacted by the proposed development.

Area 3

The aquatic habitat in Area 3 was assessed following Ontario Stream Assessment Protocol, Section 4, Module 11 (Stanfield, 2017) for all Headwater Drainage Features (HDF).

Surface water quality was collected by GHD biologists during the aquatic habitat assessments in Area 1 and Area 2. 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

Area 1 and Area 2

Fish community sampling was only conducted in Area 1 and part of Area 2. Sampling was conducted using 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/m^2) 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.

It should be noted that fish community sampling was not conducted in the headwater drainage features in Area 2 as there was not enough water during the time of assessments. Due to the COVID 19 restrictions, the issuing of fish collection permits by the Ontario Ministry of Natural Resources and Forestry (OMNRF) were extremely delayed. Initially biologists were going to sample Area 2 in the spring but did not receive the permit.

Additionally, Area 3 was not sampled as this was out of the project scope at the time of assessments.

3. Survey Results

3.1 Physical Site Characteristics

3.1.1 General Site Characteristics

Area 1

This portion of the study area is rectangular in shape and is composed of two parcels separated by Lakefield's speed skating oval. Combined, the two parcels are approximately thirty-two acres in size. The majority of the site is relatively flat and is vegetated by successional meadow though shrubs and trees are found in the northern portion. Rays Creek enters the site in the northwest and exits the property near the northeast corner. In addition to Ray's' Creek, two small headwater drainage features that outlet into Rays Creek are present within the study area (Figure 1.1).

Area 2

This portion of the study area is almost 1km when measured from north to south (Figure 1.1). It is irregular shaped, with the western boundary being influenced by neighbouring roads and both residential and commercial land uses. A small watercourse, Ray's Creek, enters the site in the northeast and exits the property under Lakefield Road to the west. There is a small valley system associated with this feature. The lowest elevations in this portion of the property are found along Ray's Creek, while the highest are located at the south end of the site. The majority of this portion of the study is relatively flat and is covered in trees and shrubs.

Area 3

Located to the south of Area 1 as well as to the east of Area 2, this portion of the study area is rectangular in shape, with dimensions of approximately 465 metres from north to south and 585 metres from east to west. This portion of the study area is relatively flat and is dominated by early successional vegetation. A small headwater drainage feature (HDF) was located along the eastern edge of this portion of the study area. The HDF conveyed flows to the east off the property.

3.2 Biological Inventories

3.2.1 Vegetation

3.2.1.1 Level of Effort

The vegetation communities were delineated within Area 1 by GHD biologists according to the methodologies outlined in Section 2. A summary of the level of effort and environmental conditions at the time of the ELC surveys have been provided in Table 3.1.

Table 3.1 Vegetation Surveys – Level of Effort and Environmental Conditions in Area 1

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
June 7, 2018	ELC and wetland mapping	13°C, cloud cover 8/10, wind scale 1-2, no precipitation	8:15 AM	11.0
June 22, 2018	ELC and wetland mapping	11°C, cloud cover 1/10, wind scale 2, no precipitation	7:45 AM	2.0

Areas 2 and 3

Vegetation communities within Area 2 and Area 3 were characterized by GHD biologists according to the methodologies outlined in Section 2. A summary of the level of effort and environmental conditions at the time surveys were conducted have been provided in Table 3.2.

Table 3.2 Vegetation Surveys – Level of Effort and Environmental Conditions in Areas 2 and 3

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
March 25, 2019	Reconnaissance and confirmation of presence of some wetlands.	2°C, cloud cover 0/10, Beaufort wind scale 3, no precipitation	2:15 PM	4.0
April 30, 2019	Wetland boundary delineation in central portion of property.	12°C, cloud cover 6/10, Beaufort wind scale 1-2, no precipitation	10:45 AM	7.0
July 10, 2019	Wetland boundary delineation in the southern portion of the property.	26°C, cloud cover 1/10, Beaufort wind scale 1-2, no precipitation	8:30 AM	5.0
June 2, 2020	ELC, wetland boundary delineation in Area 3.	18°C, cloud cover 10/10, Beaufort wind scale 1-2, no precipitation	9:00 AM	6.5
June 12, 2020	Butternut Health Assessment	14°C, cloud cover 2/10, Beaufort wind scale 4, no precipitation	9:00AM	1.0
August 14, 2022	Soil surveys to confirm specific wetland boundaries (10 samples)	15-24°C, cloud cover 2/10, Beaufort wind scale 1-2, no precipitation	8:00AM	7.0

3.2.1.2 ELC Code Descriptions

Forty vegetation communities were identified within the Area 1, 2 and 3. Each community is described below and illustrated on Figure 1.1.

A total of 162 plant species were identified during field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix B

Area 1

Fifteen vegetation communities were identified within the Area 1. Each community is described below and illustrated on Figure 1.1.

Community 1 Dry-Moist Old Field Meadow (ELC Code: CUM1-1)

Community 1 was the largest vegetation community type in Area 1. This vegetation community was located in several places in Area 1. This transitioning field-meadow had few trees or shrubs. Instead, this community was dominated by grasses and herbaceous plants including: tall goldenrod (*Solidago altissima*), awnless brome grass (*Bromus inermis*), tall fescue (*Festuca arundinacea*), orchard grass (*Dactylis glomerata*), Queen-Anne's (*Daucus carota*) and cow vetch (*Vicia cracca*).

Photo 1: Community 1 – Dry-Moist Old Field Meadow (Photo date: June 7, 2018)

Community 2 Mineral Cultural Thicket Ecosite (ELC Code: CUT1)

Community 2 was found in the southern part of Area 1 (i.e., south of the Olympic Speed Skating Oval). It bounded by Community 1 to the east, south and west. Although this vegetation community contained a few tree species, it was dominated by shrubs, in particular European buckthorn (*Rhamnus cathartica*) and tartarian honeysuckle (*Lonicera tatarica*). Choke cherry (*Prunus virginiana*), European high bush cranberry (*Viburnum trilobum var. opulis*) and red-osier dogwood (*Cornus stolonifera*) were also detected in this area. The ground layer contained a mixture of herbaceous species typical of early successional environments, including tall fescue (*Festuca arundinacea*), tall goldenrod (*Solidago altissima*), wild parsnip (*Pastinaca sativa*) and swallow-wort (*Cynanchum rossicum*).

Photo 2: Community 2 - Mineral Cultural Thicket Ecosite (Photo date: June 7, 2018)

Community 3 Mineral Cultural Thicket Ecosite (ELC Code: CUT1-1)

Although both Community 2 and 3 were dominated by shrubs, Community 3 different both in the amount and types of shrubs detected. The most abundant shrub species in Community 3 were staghorn sumac (*Rhus typhina*), European buckthorn and choke cherry. Young eastern red cedar (*Juniperus virginiana*) were also found in this area. Groundcover included tall goldenrod, cow vetch (*Vicia cracca*), Queen Anne's lace (*Daucus carota*) and goat's-beard (*Tragopogon dubius*).

Photo 3: Community 3 - Mineral Cultural Thicket Ecosite (Photo date: June 7, 2018)

Community 4 Fencerow (ELC Code: None Applicable)

Extending along an old fence line, this small, thin, linear-shaped community contained few plant species, only one of which was a tree: American elm (*Ulmus americana*). European buckthorn also provided a canopy under which species such as common dandelion (*Taraxacum officinale*), common strawberry (*Fragaria virginiana*) and black medick (*Medicago lupulina*) grew. Vines, including Virginia creeper (*Parthenocisssus inserta*) and wild grape (*Vitis riparia*) were also recorded in this vegetation community.

Photo 4: Facing south along Community 4 – Hedgerow (Photo date: June 7, 2018)

Community 5 Mineral Cultural Thicket Ecosite (ELC Code: CUT1)

Located to the west of Community 4, this shrub thicket community included three coniferous tree species: Scot's pine (*Pinus sylvestris*), eastern red cedar, and eastern white cedar (*Thuja occidentalis*). However, the dominant species in the area were shrubs such as red-osier dogwood, tartarian honeysuckle (*Lonicera tatarica*), and nannyberry (*Viburnum lentago*). Western poison ivy (*Rhus rydbergii*), common milkweed, (*Asclepias syriaca*), and sulphur cinquefoil (*Potentilla recta*) were among the species found covering the ground in this vegetation community.

Photo 5: Community 5 - Mineral Cultural Thicket Ecosite (Photo date: June 7, 2018)

Community 6 Mineral Cultural Thicket Ecosite (ELC Code: CUT1)

This small community, located in the southwestern portion of Area 1, was similar to Community 5 in that both contained the same species of coniferous trees: Scot's pine, eastern red cedar and eastern white cedar. The dominant shrub species were choke cherry and tartarian honeysuckle. Common yarrow *(Achillea millefolium*), field pussytoes (*Antennaria neglecta*), ox-eye daisy (*Chrysanthemum leucanthemum*) and New England aster (*Symphyotrichum novae-angliae*) were also found in Community 6.

Photo 6: Community 6 - Mineral Cultural Thicket Ecosite (Photo date: June 7, 2018)

Community 7 Mineral Cultural Woodland Ecosite (ELC Code: CUW1)

Community 7 was located along the western boundary of Area 1 to the south of the Olympic Speed Skating Oval. This woodland community included tree species such as eastern white cedar, eastern red cedar, American elm, Scot's pine, green ash (*Fraxinus pennsylvanica*) and trembling aspen (*Populus tremuloides*). The shrub species detected were: European buckthorn, tartarian honeysuckle, choke cherry, hawthorn (*Cratageus species*), red-osier dogwood, European high-bush cranberry and slender willow (*Salix petiolaris*). Among the species recorded in the ground layer were: tall goldenrod, goat's beard, ox-eye daisy, common strawberry, ground cedar (*Diphasiastrum complanatum*) and field horsetail (*Equisetum arvense*).

Photo 7: Community 7 – Mineral Cultural Woodland Ecosite (Photo date: June 7, 2018)

Community 8 Black Ash Mineral Deciduous Swamp (ELC Code: SWD2-1)

This small swamp community was found along the western boundary of Area 1, south of the Olympic Speed Skating Oval. Although black ash (*Fraxinus nigra*) was the dominant tree species, American elm, trembling aspen, balsam poplar (*Populus balsamifera*), eastern white cedar and Manitoba maple (*Acer negundo*) were also detected. The dominant shrub species were red-panicled dogwood (*Cornus foemina*), red-osier dogwood and slender willow. Typical wetland forbs, such as spotted jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*) and great water dock (*Rumex orbiculatus*) were also recorded in this vegetation community.

Photo 8: Community 8 – Black Ash Mineral Deciduous Swamp Ecosite (Photo date: May 10, 2017)

Community 9 Willow Mineral Thicket Swamp ELC Code: (SWT2-2)

Located in the portion of Area 1 that was north of the Olympic Speed Skating Oval, Community 9 shared many of the same plant species as Community 8. Slender willow and red-osier dogwood were the dominant shrub species in this vegetation community. Spotted joe-pye weed (*Eupatorium maculatum*), grass-leaved goldenrod (*Euthamia graminifolia*) and purple-stemmed aster (*Symphyotrichum puniceum*), all members of the aster family, were among the groundcover species detected.

Photo 9: Community 9 - Willow Mineral Thicket Swamp (Photo date: June 7, 2018)

Community 10 Mineral Cultural Woodland Ecosite ELC Code: (CUW1)

Tree species from rose family (*Rosaceae*) were prevalent in this community and included apple (*Malus domestica*), pin cherry (*Prunus pensylvanica*), black cherry (*Prunus serotina*), choke cherry and American mountain ash (*Sorbus americana*). American elm and black walnut (*Juglans nigra*) were also documented here. The vine species, wild grape and Virginia creeper were also present.

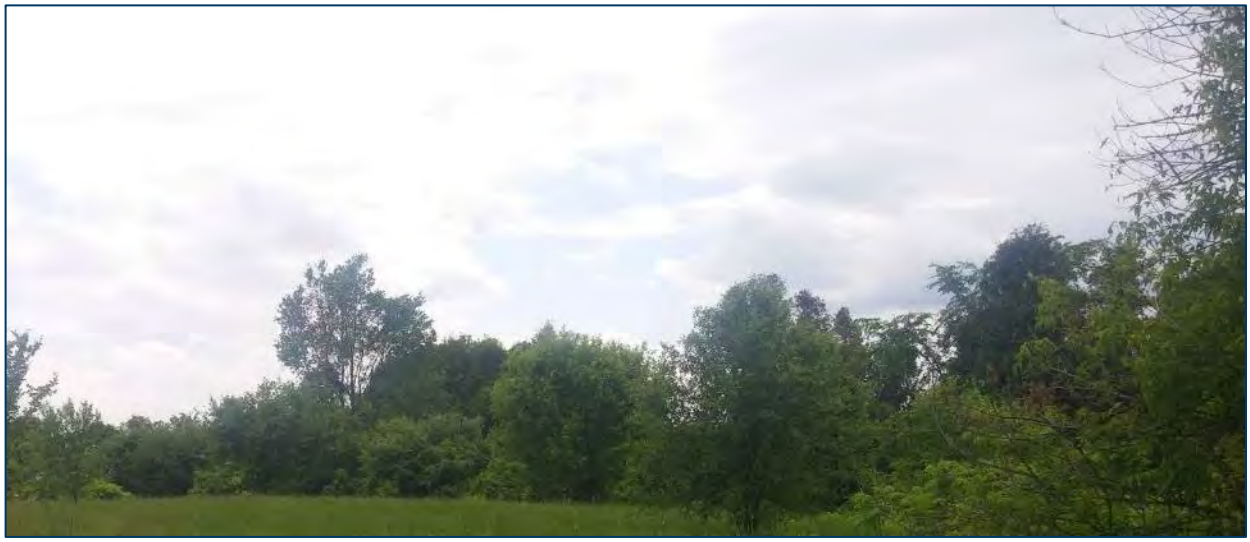


Photo 10: facing south towards Community 10 (Photo date: June 7, 2018)

Community 11 White Cedar Mineral Coniferous Swamp (ELC Code: SWC1-1)

This white cedar swamp community was located in the northern portion of Area 1. The other trees in this community were green ash and Scot's pine. Three species of fern: bulbet bladder fern, (*Cystopteris bulbifera*), ostrich fern (*Matteuccia struthiopteris*) and sensitive fern were present in portions of this heavily shaded community.

Photo 11: Community 11 - White Cedar Mineral Coniferous Swamp (Photo date: June 7, 2018)

Community 12 Fresh-Moist White Cedar Coniferous Forest (ELC Code: FOC4-1)

Located adjacent to Community 11, this coniferous forest community was found in the north and western parts of Area 1. Other tree and shrub species found in this area included Scot's pine, black walnut, staghorn sumac and European highbush cranberry. Ground cover was sparse but included species such as western poison ivy, cow vetch, and common dandelion.

Photo 12: View of Community 12 from Community 1 (Photo date: June 7, 2018)

Community 13 Mineral Cultural Woodland Ecosite (ELC Code: CUW1)

The dominant canopy tree in this vegetation community was Manitoba maple, though sugar maple (*Acer saccharum*) and Norway maple (*Acer platanoides*) were also present. In addition, black locust (*Robinia pseudo acacia*), black walnut, eastern red and eastern white cedar were also found in this part of the property. Ground cover was diverse with such species as mayapple (*Podophyllum peltatum*), white campion (*Silene latifolia*), sulphur cinquefoil (*Potentilla recta*), and common gromwell (*Lithospermum officinale*) among the many species documented in this community.

Photo 13: Facing northeast towards Community 13 from Community 1 (Photo date: June 7, 2018)

Community 14 Forb Organic Meadow Marsh (ELC Code: MAM3-9)

Community 14 was found in the northeastern corner of Area 1. Ostrich and sensitive ferns dominated the ground cover in this small meadow marsh community, which was bordered by County road 29 to the north. Small amounts of eastern white cedar, pussy willow (*Salix discolor*), and speckled alder (*Alnus rugosa*) were also detected.

Photo 14: Community 14 – Forb Organic Meadow Marsh (Photo date: June 22, 2018)

Community 15 Riparian Area along Ray's Creek (No Applicable ELC Code)

Following the meanders of Ray's Creek in the northern portion of Area 1, this vegetation community had a canopy dominated by eastern white cedar. The subcanopy was composed of scattered red-osier dogwood. Other wetland species detected included green ash, slender willow, broad-leaved arrowhead (*Sagittaria latifolia*), spotted jewelweed, and purple loosestrife (*Lythrum salicaria*).

Photo 15: Community 15 – Riparian Area along Ray's Creek, photo facing west (Photo date: August 20, 2018)

Area 2

18 vegetation communities were identified within the Area 2. Each community is described below and illustrated on Figure 1.1.

A total of 73 plant species were identified during field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix B.

Community 16 Cultural Meadow (ELC Code: CUM1-1)

This community is found in the south of Area 2, with one fragmented portion in the central portion of Area 2 near Ray's Creek. This was a mid-aged meadow, which is in the early stages of becoming a cultural thicket eco-site. This community was dominated by Kentucky blue grass (*Poa pratensis)*, awnless brome grass and a number of forb species such as: panicled aster (*Symphyotrichum lanceolatum ssp)*, goldenrods (*Solidago spp)*, New England aster (*Symphyotrichum novae- angliae)*, wild grape, common dandelion, and cow vetch. Trees and shrubs included European buckthorn and eastern white cedar. Soil samples were taken in the vicinity of this community to verify the ELC vegetation types and soil moistures in the area. The effective soil texture was fine sane. Mottles were reached at 71cm, indicating the soil moisture was 3 – very fresh.

Photo 16: Community 16 facing west (Photo date October 5, 2020)

Community 17 Cultural Thicket (ELC Code: CUT)

Community 17 is found in the extreme south of the Area 2, tucked between Community 17 and 19. This community was dominated by young Scot's pine and European buckthorn with some red-osier dogwood found along the border of Community 19. Other species identified include alfalfa (*Medicago sativa)*, cow vetch, goldenrods, wild grape, and western poison ivy.

Photo 17: Community 17 (Photo date: July 10, 2019)

Community 18 Moist White Cedar Coniferous Forest (ELC Code: FOC4-1)

This community is the largest of the identified communities in Area 2. This is a fragmented community located in one main section in the central portion of Area 2, with subsections located in the extreme south, west, and central north adjacent to Ray's Creek. Characteristics of this community included very low undergrowth species diversity, and dense stands of eastern white cedar. Other trees and herbaceous plants identified, although scarce, included eastern white pine (*Pinus strobus)*, red clover, red-osier dogwood, European buckthorn, herb Robert, green ash saplings and helleborine (*Epipactis helleborine)*.

Photo 18: Community 18
(Photo date: June 2, 2020)

Community 19 Red-Osier Mineral Thicket Swamp (ELC Code: SWT2-5)

This swamp thicket community is found in the extreme south section of Area 2. This community was dominated red-osier dogwood and narrow-leaved cattail. Other plants included Canada anemone, cursed crowsfoot (*Ranunculus sceleratus)*, willow sp, yellow avens, Virginia creeper, spotted jewelweed, swamp milkweed, American water-horehound, marsh bedstraw (*Galium palustre)*, elecampane (*Inula helenium)* and graceful sedge (*Carex gracillima)*.

Photo 19: Community 19 (Photo date: April 30, 2019)

Community 20 Moist White Cedar Coniferous Forest (ELC Code: FOC4)

Community 20 is a large community located in the north section of Area 2. Community 20 had very low species diversity due its extremely dense cover of eastern white cedar. Only two other plant species were identified in this community, those being helleborine and western poison ivy.

Photo 20: Community 20 (Photo date: October 5, 2020)

Community 21 Black Ash Mineral Deciduous Swamp (ELC Code: SWD2-1)

This community is located in the central portion of Area 2. This swamp thicket community was dominated by red-osier dogwood and eastern white cedar and black ash (*Fraxinus nigra*). Other plants identified are typical of swamp thickets, and included bulbet bladder fern, sensitive fern, red currant and marsh bedstraw.

Photo 21: Community 21 (Photo date: October 5, 2020)

Community 22 Mineral Cultural Thicket (ELC Code: CUT1)

Community 22 is small thicket community surrounded by Community 18. It is dominated by young coniferous species such as creeping juniper, eastern white cedar and eastern red cedar. Other species identified include hawthorn, choke cherry saplings, field pussytoes, and king devil hawkweed.

Photo 22: Community 22 (Photo date: October 5, 2020)

Community 23 Cattail Mineral Shallow Marsh (ELC Code: MAS2-1)

This marsh community is adjacent to Ray's Creek southern reach in Area 2. Common cattail, Canada bluejoint grass (*Calamagrostis canadensis)* and reed canary grass dominated the ground cover. Other vegetation identified in this community included: softstem bulrush (*Scirpus validus)*, purple-stemmed aster, boneset (*Eupatorium perfoliatum)*, spotted joe-pyeweed, water speedwell (*Veronica catenata)*, spotted jewelweed, water horsetail (*Equisetum fluviatile)*, marsh fern (*Thelyptris palustris)* and crack willow (*Salix fragilis)* identified on the border with Community 28. Soil samples were taken in this community to verify the ELC vegetation type and soil moisture. A mixture of silt and organics was present to approximately 79cm with silty-clay below that. Mottles were reached at 35.5cm, gley at 79cm and water at 89cm, indicating the soil moisture was between 5 – moist and 7 – moderately wet.

Photo 23: Community 23 (Photo date: March 25, 2019)

Community 24 Mineral Meadow Marsh (ELC Code: MAM2)

Community 24 was located upstream from Community 23. This community was dominated by a groundcover of ostrich fern and sensitive fern. Eastern white cedar, basswood (*Tilia Americana)*, balsam poplar and pussy willow were also found interspersed throughout. Other plants identified include narrow-leaved cattail (*Typha angustifolia)*, coltsfoot and watercress.

Photo 24: Community 24 (Photo date: March 25, 2019)

Community 25 Mineral Cultural Thicket (ELC Code: CUT1)

Community 25 is located along the along in the north portion of Area 2 and follows the meander of Ray's Creek. This community contained a number of tree and shrub species, all in young age classes. Some of the species identified here include Scot's pine, eastern white cedar, American elm, trembling aspen, red-osier dogwood, European buckthorn and Kentucky blue grass.

Photo 25: Community 25 (Photo date: October 5, 2020)

Community 26 Moist White Cedar Coniferous Forest (ELC Code: FOC4-1)

This community represents another eastern white cedar dominated forest, however, this community differs from the other eastern white cedar forests due to the trees being older than the trees identified in other similar communities such as Community 18. This community is located in the extreme north portion of Area 2. Plants identified include: bulbet bladder fern, false nettle (*Boehmeria cylindrical)* downy yellow violet (*Viola pubescens)*, and wild grape. Five soil samples were taken in the vicinity of this community in order to confirm the boundary of this ELC vegetation type. The effective soil texture was fSiS (fine silty sand) and the soil moisture ranged from 1 – moderately fresh to 3 – very fresh. No mottling or gleying was observed in any of the samples. The water table was more than 120cm below the surface.

Photo 26: Community 26 (Photo date: October 5, 2020)

Community 27 Moist Ash Lowland Deciduous Forest (ELC Code: FOD7-2)

This small community is located near the terminus of Seaforth Crescent and partially surrounded by Community 26. This community appeared to have formed around a swale feature and was dominated by both green ash and eastern white cedar. It also included American elm in the canopy. Shrub and groundcover species noted here include American stinging nettle, woodland strawberry, yellow avens, Virginia creeper, western poison-ivy, wild mint, Guelder rose, and spotted joe-pye-weed. Soil assessments were conducted in order to confirm the ELC vegetation type and soil moisture. The effective soil texture was fSiS (fine silty sand), with mottles being reached at 51cm, indicating the soil moisture was 3 – very fresh to 4 – moderately moist. The water table was more than 120cm from the surface.

Photo 27: Community 27 (Photo date: June 2, 2020)

Community 28 Fresh White Cedar Coniferous Forest (ELC Code: FOC2-2)

Community 28 is another coniferous forest identified in Area 2. It shares dominance with eastern white cedar, white spruce and Scot's pine. Other species identified included: white birch (*Betula papyrifera)*, American elm, starflower (*Trientalis borealis)*, bristly black currant (*Ribes lacustre)*, alternate-leaf dogwood (*Cornus alternifolia),* common yarrow, Jack-in-the-pulpit and lily-of-the-valley (*Convallaria majorum).*

Photo 28: Community 28 (Photo date: October 5, 2020)

Community 29 Deciduous Forest (ELC Code: FOD)

This small deciduous community is located in the north portion of Area 2, directly west of the speed skating oval. American basswood was the dominant canopy cover, with crack willow dominating closer to Ray's creek. Other species identified here included three small butternuts, goldenrods, common dandelion, drooping wood sedge, trout lily (*Erythronium americanum)*, western poison ivy and Virginia creeper.

Photo 29: Community 29 (Photo date: June 2, 2020)

Community 30 Cultural Woodlot (ELC Code: CUW1)

Located in the extreme north portion of Area 2, and fronting Seaforth Crescent, is Community 30. Community 30 is dominated by Scot's pine. The immediate road frontage area is dominated by narrow-leaved meadowsweet. Swallow-wort is the dominant groundcover, with other species including: western poison-ivy, red-osier dogwood, wild grape and tartarian honeysuckle.

Photo 30: Community 30 (Photo date: October 5, 2020)

Community 31 Cultural Thicket (ELC Code: CUT)

Fronting Lakefield Road in the furthest west portion of Area 2 is Community 31. This community contained many young and shrubby conifers, as well as areas scrubby ground. Species included eastern white cedar, eastern red cedar, creeping juniper and scot's pine. Other species identified here include: black walnut, black medick, alfalfa, red clover, wild grape, staghorn sumac, Queen-Anne's lace, common mullein, king devil hawkweed, goldenrods, meadow sedge (*Carex granularis*) and narrow-leaved blue-eyed grass (*Sisyrinchium mucronatum)*

Photo 31: Community 31 (Photo date: June 2, 2020)

Community 32 Birch-Poplar Organic Mixed Swamp (ELC Code: SWM6)

This mixed swamp community is located in the south portion of Area 2. This community was dominated by balsam poplar and eastern white cedar. Understory and ground cover species included: Canada anemone, toothwort (*Cardamine diphylla)*, common strawberry, red-osier dogwood, European buckthorn, and wild grape. Soil samples were taken in the vicinity of this community to verify delineation and ELC vegetation type as well as soil moisture. A mixture of loam, sandy loam, sand and gravels were present in this community. Mottles were reached at 20cm and 38cm, respectively. Neither gley nor the water table was less than 120cm deep. As a result, the soil moisture was between 5 – moist and 6 – very moist.

Photo 32: Community 32 (Photo date: June 2, 2020)

Community 33 Hedgerow (No ELC Code)

Hedgerows were identified in both Area 2 and 3. All hedgerows contained similar species compositions however, which defeated the purpose of breaking them up unto separate communities. Apple, Manitoba maple, European buckthorn, wild grape, American elm, Tartarian honeysuckle and Kentucky blue grass were the only species identified in the hedgerows.

Photo 33: Community 33 (Photo date: June 2, 2020)

Area 3

Seven vegetation communities were identified within the Area 3. Each community is described below and illustrated on Figure 1.1.

A total of 38 plant species were identified during field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix B

Community 34 Mineral Cultural Thicket (ELC Code: CUT1)

This is a large community totaling approximately 6 hectares in the extreme west of Area 3. The area is dominated by young coniferous trees such as white spruce (*Piece glauca)*, Austrian pine (*Pinus nigra)* eastern white pine, and Scot's pine. Groundcover is dominated by goldenrods and Kentucky blue grass.

Photo 34: Community 34 (Photo date: June 2, 2020)

Community 35 Dry-Moist Old Field Meadow (ELC Code: CUM1-1)

Community 35 is the largest community out all areas and encompasses most of Area 3. At the time of surveying, the entirety of this area had recently been plowed. Much of the species identified here were pioneering species and in a very young growth state. These species include Kentucky blue grass, awnless brome grass, common dandelion, field pussytoes, swallow-wort, Queen-Anne's lace, cow vetch, alfalfa and black medick.

Photo 35: Community 35 (Photo date: May 7, 2020)

Community 36 Cultural Thicket (ELC Code: CUT)

Community 36 is located in the extreme southeast of Area 3, and is typical of cultural thickets seen elsewhere in the study area. Species included eastern white cedar, American elm, black walnut, black medick, alfalfa, cow vetch, European buckthorn, wild grape, Manitoba maple, western poison ivy and goldenrod species.

Photo 36: Community 36 (Photo date: October 5, 2020)

Community 37 Dry-Moist Old Field Meadow (ELC Code: CUM1-1)

Community 37 is in the south of Area 3 and contains typical meadow habitat found in the area, it show some evidence of periodic mowing. Some of the species GHD identified in this community are: Kentucky blue grass, reed canary grass, common dandelion, Canada thistle, common milkweed, cow vetch, and field mustard.

No Photo Available.

Community 38 Swale (No ELC code)

A swale, which likely facilitates drainage between the two sections of Community 39, was identified in the midst of Community 36. The swale was dominated almost entirely by reed canary grass, however some Canada anemone, elecampane and red-osier dogwood was also identified.

Photo 37: Community 38 (Photo date: June 2, 2020)

Community 39 Red-Osier Mineral Thicket Swamp (ELC Code: SWT2-5)

This thicket swamp community contains two sections with similar species composition, connected by the swale feature. This community is dominated by a thick stand of red-osier dogwood. Other plants included: cow vetch, European buckthorn, trembling aspen, field horsetail, Canada anemone, and tall buttercup.

Photo 38: Community 39 (Photo date: June 2, 2020)

Community 40 Mineral Cultural Thicket (ELC Code: CUT1)

West of Community 39 is Community 40, a densely vegetated cultural thicket. Several shrub and young trees make up this community and include: eastern red cedar, choke cherry, red-osier dogwood, European buckthorn, Tartarian honeysuckle. Herbaceous plants included Kentucky blue grass, meadow sedge and goldenrod species.

Photo 39: Community 40 (Photo date: June 2, 2020)

3.2.2 Birds

Area 1 and Northern Portion of Area 2

3.2.2.1 Level of Effort

Breeding birds were identified within the study by GHD biologists according to the methodology outlined in Section 2.2.2.3. A summary of the level of effort and environmental conditions have been provided in Table 3.3.

Table 3.3 Bird Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
June 7, 2018	Breeding Birds – 3 stations	13°C, cloud cover 8/10, Beaufort wind scale 1-2, no precipitation	8:25 AM	0.75
June 7, 2018	Targeted Survey - Bobolink/Eastern Meadowlark	13°C, cloud cover 8/10, Beaufort wind scale 1-2, no precipitation	7:45 AM	0.75
June 22, 2018	Breeding Birds – 3 stations	10°C, cloud cover 2/10, Beaufort wind scale 1, no precipitation	7:45 AM	0.75
June 22, 2018	Targeted Survey - Bobolink/Eastern Meadowlark	10°C, cloud cover 2/10, Beaufort wind scale 1, no precipitation	8:16 AM	0.75
June 28, 2018	Breeding Birds – additional 3 stations	19°C, cloud cover 10/10, Beaufort wind scale 0, no precipitation	6:55 AM	0.5
June 28, 2018	Targeted Survey - Bobolink/Eastern Meadowlark	19°C, cloud cover 10/10, Beaufort wind scale 0, no precipitation	7:26 AM	0.5
May 7, 2020	Targeted Survey - Bobolink/Eastern Meadowlark	5°C, cloud cover 0/10, Beaufort wind scale 3, no precipitation	8:01 AM	1
May 28, 2020	Targeted Survey - Bobolink/Eastern Meadowlark	18°C, cloud cover 9/10, Beaufort wind scale 1, no precipitation	7:20 AM	2
May 28, 2020	Breeding Birds – 6 stations	18°C, cloud cover 9/10, Beaufort wind scale 1, no precipitation	7:20 AM	1.75
June 12, 2020	Targeted Survey - Bobolink/Eastern Meadowlark	12°C, cloud cover 2/10, Beaufort wind scale 4, no precipitation	7:00	1.5
June 12, 2020	Breeding Birds – 6 stations	12°C, cloud cover 2/10, Beaufort wind scale 4, no precipitation	7:00	1

3.2.2.2 Breeding Bird Surveys

A total of 52 bird species were detected during breeding bird surveys. Six survey stations were established in various locations throughout the Area 1 study area: two to the north of the Olympic Speed Skating Oval and four to the south. The locations of these stations can be found on Figure 1.1. A complete list of the birds detected during breeding bird surveys can be found in Appendix C.

21 species were detected from breeding bird survey station 1 (01BBS), the majority of which were species associated with early successional habitats, such as old fields and young thicket shrub communities. Among the species detected were: yellow warbler (*Dendroica petechia*), least flycatcher (*Empidonax minimus*), savannah sparrow (*Passerculus sandwichensis*), bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*) and American goldfinch (*Carduelis tristis*).

19 species were detected from breeding bird survey station 2 (02BBS). As was the case with BBS1, a number of species associated with early successional habitats were detected from BBS2, which was located just south of the Olympic Speed Skating Oval. Also detected were species characteristic of open woodlands. Species detected included song sparrow (*Melospiza melodia*), house wren (*Troglodytes aedon*) and willow flycatcher (*Empidonax traillii*). Eastern meadowlark (*Sturnella magna*) were also noted at this station.

20 bird species were detected from breeding bird survey station 3 (03BBS), which was located to the north of the Olympic Speed Skating Oval in Area 1. From this survey station, a few species typically associated with closed forest environments were detected. These included: ovenbird (*Seiurus aurocapillus*) and black-and-white warbler (*Mniotilta varia*). Also detected were species found in open woodlands such as American redstart (*Setophaga ruticilla*), cedar waxwing (*Bombycilla cedrorum*) and northern flicker (*Colaptes auratus*).

22 bird species were detected from breeding bird survey station 4 (04BBS), which was located slightly to the south and west of BBS2. The majority of the birds detected at this supplemental survey station had already been detected elsewhere in the study area. Among the species added to the list of birds in the study area from BBS4 were: red-eyed vireo (*Vireo olivaceus*), blue jay (*Cyanocitta cristata*), purple finch (*Carpodacus purpureus*) and indigo bunting (*Passerina cyanea*). Eastern meadowlark (*Sturnella magna*) were also noted at this station.

15 bird species were detected during a single survey from this breeding bird station (05BBS) located in the southwest corner of Area 1. Among the species detected from this location were birds that inhabit forests and closed woodlands. Examples of such species were: downy woodpecker (*Picoides pubescens*), pileated woodpecker (*Dryocopus pileatus*) and rose-breasted grosbeak (*Pheucticus ludovicianus*).

16 bird species were detected during a single survey from this breeding bird station (06BBS) located in the northern portion of Area 1. The majority of species detected from this station were those associated with open woodlands and shrub-thickets. Also detected were generalist species that are often found in suburban and urban areas. Examples of species detected from breeding bird station 6 were: mourning dove (*Zenaida macroura*), chestnut-sided warbler (*Dendroica pensylvanica*), common grackle (*Quiscalus quiscula*) and house wren (*Troglodytes aedon*).

Area 2 and Area 3

A total of 38 bird species were detected during breeding bird surveys. Six survey stations were established in various locations throughout the Area 2 and 3: Three stations throughout Area 2 and three stations throughout Area 3. The locations of these stations can be found on Figure 1.1. A complete list of the birds detected during breeding bird surveys can be found in Appendix C.

22 species were detected from breeding bird survey station 7 (07BBS), the majority of which were species associated with early successional habitats, such as old fields and young thicket shrub communities. Among the species detected were: yellow warbler (*Dendroica petechia*), least flycatcher (*Empidonax minimus*), savannah sparrow (*Passerculus sandwichensis*), bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*) and field sparrow (*Spizella pusilla*).

21 species were detected from breeding bird survey station 8 (08BBS), the majority of which were species associated shrubby habitats. Among the species detected were: yellow warbler (*Dendroica petechia*), alder flycatcher (*Empidonax alnorum*), song sparrow (*Melospiza melodia*), gray catbird (*Dumetella carolinensis*), eastern meadowlark (*Sturnella magna*) and field sparrow (*Spizella pusilla*).

20 species were detected from breeding bird survey station 9 (09BBS), species identified were typical of open fields and hedgerows. Among the species detected were: yellow warbler (*Dendroica petechia*), American goldfinch (*Carduelis tristis*), field sparrow (*Spizella pusilla*), eastern meadowlark (*Sturnella magna*) and mourning dove (*Zenaida macroura).*

16 species were detected from breeding bird survey station 10 (10BBS), species identified here were also typical of old fields and hedgerows. Among the species detected were: blue-winged warbler (*Vermivora pinus*), brown-headed cowbird (*Molothrus ater*), field sparrow (*Spizella pusilla*), American robin (*Turdus migratorius*) and clay-coloured sparrow (*Spizella pallida).*

19 species were detected from breeding bird survey station 11 (11BBS), species were variable and included species typical of fields and of woodlots. Among the species detected were: downy woodpecker (*Picoides pubescens*), brown thrasher (*Toxostoma rufum*), field sparrow (*Spizella pusilla*), northern flicker (*Colaptes auratus*) and great-crested flycatcher (*Myiarchus crinitus).*

16 species were detected from breeding bird survey station 12 (12BBS), species were of typical urban woodlots and creeks. Among the species detected were: black-and-white warbler (*Mniotilta varia*), common yellowthroat (*Geothlypis trichas*), song sparrow (*Melospiza melodia*), northern flicker (*Colaptes auratus*) and American redstart (*Setophaga ruticella).*

3.2.2.3 Targeted SAR Surveys for Eastern Meadowlark and Bobolink

Area 1

Field and meadow, which are the preferred habitat of eastern meadowlark and bobolink, were present in both the northern and southern portions of Area 1. 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. Four survey stations and one transect were established in Area 1 (Figure 1.1). Table 3.3 shows the dates and level of effort of these surveys while Figure 1.1 shows survey locations.

Eastern meadowlarks were observed in the south-eastern portion of Area 1 and were also detected on the property containing the Olympic Speed Skating Oval. Bobolinks were detected using the fields in the south-eastern portion of Area 1 as well as western portion Area 3. Eastern meadowlarks were detected during each of the three survey dates, while bobolinks were present on two of the three survey dates.

Area 2 and Area 3

During 2018 field visits to Area 2, GHD biologists noted that suitable habitat for eastern meadowlark and bobolink were absent. Portions of Area 2 that were initially thought to contain old field meadow (based on a desktop mapping exercise) had a significant shrub component. Field surveys in 2020 confirmed that Area 2 did not contain suitable habitat.

In area 3, 2020 field surveys revealed extensive eastern meadowlark, bobolink and grasshopper sparrow habitat. Meadowlarks were detected at each of the three transects and their substations. Bobolinks were only detected at transect 1, substation 3, located in the far southeast of Area 3, and at transect 2, substation 2, located in the central portion of Area 3. A grasshopper sparrow was also detected during meadowlark surveys at transect 2, substation 2 (See Figure 1.1 for these survey locations).

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. Seven (7) additional bird species were recorded outside of the breeding bird surveys and targeted eastern meadowlark/bobolink surveys. Among these species were: a grasshopper sparrow (*Ammodramus savannarum*) in Community 2; a ruby-throated hummingbird (*Archilochus colubris*) in Community 5; eastern phoebes (*Sayornis phoebe*) in Communities 5 and 7; a brown thrasher (*Toxostoma rufum*) in Community 7; and a Baltimore oriole (*Icterus galbula*) in Community 15. A comprehensive summary of all of the birds observed on site, along with their breeding evidence code can be found in Appendix C.

3.2.3 Amphibians

Area 1 and Northern Portion of Area 2

3.2.3.1 Level of Effort

Three amphibian surveys were conducted by GHD biologists according to the methodologies described in Section 2.2.2.3. A summary of the level of effort and weather conditions at the time of surveys has been provided in Table 3.4.

Table 3.4 Amphibian Surveys – Level of Effort and Environmental Conditions

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
April 26, 2018	Marsh Amphibian Survey	9°C, Beaufort wind scale 1, no precipitation, noise 2	8:44 PM	1.25
May 17, 2018	Marsh Amphibian Survey	15°C, Beaufort wind scale 1, no precipitation, noise 1	9:04 PM	1.25
June 19, 2018	Marsh Amphibian Survey	20°C, Beaufort wind scale 0, no precipitation, noise 0	8:35 PM	1.5
April 28, 2020	Marsh Amphibian Survey	10°C, Beaufort wind scale 0, no precipitation, noise 0	8:15 PM	1.0
May 25, 2020	Marsh Amphibian Survey	23°C, Beaufort wind scale 0, no precipitation, noise 0	9:15 PM	1.0
June 22, 2020	Marsh Amphibian Survey	20°C, Beaufort wind scale 0, no precipitation, noise 0	9:00 PM	1.0

3.2.3.2 Amphibian Surveys (Modified Marsh Monitoring Protocol)

Area 1

Two survey stations were established in the northern portion of Area 1, north of the Ontario Speed Skating Oval (Figure 1.1). A third survey station was established along the boundary line between Areas 1 and 2 to the west of the Oval with the fourth being placed in the southwestern portion of Area 1 (Figure 1.1). The placement of these stations was such that much of the habitat in Area 2 was also surveyed. Additional marsh amphibian surveys were conducted to sample the balance of Areas 2 and Area 3. The locations of survey stations are shown on Figure 1.1.

Two amphibian species were detected during the surveys for calling amphibians (Appendix D). During the first round of surveys, a large number of spring peepers (*Pseudacris crucifer*) were detected calling from southwest of marsh amphibian survey station 4. During the second round of surveys, a single male spring peeper was heard calling from northwest of marsh amphibian survey station 3. During the third round of surveys, a single male gray tree frog (*Hyla versicolor*) was detected to the north-northwest of marsh amphibian survey station 4.

3.2.3.3 Area Searches

Two additional amphibian species were detected during aquatic habitat surveys along Ray's Creek. These species, the northern leopard frog (*Lithobates pipiens*) and green frog (*Lithobates clamitans*) were found within Habitat Zone 4 (Vegetation Community 11) which extends across the northern portion of Area 2 (Figure 1.1 & 3.1). No other amphibians were detected by GHD biologists during survey work in the study area. A comprehensive list of all amphibians noted in Area 1 is summarized in Appendix D.

Area 2 and Area 3

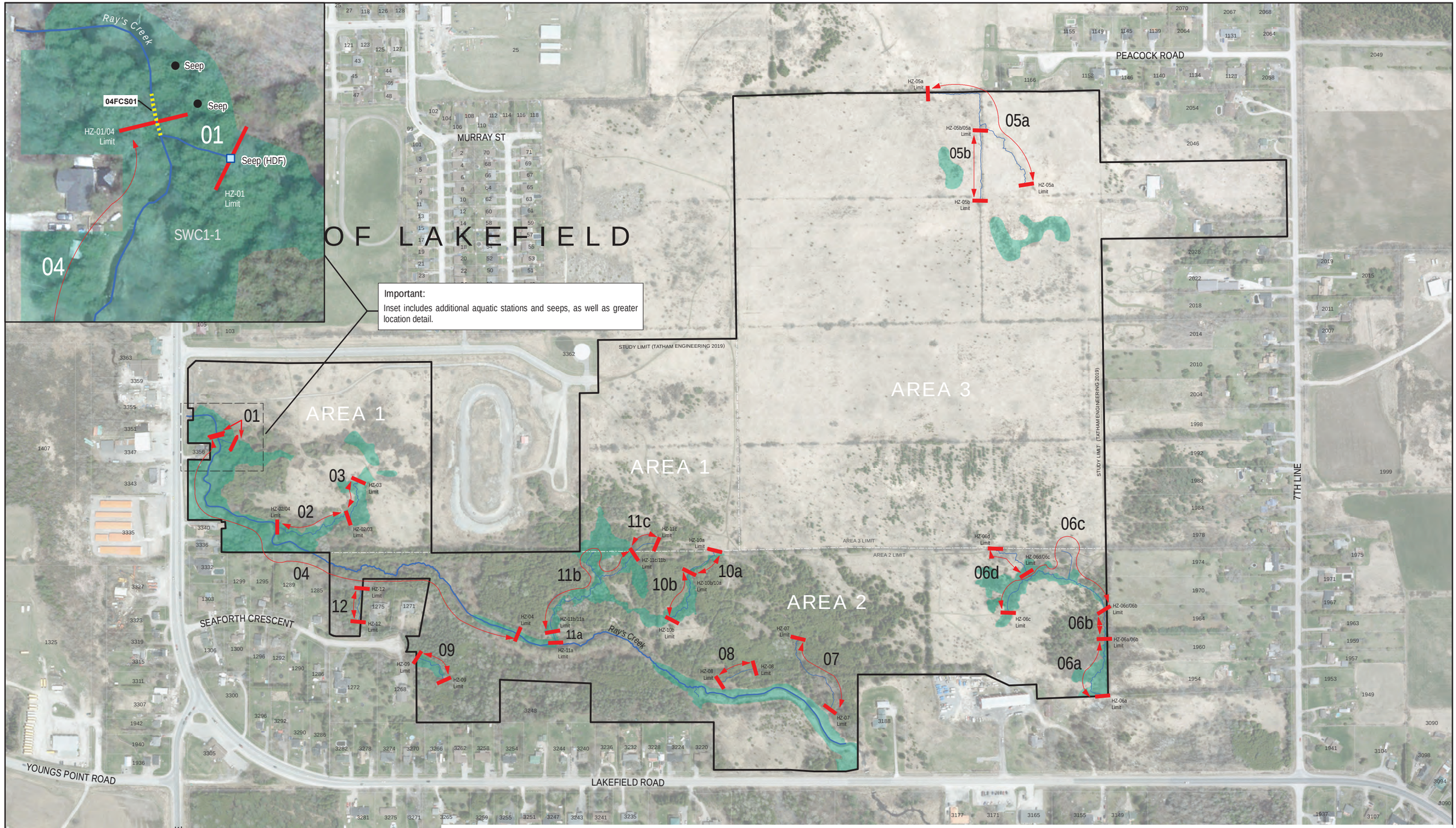
Three survey stations were established along the Lakefield Road corridor, capturing a portion of Area 1 and the wetlands and watercourse of Area 2. A fourth survey station was established at the end of Seaforth Crescent (Figure 1.1). The placement of these stations was such that much of the habitat in Area 2 was also surveyed, but also a portion of Area 1.

Three amphibian species were detected during the surveys for calling amphibians (Appendix D). Only stations 2 and 4 yielded calling amphibians during surveys. During the first round of surveys on April 28, 2020, a large number of western chorus frogs (*Pseudacris triseriata*) were detected calling from amphibian station 8. During the second round of surveys on May 25, 2020 only station 4 again yielded calling amphibians. A full chorus of spring peepers as well as a single western chorus frog. During the third round of surveys on June 22, 2020, only a green frog was detected at amphibian survey station 8.

3.2.4 Other Wildlife

3.2.4.1 All Areas

No reptiles, or evidence of habitat use by reptiles, were detected by GHD within any of the 3 areas. Four species of mammals were detected in the Area 1. A red squirrel (*Tamiasciurus hudsonicus*) was observed in Community 1. Evidence of both white-tailed deer (*Odocoileus virginianus*) and raccoon (*Procyon lotor*) were recorded in Community 7 and an eastern gray squirrel (*Sciurus carolinensis*) was noted in the riparian area along Habitat Zone 4 (Community 11) (Appendix E). Area 2 contained evidence of raccoon along the watercourse, as well as numerous sightings of eastern gray squirrels taking advantage of the tree cover that makes up the majority of the area. Area 3 contained evidence of white-tailed deer as well as common raccoon.



Data Disclaimer

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Legend

- Seep
- Seep, HDF
- Watercourse, Field Verified (GHD, 2017)
- Study Limit (Tatham Engineering, 2019)
- Wetland Communities
- Electrofishing Station
- Aquatic Habitat Extent
- Aquatic Habitat Break

1 cm = 46 meters

0 30 60 90 120

Meters

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

Paper Size ANSI B

Q:\GIS\PROJECTS\11214000s\11214535\Layouts\202008_RPT001\11214535_20220830_GIS002 - Aquatic Survey Locations.mxd
Print date: 21 Dec 2022 - 09:50

Triple T. Holdings Limited
Pt Lot 26, Con 7, Township of Smith
Town of Lakefield

Environmental Impact Study
Aquatic Survey Locations

Project No. 11214535
Revision No.
Date Dec 21, 2022

Figure 3.1

Data source: Image © County of Peterborough, 2018.

3.2.5 Wetlands

Area 1

Five wetland ELC vegetation types were identified within the northern portion of Area 1, namely Community 8 (SWD2-1), Community 9 (SWT2-2), Community 11 (SWC1-1), Community 14 (MAM3-9) and Community 15, a riparian area (no applicable code) (Figure 1.1). One additional wetland community vegetation type was found in the southern portion of Area 1 (i.e. in Community 8 (SWD2-1). The vegetation characteristics of Communities 8, 9, 11, 14 and 15 are described in Section 3.2.1.

Area 2

Three wetland areas were identified within Area 2 namely Communities 22 (SWD2-1), 23 (MAM2), and 24 (MAM2) (Figure 1.1). The first was a large meadow marsh that had formed in the floodplain area associated with Ray's Creek (Community 24). The second area consisted of thicket swamp that meandered in-between upland cedar forests (Community 22). This feature was located adjacent to the southwestern portion of Area 1 and extended towards Ray's Creek. The third wetland was located along the southwestern and western portions of Area 2 and extended to the north (Community 23).

Area 3

Preliminary site visits and existing information sources did not indicate any wetlands are present in Area 3, though assessments of a headwater drainage feature were conducted in the south-eastern portion of that area.

However, visits in 2020 to assess Area 3 indicated that red-osier dogwood dominated thicket swamps are present in the extreme southeast portion of Area 3. These wetlands are identified as Community 39 (SWT2-5) in Figure 1.1. Additionally a swale feature connects the two portions of Community 39 to facilitate drainage.

3.2.6 Woodlands

GHD's Terrestrial and Wetland biologists determined that woodlands were found in the northern portion of Area 1 within Communities 10 (CUW1), 12 (FOC 4-1) and 13 (CUW1) and southeastern portion of Area 1 within Community 7 (CUW1). Woodlands also covered the majority of Area 2. No woodland habitat appeared to be present in Area 3. An analysis of the functions provided by these woodlands can be found in Section 4.3, Table 3.15.

3.2.7 Valleyland

GHD biologists documented a valley system associated with Ray's Creek. It is located in the south-central portion of Area 2 and predominantly consists of the community identified as 23 as well as Community 25.

3.2.8 Significant Wildlife Habitat

In Ecoregion 6E, OMNRF has developed criteria that can be used to confirm five broad categories of Significant Wildlife Habitat (SWH): 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).

Area 1

GHD biologists identified the following categories of candidate Significant Wildlife Habitat in Area 1: seasonal concentration areas, specialized wildlife habitat and habitat for species of conservation concern. No rare vegetation communities were found in the study area. One type of specialized wildlife habitat (i.e., seeps and springs) and one type of habitat for species of special conservation concern (i.e., habitat for special concern and rare wildlife species) were confirmed in the study area.

Area 2 and Area 3

GHD biologists identified the following categories of candidate Significant Wildlife Habitat in Areas 2 and 3: amphibian breeding habitat, open country bird breeding habitat, shrub/early successional bird breeding habitat and habitat for special concern and rare wildlife species.

3.2.9 Fish and Aquatic Habitat

3.2.9.1 Introduction and Level of Effort

The fish and aquatic habitat were assessed by GHD fisheries biologists on May 11th, May 29th and August 20th 2018 in Area 1; June 11th, June 21st in 2019, May 12th and July 15th in 2020 in Area 2; and April 15th, April 30th and July 8th 2019 in Area 3. The assessments were completed following the methodologies outlined in Section 2.2.8. The level of effort and environmental conditions for each proposed development area has been provided in Table 3.5 (Area 1), Table 3.6 (Area 2) and Table 3.7 (Area 3).

Table 3.5 Fish and Aquatic Habitat Surveys – Level of Effort and Environmental Condition of Area 1

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
May 11th 2018	Aquatic Habitat Assessments, HDF and Surface Water Quality	Cool, sunny (0% cloud cover), no precipitation during assessment and BWS 1.	8:00-14:30	6.5 hrs. (x 2 staff)
May 29th 2018	Aquatic Habitat Assessments and HDF	Sunny (10% cloud cover), no precipitation and BWS 1-2.	13:30-14:30	1 hr. (x 2 staff)
August 20th 2018	Aquatic Habitat Assessments, Fish Community Surveys	Warm, sunny (20% cloud cover), no precipitation during assessments and BWS 1-2	11:10-16:30	5 hrs. (x 2 staff)
*Note: BWS Beaufort wind scale (Government of Canada, 2017), HDF Headwater Drainage Feature Assessments.				

Table 3.6 Fish and Aquatic Habitat Surveys – Level of Effort and Environmental Conditions for Area 2

Survey Date	Survey Type	Weather Conditions	Time on Site (24 hr.)	Effort (hours per person)
August 20th 2018	Aquatic Habitat Assessments, Fish Community Surveys and Surface Water Quality	Warm, sunny (20% cloud cover), no precipitation during assessments and BWS 1-2	11:10-16:30	5 hrs. (x 2 staff)
June 11th 2019	Headwater Drainage Feature Assessment	Sunny (50% overcast), no precipitation during surveys, BWS 1-2.	07:30-14:00	6.5 hrs. (x 2 staff)
June 21st 2019	Headwater Drainage Feature Assessment	Sunny (30% cloud cover), no precipitation during surveys, BWS 1-2.	07:30-10:30	3 (x 2 staff)
May 12th 2020	Headwater Drainage Feature Assessment	Warm, sunny, BWS 0-1	10:00-14:30	4.75 (x 2 staff)
July 15th 2020	Headwater Drainage Feature Assessment	Warm, sunny, BWS 0-1	09:00-12:30	3.5 (x 2 staff)
*Note: BWS Beaufort wind scale **Invalid source specified.**.				

Table 3.7 Fish and Aquatic Habitat Surveys – Level of Effort and Environmental Conditions for Area 3

Survey Date	Survey Type	Weather Conditions	Time on Site (24 hr.)	Effort (hours per person)
April 15th 2019	Headwater Drainage Feature Assessment	Overcast (100% cloud cover), light rain during survey and BWS 3-4.	12:30-15:00	2.5 (x 2 staff)
April 30th 2019	Headwater Drainage Feature Assessment	Overcast (80% cloud cover), cool, no precipitation during surveys and BWS 1-2.	11:30-13:00	1.5(x 2 staff)
July 8th 2019	Headwater Drainage Feature Assessment	Sunny (10% cloud cover), no precipitation during surveys and BWS 0-1.	13:00-14:30	1.5 (x 2 staff)
*Note: BWS Beaufort wind scale **Invalid source specified.**.				

3.2.9.2 Aquatic Habitat Assessments – Area 1

The study area that was encompassed in Area 1 was classified into four Habitat Zones (HZ). Habitat Zones are determined based on presence of barriers, substrate composition, channel morphology, riparian habitat, percent in-stream cover, hydrological connection and unique features. The habitat zone location has been illustrated in Figure 3.1 and attributes have been summarized in Table 3.8 (HZ 1-3) and 9 (HZ 4).

Habitat Zone 1 was located in the headwater drainage feature (HDF) in the north-eastern portion of the property in Area 1 (Figure 3.1). The HDF originates from a seep that measures approximately 38m^2, the HDF flows northwest for 30 m until it reaches Ray's Creek.

Habitat Zone 1 feature type was classified as having defined channels, minimal flow and minimal roughness. There was no evidence of sediment transport adjacent to or in the feature and there were no signs of sediment deposition in the feature. The dominant and sub dominant substrate was silt and sand, respectively. The average water depth of 0.045 m and wetted width of 1.4m during the first HDF assessment. The average water depth was 0.03 m with an average wetted width of 0.35 m during the second HDF assessment. The feature vegetation was dominated by forest (Table 3.8). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 40: Habitat Zone 1, photo showing HDF and riparian habitat, photo facing upstream (south) (Photo Date: May 11, 2018)

The second HDF located in the north-western portion of Area 1 was broken into two segments based on the feature type change (Habitat Zone 2 and Habitat Zone 3). Habitat Zone 2 and 3 originate from a wetland (Community 9) located southeast of the Habitat Zone 1 (Figure 3.1).

Habitat Zone 2 started near an existing ATV trail and flowed northwest for 67 m until it reached Ray's Creek (Figure 3.1). The habitat zone feature type was classified as having defined channels, minimal flow and minimal roughness. There was no evidence of sediment transport adjacent to the feature. There was however evidence of instream bank erosion in the feature during both site assessments. There were signs of minimal of sediment deposition in the feature during both site assessments. The dominant and sub-dominant substrate was silt and sand, respectively (Table 3.8). The average water depth was 0.06 m with an average wetted width of 0.75 m during the first HDF assessment. The average water depth was 0.03 with an average wetted width of 0.45 m during the second HDF assessment. The feature vegetation was dominated by cedar forest (Table 3.8). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 41: Habitat Zone 2, photo showing HDF and riparian habitat, photo facing upstream (south) (Photo Date: May 11, 2018).

Habitat Zone 3 was located directly upstream (south) of Habitat Zone 2 in the same HDF. The zone started at the wetland and continued northwest for 81 m until it reached Habitat Zone 2 at the ATV trail (Figure 2).

Habitat Zone 3 had no defined channels, and the feature type was classified as wetland with standing water and extreme roughness. There was no evidence of sediment transport adjacent to or in the feature and there were no signs of sediment deposition in the feature. The substrate was dominated by silt and the sub-dominant substrate was soil. The average water depth of 0.03 m during the first HDF assessment (Table 3.8). The feature was dry during the second feature assessment (i.e. water depth was 0 m). The feature vegetation was dominated by wetland (Community 9). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 42: Habitat Zone 3, photo showing HDF and riparian habitat, photo facing upstream (southeast) (Photo Date: May 11, 2018).

Habitat Zone 4 was located in Rays' Creek in Area 1 and within the boundaries of Area 2 (Figure 2). The creek originated southwest of the study area. The portion of Ray's Creek that was assessed started slightly west of the property boundary and extended northeast for 776 m (Figure 2). The creek had defined channels with slightly unstable banks, the creek had standing water during assessments. A beaver dam and ATV crossing were located upstream outside of the Habitat Zone altering the creek flows. Biologists also noted several seeps southeast of the downstream extent of Habitat Zone 4 (Figure 2).

The in-water habitat substrate was dominated by boulder and fine organics, with an average water depth of 0.2 m and wetted width of 1.75 m (Table 3.9). The watercourse morphology was composed of runs, pools, riffles and flats. The canopy cover was moderate, covering 25-49% of the water surface. The overhead cover was considered moderate and was composed of shrubs, trees, woody debris, overhanging banks, and non-woody vegetation. The instream cover was also considered moderate, consisting of undercut banks, submergent aquatic vegetation, emergent aquatic vegetation, boulders, large and small woody debris (Table 3.9). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 43: Habitat Zone 4, photo showing Ray's Creek and riparian habitat, photo facing downstream (north) (Photo Date: August 20, 2018).

Table 3.8 Area 1 – Aquatic Habitat Observations for the Headwater Drainage Features (Habitat Zone 1 to 3) (May 11th and 29th 2018)

Date	Habitat Zone	Flow Influence	Flow Condition	Feature Type	Dominant Substrate/Sub-Dominant Substrate	Feature Vegetation	Feature Roughness	Sediment Transport		Sediment Deposition	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
								Adjacent	Feature				
May 11th	1	Freshet	Minimal Flow	Defines Natural Channel	Silt/Sand	Cedar Forest	<10% Minimal	None	None	None	0.045	1.4	30
May 20th		Baseflow	Minimal Flow	Defines Natural Channel	Silt/Sand	Cedar Forest	<10% Minimal	None	None	None	0.030	0.35	30
May 11th	2	Freshet	Minimal Flow	Defines Natural Channel	Silt/Sand	Cedar Forest	10-40% Moderate	None	Instream Bank Erosion	<5mm Minimal	0.06	0.75	67
May 20th		Baseflow	Dry/ Minimal Flow	Defines Natural Channel	Silt/Sand	Cedar Forest	10-40% Moderate	None	Instream Bank Erosion	<5mm Minimal	0.03	0.45	67
May 11th	3	Freshet	Standing Water	Wetland	Silt/Soils	Wetland	>60% Extreme	None	None	None	0.03	N/A	81
May 20th		Baseflow	Dry	Wetland	Silt/Soils	Wetland	>60% Extreme	None	None	None	0 (dry)	N/A	81

Table 3.9 Area 1 (part of Area 2) – Aquatic Habitat Observations for Ray's Creek (Habitat Zone 4) (August 20th, 2018)

Habitat Zone	Percent Substrate Composition	Percent Instream Cover	Percent Canopy Cover (%)	Overhead Cover	Watercourse Hydrology	Flow Condition	Feature Type	Watercourse Morphology	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
t	30% boulder 20% cobble 20% gravel 30% fine organics	10% large woody debris 10% small woody debris 10% undercut banks 5% emergent aquatic vegetation 15% boulders	25-49%	15% shrubs 15% trees 5% woody debris 1% overhanging vegetation 15% non-woody vegetation	40% run 30% pool 20% riffle 10% flats	Minimal Flow	Defined Natural Channel	40% run 30% pool 20% riffle 10% flats	0.2	1.75	776

Surface water quality parameters were collected during the aquatic habitat assessments in Habitat Zone 1 and 4 in Area 1 (Figure 3.1). A summary of results and information on the parameter specifics has been provided in Table 3.10.

Table 3.10 Area 1 – Surface Water Quality Results (May 11th, 2018)

Water Quality Parameters	Habitat Zone (Sample Number)		Accepted Parameter Range
	1(1)	4(1)	
Date (dd/mm/yy)	11/05/18	11/05/18	N/A
Time (hh:mm)	9:05	9:15	N/A
Weather Conditions	Cool, sunny (0% cloud cover), no precipitation during assessments and BWS 1	Cool, sunny (0% cloud cover), no precipitation during assessments and BWS 1	N/A
Sample Depth (m)	0.045	0.3	N/A
Air Temperature (□C)	6.5	6.8	N/A
Water Temperature (□C)	4.6	9.4	N/A
Dissolved Oxygen (mg/L)	9.32	9.90	5-8*
Total Dissolved Solids (mg/L)	-	354.25	N/A
Conductivity (SPC-us/cm)	-	544.9	N/A
Salinity (ppt)	-	0.27	N/A
pH	7.62	8.02	6.5-8.5**
Turbidity (NTU)	-	0.94	Normal**

Note: BWS=Beaufort wind scale (Government of Canada, 2017), (-) unable to take reading as the water depth was too shallow to submerge probe or take water sample, N/A= not applicable and/or specific guidelines not available. *lowest acceptable range for warm water biota (Canadian Council of Ministers of the Environment, 2002).

3.2.9.3 Aquatic Habitat Assessments – Area 2

The study area that was encompassed in Area 2 was classified into seven Habitat Zones, some of which were further broken into sub sections (i.e. segments) due to a change in feature type and/or location based on the preliminary site assessment. Preliminary assessments and one HDF assessment was completed in 2019. Two additional HDF assessments were completed in 2020 on only the features that will be directly impacted by the proposed development to understand their form and function.

Habitat Zones are determined 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 3.1 and attributes have been provided in Table 3.11.

Habitat Zone 6 was the headwater drainage feature (HDF) that was located in the most southern portion of Area 2. The feature originated in a wetland community (Community 19) and flowed south into second wetland community (Community 19) and eventually off the property. The habitat zone was broken into four segments (6a to 6d) based on a change in feature type. All of the segments had interstitial flow, minimal flow or was dry during the three HDF assessments.

The feature roughness ranged from minimal to high, with no evidence of sediment transport adjacent to or in the feature, with the exception of segment 6b. Segment 6b showed evidence of instream bank erosion. The sediment deposition within the feature ranged from none to moderate. The dominant and sub-dominant substrate for all segments with the exception of segment 6b was soil. Segment 6b dominate and sub dominate substrate was cobble

and silt, respectively (Table 3.11). Each segment has been further described based on the three HDF assessment below. Habitat Zone 6 has the potential to connect to Rays Creek south outside of the subject property.

Segment 6d was the most upstream segment, the feature type appeared to be a swale that was part of an ATV trail with no defined channel. The segment measured 32 m in length and conveyed flows to the south (segment 6c) (Figure 3.1). The average water depth was 0.2 m with an average wetted width of 0.9 m. The feature roughness was <10% minimal with no evidence of sediment transport during the three HDF assessments. On the May 12th and July 15th visit of 2020 this segment was dry. The feature vegetation was dominated by meadow (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 44: Habitat Zone 6, segment 6d, photo showing HDF and riparian habitat (Photo Date: June 11, 2019)

Segment 6c was located slightly south of segment 6d and the feature type appeared to be a multithread/wetland with no defined channel, measuring 308 m in length and flowed south to segment 6b (Figure 3.1). The average water depth ranged from 0.08 m to 0.17m and the feature vegetation was dominated by wetland (Table 3.11). The feature roughness was 10-40% moderate with no evidence of sediment transport during the three HDF assessments. On the July 15th visit of 2020 this segment was dry. Refer to Section 3.2.1.2 for full vegetation community details.

Photo 45: Habitat Zone 6, segment 6c, photo showing HDF and riparian habitat, photo facing upstream (east) (Photo Date: June 11, 2019)

Segment 6b was located directly downstream (west) of segment 6c and appeared to have a feature type with defined natural channels. The segment measured 48 m in length and flowed west to segment 6a (Figure 3.1). The average water depth ranged from 0.03m to 0.12 m with a wetted width that ranged from 0.86 m of 1.14 m. The feature vegetation was dominated by forest (Table 3.11). The feature roughness ranged from <10% minimal to 10-40% moderate with no evidence of sediment transport adjacent to the feature during the three HDF assessments. During the June 11th 2019 site visit there was evidence of instream bank erosion. . On the July 15th visit of 2020 this segment was dry. Refer to Section 3.2.1.2 for full vegetation community details.

Photo 46: Habitat Zone 6, segment 6b, photo showing HDF and riparian habitat photo facing upstream (east) (Photo Date: June 11, 2019)

Photo 47: Habitat Zone 6, segment 6b photo showing HDF and riparian habitat photo facing east (Photo Date: May 12, 2020)

Segment 6a was located directly downstream (south) of segment 6b and the feature type appeared to be a wetland that measured 59 m in length and flowed west off the property (Figure 3.1). The average water depth ranged from 0.02 m to 0.05 m. The feature vegetation was dominated by forest (Table 3.11). The feature roughness ranged from 10-40% moderate to 40-60% high with no evidence of sediment transport adjacent to the feature during the three HDF assessments. During the May 12th 2020 and July 15th 2020 there was evidence of sheet erosion within the feature. On the July 15th visit of 2020 this segment was dry. The feature vegetation was dominated by wetland (Table 3.11), refer to Section 3.2.1.2 for full vegetation community details.

Photo 48: Habitat Zone 6, segment 6a, photo showing HDF, minimal water during assessment and riparian habitat (Photo Date: June 11, 2019)

Habitat Zone 7 was the headwater drainage feature (HDF) north of Habitat Zone 6 located in Area 2. The feature originated within the property in a cedar forest and flowed southwest for 123 m until it reached Ray's Creek (Figure 3.1). The feature type appeared to be a defined natural channel with water flows that ranged from dry, dry with standing pockets of water to minimal flows. The average water depth ranged from 0.05 m to 0.06 m with a wetted width that ranged from 0.5 m to 1.3 m. The feature roughness ranged from <10% minimal to 40-60% high. There was no evidence of sediment transportation adjacent to the feature during the three HDF assessments. During the June 11th 2019 and July 15th 2020 site visits there was evidence of instream bank erosion within the feature. On the July 15th visit of 2020 this segment was dry. The feature vegetation was dominated by forest (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 49: Habitat Zone 7, photo showing HDF and riparian habitat, photo facing downstream (west) (Photo Date: June 11, 2019)

Habitat Zone 8 was the headwater drainage feature (HDF) north of Habitat Zone 7 located in Area 2 (Figure 3.1). The feature originated from a cedar forest within the property and flowed northwest for 50 m where the feature ended. The feature did not appear to outlet into Ray's Creek (Figure 3.1). The feature type appeared to have defined natural channel with no flows, only standing water and moderate roughness. The average water depth ranged from 0.05 m to 0.06 m with a wetted width that ranged from 0.6m to 2m. The feature vegetation was dominated by forest (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details. On the July 15th visit of 2020 this segment was dry.

Photo 50: Habitat Zone 8, photo showing HDF, standing water during assessment and riparian habitat (Photo Date: June 11, 2019)

Habitat Zone 9 was the headwater drainage feature located at the most northern section of Area 2. The feature originated east of Seaforth Crescent and flowed 55 m east, where it dissipated before connecting to Ray's Creek (Figure 3.1). The feature type appeared to a have defined natural channel with minimal flows to no flows. The average water depth ranged from 0.02 m to 0.15m with a wetted width of 0.38m to 0.41 m. The feature roughness ranged from <10% minimal to 10-40% moderate There was no evidence of sediment transport adjacent to or in the feature and no signs of sediment deposition within the feature. This segment was dry during the July 15th 2020 site visit. The feature vegetation was dominated by forest, (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 51: Habitat Zone 9, photo showing HDF and riparian habitat, photo facing downstream (north) (Photo Date: June 11, 2019)

Photo 52: Habitat Zone 9, photo showing HDF and riparian habitat, photo facing downstream (north) (Photo Date: May 12, 2020)

Habitat Zone 10 was the headwater drainage feature (HDF) located north of Habitat Zone 8 within Area 2 (Figure 3.1). This zone was not assessed in 2020 HDF assessments. The habitat zone was broken into two segments (10a and 10b) based on a change in feature type (Figure 3.1). Segment 10a was located in the upstream (western) portion of the HDF and extended downstream (east) for 50 m until it reached segment 10b. Segment 10a appeared to have a feature type with a defined natural channel. There was no flow during the time of assessment, only standing water with and average water depth of 0.01 m and average wetted width of 0.5 m. The dominant riparian vegetation was forest. Segment 10b was approximately 55m in length and the feature type appeared to be a wetland with no defined channels and standing water with and average water depth was 0.04 m. The dominant riparian vegetation was wetland (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Both segment 10a and 10b feature types had minimal roughness and no evidence of sediment transport adjacent to or in the feature. There were signs of minimal sediment deposition in the feature for both segments. The dominant and sub-dominant substrate for both segments was soil (Table 3.11).

Photo 53: Habitat Zone 10, photo showing middle section of feature photo facing downstream (west) (Photo Date: June 21, 2019)

Habitat Zone 11 was the headwater drainage feature (HDF) located slightly north of Habitat Zone 10 in Area 2. This zone was not assessed in 2020 HDF assessments. The habitat zone was broken into three segments (11a, 11b and 11c) based on the change of feature type and location (Figure 3.1). The feature originated within the property and appeared to eventually connect to Ray's Creek. The majority of the zone was classified as having a feature type of a wetland (11b), only the most upstream (11c) and downstream (11a) sections had defined natural channels. The feature roughness ranged from minimal to moderate. All three segments had no evidence of sediment transport adjacent to or in the feature. There was evidence of sheet erosion within the feature in all three segments. There were minimal signs of sediment deposition within all segments. The dominant and sub dominant substrates for all segments was soil (Table 3.11). Each segment has been further described based on the initial site assessment below.

Segment 11c was the most upstream segment, the feature type appeared to be a defined natural channel that measured 55 m and flowed west to segment 11b (Figure 3.1). The segment was dry during the time of assessment. The feature vegetation was dominated by forest (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 54: Habitat Zone 11, segment 11c. Photo showing the dry condition of the most upstream HDF, photo facing downstream (west) (Photo Date: June 21, 2019).

Segment 11b was directly downstream (west) of segment 11c and the feature type appeared to be a wetland that measured approximately 218 m. The segment extended to the west until it reached segment 11a (Figure 3.1). The segment had standing water during the time of assessment with an average water depth of 0.06 m and the feature vegetation was dominated by wetland (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Segment 11a was located directly downstream of segment 11b, the feature type appeared to have a defined natural channel. The feature flowed to the west for approximately 30m until it reached Ray's Creek (Figure 3.1). The segment had minimal flow during the time of assessment with an average water depth of 0.04 m. The feature vegetation was dominated by forest (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details.

Photo 55: Habitat Zone 11, segment 11a. Photo showing most downstream portion of HDF and riparian habitat, photo facing downstream (west) (Photo Date: June 21, 2019)

Habitat Zone 12 was the headwater drainage feature located south of Habitat Zone 9 in Area 2 (Figure 3.1). The feature originated directly south of Seaforth Crescent and extended approximately 74 m in a southern direction (Figure 3.1). The feature type appeared to be a swale with no defined channel and with standing water and minimal roughness. There was no evidence of sediment transport adjacent to or in the feature and no signs of sediment deposition within the feature. The dominant and sub-dominant substrate was soil. The feature vegetation was dominated by forest (Table 3.11). Refer to Section 3.2.1.2 for full vegetation community details. On the July 15th visit of 2020 this segment was dry.

It should be noted that during the assessments there was evidence of seepage within this feature and that the ditching along Seaforth Crescent appear to be influencing this feature.

Photo 56: Habitat Zone 12, photo showing HDF, standing water during assessment and riparian habitat, photo facing south (Photo Date: June 11, 2019)

Photo 57: Habitat Zone 12, photo showing HDF, standing water during assessment and riparian habitat, photo facing south (Photo Date: May 12, 2020)

Table 3.11 Area 2- Aquatic Habitat Observations for the Headwater Drainage Features (Habitat Zone 6-12) (June 11th and June 21st, 2019, May 12th and July 15th, 2020)

Date	Habitat Zone	Flow Influence	Flow Condition	Feature Type	Dominant Substrate/Sub-Dominant Substrate	Feature Vegetation	Feature Roughness	Sediment Transport		Sediment Deposition	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
								Adjacent	Feature				
May 12th 2020	6a	Freshet	Minimal Flow	Wetland	Soil/Soil	Wetland	10-40% Moderate	None	Sheet Erosion	<5mm Minimal	0.05	N/A-wetland (see veg community)	59
June 11th 2019	6a	Baseflow	Minimal Flow	Wetland	Soil/Soil	Wetland	40-60% High	None	None	5-30mm Moderate	0.02	N/A-wetland (see veg community)	59
July 15th 2020	6a	Baseflow	Dry	Wetland	Soil/Soil	Wetland	10-40% Moderate	None	Sheet Erosion	<5mm Minimal	0-Dry	N/A-wetland (see veg community)	59
May 12th 2020	6b	Freshet	Minimal Flow	Defined Natural Channel	Cobble/Silt	Forest	<10% Minimal	None	None	<5mm Minimal	0.03	0.86	48
June 11th 2019	6b	Baseflow	Minimal Flow	Defined Natural Channel	Cobble/Silt	Forest	10-40% Moderate	None	Instream Bank Erosion	<5mm Minimal	0.12	1.4	48
July 15th 2020	6b	Baseflow	Dry	Defined Natural Channel	Cobble/Silt	Forest	<10% Minimal	None	None	<5mm Minimal	0-Dry	0-Dry	48
May 12th 2020	6c	Freshet	Interstitial Flow	Multi-Thread	Soil/Soil	Wetland	10-40% Moderate	None	None	<5mm Minimal	0.17	N/A-wetland (see veg community)	308
June 11th 2019	6c	Baseflow	Minimal Flow	Multi-Thread	Soil/Soil	Wetland	10-40% Moderate	None	None	<5mm Minimal	0.08	N/A-wetland (see veg community)	308
July 15th 2020	6c	Baseflow	Dry	Multi-Thread	Soil/Soil	Wetland	10-40% Moderate	None	None	<5mm Minimal	0-Dry	N/A-wetland (see veg community)	308
May 12th 2020	6d	Freshet	Dry	Swale/ATV Trail	Soil/Soil	Meadow/Trail	<10% Minimal	None	None	None	0-Dry	0-dry	32
June 11th 2019	6d	Baseflow	Minimal Flow	Swale/ATV Trail	Soil/Soil	Meadow/Trail	<10% Minimal	None	None	None	0.2	0.9	32
July 15th 2020	6d	Baseflow	Dry	Swale/ATV Trail	Soil/Soil	Meadow/Trail	<10% Minimal	None	None	None	0-Dry	0-Dry	32
May 12th 2020	7	Freshet	Dry with Standing Pockets of Water	Swale/Defined Natural Feature	Soil/Soil	Forest	<10% Minimal	None	None	5-30 mm Moderate	0.05	0.01	123
June 11th 2019	7	Baseflow	Minimal Flow	Defined Natural Channel	Soil/Soil	Forest	40-60% High	None	Instream Bank Erosion	<5mm Minimal	0.06	1.3	123
July 15th 2020	7	Baseflow	Dry	Defined Natural Channel	Soil/Soil	Forest	<10% Minimal	None	Instream Bank Erosion	<5mm Minimal	0-Dry	0-Dry	123
May 12th 2020	8	Freshet	Dry with Standing Pockets of Water	Defined Natural Channel	Soil/Soil	Forest	10-40% Moderate	None	None	None	0.05	0.6	50
June 11th 2019	8	Baseflow	Standing Water	Defined Natural Channel	Soil/Soil	Forest	10-40% Moderate	None	None	None	0.16	2	50
July 15th 2020	8	Baseflow	Dry	Defined Natural Channel	Soil/Soil	Forest	10-40% Moderate	None	None	None	0-Dry	0-Dry	50
May 12th 2020	9	Freshet	Standing Water	Defined Natural Channel	Soil/Sand	Forest	10-40% Moderate	None	None	5-30 mm Moderate	0.02	0.41	55
June 11th 2019	9	Baseflow	Minimal Flow	Defined Natural Channel	Soil/Gravel	Forest	<10% Minimal	None	None	<5mm Minimal	0.15	0.38	55
July 15th 2020	9	Baseflow	Dry	Defined Natural Channel	Soil/Gravel	Forest	<10% Minimal	None	None	5-30 mm Moderate	0-Dry	0-Dry	55
June 21st 2019	10a	Baseflow	Standing Water	Defined Natural Channel	Soil/Soil	Forest	<10% Minimal	None	None	<5mm Minimal	0.01	0.5	50
June 21st 2019	10b	Baseflow	Standing Water/Seep	Wetland	Soil/Soil	Wetland	<10% Minimal	None	None	<5mm Minimal	0.04	N/A-wetland (see veg community)	94

Date	Habitat Zone	Flow Influence	Flow Condition	Feature Type	Dominant Substrate/Sub-Dominant Substrate	Feature Vegetation	Feature Roughness	Sediment Transport		Sediment Deposition	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
								Adjacent	Feature				
June 21st 2019	11a	Baseflow	Minimal Flow	Defined Natural Channel	Soil/Soil	Forest	10-40% Moderate	None	Sheet Erosion	<5mm Minimal	0.04	0.21	30
June 21st 2019	11b	Baseflow	Standing Water/Wetland	Wetland	Soil/Soil	Wetland	10-40% Moderate	None	Sheet Erosion	<5mm Minimal	0.06	N/A-wetland (see veg community)	218
June 21st 2019	11c	Baseflow	Dry	Defined Natural Channel	Soil/Soil	Forest	<10% Minimal	None	Sheet Erosion	<5mm Minimal	0-Dry	0-Dry	55
May 12th 2020	12	Freshet	Standing Water/Seep	Swale	Soil/Soil	Forest/Wetland	<10% Minimal	None	None	None	0.02	0.01	74
June 11th	12	Baseflow	Standing Water/Seep	Swale	Soil/Soil	Forest/Wetland	<10% Minimal	None	None	None	0.05	TBD	74
July 15th 2020	12	Baseflow	Dry	Swale	Soil/Soil	Forest/Wetland	10-40% Moderate	None	None	None	0-Dry	0-Dry	74

Surface water quality parameters were collected during the aquatic habitat assessments in Habitat Zone 4 in Area 2 (Figure 3.1). A summary of results and information on the parameter specifics has been provided in Table 3.12.

Table 3.12 Area 2 – Surface Water Quality Results (August 20th, 2018)

Water Quality Parameters	Habitat Zone (Sample Number)	Accepted Parameters
	4(2)	
Date (dd/mm/yy)	20/08/18	N/A
Time (hh:mm)	12:32	N/A
Weather Conditions	Warm, sunny (20% cloud cover), no precipitation during assessments, BWS 1-2	N/A
Sample Depth (m)	0.25	N/A
Air Temperature (□C)	25.7	N/A
Water Temperature (□C)	18.3	N/A
Dissolved Oxygen (mg/L)	7.28	5-8*
Total Dissolved Solids (mg/L)	611	N/A
Conductivity (SPC-us/cm)	937	N/A
Salinity (ppt)	0.46	N/A
pH	7.94	6.5-8.5**
Turbidity (NTU)	1.33	Normal**

Note: BWS=Beaufort wind scale (Government of Canada, 2017), N/A= not applicable and/or specific guidelines not available. *lowest acceptable range for warm water biota (Canadian Council of Ministers of the Environment, 2002).

3.2.9.4 Aquatic Habitat Assessments – Area 3

The study area that was encompassed in Area 3 was classified into one Habitat Zone (i.e. Habitat Zone 5) which was further broken into segments based on location. Habitat Zones are determined based on presence of barriers, substrate composition, channel morphology, riparian habitat, percent in-stream cover, hydrological connection and unique features. The habitat zone location has been illustrated in Figure 2 and attributes have been provided in Table 3.13.

Habitat Zone 5 was the headwater drainage feature (HDF) that was located in the most south-eastern portion of Area 3 (Figure 3.1). The habitat zone was broken into two segments (5a and 5b). Segment 5a was located in the HDF in the most south-eastern portion of Area 3. The HDF originated on the property and extended northeast for approximately 180m where it continued to the east off property. Segment 5b originated west of segment 5a and extended east for approximately 107m until it reached segment 5a (Figure 3.1).

Both segment 5a and 5b feature types were classified as a swale feature with no defined channel conveying flows off property. During the first assessment both segments had minimal flows, during the second assessment the segments had interstitial flow and both segments were dry during the third assessment. Both of the segments had minimal roughness and no evidence of sediment transport adjacent to or in the feature. There were signs of minimal sediment deposition in the feature for both segments. The dominant and sub-dominant substrate for both segments was soil. The feature vegetation was dominated by meadow (Table 3.13). Refer to Section 3.2.1.2 for full vegetation community details.

The average water depth of zone 5a was 0.06 m and 0.07 m during the first and second site assessment, respectively. The average wetted width was 1.7 m and 1.1 m during the first and second site assessment, respectively. The average water depth of zone 5b was 0.06 m during both site assessment. The average wetted with was 1.2m and 1 m during the first and second site assessment, respectively (Table 3.13).

Photo 58: Habitat Zone 5, segment 5a, photo showing HDF and riparian habitat and the most downstream extent, photo facing upstream (southeast)
(Photo Date: April 15, 2019)

Table 3.13 Area 3 – Aquatic Habitat Observations for the Headwater Drainage Feature (Habitat Zone 5) (April 15th, April 30th and July 8th, 2019)

Date	Habitat Zone	Flow Influence	Flow Condition	Feature Type	Dominant Substrate/Sub-Dominant Substrate	Feature Vegetation	Feature Roughness	Sediment Transport		Sediment Deposition	Average Water Depth (m)	Average Wetted Width (m)	Zone Length (m)
								Adjacent	Feature				
April 15th	5a	Freshet	Minimal Flow	Swale	Soil/Soil	Meadow	10% Minimal	None	None	<5mm		None	None
April 30th		Baseflow	Interstitial Flow	Swale	Soil/Soil	Meadow	10% Minimal	Minimal	0.06	1.7	180	Minimal	0.06
July 8th		Baseflow	Dry	Swale	Soil/Soil	Meadow	10% Minimal	None	None	<5mm		None	None
April 15th	5b	Freshet	Minimal Flow	Swale	Soil/Soil	Meadow	10% Minimal	Minimal	0.07	1.1	180	Minimal	0.07
April 30th		Baseflow	Minimal Flow	Swale	Soil/Soil	Meadow	10% Minimal	None	None	<5mm		None	None
July 8th		Baseflow	Dry	Swale	Soil/Soil	Meadow	10% Minimal	Minimal	0-Dry	0-Dry	180	Minimal	0-Dry

3.2.9.5 Fish Community – Area 1 & 2

GHD conducted fish community surveys in Area 1 and in Area 2 at two locations in Ray's Creek on August 20th 2018 (Figure 3.1). Cumulatively six fish species were collected in Ray's Creek which represented the following families: Catostomidae, Centrarchidae, Cyprinidae and Gasterosteidae. The fish community was dominated by fish species that prefer a cool water thermal regime.

GHD's fish community sampling results in Ray's Creek within Area 1 was composed of two fish species: White Sucker (*Catostomus commersonii*) and Blacknose Dace (*Rhinichthys obtusus*). The fish community found in Area 2 was composed of six fish species: White Sucker, Rock Bass (*Ambloplites rupestris*), Blacknose Dace, Common Shiner (*Luxilus cornutus*), Creek Chub (*Semotilus atromaculatus*) and Brook Stickleback (*Culaea inconstans*). The fish community in both Area 1 and 2 prefer cool water and spawn in the spring.

The environmental conditions, level of effort and results have been provided in Table 3.14. A review of the fish species historically documented in Ray's Creek has been provided as context for contributing fish habitat value (Appendix F).

Table 3.14 Area 1 & Area 2 Fish Community Data for Ray's Creek within the Study Area (August 20th, 2018)

Family Name	Common Name	Scientific Name	Thermal Regime	Spawning Season	Habitat Zone (Sample Number)	
					4(1) – Area 1	4(2) – Area 2
Catostomidae	White Sucker	*Catostomus commersonii*	Coolwater	Spring (April-June)	1	3
Centrarchidae	Rock Bass	*Ambloplites rupestris*	Coolwater	Spring (May-June)	0	1
Cyprinidae	Blacknose Dace	*Rhinichthys obtusus*	Coolwater	Spring (May-June)	20	8
	Common Shiner	*Luxilus cornutus*	Coolwater	Spring (May-June)	0	6
	Creek Chub	*Semotilus atromaculatus*	Coolwater	Spring (May-June)	0	69
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	Coolwater	Spring-summer (May-July)	0	11
Catch Summary						
				Abundance	21	98
				Species Diversity	2	6
Environmental Conditions						
				Air Temperature (□C)	25.7	26
				Stream Temperature (□C)	18.3	18.3
Sample Attributes						
				Date (dd-mm-yy)	20-Aug-18	20-Aug-18
				Gear Type	Electrofisher	Electrofisher
				Frequency (hertz)	40	50
				Voltage	140	225
				Site Length (m)	22.9	21.7
				Average Width (m)	1.39	1.82
				Shocker Seconds	796	634
				Effort sec/m²	25	16

Note: Fish species thermal regime and spawning season obtained from the Ontario Freshwater Fishes Life History Database (Eakins, 2017)

4. Discussion and Analysis

4.1 Physical Site Characteristics

4.1.1 Soil

Area 1

According to the Ontario Soil Survey, Area 1 is situated primarily on Otonabee loam, a well-drained soil type. Poorly drained Grandby sandy loam soils are also found along the drainage course of Ray's Creek which flows through the property (Gillespie and Acton, 1981). A Geotechnical Investigation conducted by Cambium Inc. found that subsurface conditions in the study area generally consisted of a layer of topsoil underlain by a layer of sand, silt, sandy silt or silty sand glacial till (Cambium Inc., 2019). Test pits dug in the northern part of Area 1 showed that soils were dry to moist gravelly sand (30% gravel, 56% sand, 14% silt and clay). Unweathered bedrock was reached at 1.15m, 1.88m and 1.43m below ground surface in the three test pits that were dug in this area (Cambium Inc., 2019). Test pits in the southern part of Area 1 also indicated gravelly sands were present (29% gravel, 61% sand, 10% silt/clay) and that soils were dry to moist (1.6% moisture content). In this area, test pits reached unweathered bedrock at 1.98m and 0.98m below ground surface, respectively (Cambium Inc., 2019).

Area 2

According to the Ontario Soil Survey, approximately 70% of Area 2 is underlain by Grandby sandy loam soils (Gillespie and Acton, 1981). These soils generally follow Ray's Creek. A small area in the northwest corner and the area to the southeast are Otonabee loam, which is also found in Areas 1 and 3 (Gillespie and Acton, 1981). Six test pits were dug in the central and southern portions of Area 2 by Cambium Inc. Soils at test pit 118-19, located in the south-eastern corner of Area 2 were described as saturated, with water seepage observed at 2.16m below ground surface (Cambium Inc., 2019). The dominant soil type at this location was silt. The water table was reached below the unweathered limestone bedrock layer (2.56m below ground surface). In the other three locations, soils were described as dry to moist. GHD biologists also conducted soil assessments at ten locations in Area 2 in order to confirm the boundaries of specific ELC communities (i.e., Communities 16, 23, 26, and 32) as well as the vegetation type itself. Specific results were discussed in Section 3.2.1.2.

Area 3

According to the Ontario Soil Survey, approximately 75% of Area 3 is underlain by Otonabee loam soils, with the balance consisting of Emily loam (Gillespie and Acton, 1981). Although Otonabee loam soils are well drained, Emily loam soils are imperfectly drained. Generally, these soils have saturated moisture conditions for a portion of the year (i.e., they are seasonally saturated). Approximately 10 test pits were dug by Cambium Inc. within Area 3 (Cambium Inc., 2019). A surface layer of sandy silt to silt topsoil was observed in all test pit locations in this area of the property, under which silty sand to sand and silt till materials were encountered. In a few locations, there was trace gravel, cobbles and clay. As was the case with Area 1 and 2, soils were identified as dry to moist. There was no evidence of seasonal watercourses in the southwestern portion of the study area.

4.2 Species and Communities

4.2.1 Vegetation

GHD biologists found two species, black ash and butternut, that are considered to be nationally and/or provincially significant (SARA 2019; COSEWIC 2019; COSSARO 2018) (Appendix B). Black ash (*Fraxinus nigra*), which was

recently listed as threatened (COSEWIC, 2019), was found in Communities 8, 21 and 23. As of January 2022, this species is also listed as Endangered under Ontario's Endangered Species Act. Butternut is listed as an endangered species both nationally and provincially (COSSARO 2022, COSEWIC 2021, SARA 2022).

Three butternut trees were identified adjacent to the walking trail in Community 29 (See Figure 1.1). This species usually grows alone or in small groups and is often found on well-drained gravelly sites along forest edges, or in openings in the forest canopy. In Ontario, this species is being affected by a fungal disease that can kill the tree. The locations of three butternut were recorded on site (Figure 1). The trees were then evaluated by a certified butternut health assessor. They were determined to be category 1, non-retainable. A butternut health assessment report will be submitted to Ontario Ministry of the Environment, Conservation and Parks (MECP). GHD will work with the MECP to ensure that requirements under the Endangered Species Act (2007) for this species will be met.

Black ash is a medium-sized, shade intolerant hardwood tree species that is found on sites that are moist to wet (e.g., riparian areas, swamps). The species is being affected by the invasive emerald ash borer (EAB) and it is expected that more than 70% of the black ash trees in Ontario will die as a result of EAB within the next 100 years. A provincial recovery strategy for the species is currently being developed.

In addition, three species considered to be regionally rare (Oldham, 1999) were identified in Area 1. These species were: ground cedar (*Diphasiastrum complanatum*), black walnut (*Juglans nigra*) and Norway maple (*Acer plantanoides*). Norway maple is an introduced species and has established itself throughout Ontario and warrants no further consideration. Black walnut has been planted outside of its natural range and is now common in the local area. Ground cedar is commonly found in the area since this rare species list was established and GHD would not consider this a significant plant species today.

A further three regionally rare species were identified in areas 2 and 3 in addition to the species mentioned above (minus the ground cedar). These species included guelder rose, Austrian pine and Lily-of-the-valley. These species are non-native and relatively common in the area. GHD does not consider these species significant and neither species warrants protection.

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

4.2.2 Birds

Four bird species detected during GHD surveys are considered to be significant at the national (SARA 2019; COSEWIC 2019) or provincial level (COSSARO 2018) (Appendix C). These species are: grasshopper sparrow (*Ammodramus savannarus*), eastern meadowlark (*Sturnella magna*) bobolink (*Dolichonyx oryzivorus*) and barn swallow (*Hirundo rustica)*.

Bobolinks and eastern meadowlarks are both listed as threatened species at both the provincial and national levels (COSSARO 2018; SARA 2019). These species prefer grassy meadows and pastures with tall, dense grasses. Suitable habitat for these species was found in the middle and south end of Area 1 as well as in portions of Area 3.

The grasshopper sparrow is listed as a special concern species at both the national and provincial levels (SARA 2019; 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. Suitable habitat for this species was also found in the southern portion of Area 1 as well as in portions of Area 3.

The barn swallow is listed as a threatened species in both the national and provincial levels (SARA 2019; 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 contains appropriate foraging habitat and may have appropriate nesting habitat in the developed area to the extreme south. The proposed development indicates this area will remain undisturbed.

Two of the species detected during field inventories, the ovenbird (*Seirus aurocapillus*) and yellow-bellied sapsucker (*Sphyrapicus varius)* are considered area sensitive. Area sensitive species are species that require a minimum area of suitable habitat to successfully breed. The ovenbird was heard singing from BBS 3 on June 7th, 2019 and again from BBS4 on June 28th, 2019.

Records obtained from the Ontario Natural Heritage Information Centre (2019), indicate one Species at Risk occurred within the 1km x 1 km square overlapping the property (17QK1621), the eastern meadowlark. The most recent record of this species is from 2011. This species was observed in 2018 and 2020 during GHD field work and suitable habitat was present in the study area.

The Ontario Breeding Bird Atlas data for the 10 km x 10 km square that includes the property (17QK12) includes eighteen (18) bird species that are provincially (COSSARO, 2018) or nationally (COSEWIC, 2019) significant: least bittern (*Ixobrychus exilis* – threatened); black tern (*Chlidonias niger* – special concern provincially); common nighthawk (*Chordeiles minor* – special concern); eastern whip-poor-will (*Antrostomus vociferous* - threatened); chimney swift (*Chaetura pelagica* - threatened); olive-sided flycatcher (*Contopus cooperi* – special concern)*;* eastern wood-pewee (*Contopus virens* – special concern), loggerhead shrike (*Lanius ludovicianus migrans* – endangered); bank swallow (*Riparia riparia* – threatened) barn swallow (*Hirundo rustica* - threatened); wood thrush (*Hylocichla mustelina* – threatened federally, special concern provincially); golden-winged warbler (*Vermivora chrysoptera* – threatened nationally, special concern provincially); cerulean warbler (*Setophaga cerulea* – endangered nationally, threatened provincially); Canada warbler (*Wilsonia canadensis* – threatened nationally, special concern provincially); grasshopper sparrow (special concern), bobolink (threatened), eastern meadowlark (threatened) and evening grosbeak (*Coccothraustes vespertinus* – special concern). Many of these records were associated with larger natural features outside of the immediate study area. GHD biologists did not observe suitable nesting habitat for most of these species within the study area. As has been previously mentioned, old field meadows on the property provided appropriate breeding habitat for grassland species such as grasshopper sparrow, eastern meadowlark and bobolink. It also provided suitable foraging habitat for barn swallow. It is possible that aerial foraging birds such as bank swallows and common nighthawks might find suitable feeding habitat over the fields and meadows on the property; however, these species were not detected during GHD's survey efforts.

4.2.3 Amphibians and Reptiles

One amphibian species detected by GHD staff is considered to be nationally and/or provincially significant, the western chorus frog (SARA 2019; COSEWIC 2019; COSSARO 2018) (Appendix D). The western chorus frog was only identified at amphibian station 8, bordering Area 2. No reptile species were detected within Area 1 or the portions of Area 2 or 3 that GHD staff visited. No herpetofauna Species at Risk were listed among the records obtained from the Ontario Natural Heritage Information Centre (2019) for the 1km x 1 km square overlapping the property (17QK1621).

The Ontario Reptile and Amphibian Atlas (Ontario Nature 2019) records for the 10 km x 10 km square that overlaps the property (17QK12) include six species that are considered significant at either the provincial (COSSARO 2018) or national (SARA 2019; COSEWIC 2019) level. These records were for Blanding's turtle (*Emydoidea blandingii*), snapping turtle (*Chelydra serpentina*), midland painted turtle (*Chrysemys picta marginata*), eastern musk turtle (*Sternotherus odoratus*), northern map turtle (*Graptemys geographica*) and western chorus frog (*Pseudacris triseriata*). As was the case with records from the OBBA, most of these observations were associated with larger natural features outside of the immediate study area such as the nearby Otonabee River. Only the western chorus frog was identified by GHD during the 2020 field surveys.

The Blanding's turtle is listed as endangered federally (SARA 2019). It is listed as threatened provincially (COSSARO 2018). This turtle is known to travel large distances overland in search of nesting sites and new habitat. This shy turtle requires clean shallow lakes, ponds, and wetlands. This type of habitat is not found on the site but may exist in the nearby Lakefield South Wetland, which is located to the west of Lakefield Road.

The snapping turtle (*Chelydra serpentina*) is listed both federally and provincially as special concern (SARA 2019; 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. Possible habitat in beaver flooding along Ray's Creek.

The midland painted turtle is listed nationally as of special concern (COSEWIC, 2018). Painted turtles are excellent swimmers and avid baskers. To thrive, they require fresh water with soft bottoms, aquatic vegetation and basking sites. No suitable habitat was observed in Area 1, 2 or 3.

The eastern musk turtle is listed as special concern at both the national (COSEWIC 2019) and provincial levels (COSSARO 2018). Musk turtles are a small highly aquatic turtle rarely leaving the water other than to nest. They prefer shallow vegetated water and inhabit the near shore of these habitats. This type of habitat was not present in the study area.

The northern map turtle is listed as special concern at both the federal level (SARA 2019) and the provincial level (COSSARO 2018). Map turtles inhabit large rivers and medium to large sized lakes. The record from this atlas square was likely from the nearby Otonabee River as suitable habitat for this turtle was not found in the study area.

The western chorus frog is listed federally as threatened (SARA 2019). 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. This species was identified by call at Amphibian station 8.

4.2.4 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 (2019) for the 1km x 1 km square overlapping the property (17QK1621).

4.3 Natural Features

4.3.1 Lakefield South Wetland Complex

The Lakefield South Wetland Complex has been evaluated under the Ontario Wetland Evaluation System. The status of the wetland is provincially significant (PSW) based on its biological score (i.e., 203, with anything over 200 points being considered provincially significant). Other functions include resource products, habitat for snapping turtles, bullfrogs and furbearing species (Lakefield South Complex Wetland Evaluation). Although the Lakefield South PSW is located to the west of Area 2 on the other side of Lakefield Road, it is hydrologically connected to wetlands within the study area via Ray's Creek.

4.3.2 Wetlands

Wetlands identified in all three study areas are currently not mapped by the agencies as they are unevaluated. A memo was completed by GHD (Oct 12, 2022) assessing the wetland complexing rules for Provincially Significant wetlands and whether the unevaluated wetlands on the property would be considered for complexing. The conclusions in the memo identified they would not be considered for complexing due to their small size (<0.2 ha) and lack of connectivity hydrologically to the PSW Buffer recommendations are discussed in later sections of this report,

4.3.3 Woodlands

Woodlands are a natural heritage feature listed under Section 4.1 (Natural Environment) in the County of Peterborough's Official Plan (Office Consolidation July 2019). The OP permits development or site alteration in and adjacent to (within 50m) significant woodlands south and east of the Canadian Shield so long as it has been demonstrated there will be no new negative impacts on the woodland or its ecological functions. Although woodlands within the County have not yet been evaluated to determine their significance, the Official Plan indicates, "significance may be determined using criteria recommended by the Ministry of Natural Resources, or using alternative approaches approved by the local municipality that obtain the same objective." As a result, 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 in Area 1 and 2 would meet more than one of the criteria used to confer significance (Table 3.15). Further discussion on the impact on the woodlands is found in later sections of this report.

Table 4.1 Application of Significant Woodland Criteria on Subject Property

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, woodland is approximately 24ha 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.	No
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 which is within a specified distance (e.g., 120 m) *and meets minimum area thresholds (e.g., 1–20 ha, depending on circumstance)*	The County of Peterborough has not identified a natural heritage system in the area. Although the Lakefield South Wetland Complex is within 120m of woodlands identified in Area 1 and Area 2, the Lakefield Marsh wetland complex is more than 500 metres to the north of Area 1.
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 – in both Area 1 and 2
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.

Recommended Significant Woodland Criteria & Standards (NHRM, 2010)		
Criteria	**Comments & Standards**	**Met (Yes/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

4.3.4 Other Natural Features

There are no provincially significant Areas of Natural and Scientific Interest (ANSI) located within 120m of the subject property. The nearest ANSI (Lakefield Quarry) is located more than 1.8km to the east of Area 3. Although there is a valley system associated with Ray's Creek, it has not been designated as provincially significant by any agencies. Similarly, no one has previously identified provincially significant woodlands in the study area.

GHD's site visits confirmed the presence and location of Ray's Creek. This feature extended throughout Area 2 and was also present in the northern portion of Area 1. For more information about this feature and its functions, refer to Section 3.2.8 and 4.3.6 of this EIA report.

4.3.5 Significant Wildlife Habitat

In the Provincial Policy Statement (2014) 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 in Area 1 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 special concern and rare wildlife species. Three additional candidate SWH types were identified that could not be confirmed based on the field work GHD has conducted to date. All candidate habitats are described in Table 4.1 along with a note indicating whether they have a high, moderate or low probability of occurring.

Table 4.2 Candidate Significant Wildlife Habitat on Site

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**
Raptor wintering area	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Sites must be >20ha in size with a combination of forest and upland. Idle/fallow or lightly grazed field/meadow >15ha with adjacent woodlands. To confirm: Studies must show use of the habitat by one or more short-eared owls, or one or more bald eagles, or at least 10 individuals and 2 of the listed hawk/owl species. To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds.	Not confirmed, but possible	Low – GHD could not confirm this candidate SWH because surveys were not conducted over several winters.

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	Four seepage areas were documented within Community 11.
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 tree frog and spring peeper), only the spring peeper was abundant enough to meet the criterion.
Amphibian Breeding	Wetlands and pools >500m^2 supporting high species diversity.	Confirmed Area 2, Station 4	Western chorus frogs identified calling at Station 4.

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**
Habitat (Wetlands)	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.		

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**
Shrub Early Successional Bird Breeding Habitat	Large field areas succeeding to shrub and thicket habitats ≥10ha in size. Must not be class 1 or 2 agricultural lands or be actively used for farming in the past 5 years. To confirm: presence of nesting or breeding of 1 of the indicator species and at least two of the common species.	Not confirmed, but possible.	High - Both the indicator species; clay-coloured sparrow and brown thrasher were detected in the southern portion of Area 1 and 3 as were the common species field sparrow and willow flycatcher. Fields have been used as cattle pasture in last few years.
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	A grasshopper sparrow was detected throughout Area 3. Suitable habitat appears to be present throughout Area 3 and the south portion of Area 1

4.3.6 Fish and Aquatic Habitat

Area 1

The headwater drainage features (HDF) in Area 1 have the potential to provide direct and indirect fish habitat for Ray's Creek. Both the HDFs located in Area 1 are hydrologically connected through intermittent flows and provides nutrients, sediment, dissolved nutrients and organic matter to Ray's Creek. These components are important for the sustainability of warm and cool water fish communities. Ray's Creek provides direct fish habitat. Specifically, it provides feeding, spawning, rearing and overwintering habitat for Cyprinids of recreation and commercial value.

The surface water quality parameters collected within Area 1 were within the normal ranges for aquatic life (Section 3.2.2.2). The baseline data can be used for construction and post construction effectiveness monitoring that was requested by ORCA in June 2021.

Area 2

The HDFs located in Area 2 have the potential to provide direct and indirect fish habitat to Ray's Creek. Three (Habitat Zones 6, 7 and 11) of the seven HDFs identified in Area 2 are hydrologically connected through intermittent flows and provides nutrients, sediment, dissolved nutrients and organic matter to Ray's Creek. These components are important for the sustainability of warm and cool water fish communities. Ray's Creek provides direct fish habitat. Specifically, it provides feeding, spawning, rearing and overwintering habitat for Cyprinids of recreation and commercial value.

The remaining three HDFs (Habitat Zones 8, 9, 10 and 12) do not directly connect to Ray's Creek. Therefore, they do not provide direct fish habitat, however Habitat Zone 10 has the potential to connect Habitat Zone 11 which is directly connected to Ray's Creek.

The surface water quality parameters collected within Area 2 were within the normal ranges for aquatic life (Section 3.2.2.2). The baseline data can be used for construction and post construction effectiveness monitoring that was requested by ORCA in June 2021.

Area 3

The HDF identified in Area 3 has the potential to provide intermittent indirect fish habitat downstream to the Otonabee River. The connectivity is unknown as the HDF flows off site before potentially connecting to the Otonabee River. Specifically, it has the potential to provide marginal seasonal hydrological connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat. These attributes are important for the sustainability of the Otonabee River fish community.

Fish habitat in Ontario is managed federally by the Minister of Fisheries and Oceans Canada. Therefore, the Fisheries Act applies to the subject lands including Area 1, Area 2 and Area 3. No critical habitat for Aquatic Species at Risk (DFO, 2019) or sensitive spawning habitat was identified within the study area (OMNR, 2012).

4.3.7 Fish Community

Area 1, Area 2 and Area 3

The literature review and sampling efforts found no provincially and/or nationally rare species documented within the Area 1, Area 2 and Area 3(COSEWIC, 2019; COSSARO, 2018; OMNR, 2012; OMNRF, 2014).

The literature review of the fish species documented in Ray's Creek and the Otonabee River prefer cool and warm water thermal regimes and typically spawn in the spring and summer (Appendix F). The fish species found in both Ray's Creek and the Otonabee River are common and widely distributed within 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.

5.1 Wetlands

Area 1

A few unevaluated wetlands were identified in Area 1. Among the wetlands for which detailed vegetation assessments were conducted in Area 1 were Communities 8, 9, 11, 14 and 15. Under the Ontario Wetland Evaluation System 3rd edition, they would be called deciduous swamp, tall shrub swamp, coniferous swamp and groundcover marsh. Under the ELC system, they were considered to be black ash swamp, willow thicket swamp, white cedar swamp, meadow marsh and riparian edge of creek. These wetlands are found within 750m of the provincially significant Lakefield South Wetland Complex and are hydrologically connected. Under complexing criteria it may be some of these wetlands could be complexed. 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 various wetlands within Area 1 as an area of constraint (Figure 1.1).

In Area 1, the wetlands to be buffered are directly connected to Ray's Creek and its tributaries (i.e., Community 11). Two small pockets of willow thicket were located in a disturbed area north of an existing trail (communities 9 and 10). The area in general was a cultural thicket with apple trees, scattered cedar and buckthorn. Two small seeps created linear bands of shrub willows. Due to the size of these small wetland pockets (168 and 817 square metres) and their isolated nature, they are not recommended for retention. They will be compensated for by widening the wetland to the south of the trail (Community 11). This is being discussed with ORCA and a wetland compensation plan report and drawing are being developed.

The 30-meter buffer will protect the various features and functions of these wetlands of which included 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 buffer's integrity.

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

In the northern portion of Area 1, the majority of the proposed buffer area is cultural meadow and thicket. GHD recommends a planting plan that includes only native tree and shrub be prepared for the buffer areas. This will increase the density of the buffer vegetation to assist in mitigating noise, light and activity from the development during the site preparation, construction and post-construction periods. This will also better protect the functions of wetland. Species selected should be native tree and shrub species indigenous to the Peterborough Area.

Area 2

A few unevaluated wetlands were also identified in Area 2. Among the wetlands for which detailed vegetation assessments were conducted in Area 2 were Communities 19, 21, 23, 24and 32. Under the Ontario Wetland Evaluation System 3rd edition, they would be called tall shrub swamp, deciduous swamp, robust emergent marsh, groundcover marsh and tall shrub swamp. Under the ELC system, they were considered to be mineral thicket swamp, green ash mineral deciduous swamp, cattail mineral shallow marsh, mineral meadow marsh and mineral thicket swamp. These wetlands are found within 750m of the provincially significant Lakefield South Wetland Complex, however, only Communities 21, 23 and 24 are hydrologically connected by Ray's Creek. Communities 19 and 32 are separated from Lakefield Road by properties in private ownership and as such, hydrological connectivity could not be ascertained.

A memo was completed by GHD (Oct 12, 2022) assessing the wetland complexing rules for Provincially Significant wetlands and whether the unevaluated wetlands on the property would be considered for complexing. The conclusions in the memo identified they would not be considered for complexing due to their small size (<0.2 ha) and lack of connectivity hydrologically to the PSW. Buffers that have been applied range from 15- 30 meters.

The wetlands in the central portion of Area 2 are recommended for retention, as they are associated with seepage areas. In the southern portion of Area 2, there is a headwater drainage feature that winds down the slope. Associated with that is a band of dogwood and willows (Community 19). A 15-meter buffer is proposed to be implemented off of communities 19 and 32. The 15-meter buffer will protect the features and functions of this area, so the proposed development does not have a significant negative impact. .

Cultural thicket habitat was identified adjacent to some of the wetlands delineated at the southern end of Area 2. GHD recommends a planting plan that includes only native tree and shrub be prepared for the buffer areas. This will increase the density of the buffer vegetation to assist in mitigating noise, light and activity from the development during the site preparation, construction and post-construction periods. This will also better protect the functions of wetland. Species selected should be native tree and shrub species indigenous to the Peterborough Area.

Areas 1 & 2

The proposed development is residential and neighbourhood commercial with a combination of single-family dwellings, town homes and apartment buildings. The residential buildings and associated parking and roads will be entirely outside of wetlands and their associated 30-meterbuffer. Geotechnical reports from Cambium Inc. suggest that wetlands in the study area are maintained by surface flows, rather than groundwater sources (Cambium Inc., 2017). As a result, GHD recommends the incorporation of low impact development techniques in development plans so as to maintain hydrologic flows to wetlands, particularly in Area 2.

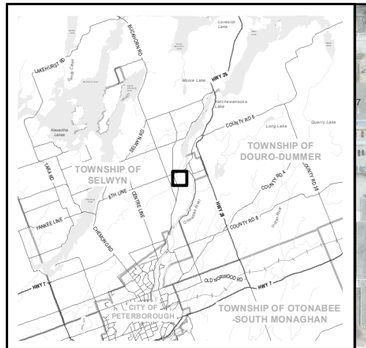
A sanitary sewer line is proposed along the western edge of the development to service the residents of the subdivision. The majority of the sewer line is located outside of identified wetlands in Area 1 and 2 and their associated buffers. This sewer line will be installed through an open cut construction technique. A small portion of this sanitary sewer is proposed through the wetland buffer and a small portion of the unevaluated wetland (Communities 8 and 9) (Figure 1.1). To minimize impacts to these wetlands and their associated buffers, this section of the sewer line could be installed by directional drilling. This needs to be confirmed based on geotech and engineering servicing assessments. Alternatively an open trench would require temporary loss of wetland and a wetland restoration plan. This could include vegetative matting techniques. The final method of construction may require input from a biologist and ORCA to mitigate any long term negative impacts on the wetland and the preferred restoration technique.

The stormwater ponds (SWM #1 and 2) have been located outside of the 30 metres buffers from the watercourses and wetlands. The outfalls will need to pass through a portion of the 30 m buffers. GHD will work with ORCA and the stormwater engineers on a design that incorporates measures to prevent and mitigate impacts to those features.

No significant impacts are anticipated on the wetlands as a result of the proposed development so long as the buffer and silt fencing recommendations and mitigation measures are implemented. Compensation is being pursued as an option for any of the small wetlands that are recommended for removal.

Area 3

Two pockets of young dogwood, grasses and wetland plants were located in a disturbed area southeast corner of Area 3. These areas (Community 39) were slightly lower than the surrounding abandoned field that was in a mid-successional stage (Communities 35 and 36). The area in general was an old meadow, likely abandoned pasture land with apple trees, scattered cedar and buckthorn. Due to the size of these wetland pockets and their isolated nature, they are not recommended for retention. If wetland is removed, it will be compensated for elsewhere on the property in the large parts of Area 2 where buffers and open space areas are outside of the development envelope (see figure). This option is being discussed with ORCA and will require submission of a wetland compensation plan report and drawing.



ELC TYPES - 1ST APPROXIMATION

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

ELC CODE	ECOSITE/VEG TYPE DESCRIPTION
CUM	Cultural meadow
CUM1-1	Dry-moist old field meadow
CUT	Cultural thicket
CUT1	Mineral cultural thicket
CUT1-1	Sumac cultural thicket
CUW1	Mineral cultural woodland
FOC2-2	Dry-fresh white cedar coniferous forest
FOC4-1	Fresh-moist white cedar coniferous forest (Type)
FOD	Deciduous forest
FOD4	Dry-fresh deciduous forest
FOD7-2	Fresh-moist ash lowland deciduous forest
MAM2	Mineral meadow marsh
MAS2-1	Cattail mineral shallow marsh
SWC1-1	White cedar mineral coniferous swamp
SWD2-1	Black ash mineral deciduous swamp
SWM6	Birch-poplar organic mixed swamp
SWT2	Mineral thicket swamp
SWT2-2	Willow mineral thicket swamp
SWT2-5	Red-osier mineral thicket swamp

VILLAGE OF LAKEFIELD

LAKEFIELD SOUTH COMPLEX PSW

LAKEFIELD SOUTH COMPLEX PSW

LAKEFIELD SOUTH COMPLEX PSW

AREA 1

AREA 2

AREA 3

BUILT-UP AREA 18,759 m²

PEACOCK ROAD

MURRAY ST

COYLE CR

SMITH STREET

SEAFORTH CRESCENT

YOUNGS POINT ROAD

LAKEFIELD ROAD

8TH LINE

7TH LINE

STUDY LIMIT (TATHAM ENGINEERING 2019)

AREA 2 LIMIT

AREA 3 LIMIT

Ray's Creek

33 HEDGEROW
35 CUM (PLOWED) 31,577 m²
02MLS01
02MLS02
02MLS
02MLS03
39 SWT 1,020 m²
38 SWALE 35,716 m²
07BBS
33 HEDGEROW 1,500 m²
08BBS
36 CUT 35,716 m²
03MLS01
39 SWT2-5 2,845 m²
03MLS
35 CUM (PLOWED) 115,372 m²
03MLS02
03MLS03
33 HEDGEROW 2,241 m²
40 CUT1 5,760 m²
37 CUM1-1 35,716 m²
04MLS01
35 CUM (PLOWED)
01MLS01
01MLS02
01BBS
2 CUT1 4,829 m²
3 CUT1-1 7,181 m²
4 HEDGEROW 721 m²
06BBS
BERM 1,424 m²
09BBS
04MLS02
04MLS03
34 CUT1 61,771 m²
33 HEDGEROW 2,020 m²
16 CUM1 1,833 m²
04BBS
13 CUW1 2,397 m²
MLS04
1 CUM1-1
1 CUM1-1 36,940 m²
9 SWT2-2 817 m²
12 FOC4-1 2,332 m²
02BBS
10 CUW1
10 CUW1 5,762 m²
9 SWT2-2 168 m²
11 SWC1-1 10,710 m²
02MAS
05BBS
12 FOC4-1 5,245 m²
01MAS
1 CUM1-1
15 RIPARIAN 1,440 m²
05MAS
MLS03
14 MAM3-9 907 m²
1 CUM1-1
11 SWC1-1
12 FOC4-1 4,827 m²
03MAS
001
5 CUT1 18,452 m²
6 CUT1 678 m²
7 CUW1 3,728 m²
8 SWD2-1 1,464 m²
9 SWT2-2 2,376 m²
26 FOC4-1 3,884 m²
29 FOD 3,099 m²
003
002
20 FOC4-1 10,564 m²
21 SWD2-1 6,074 m²
18 FOC4-1
18 FOC4-1 7,027 m²
16 CUM1
18 FOC4-1 804 m²
10BBS
WSS08
32 SWM6 641 m²
WSS09
19 SWT
18 FOC4-1 761 m²
15 RIPARIAN
18 FOC4-1 3,550 m²
32 SWM6 748 m²
WSS10
16 CUM 40,994 m²
06MAS
WSS04
WSS06
WSS02
30 CUW1 1,153 m²
WSS05
26 FOC4-1 15,491 m²
27 SWD2-1 509 m²
BBS12
18 FOC4-1 3,225 m²
25 CUT1 13,854 m²
24 MAM2 1,129 m²
26 FOC4-1 9,565 m²
22 CUT1 2,073 m²
18 FOC4-1 32,640 m²
16 CUM1 2,423 m²
11BBS
16 CUM
25 CUT1
23 MAS2-1 6,269 m²
31 CUT1 11,508 m²
WSS07
33 HEDGEROW 1,424 m²
BUILT-UP AREA 320 m²
17 CUT1 1,410 m²
19 SWT2 4,520 m²
07MAS
18 FOC4-1 1,048 m²
08MAS

Wetland loss calculation

Total wetland loss = 5,454 sq. m.

Total wetland comp = 10, 908 sq. m. at 2:1 ratio

Note:
wetland compensation areas shown in pink are potential general locations for compensation to occur

Legend

- Butternut Health Assessment
- WWS - Wetland Soil Survey
- BBS - Breeding Bird Survey Station
- MAS - Modified Amphibian Survey Station
- MLS - Eastern Meadowlark/Bobolink Survey Station
- MLS - Eastern Meadowlark/Bobolink Survey Transect
- Setback, Multi-Value (See Report for Details)
- Watercourse, Field Verified (GHD, 2017)
- Study Limit (Tatham Engineering, 2019)
- Wetland, Evaluated-Provincial
- Vegetation Communities
- Wetland Communities
- Forest Communities
- Wetland Compensation
- Wetland to be Removed and Compensated for

1 cm = 46 meters

0 30 60 90 120

Meters

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

Paper Size ANSI B

Data Disclaimer

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Print date: 10 May 2024 - 12:12

Triple T. Holdings Limited
Pt Lot 26, Con 7, Township of Smith
Town of Lakefield
Environmental Impact Study

Wetland Loss and Compensation

Project No. 11214535
Revision No.
Date May 10, 2024

Figure 4

Data source: Image © County of Peterborough, 2018.

5.2 Woodlands

Area 1 and Area 2

The majority of Area 2 and the north-western portion of Area 1 are part of a contiguous forest block that meets MNRF's criteria for Significant Woodlands. The ecological functions of the woodland in Area 2 include water protection (e.g., along Ray's Creek and identified seepage areas) and as a linkage area for wildlife movement and migration. The proposed development has been placed outside of the woodland areas providing these functions.

Development is not proposed in either the coniferous swamp or coniferous forest communities identified in the northern portion of Area 1 (i.e., Communities 11 and 12). Development is not proposed in coniferous or mixed forests that are either side of Ray's Creek, or headwater drainage features that contribute to it. Some trees along the eastern edge of coniferous forests identified in the south of Area 2 would be removed in order to accommodate the proposed subdivision. Similarly, it is anticipated that tree removal will occur in the far north of Area 2 (community 26), where four estate residential lots are proposed. However, the north-south connections through the area would be maintained.

Area 3

Area 3 does not contain any vegetation communities that would be considered woodland.

5.3 Valleyland

Area 1 and Area 2

An approximately 670 metre long swath of Area 2 is valleyland associated with Ray's Creek. A staking exercise should be completed in cooperation with ORCA to determine the top of bank of this feature. Currently, the valley is considered to occur entirely within the buffers provided to the wetland communities and the watercourse (i.e., Ray's Creek).

Area 3

Area 3 does not contain any features that would be considered valleyland.

5.4 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. Three 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. Where avoidance was not possible, additional measures have been described below.

5.4.1 Seeps and Springs

Seeps/Springs are important feeding and drinking areas especially in the winter and will typically support a variety of plant and animal species. Four seeps/springs were identified in the northern portion of Area 1 that were associated with a wetland (i.e., Community 11). As these seeps were within the boundaries of the wetland community, they will be protected from development and by a minimum of 30-meter buffer from the wetland edge.

The sewer line will be located just upstream of these features. To protect the seeps and prevent drainage of groundwater into the trench, it is recommended that trench plugs be installed in those parts of the sewer line adjacent to Communities 7 and 12.

Based on initial site assessments there are several headwater drainage features and seeps in Area 2 that are based on seepage. Those have been shown on Figures 1.1 and 3.1. Measures to protect those features and/or mitigate have been included in other sections.

No seepage areas were identified in Area 3.

5.4.2 Special Concern and Rare Species

One special concern species was identified during field surveys: grasshopper sparrow. This species was identified within Community 2 (a cultural thicket). Community 2 and adjacent vegetation Communities 1 and 5 will be removed as part of the proposed development. Grasshopper sparrows inhabit similar grassland habitats as eastern meadowlarks and bobolinks, which have also been identified on the site (in Areas 1 and 3). It is anticipated that off-site habitat compensation will be required by MECP as part of the approvals for the proposed development. Such off-site enhancement will also create habitat for grasshopper sparrows. Refer to Section 5.4.1 for further details on habitat compensation.

5.5 Species at Risk

5.5.1 Eastern Meadowlark/ Bobolink

Eastern meadowlark and bobolinks were identified during field surveys in various parts of Community 1 north and south of the skating oval (Area 1). Birds were observed and suitable habitat documented for bobolink and eastern meadowlark in Area 3. This same open field community extends into Area 2 (Community 16). 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 is in compliance with the Endangered Species Act.

5.5.2 Barn Swallow

Barn swallows were detected flying over and foraging in the vicinity of Communities 35, 36, 38 and 39 in Areas 3. One was also observed in the vicinity of Community 27 in Area 2. Suitable structures for nesting were not confirmed in the study area. Potential nesting habitat in the built up area south of Community 36 is located in an area of the site that is to remain undisturbed. Should the development plan change in a manner that would require demolition of any structures in this area, a nest search would need to be conducted during the appropriate season. Depending on the results of this search, appropriate permissions would need to be obtained from MECP to ensure compliance with the Endangered Species A

5.5.3 Western Chorus Frog

Western chorus frog was found along the highway in Area 2, associated with the wetlands of Ray’s Creek. Although several lots are proposed in community 31 on the highway, this will not interfere with the breeding habitat of this species. As the species is only listed federally, it is not protected on private land in Ontario.

5.5.4 Butternut

Three butternut trees were identified in community 29, just west of the oval. All three trees were assessed by a butternut health assessor and found to be Category 1 (non-retainable). As a result, these trees do not require a specific buffer. That said, the habitat in which the trees were found was within the woodland and wetland communities where no development is proposed. As such the trees will be retained and will not be impacted by the development of the site.

5.5.5 Black Ash

Three communities containing this species (8, 21 and 23) were found in Area 1 and 2, north of Ray's Creek and southwest of the Ontario Speed Skating Oval. The Ontario Ministry of the Environment, Conservation and Parks is still trying to determine the best way to recover black ash in Ontario. As a result, the Ministry has temporarily suspended protections for black ash for a period of two years from the time the species was added to the Species at Risk in Ontario list (i.e., until January 2024). During this time, proponents do not need to seek authorizations for activities that impact this species or its habitat.

5.5.6 Bats

Although GHD staff looked for evidence of bat maternity roosts in the study area, none were found. That said, the majority of the Ray's Creek corridor is being protected by buffers/setbacks from the wetland and/or the creek. As a mitigation measure, prior to any woodland clearing, a biologist shall identify and ensure no bat cavity/snag trees are within the clearing area. GHD will work with MECP to ensure compliance with the ESA.

5.6 Fish and Aquatic Habitat

Area 1

Ray's Creek provides direct fish habitat and the headwater drainage features (HDF) provides direct and indirect fish habitat to Ray's Creek. The natural feature form and function of Ray's Creek and the HDFs will be protected by a 30 m naturally vegetative buffer from the high-water mark.

All development will be located outside the 30 m buffer. Developments includes houses, roads, and stormwater management facilities.

No significant impacts to fish or fish habitat are anticipated from future development of Area 1 provided the 30 m setback is respected and the mitigation measures and recommendations are implemented as outlined in this report. The design of the stormwater facility and the outfall must be discussed with the agencies to ensure compliance with ORCA, MECP and DFO requirements.

Area 2

Ray's Creek provides direct fish habitat and the headwater drainage features (HDF) in Habitat Zone 10 and 11. As in Area 1 the natural feature form and function will be protected by a 30 m naturally vegetative buffer from the high-water mark. All development will be located outside the 30 m buffer of Rays Creek and HDFs identified above. Developments includes houses, parks and stormwater management facilities. The 30 m buffer on Ray's Creek will encompass the HDF's in Habitat Zone 8 and most of Habitat Zone 7.

No significant impacts to fish or fish habitat to Rays Creek and HDFs (Habitat Zone 8, 9, 10, 11 and most of Habitat Zone 7) are anticipated from future development provided the 30 m setback is respected and the mitigation measures and recommendations are implemented as outlined in this report.

It is anticipated that the headwater drainage features (HDF) within Habitat Zone 6, 9, 12 and the northern part of Habitat Zone 7 will be directly impacted from the proposed development. To ensure there are no significant negative impacts to the downstream fish or fish habitat the HDF function must be replicated by maintaining lot level conveyance of surface water flows through a vegetated swale. Lot level conveyance of flows through an open vegetated channel will maintain surface water flow from the site to the downstream wetland and maintain the hydrological connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat specifically for Habitat Zone 6 that has the potential to connect to Rays' Creek downstream during the spring or high flow event.

The proposed development will directly impact the HDF feature through modification or realignment of the feature. To ensure there are no significant negative impacts to the downstream fish or fish habitat the HDF function must be replicated by maintaining by either LID's, collection systems or other techniques such as lot level conveyance of

surface water flows through a vegetated swale. Lot level conveyance of flows through an open vegetated channel will maintain surface water flow from the site to the downstream wetland and maintain the hydrological connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat. Compensation for these features may be required.

Area 3

The headwater drainage feature (HDF) potentially provides intermittent indirect fish habitat downstream to Otonabee River. The proposed development will directly impact the HDF feature through modification or realignment of the feature. To ensure there are no significant negative impacts to the downstream fish or fish habitat the HDF function must be replicated by maintaining lot level conveyance of surface water flows through a vegetated swale. Lot level conveyance of flows through an open vegetated channel will maintain surface water flow from the site to the downstream wetland and maintain the hydrological connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat.

Stormwater Management Facilities for Area 1, Area 2 and Area 3

During the detailed design phase of the project. A multiple treatment drain approach should be used to manage stormwater onsite. A combination of lot level conveyance and end-of-pipe treatments should be incorporated where possible into the final design. 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 sediment and erosion control plan must be reviewed and approved for construction activities to ensure disturbed soils are not transported off-site to all watercourses (Ray’s Creek, HDFs and Otonabee River) negatively impacting aquatic life, fish and fish habitat. To protect the watercourses and ensure project compliance with the PPS and Fisheries Act, recommendations have been provided in Section 7.0 for incorporation into the final site plan.

Table 5.1 Impact Assessment and Recommendation 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 built infrastructure on adjacent lands. Potential release of contaminants via surface runoff.	30-meter buffer from the boundary of wetlands as per Figure 1.1 Buffer to be supplemented with native trees and shrubs in those areas where such vegetation is absent Heavy-duty silt fencing to be installed around the active development area, to prevent sediment from silt flowing into wetlands LID approaches to be incorporated into the development plan Compensation to be discussed with ORCA in order determine whether wetland compensation is suitable and if so to develop an appropriate wetland compensation plan. Minimum 5-year post build-out 'effectiveness monitoring plan' to be developed	None
Woodlands	Potential loss of woodland area. Potential loss of function as linkage area. Potential loss of water protection function.	Development in woodland areas will be minimized to the extent possible. Development will be situated along the edge of woodland features Woodlands within 30 metres of Ray's Creek and identified wetlands will be retained as naturally-occurring vegetation.	Low
Valleyland	Potential impacts to feature. Potential that natural hazards are created.	Staking exercise to confirm the extent of this feature shall be completed in cooperation with ORCA. A minimum setback distance of 5-meters will be established from either the approved top of bank OR from the combined distance from the stability and erosion components; or the setback will be 5-meters from the toe of the valley slope; or the setback shall be 5-meters measured from the regulatory floodplain, whichever is greater. This feature is not to be fragmented by the proposed development.	None
Significant Wildlife Habitat - Seeps and Springs	Potential loss of wildlife habitat	A 30-metre buffer has been placed around wetlands were seeps/springs where identified – trench plugs to be installed in sewer lines – design of LID's or other measures to maintain seepage sources and groundwater flows	None Additional mitigation measures, including compensation may be required.
Significant Wildlife Habitat - Special Concern Species - Grasshopper Sparrow	Loss of breeding and feeding habitat for grassland birds	Compensation off-site as part of MECP permit for meadowlark 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 5.3.1 for details)	None
<u>Area 1</u> Fish and Aquatic Habitat-Ray's Creek (Habitat Zone 4) and Headwater Drainage Features (HDF) (Habitat Zone 1-3)	Potential of disturbance of fish habitat due to SWM facility	– 30 m vegetated buffer from high water mark. No development within the buffer. – No in-water works. – Sediment and erosion control plan to be reviewed by professional biologist. – Construction sediment and erosion control measures to be incorporated into development (Section 7.0). – Development must comply with *DFO Measures to Protect Fish and Fish Habitat.* – Final design to be assessed by professional biologist. – Minimum 5-year post build-out 'effectiveness monitoring plan' to be developed	No negative impact to feature.
<u>Area 2</u> Fish and Aquatic Habitat- Ray's Creek (Habitat Zone 4) and HDFs (Habitat Zone 8, 10, 11 and part of zone 7)	Potential of disturbance of fish habitat due to SWM facility	– 30 m vegetated buffer from high water mark. No development should occur within the buffer. – No in-water works. – Sediment and erosion control plan to be reviewed by professional biologist. – Construction sediment and erosion control measures to be incorporated into development (Section 7.0). Development must comply with *DFO Measures to Protect Fish and Fish Habitat.* Final design to be assessed by professional biologist. Minimum 5-year post build-out 'effectiveness monitoring plan' to be developed	Low
<u>Area 2</u> Fish and Aquatic Habitat of HDF (Habitat Zones 6, 9, 12 and the norther part of Habitat Zone 7)	Modification or Realignment of Intermittent HDF	– Sediment and erosion control plan to be reviewed by professional biologist. – Construction sediment and erosion control measures to be incorporated into development (Section 7.0). Development must comply with *DFO Measures to Protect Fish and Fish Habitat.* – Compensation for these features may be required based on the results of the additional site assessments. – Final design to be assessed by professional biologist. – additional mitigation measures may apply based on additional assessments.	Low Moderate
<u>Area 3</u> Fish and Aquatic Habitat of HDF (Habitat Zone 5)	Modification or Realignment of Intermittent HDF	Must maintain lot level conveyance of flows to downstream wetland. Must maintain open channel form with vegetated banks. Development must comply with *DFO Measures to Protect Fish and Fish Habitat.* Final design to be assessed by professional biologist.	Low
<u>Area 3</u> Fish and Aquatic Habitat Otonabee River	No impact anticipated: proposal development is a significant distance away from Otonabee River.	– Sediment and erosion control plan to be reviewed by professional biologist. – Construction sediment and erosion control measures to be incorporated into development (Section 7.0). Development must comply with *DFO Measures to Protect Fish and Fish Habitat.*	None

Feature or Function	Impact to Feature or Function	Mitigation	Residual Effect
Stormwater Management Facilities (Area 1, Area 2 & Area 3)	Stormwater management, change to water quality	– Stormwater ponds to remain outside of the 30 m buffer from Ray's Creek and identified HDFs in Area 1. – No in-water works in Area 1. – Stormwater management should have a multiple treatment approach and included low impact development features. – Stormwater pond outlet should have finishing treatment through a bioswale feature. – Features to minimize thermal pollution and reduce the temperature of discharged waters to the Ray's Creek to protect cool and warm water fish species. Final detailed design should be reviewed by a biologist in terms of the outfall and setbacks.	Low

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 Federal Legislation

6.1.1 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. It is recommended that during the final design the development be reviewed by a professional biologist and DFO staff to ensure projects complies with the Fisheries Act.

6.1.2 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.

6.2 Provincial Legislation

6.2.1 Endangered Species Act

In order to maintain compliance with Section 23.2 of the Endangered Species Act, a number of steps are required because of the presence of eastern meadowlark and bobolink in the study area. 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.

6.2.2 Provincial Policy Statement (2020)

The subject property does not contain any provincially significant coastal wetlands, valleylands, or ANSI's. As a result, Sections 2.1.4b) and 2.1.5 a) c) e) and f) of the Provincial Policy Statement would not apply. As significant wetlands, 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 a, b, and d, 2.1.6, 2.1.7, and 2.1.8. Section 5.1 (Significant Natural Features: Lakefield South Wetland Complex), Section 5.2 (Significant Woodlands), Section 5.3 (Significant Wildlife Habitat), Section 5.4 (Species at Risk) and Section 5.5 (Fish and Aquatic Habitat) of this EIA report contain recommendations, including buffers and mitigation measures, as well as compensation that show the proposed development would not a negative impact on those natural heritage features and their ecological functions.

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

The study area falls within an identified settlement area associated with the Town of Lakefield. It is located within a recognized Growth Centre that has specific policies under the County of Peterborough's 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.

6.3 Local and Other Regulatory Bodies

6.3.1 County of Peterborough Official Plan (Consolidated to July 2019) and Township of Lakefield Land Use Plan (Schedule A1-1)

In this EIA report, Section 5.1 (Significant Natural Features: Lakefield South Wetland Complex), Section 5.2 (Significant Woodlands), Section 5.3 (Significant Wildlife Habitat), Section 5.4 (Species at Risk) and Section 5.5 (Fish and Aquatic Habitat) describe measures that would permit the proposed development to proceed in a manner consistent with the County of Peterborough 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.

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

In this EIA report, Section 5.1 (Significant Natural Features: Lakefield South Wetland Complex) and Section 5.5 (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.

The EIS includes recommendations regarding development in portions of unevaluated wetlands and headwater drainage features. Those locations will be discussed with ORCA in terms of potential compensation and other mitigation measures.

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

7. Summary of Recommendations

The following section is a comprehensive list of all project mitigation measures, recommendations, best management practices, and or compensation measures (if required). Many recommendations have been discussed or referenced in the body of the text and others may be newly presented standard best management practices. This list is intended to assist project reviews, contractors and clients to understand all environmental recommendations and to ensure all parties have fulsome understanding of the project. The final conclusions of this report are based on the implementation of the following.

7.1 General

1. The construction envelope must be clearly defined and delineated and a line 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 County of Peterborough, Otonabee Region Conservation Authority, Department of Fisheries and Oceans and Ministry of the Environment, Conservation and Parks.
4. Any vegetation clearing required for site access prior to construction shall be completed outside of the Breeding Bird timing window of April 15th to August 15th (as per Environment and Climate Change Canada regulations).
5. The Project Manager and Contractor are obligated to ensure that all mitigation measures are strictly observed.
6. Construction should be undertaken during normal weather conditions, to the extent possible, and the project shall be designed to appropriate specifications to withstand variable weather conditions.
7. No works within Ray's Creek.
8. The headwater drainage feature (HDF) function for any HDFs that are being modified or realigned must be replicated by maintaining lot level conveyance of surface water flows through a vegetated swale.
9. During the detailed design of any mitigation measures re HDF, the project should be reviewed by a professional biologist.

7.2 Wetlands

1. A 30 m buffer (setback) will be established from the outermost edge of the unevaluated wetland communities in the study area, with a few wetlands protected with a 15-meter buffer as per Figure 1.1.
2. No development, grading, fill or building envelopes are to intrude into this buffer (setback), which shall consist of natural self-sustaining vegetation indigenous to the study area.
3. Directional Drilling be the required method for the installation of the sanitary sewer within the section running through the wetland communities and associated buffer areas to minimize any potential negative impacts.
4. Low impact development (LID) practices will be incorporated into the proposed development so as to maintain surface water flow to wetlands.
5. Wetland compensation will be completed for any smaller wetlands recommended for removal in consultation with ORCA and appropriate permits obtained.
6. A 5-year post build-out effectiveness monitoring plan will be implemented to ensure the performance of the 30-metre buffer and any wetland compensation area(s) developed, amongst other proposed mitigation measures.

7.3 Woodlands and Associated Wildlife Habitat

1. Natural vegetation cover shall be allowed to grow wild, and downed woody debris (i.e., fallen sticks, logs) shall not be removed from woodland habitats retained 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.

7.4 Valleyland

1. A staking exercise will be conducted in cooperation with ORCA to confirm the extent of the valley feature in the study area.
2. This feature is not to be fragmented by the proposed development.
3. A minimum setback distance of 5-meters will be established from either the approved top of bank OR from the combined distance from the stability and erosion components; or the setback will be 5-meters from the toe of the valley slope; or the setback shall be 5-meters measured from the regulatory floodplain, whichever is greater.

7.5 Species at Risk

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

7.6 Stormwater

1. Development including stormwater features will be located outside of the 30 m buffer from all watercourses (Ray's Creek and HDFs in Area 1).
2. To avoid point source erosion, the outfall to all watercourse will be 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 Ray's Creek to protect cool and warm water fish species.
6. Stormwater outfall to be designed in consultation with ORCA and a fisheries biologist.

7.7 Sediment and Erosion Control

1. All sediment and erosion control products will be selected for the site based on the manufacturer's product specifications. Product installation and maintenance will follow the manufactures guidelines.
2. 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 the watercourse.
3. All sediment and erosion control measures shall be inspected regularly during the construction phase and periodically thereafter to ensure they are functioning properly, maintained, and upgraded as required. Sediment fence to be checked regularly to ensure they are maintained and working properly. Accumulated silt and debris will be removed from the fence and site after every precipitation event.
4. Construction will be undertaken during normal weather conditions, to the extent possible, and will avoid large precipitation events to minimize the risk of sedimentation off-site.

5. 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). Such occurrences should be document by the site inspector and provided to a qualified biologist.
6. Should work conditions change such that it is possible that fish or fish habitat may potentially be impacted, all works shall cease until the problem has been corrected or authorization has been obtained from the appropriate authorities.

7.8 Fish and Fish Habitat (DFO measures to protect fish and fish habitat)

7.8.1 Channel Realignment and or Modifications of Headwater Drainage Features (Area 2 and Area 3)

1. The final site plan should be reviewed by a professional biologist and DFO staff to ensure the project is in compliance with the Fisheries Act.
2. Headwater drainage feature (HDF) function must be replicated by maintaining lot level conveyance of surface water flows through a vegetated swale. Lot level conveyance of flows through an open vegetated channel will maintain surface water flow from the site to the downstream wetland and maintain the hydrological connections, sources of nutrients, sediments and food supply inputs to the downstream fish habitat.
3. During construction if fish are observed within the channelized HDF at any time, works shall be stopped immediately, and a qualified biologist must be contacted to conduct a fish salvage.

7.8.2 Ray's Creek (Area 1 and 2) and the Otonabee River (Area 3)

1. No work in or near water to avoid killing fish by means other than fishing.
2. Development will occur a minimum of 30m from Ray's Creek and the Otonabee River. The buffer will maintain riparian vegetation between areas of land activity and the high watermark of the watercourses.
3. No use of explosives in or near water.
4. Respect MNRF fish timing windows to protect fish.
5. 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.
6. Maintain riparian vegetation around wetland.
7. 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.
8. No disturbance of bank material or building structures in the area than may result in erosion or scouring.
9. Prevent soil compaction using mats and pads.
10. 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.

7.9 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 watercourses.
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 watercourses.
4. Vehicle and equipment refuelling and/or maintenance shall be conducted within a defined staging area 30 m from any watercourse.
5. Machinery will not cross the watercourse.

7.10 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 the watercourse.
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 watercourse.
3. Completely isolate all concrete work from all watercourses. All concrete wash water shall be directed to a collection basin or vegetated area to effectively remove all suspended solids, dissipate velocity and prevent deleterious substances from entering the watercourse.
4. 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.
5. All mortars, 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.

7.11 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. Building material used in a watercourse will be handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish. Construction crews will be fully trained in their use to ensure timely and effective responses to spill incidents.
4. Vehicle and equipment refueling shall be conducted on impermeable pads/pans within a defined staging area.
5. 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 meters from the watercourse.
6. 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.

8. Conclusion

This Environmental Impact Assessment report was prepared to address potential environmental issues associated with an application to develop a property located at Part Lot 26, Concession 7 in the Township of Selwyn, 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. In particularly obtaining the relevant permits from ORCA and MECP. These recommendations have been made to address potential impacts to natural features (identified wetlands, woodlands, watercourses and wildlife habitat, Species at Risk) and/or their functions during the site preparation, construction and post-construction period.

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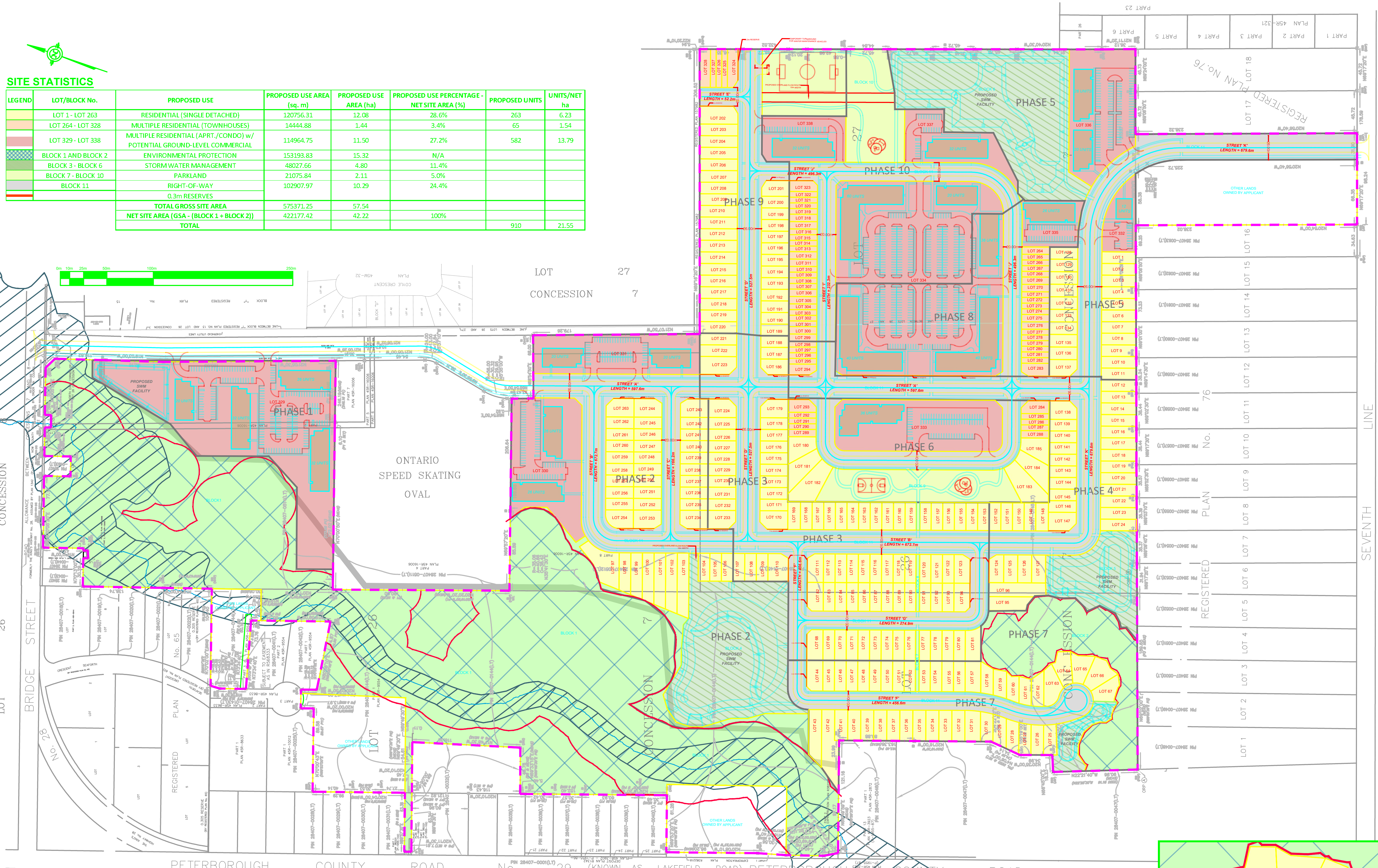
Appendices

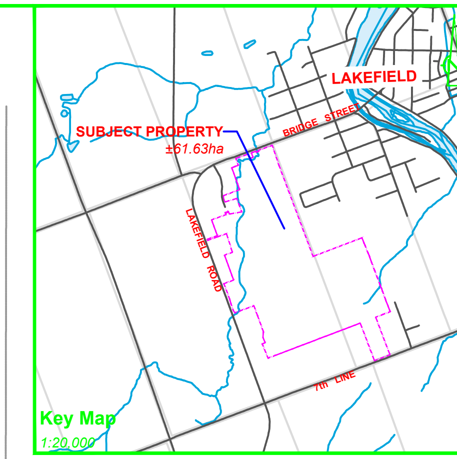
Appendix A

Site plan

SITE STATISTICS

LEGEND	LOT/BLOCK No.	PROPOSED USE	PROPOSED USE AREA (sq. m)	PROPOSED USE AREA (ha)	PROPOSED USE PERCENTAGE - NET SITE AREA (%)	PROPOSED UNITS	UNITS/NET ha
	LOT 1 - LOT 263	RESIDENTIAL (SINGLE DETACHED)	120756.31	12.08	28.6%	263	6.23
	LOT 264 - LOT 328	MULTIPLE RESIDENTIAL (TOWNHOUSES)	14444.88	1.44	3.4%	65	1.54
	LOT 329 - LOT 338	MULTIPLE RESIDENTIAL (APRT./CONDO) w/ POTENTIAL GROUND-LEVEL COMMERCIAL	114964.75	11.50	27.2%	582	13.79
	BLOCK 1 AND BLOCK 2	ENVIRONMENTAL PROTECTION	153193.83	15.32	N/A		
	BLOCK 3 - BLOCK 6	STORM WATER MANAGEMENT	48027.66	4.80	11.4%		
	BLOCK 7 - BLOCK 10	PARKLAND	21075.84	2.11	5.0%		
	BLOCK 11	RIGHT-OF-WAY	102907.97	10.29	24.4%		
		0.3m RESERVES					
		TOTAL GROSS SITE AREA	575371.25	57.54			
		NET SITE AREA (GSA - (BLOCK 1 + BLOCK 2))	422177.42	42.22	100%		
		TOTAL				910	21.55





SUBJECT BOUNDARY

PHASE BOUNDARY

EXISTING WATERCOURSE

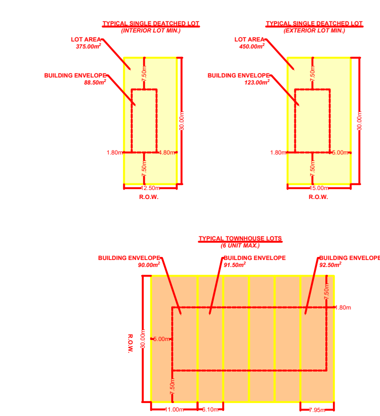
ENVIRONMENTAL CONSTRAINT BUFFER
Provided by GHD Ltd., refer to EIS for full details

RAYS CREEK FLOODPLAIN

POTENTIAL APARTMENT/CONDO BUILDING (POTENTIAL COMMERCIAL ON GROUND FLOOR)

PROPOSED STREET CENTRE LINE

PROPOSED RAY'S CREEK SANITARY SEWER EASEMENT (6.0m)



GENERAL NOTES:

1. PHASE BOUNDARIES AND ORDER MAY BE SUBJECT TO CHANGE
2. PROPOSED APARTMENT/CONDO BUILDINGS TO CONTAIN UP TO 8500 Sq. m OF GROUND FLOOR COMMERCIAL.
3. PROPOSED TRAFFIC CALMING MEASURES WILL BE SHOWN THROUGH DETAILED DESIGN PHASE. MEASURES WILL GENERALLY FOLLOW RECOMMENDED DESIGN GUIDANCE PROVIDED IN CHAPTER 4 OF THE TAC *CANADIAN GUIDE TO TRAFFIC CALMING*. THIS INCLUDES THE USE OF VERTICAL AND HORIZONTAL DEFLECTION FEATURES (I.E. RAISED CROSSWALKS, SPEED HUMPS, CHICANES, ETC.), AS WELL AS ROADWAY NARROWING, AND VARIED SURFACE TREATMENTS.

LINE TABLE

	BEARING	DIST
L2	N19°47'30"W	28.39
L3	N70°13'00"E	2.54
L4	N66°55'50"E	8.32
L5	N24°13'40"W	4.78
L6	N21°49'03"W	5.26
L7	N19°47'30"W	28.44
L8	N70°15'30"E	21.34
L9	N70°05'20"E	28.36
L10	N70°05'20"E	15.61
L11	N19°40'00"W	6.69
L12	N70°05'20"E	0.23
L13	N19°53'30"W	6.71

SURVEYOR'S CERTIFICATE
This Draft Plan accurately shows the boundaries of all lands proposed to be subdivided.
Certified by:

Christopher E. Musclow — Date
Ontario Land Surveyor
JBF Surveyors

OWNER'S CERTIFICATE
I hereby authorize EcoVue Consulting Services Inc. to prepare and submit this plan to the County of Peterborough

Bill Turner (Triple T Holdings) — Date

COORDINATES ARE DERIVED FROM GPS RTK OBSERVATIONS USING THE SMARTNET CORRECTION DATA AND ARE REFERRED TO UTM ZONE 17 (81°W LONGITUDE) NAD83 (CSRS EPOCH 2010.0).

OBSERVED REFERENCE POINT (ORP) COORDINATE VALUES ARE TO 'RURAL' ACCURACY SPECIFICATION IN ACCORDANCE WITH SEC. 14(2) OF O.REG. 216/10

POINT	UTM NORTHING	UTM EASTING
ORP Ⓐ	4920802.02	716395.77
ORP Ⓑ	4920869.86	716572.83

CAUTION: COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

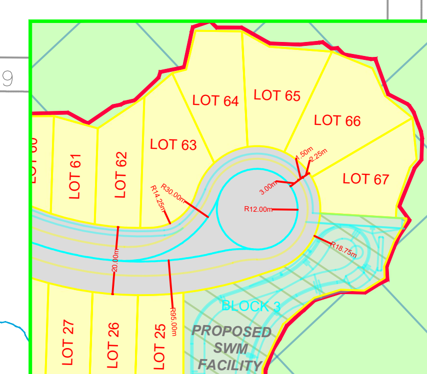
REVISIONS

DATE	DESCRIPTION	INITIAL
12-Feb-21	REVISIONS FROM TATHAM COMMENTS	MC
25-Feb-21	FIRST SUBMISSION	MC
12-Jul-23	RESPONSE TO COMMENTS	MC
03-Aug-23	RESPONSE TO COMMENTS	MC
07-Sep-23	REVISIONS FROM TATHAM COMMENTS	MC
02-May-24	RESPONSE TO COMMENTS	MC

Submission Requirements

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 (a-l) THE PLANNING ACT

- a) As shown on this Draft Plan and Plan from JBF Surveyors
- b) As shown on this Draft Plan and Plan from JBF Surveyors
- c) As shown on this Draft Plan
- d) As shown on this Draft Plan
- e) Residential
- f) As shown on this Draft Plan
- f.1) N/A
- g) As shown on this Draft Plan and the report by Tatham
- h) Refer to report from Tatham
- i) Refer to report from Tatham
- j) Refer to report from Tatham
- k) Refer to report from Tatham
- l) As shown on this Draft Plan



Street 'F' Cul-de-Sac Detail
1:1000

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APPROVED BY:	HORIZ. SCALE: 1:2000
REVISION DATE: MAY 02, 2024	PLOT DATE: MAY 02, 2024

LAKEFIELD SOUTH PLAN OF SUBDIVISION

TRIPLE T HOLDINGS

PART OF LOT26 CONCESSION 7
GEOG. TWP. OF SMITH
TOWNSHIP OF SELWYN
COUNTY OF PETERBOROUGH

DRAFT PLAN — **DP1**

Appendix B

Plant Species by Community and List of Significant Plant Species

APPENDIX B 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
CLUBMOSS FAMILY	*LYCOPODIACEAE*																
ground cedar	*Diphasiastrum complanatum*	1							X								
HORSETAIL FAMILY	*EQUISETACEAE*																
field horsetail	*Equisetum arvense*	8	X						X		X	X			X		
water horsetail	*Equisetum fluviatile*	1															
meadow horsetail	*Equisetum pratense*	1								X							
variegated horsetail	*Equisetum variegatum*	1															
BRACKEN FERN FAMILY	*DENNSTAEDTIACEAE*																
eastern bracken fern	*Pteridium aquilinum*	1															
BEECH FERN FAMILY	*THELYPTERIDAE*																
marsh fern	*Thelypteris palustris*	2															

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*																	
bulbet bladder fern	*Cystopteris bulbifera*	3											X					
ostrich fern	*Matteuccia struthiopteris*	6											X			X		
sensitive fern	*Onoclea sensibilis*	8								X			X			X	X	
PINE FAMILY	*PINACEAE*																	
white spruce	*Picea glauca*	2																
Austrian pine	*Pinus nigra*	1																
eastern white pine	*Pinus strobus*	2																
Scot's pine	*Pinus sylvestris*	14		X			X	X	X				X	X				
CYPRESS FAMILY	*CUPRESSACEAE*																	
creeping juniper	*Juniperus horizontalis*	2																
eastern red cedar	*Juniperus virginiana*	10			X		X	X	X						X			
eastern white cedar	*Thuja occidentalis*	24		X			X	X	X	X			X	X	X	X	X	
BUTTERCUP FAMILY	*RANUNCULACEAE*																	
Canada anemone	*Anemone canadensis*	4																
thimbleweed	*Anemone virginiana*	1							X									
tall buttercup	*Ranunculus acris*	8	X	X			X		X	X					X			
cursed crowfoot	*Ranunculus sceleratus*	2																
BARBERRY FAMILY	*BERBERIDACEAE*																	
mayapple	*Podophyllum peltatum*	1													X			
ELM FAMILY	*ULMACEAE*																	
American elm	*Ulmus americana*	15		X	X	X		X	X	X	X	X						
NETTLE FAMILY	*URTICACEAE*																	
false nettle	*Boehmeria cylindrica*	2																X
European stinging nettle	*Urtica dioica L. ssp.dioica*	1																X
American stinging nettle	*Urtica dioica ssp. Gracilis*	2																
WALNUT FAMILY	*JUGLANDACEAE*																	
butternut	*Juglans cinerea*	1																
black walnut	*Juglans nigra*	6		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
BIRCH FAMILY	*BETULACEAE*																
speckled alder	*Alnus rugosa*	1														X	
white birch	*Betula papyrifera*	1															
PINK FAMILY	*CARYOPHYLLACEAE*																
white campion	*Silene latifolia*	1													X		
BUCKWHEAT FAMILY	*POLYGONACEAE*																
Japanese knotweed	*Polygonum cuspidatum*	1													X		
curled dock	*Rumex crispus*	2	X								X						
great water dock	*Rumex orbiculatus*	1								X							
LINDEN FAMILY	*TILIACEAE*																
American basswood	*Tilia americana*	2															
VIOLET FAMILY	*VIOLACEAE*																
downy yellow violet	*Viola pubescens*	2															
GOURD FAMILY	*CUCURBITACEAE*																
wild cucumber	*Echinocystis lobata*	1											X				
WILLOW FAMILY	*SALICACEAE*																
balsam poplar	*Populus balsamifera*	6								X	X						
large-toothed aspen	*Populus grandidentata*	1															
trembling aspen	*Populus tremuloides*	5							X	X					X		X
pussy willow	*Salix discolor*	4														X	
crack willow	*Salix fragilis*	2															
slender willow	*Salix petiolaris*	5							X	X	X					X	X
willow species	*Salix spp.*	1															
MUSTARD FAMILY	*BRASSICACEAE*																
yellow rocket	*Barbarea vulgaris*	2	X														
toothwort	*Cardamine diphylla*	1															
dame's rocket	*Hesperis matronalis*	1	X														
watercress	*Nasturtium officinale*	2															X
wild mustard	*Sinapsis arvensis*	1															

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
PRIMROSE FAMILY	*PRIMULACEAE*																	
starflower	*Trientalis borealis*	1																
GOOSEBERRY FAMILY	*GROSSULARIACEAE*																	
bristly black currant	*Ribes lacustre*	2																
red currant	*Ribes rubrum*	3										X				X		
ROSE FAMILY	*ROSACEAE*																	
hawthorn species	*Crataegus spp.*	5							X		X	X				X		
woodland strawberry	*Fragaria vesca*	1																
common strawberry	*Fragaria virginiana*	11			X	X	X	X	X	X					X			
yellow avens	*Geum aleppicum*	4								X		X						
apple	*Malus domestica*	11	X	X					X			X		X		X		
silverweed	*Potentilla anserina*	1	X															
sulfur cinquefoil	*Potentilla recta*	3	X				X								X			
pin cherry	*Prunus pensylvanica*	1										X						
black cherry	*Prunus serotina*	2		X								X						
choke cherry	*Prunus virginiana*	12	X	X	X	X	X	X	X			X	X		X			
wild red raspberry	*Rubus idaeus*	4										X		X		X		
dwarf raspberry	*Rubus pubescens*	1														X		
American mountain ash	*Sorbus americana*	1										X						
narrow-leaved meadowsweet	*Spiraea alba*	1																
PEA FAMILY	*FABACEAE*																	
bird's-foot trefoil	*Lotus corniculatus*	3	X				X	X										
black medick	*Medicago lupulina*	12	X	X	X	X	X	X	X									
alfalfa	*Medicago sativa ssp. Sativa*	6	X															
black locust	*Robinia pseudo acacia*	2													X			
red clover	*Trifolium pratense*	5					X	X										
cow vetch	*Vicia cracca*	19	X	X	X	X	X	X	X		X			X	X			
LOOSESTRIFE FAMILY	*LYTHRACEAE*																	
purple loosestrife	*Lythrum salicaria*	1																X

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DOGWOOD FAMILY	*CORNACEAE*																
alternate-leaf dogwood	*Cornus alternifolia*	1															
red panicled dogwood	*Cornus foemina Miller ssp.racemosa*	1								X							
red-osier dogwood	*Cornus stolonifera*	22		X			X		X	X	X	X				X	X
BUCKTHORN FAMILY	*RHAMNACEAE*																
European buckthorn	*Rhamnus cathartica*	25	X	X	X	X			X			X	X	X	X	X	
GRAPE FAMILY	*VITACEAE*																
Virginia creeper	*Parthenocissus inserta*	17		X		X	X	X	X	X	X	X		X	X	X	
wild grape	*Vitis riparia*	25	X	X		X	X	X	X	X	X	X			X	X	
MAPLE FAMILY	*ACERACEAE*																
Manitoba maple	*Acer negundo*	5							X	X					X		
Norway maple	*Acer platanoides*	2													X		
sugar maple	*Acer saccharum ssp.saccharum*	2													X		
CASHEW FAMILY	*ANACARDIACEAE*																
western poison-ivy	*Rhus rydbergii*	18	X	X	X	X	X		X	X	X			X			
staghorn sumac	*Rhus typhina*	4			X									X	X		
WOOD-SORREL FAMILY	*OXALIDACEAE*																
common yellow wood-sorrel	*Oxalis dillenii*	1															
GERANIUM FAMILY	*GERANIACEAE*																
wild geranium	*Geranium maculatum*	1												X			
herb Robert	*Geranium robertianum*	1															
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*																
spotted jewelweed	*Impatiens capensis*	6								X			X			X	X
CARROT FAMILY	*APIACEAE*																
goutweed	*Aegopodium podagraria L.*	1	X														
Queen-Anne's lace	*Daucus carota*	13	X	X	X	X	X	X	X		X				X		
wild parsnip	*Pastinaca sativa*	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
MILKWEED FAMILY	*ASCLEPIADACEAE*																
swamp milkweed	*Asclepias incarnata*	2								X							
common milkweed	*Asclepias syriaca*	9	X	X	X		X	X	X						X		
swallow-wort	*Cynanchum rossicum*	4	X	X													
NIGHTSHADE FAMILY	*SOLANACEAE*																
bitter nightshade	*Solanum dulcamara*	1											X				
BORAGE FAMILY	*BORAGINACEAE*																
common gromwell	*Lithospermum officinale*	1													X		
true forget-me-not	*Myosotis scorpioides*	1											X				
MINT FAMILY	*LAMIACEAE*																
American water-horehound	*Lycopus americanus*	2									X						
northern water-horehound	*Lycopus uniflorus*	1									X						
wild mint	*Mentha arvensis*	2															
spear mint	*Mentha spicata*	1															X
heal-all	*Prunella vulgaris ssp. Lanceolata*	1													X		
PLANTAIN FAMILY	*PLANTAGINACEAE*																
broad-leaved plantain	*Plantago major*	4	X						X								
Rugel's plantain	*Plantago rugelii*	1	X														
OLIVE FAMILY	*OLEACEAE*																
black ash	*Fraxinus nigra*	3								X							
green ash	*Fraxinus pennsylvanica var. subinteg*	11		X	X				X				X				X
lilac	*Syringa vulgaris*	1													X		
FIGWORT FAMILY	*SCROPHULARIACEAE*																
butter-and-eggs	*Linaria vulgaris*	3	X	X							X						
common mullein	*Verbascum thapsus*	2	X														
water speedwell	*Veronica catenata*	1															
MADDER FAMILY	*RUBIACEAE*																
rough bedstraw	*Galium asprellum*	1														X	
marsh bedstraw	*Galium palustre*	3															

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*																
tartarian honeysuckle	*Lonicera tatarica*	15	X	X			X	X	X	X		X		X	X		
Guelder rose	*Viburnum americanum*	2															
nannyberry	*Viburnum lentago*	1					X										
European high bush cranberry	*Viburnum trilobum var. opulis*	4		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
ASTER FAMILY	*ASTERACEAE*																
common yarrow	*Achillea millefolium*	5	X				X	X	X								
field pussytoes	*Antennaria neglecta*	4						X									
ox-eye daisy	*Chrysanthemum leucanthemum*	6	X	X	X		X	X	X								
chicory	*Cichorium intybus*	1	X														
Canada thistle	*Cirsium arvense*	1															
bull thistle	*Cirsium vulgare*	2							X						X		
Philadelphia fleabane	*Erigeron philadelphicus ssp. philadel*	1	X														
spotted joe-pyeweed	*Eupatorium maculatum*	5									X		X			X	
boneset	*Eupatorium perfoliatum*	1															
large-leaved aster	*Eurybia macrophylla*	1													X		
grass-leaved goldenrod	*Euthamia graminifolia*	1									X						
orange hawkweed	*Hieracium aurantiacum*	1					X										
king devil hawkweed	*Hieracium x florbundum*	4			X		X										
elecampane	*Inula helenium*	2															
tall goldenrod	*Solidago altissima*	10	X	X	X	X	X	X	X			X			X	X	
gray goldenrod	*Solidago nemoralis ssp. Nemoralis*	1									X						
goldenrod species	*Solidago spp.*	10															
spiny-leaved sow thistle	*Sonchus asper*	1															
panicled aster	*Symphyotrichum lanceolatum ssp.he*	1															
New England aster	*Symphyotrichum novae- angliae*	8	X	X			X	X	X	X		X					
purple-stemmed aster	*Symphyotrichum puniceum*	2									X						
common dandelion	*Taraxacum officinale*	12	X			X	X		X				X	X	X		
goat's-beard	*Tragopogon dubius*	7	X		X	X	X		X						X		
coltsfoot	*Tussilago farfara*	1															
WATER-PLANTAIN FAMILY	*ALISMATACEAE*																
broad-leaved arrowhead	*Sagittaria latifolia*	1															X
FROG'S-BIT FAMILY	*HYDROCHARITACEAE*																
Canada waterweed	*Elodea canadensis*	1															

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*	1																
RUSH FAMILY	*JUNCACEAE*																	
path rush	*Juncus tenuis*	1					X											
SEDGE FAMILY	*CYPERACEAE*																	
drooping wood sedge	*Carex arctata Boott*	4		X						X		X						
graceful sedge	*Carex gracillima*	1																
meadow sedge	*Carex granularis*	3																
Pennsylvania sedge	*Carex pensylvanica*	1																
softstem bulrush	*Scirpus validus*	1																
GRASS FAMILY	*POACEAE*																	
awnless brome grass	*Bromus inermis ssp.inermis*	4	X			X												
Canada bluejoint grass	*Calamagrostis canadensis*	1																
orchard grass	*Dactylis glomerata*	3	X				X	X										
tall fescue	*Festuca arundinacea*	5	X	X		X	X		X									
reed canary grass	*Phalaris arundinacea*	6														X		
Kentucky blue grass	*Poa pratensis*	10	X															
CATTAIL FAMILY	*TYPHACEAE*																	
narrow-leaved cattail	*Typha angustifolia*	1																
common cattail	*Typha latifolia*	2																
LILY FAMILY	*LILIACEAE*																	
lily-of-the-valley	*Convallaria majalis L.*	1																
trout lily	*Erythronium americanum ssp. ameri*	1																
tiger lily	*Lilium lancifolium*	1													X			
IRIS FAMILY	*IRIDACEAE*																	
narrow-leaved blue-eyed-grass	*Sisyrinchium mucronatum*	2									X							
ORCHID FAMILY	*ORCHIDACEAE*																	
helleborine	*Epipactis helleborine*	2																

Common Name	*Scientific Name*	Total	COMMUNITY NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Total Number of Plant Species	162		38	28	16	15	30	21	36	23	20	21	14	14	33	20	13
			Number of Plant Species Per Comm														

APPENDIX I - A Communities 16-30

Common Name	*Scientific Name*	COMMUNITY NUMBER															
		Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CLUBMOSS FAMILY	*LYCOPODIACEAE*																
ground cedar	*Diphasiastrum complanatum*	1															
HORSETAIL FAMILY	*EQUISETACEAE*																
field horsetail	*Equisetum arvense*	8				X						X					
water horsetail	*Equisetum fluviatile*	1								X							
meadow horsetail	*Equisetum pratense*	1															
variegated horsetail	*Equisetum variegatum*	1								X							
BRACKEN FERN FAMILY	*DENNSTAEDTIACEAE*																
eastern bracken fern	*Pteridium aquilinum*	1									X						
BEECH FERN FAMILY	*THELYPTERIDAE*																
marsh fern	*Thelypteris palustris*	2								X		X					
WOOD FERN FAMILY	*DRYOPTERIDACEAE*																
bulbet bladder fern	*Cystopteris bulbifera*	3						X					X				
ostrich fern	*Matteuccia struthiopteris*	6									X		X		X	X	
sensitive fern	*Onoclea sensibilis*	8						X		X	X					X	
PINE FAMILY	*PINACEAE*																
white spruce	*Picea glauca*	2													X		
Austrian pine	*Pinus nigra*	1															
eastern white pine	*Pinus strobus*	2			X												
Scot's pine	*Pinus sylvestris*	14		X								X	X		X		X
CYPRESS FAMILY	*CUPRESSACEAE*																
creeping juniper	*Juniperus horizontalis*	2							X								
eastern red cedar	*Juniperus virginiana*	10							X								

		COMMUNITY NUMBER															
Common Name	*Scientific Name*	Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
eastern white cedar	*Thuja occidentalis*	24	X		X	X	X	X	X		X	X	X	X	X		
BUTTERCUP FAMILY	*RANUNCULACEAE*																
Canada anemone	*Anemone canadensis*	4				X											
thimbleweed	*Anemone virginiana*	1															
tall buttercup	*Ranunculus acris*	8				X											
cursed crowfoot	*Ranunculus sceleratus*	2				X				X							
BARBERRY FAMILY	*BERBERIDACEAE*																
mayapple	*Podophyllum peltatum*	1															
ELM FAMILY	*ULMACEAE*																
American elm	*Ulmus americana*	15										X			X		
NETTLE FAMILY	*URTICACEAE*																
false nettle	*Boehmeria cylindrica*	2											X				
European stinging nettle	*Urtica dioica L. ssp.dioica*	1															
American stinging nettle	*Urtica dioica ssp. Gracilis*	2								X				X			
WALNUT FAMILY	*JUGLANDACEAE*																
butternut	*Juglans cinerea*	1														X	
black walnut	*Juglans nigra*	6															
BIRCH FAMILY	*BETULACEAE*																
speckled alder	*Alnus rugosa*	1															
white birch	*Betula papyrifera*	1													X		
PINK FAMILY	*CARYOPHYLLACEAE*																
white campion	*Silene latifolia*	1															
BUCKWHEAT FAMILY	*POLYGONACEAE*																
Japanese knotweed	*Polygonum cuspidatum*	1															
curled dock	*Rumex crispus*	2															
great water dock	*Rumex orbiculatus*	1															
LINDEN FAMILY	*TILIACEAE*																
American basswood	*Tilia americana*	2									X					X	
VIOLET FAMILY	*VIOLACEAE*																

Common Name	*Scientific Name*	COMMUNITY NUMBER															
		Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
downy yellow violet	*Viola pubescens*	2											X			X	
GOURD FAMILY	*CUCURBITACEAE*																
wild cucumber	*Echinocystis lobata*	1															
WILLOW FAMILY	*SALICACEAE*																
balsam poplar	*Populus balsamifera*	6									X			X			X
large-toothed aspen	*Populus grandidentata*	1															X
trembling aspen	*Populus tremuloides*	5										X					
pussy willow	*Salix discolor*	4									X						
crack willow	*Salix fragilis*	2								X						X	
slender willow	*Salix petiolaris*	5															
willow species	*Salix spp.*	1				X											
MUSTARD FAMILY	*BRASSICACEAE*																
yellow rocket	*Barbarea vulgaris*	2								X							
toothwort	*Cardamine diphylla*	1															
dame's rocket	*Hesperis matronalis*	1															
watercress	*Nasturtium officinale*	2									X						
wild mustard	*Sinapsis arvensis*	1															
PRIMROSE FAMILY	*PRIMULACEAE*																
starflower	*Trientalis borealis*	1													X		
GOOSEBERRY FAMILY	*GROSSULARIACEAE*																
bristly black currant	*Ribes lacustre*	2													X	X	
red currant	*Ribes rubrum*	3						X									
ROSE FAMILY	*ROSACEAE*																
hawthorn species	*Crataegus spp.*	5							X								
woodland strawberry	*Fragaria vesca*	1												X			
common strawberry	*Fragaria virginiana*	11	X			X											
yellow avens	*Geum aleppicum*	4				X								X			
apple	*Malus domestica*	11				X						X					
silverweed	*Potentilla anserina*	1															

Common Name	*Scientific Name*	COMMUNITY NUMBER															
		Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
sulfur cinquefoil	*Potentilla recta*	3															
pin cherry	*Prunus pensylvanica*	1															
black cherry	*Prunus serotina*	2															
choke cherry	*Prunus virginiana*	12							X								
wild red raspberry	*Rubus idaeus*	4										X					
dwarf raspberry	*Rubus pubescens*	1															
American mountain ash	*Sorbus americana*	1															
narrow-leaved meadowsweet	*Spiraea alba*	1															X
PEA FAMILY	*FABACEAE*																
bird's-foot trefoil	*Lotus corniculatus*	3															
black medick	*Medicago lupulina*	12															
alfalfa	*Medicago sativa ssp. Sativa*	6		X													
black locust	*Robinia pseudo acacia*	2															
red clover	*Trifolium pratense*	5			X	X											
cow vetch	*Vicia cracca*	19	X	X		X											
LOOSESTRIFE FAMILY	*LYTHRACEAE*																
purple loosestrife	*Lythrum salicaria*	1															
DOGWOOD FAMILY	*CORNACEAE*																
alternate-leaf dogwood	*Cornus alternifolia*	1													X		
red panicled dogwood	*Cornus foemina Miller ssp.racemos*	1															
red-osier dogwood	*Cornus stolonifera*	22		X	X	X		X			X	X		X			X
BUCKTHORN FAMILY	*RHAMNACEAE*																
European buckthorn	*Rhamnus cathartica*	25	X	X	X			X				X		X	X		
GRAPE FAMILY	*VITACEAE*																
Virginia creeper	*Parthenocissus inserta*	17				X						X		X		X	
wild grape	*Vitis riparia*	25	X	X		X		X				X	X			X	X
MAPLE FAMILY	*ACERACEAE*																
Manitoba maple	*Acer negundo*	5															
Norway maple	*Acer platanoides*	2															

Common Name	*Scientific Name*	COMMUNITY NUMBER															
		Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
sugar maple	*Acer saccharum ssp.saccharum*	2													X		
CASHEW FAMILY	*ANACARDIACEAE*																
western poison-ivy	*Rhus rydbergii*	18		X	X	X	X							X	X	X	X
staghorn sumac	*Rhus typhina*	4															
WOOD-SORREL FAMILY	*OXALIDACEAE*																
common yellow wood-sorrel	*Oxalis dillenii*	1										X					
GERANIUM FAMILY	*GERANIACEAE*																
wild geranium	*Geranium maculatum*	1															
herb Robert	*Geranium robertianum*	1			X												
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*																
spotted jewelweed	*Impatiens capensis*	6				X				X							
CARROT FAMILY	*APIACEAE*																
goutweed	*Aegopodium podagraria L.*	1															
Queen-Anne's lace	*Daucus carota*	13	X									X					
wild parsnip	*Pastinaca sativa*	2															
MILKWEED FAMILY	*ASCLEPIADACEAE*																
swamp milkweed	*Asclepias incarnata*	2				X											
common milkweed	*Asclepias syriaca*	9															
swallow-wort	*Cynanchum rossicum*	4															X
NIGHTSHADE FAMILY	*SOLANACEAE*																
bitter nightshade	*Solanum dulcamara*	1															
BORAGE FAMILY	*BORAGINACEAE*																
common gromwell	*Lithospermum officinale*	1															
true forget-me-not	*Myosotis scorpioides*	1															
MINT FAMILY	*LAMIACEAE*																
American water-horehound	*Lycopus americanus*	2				X											
northern water-horehound	*Lycopus uniflorus*	1															
wild mint	*Mentha arvensis*	2								X				X			
spear mint	*Mentha spicata*	1															

		COMMUNITY NUMBER															
Common Name	*Scientific Name*	Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
heal-all	*Prunella vulgaris ssp. Lanceolata*	1															
PLANTAIN FAMILY	*PLANTAGINACEAE*																
broad-leaved plantain	*Plantago major*	4									X	X					
Rugel's plantain	*Plantago rugelii*	1															
OLIVE FAMILY	*OLEACEAE*																
black ash	*Fraxinus nigra*	3						X		X							
green ash	*Fraxinus pennsylvanica var. subint*	11			X									X	X		X
lilac	*Syringa vulgaris*	1															
FIGWORT FAMILY	*SCROPHULARIACEAE*																
butter-and-eggs	*Linaria vulgaris*	3															
common mullein	*Verbascum thapsus*	2															
water speedwell	*Veronica catenata*	1								X							
MADDER FAMILY	*RUBIACEAE*																
rough bedstraw	*Galium asprellum*	1															
marsh bedstraw	*Galium palustre*	3				X		X		X							
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*																
tartarian honeysuckle	*Lonicera tatarica*	15										X					X
Guelder rose	*Viburnum americanum*	2				X								X			
nannyberry	*Viburnum lentago*	1															
European high bush cranberry	*Viburnum trilobum var. opulis*	4															
ASTER FAMILY	*ASTERACEAE*																
common yarrow	*Achillea millefolium*	5													X		
field pussytoes	*Antennaria neglecta*	4							X						X		
ox-eye daisy	*Chrysanthemum leucanthemum*	6															
chicory	*Cichorium intybus*	1															
Canada thistle	*Cirsium arvense*	1															
bull thistle	*Cirsium vulgare*	2															
Philadelphia fleabane	*Erigeron philadelphicus ssp. philad*	1															
spotted joe-pyeweed	*Eupatorium maculatum*	5								X				X			

		COMMUNITY NUMBER															
Common Name	*Scientific Name*	Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
boneset	*Eupatorium perfoliatum*	1								X							
large-leaved aster	*Eurybia macrophylla*	1															
grass-leaved goldenrod	*Euthamia graminifolia*	1															
orange hawkweed	*Hieracium aurantiacum*	1															
king devil hawkweed	*Hieracium x florbundum*	4							X								
elecampane	*Inula helenium*	2				X											
tall goldenrod	*Solidago altissima*	10															
gray goldenrod	*Solidago nemoralis ssp. Nemoralis*	1															
goldenrod species	*Solidago spp.*	10	X	X		X						X				X	
spiny-leaved sow thistle	*Sonchus asper*	1										X					
panicled aster	*Symphyotrichum lanceolatum ssp.*	1	X														
New England aster	*Symphyotrichum novae- angliae*	8	X														
purple-stemmed aster	*Symphyotrichum puniceum*	2								X							
common dandelion	*Taraxacum officinale*	12	X									X				X	
goat's-beard	*Tragopogon dubius*	7	X														
coltsfoot	*Tussilago farfara*	1									X						
WATER-PLANTAIN FAMILY	*ALISMATACEAE*																
broad-leaved arrowhead	*Sagittaria latifolia*	1															
FROG'S-BIT FAMILY	*HYDROCHARITACEAE*																
Canada waterweed	*Elodea canadensis*	1								X							
ARUM FAMILY	*ARACEAE*																
Jack-in-the-pulpit	*Arisaema triphyllum*	1													X		
RUSH FAMILY	*JUNCACEAE*																
path rush	*Juncus tenuis*	1															
SEDGE FAMILY	*CYPERACEAE*																
drooping wood sedge	*Carex arctata Boott*	4														X	
graceful sedge	*Carex gracillima*	1				X											
meadow sedge	*Carex granularis*	3															
Pennsylvania sedge	*Carex pensylvanica*	1						X									

			COMMUNITY NUMBER														
Common Name	*Scientific Name*	Total	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
softstem bulrush	*Scirpus validus*	1								X							
GRASS FAMILY	*POACEAE*																
awnless brome grass	*Bromus inermis ssp.inermis*	4	X														
Canada bluejoint grass	*Calamagrostis canadensis*	1								X							
orchard grass	*Dactylis glomerata*	3															
tall fescue	*Festuca arundinacea*	5															
reed canary grass	*Phalaris arundinacea*	6				X				X							
Kentucky blue grass	*Poa pratensis*	10	X									X					
CATTAIL FAMILY	*TYPHACEAE*																
narrow-leaved cattail	*Typha angustifolia*	1									X						
common cattail	*Typha latifolia*	2				X				X							
LILY FAMILY	*LILIACEAE*																
lily-of-the-valley	*Convallaria majalis L.*	1													X		
trout lily	*Erythronium americanum ssp. ame*	1														X	
tiger lily	*Lilium lancifolium*	1															
IRIS FAMILY	*IRIDACEAE*																
narrow-leaved blue-eyed-grass	*Sisyrinchium mucronatum*	2															
ORCHID FAMILY	*ORCHIDACEAE*																
helleborine	*Epipactis helleborine*	2			X		X										
Total Number of Plant Species	162		13	8	9	25	3	10	7	21	12	20	7	13	17	14	10
			Number of Plant Species Per Community														

APPENDIX B Communities 31- 40

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
CLUBMOSS FAMILY	*LYCOPODIACEAE*											
ground cedar	*Diphasiastrum complanatum*	1										
HORSETAIL FAMILY	*EQUISETACEAE*											
field horsetail	*Equisetum arvense*	8									X	
water horsetail	*Equisetum fluviatile*	1										
meadow horsetail	*Equisetum pratense*	1										
variegated horsetail	*Equisetum variegatum*	1										
BRACKEN FERN FAMILY	*DENNSTAEDTIACEAE*											
eastern bracken fern	*Pteridium aquilinum*	1										
BEECH FERN FAMILY	*THELYPTERIDAE*											
marsh fern	*Thelypteris palustris*	2										
WOOD FERN FAMILY	*DRYOPTERIDACEAE*											
bulbet bladder fern	*Cystopteris bulbifera*	3										
ostrich fern	*Matteuccia struthiopteris*	6										
sensitive fern	*Onoclea sensibilis*	8										
PINE FAMILY	*PINACEAE*											
white spruce	*Picea glauca*	2				X						
Austrian pine	*Pinus nigra*	1				X						
eastern white pine	*Pinus strobus*	2				X						
Scot's pine	*Pinus sylvestris*	14	X			X	X					
CYPRESS FAMILY	*CUPRESSACEAE*											
creeping juniper	*Juniperus horizontalis*	2	X									
eastern red cedar	*Juniperus virginiana*	10	X				X	X				X

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
eastern white cedar	*Thuja occidentalis*	24	X	X				X				
BUTTERCUP FAMILY	*RANUNCULACEAE*											
Canada anemone	*Anemone canadensis*	4		X						X	X	
thimbleweed	*Anemone virginiana*	1										
tall buttercup	*Ranunculus acris*	8									X	
cursed crowfoot	*Ranunculus sceleratus*	2										
BARBERRY FAMILY	*BERBERIDACEAE*											
mayapple	*Podophyllum peltatum*	1										
ELM FAMILY	*ULMACEAE*											
American elm	*Ulmus americana*	15	X		X	X		X			X	
NETTLE FAMILY	*URTICACEAE*											
false nettle	*Boehmeria cylindrica*	2										
European stinging nettle	*Urtica dioica L. ssp.dioica*	1										
American stinging nettle	*Urtica dioica ssp. Gracilis*	2										
WALNUT FAMILY	*JUGLANDACEAE*											
butternut	*Juglans cinerea*	1										
black walnut	*Juglans nigra*	6	X					X				
BIRCH FAMILY	*BETULACEAE*											
speckled alder	*Alnus rugosa*	1										
white birch	*Betula papyrifera*	1										
PINK FAMILY	*CARYOPHYLLACEAE*											
white campion	*Silene latifolia*	1										
BUCKWHEAT FAMILY	*POLYGONACEAE*											
Japanese knotweed	*Polygonum cuspidatum*	1										
curled dock	*Rumex crispus*	2										
great water dock	*Rumex orbiculatus*	1										
LINDEN FAMILY	*TILIACEAE*											
American basswood	*Tilia americana*	2										
VIOLET FAMILY	*VIOLACEAE*											

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
downy yellow violet	*Viola pubescens*	2										
GOURD FAMILY	*CUCURBITACEAE*											
wild cucumber	*Echinocystis lobata*	1										
WILLOW FAMILY	*SALICACEAE*											
balsam poplar	*Populus balsamifera*	6		X								
large-toothed aspen	*Populus grandidentata*	1										
trembling aspen	*Populus tremuloides*	5										
pussy willow	*Salix discolor*	4								X	X	
crack willow	*Salix fragilis*	2										
slender willow	*Salix petiolaris*	5										
willow species	*Salix spp.*	1										
MUSTARD FAMILY	*BRASSICACEAE*											
yellow rocket	*Barbarea vulgaris*	2										
toothwort	*Cardamine diphylla*	1		X								
dame's rocket	*Hesperis matronalis*	1										
watercress	*Nasturtium officinale*	2										
wild mustard	*Sinapsis arvensis*	1							X			
PRIMROSE FAMILY	*PRIMULACEAE*											
starflower	*Trientalis borealis*	1										
GOOSEBERRY FAMILY	*GROSSULARIACEAE*											
bristly black currant	*Ribes lacustre*	2										
red currant	*Ribes rubrum*	3										
ROSE FAMILY	*ROSACEAE*											
hawthorn species	*Crataegus spp.*	5										
woodland strawberry	*Fragaria vesca*	1										
common strawberry	*Fragaria virginiana*	11		X		X						
yellow avens	*Geum aleppicum*	4										
apple	*Malus domestica*	11	X		X	X						
silverweed	*Potentilla anserina*	1										

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
sulfur cinquefoil	*Potentilla recta*	3										
pin cherry	*Prunus pensylvanica*	1										
black cherry	*Prunus serotina*	2										
choke cherry	*Prunus virginiana*	12										X
wild red raspberry	*Rubus idaeus*	4										
dwarf raspberry	*Rubus pubescens*	1										
American mountain ash	*Sorbus americana*	1										
narrow-leaved meadowsweet	*Spiraea alba*	1										
PEA FAMILY	*FABACEAE*											
bird's-foot trefoil	*Lotus corniculatus*	3										
black medick	*Medicago lupulina*	12	X			X	X	X			X	
alfalfa	*Medicago sativa ssp. Sativa*	6	X				X	X				X
black locust	*Robinia pseudo acacia*	2	X									
red clover	*Trifolium pratense*	5	X									
cow vetch	*Vicia cracca*	19					X	X	X	X	X	X
LOOSESTRIFE FAMILY	*LYTHRACEAE*											
purple loosestrife	*Lythrum salicaria*	1										
DOGWOOD FAMILY	*CORNACEAE*											
alternate-leaf dogwood	*Cornus alternifolia*	1										
red panicled dogwood	*Cornus foemina Miller ssp.racemos*	1										
red-osier dogwood	*Cornus stolonifera*	22		X		X		X		X	X	X
BUCKTHORN FAMILY	*RHAMNACEAE*											
European buckthorn	*Rhamnus cathartica*	25	X	X	X	X	X	X			X	X
GRAPE FAMILY	*VITACEAE*											
Virginia creeper	*Parthenocissus inserta*	17			X	X						
wild grape	*Vitis riparia*	25	X	X	X	X		X				X
MAPLE FAMILY	*ACERACEAE*											
Manitoba maple	*Acer negundo*	5			X			X				
Norway maple	*Acer platanoides*	2	X									

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
sugar maple	*Acer saccharum ssp.saccharum*	2										
CASHEW FAMILY	*ANACARDIACEAE*											
western poison-ivy	*Rhus rydbergii*	18						X				
staghorn sumac	*Rhus typhina*	4	X									
WOOD-SORREL FAMILY	*OXALIDACEAE*											
common yellow wood-sorrel	*Oxalis dillenii*	1										
GERANIUM FAMILY	*GERANIACEAE*											
wild geranium	*Geranium maculatum*	1										
herb Robert	*Geranium robertianum*	1										
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*											
spotted jewelweed	*Impatiens capensis*	6										
CARROT FAMILY	*APIACEAE*											
goutweed	*Aegopodium podagraria L.*	1										
Queen-Anne's lace	*Daucus carota*	13	X				X					
wild parsnip	*Pastinaca sativa*	2										
MILKWEED FAMILY	*ASCLEPIADACEAE*											
swamp milkweed	*Asclepias incarnata*	2										
common milkweed	*Asclepias syriaca*	9				X			X			
swallow-wort	*Cynanchum rossicum*	4					X					
NIGHTSHADE FAMILY	*SOLANACEAE*											
bitter nightshade	*Solanum dulcamara*	1										
BORAGE FAMILY	*BORAGINACEAE*											
common gromwell	*Lithospermum officinale*	1										
true forget-me-not	*Myosotis scorpioides*	1										
MINT FAMILY	*LAMIACEAE*											
American water-horehound	*Lycopus americanus*	2										
northern water-horehound	*Lycopus uniflorus*	1										
wild mint	*Mentha arvensis*	2										
spear mint	*Mentha spicata*	1										

Common Name	*Scientific Name*	COMMUNITY NUMBER										
		Total	31	32	33	34	35	36	37	38	39	40
heal-all	*Prunella vulgaris ssp. Lanceolata*	1										
PLANTAIN FAMILY	*PLANTAGINACEAE*											
broad-leaved plantain	*Plantago major*	4										
Rugel's plantain	*Plantago rugelii*	1										
OLIVE FAMILY	*OLEACEAE*											
black ash	*Fraxinus nigra*	3										
green ash	*Fraxinus pennsylvanica var. subint*	11				X	X					
lilac	*Syringa vulgaris*	1										
FIGWORT FAMILY	*SCROPHULARIACEAE*											
butter-and-eggs	*Linaria vulgaris*	3										
common mullein	*Verbascum thapsus*	2	X									
water speedwell	*Veronica catenata*	1										
MADDER FAMILY	*RUBIACEAE*											
rough bedstraw	*Galium asprellum*	1										
marsh bedstraw	*Galium palustre*	3										
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*											
tartarian honeysuckle	*Lonicera tatarica*	15	X		X		X					X
Guelder rose	*Viburnum americanum*	2										
nannyberry	*Viburnum lentago*	1										
European high bush cranberry	*Viburnum trilobum var. opulis*	4										
ASTER FAMILY	*ASTERACEAE*											
common yarrow	*Achillea millefolium*	5										
field pussytoes	*Antennaria neglecta*	4					X					
ox-eye daisy	*Chrysanthemum leucanthemum*	6										
chicory	*Cichorium intybus*	1										
Canada thistle	*Cirsium arvense*	1							X			
bull thistle	*Cirsium vulgare*	2										
Philadelphia fleabane	*Erigeron philadelphicus ssp. philad*	1										
spotted joe-pyeweed	*Eupatorium maculatum*	5										

			COMMUNITY NUMBER									
Common Name	*Scientific Name*	Total	31	32	33	34	35	36	37	38	39	40
boneset	*Eupatorium perfoliatum*	1										
large-leaved aster	*Eurybia macrophylla*	1										
grass-leaved goldenrod	*Euthamia graminifolia*	1										
orange hawkweed	*Hieracium aurantiacum*	1										
king devil hawkweed	*Hieracium x florbundum*	4	X									
elecampane	*Inula helenium*	2								X		
tall goldenrod	*Solidago altissima*	10										
gray goldenrod	*Solidago nemoralis ssp. Nemoralis*	1										
goldenrod species	*Solidago spp.*	10	X			X		X			X	X
spiny-leaved sow thistle	*Sonchus asper*	1										
panicled aster	*Symphyotrichum lanceolatum ssp.*	1										
New England aster	*Symphyotrichum novae- angliae*	8										
purple-stemmed aster	*Symphyotrichum puniceum*	2										
common dandelion	*Taraxacum officinale*	12					X		X			
goat's-beard	*Tragopogon dubius*	7										
coltsfoot	*Tussilago farfara*	1										
WATER-PLANTAIN FAMILY	*ALISMATACEAE*											
broad-leaved arrowhead	*Sagittaria latifolia*	1										
FROG'S-BIT FAMILY	*HYDROCHARITACEAE*											
Canada waterweed	*Elodea canadensis*	1										
ARUM FAMILY	*ARACEAE*											
Jack-in-the-pulpit	*Arisaema triphyllum*	1										
RUSH FAMILY	*JUNCACEAE*											
path rush	*Juncus tenuis*	1										
SEDGE FAMILY	*CYPERACEAE*											
drooping wood sedge	*Carex arctata Boott*	4										
graceful sedge	*Carex gracillima*	1										
meadow sedge	*Carex granularis*	3	X			X						X
Pennsylvania sedge	*Carex pensylvanica*	1										

		COMMUNITY NUMBER										
Common Name	*Scientific Name*	Total	31	32	33	34	35	36	37	38	39	40
softstem bulrush	*Scirpus validus*	1										
GRASS FAMILY	*POACEAE*											
awnless brome grass	*Bromus inermis ssp.inermis*	4					X					
Canada bluejoint grass	*Calamagrostis canadensis*	1										
orchard grass	*Dactylis glomerata*	3										
tall fescue	*Festuca arundinacea*	5										
reed canary grass	*Phalaris arundinacea*	6							X	X	X	
Kentucky blue grass	*Poa pratensis*	10			X	X	X	X	X		X	X
CATTAIL FAMILY	*TYPHACEAE*											
narrow-leaved cattail	*Typha angustifolia*	1										
common cattail	*Typha latifolia*	2										
LILY FAMILY	*LILIACEAE*											
lily-of-the-valley	*Convallaria majalis L.*	1										
trout lily	*Erythronium americanum ssp. ame*	1										
tiger lily	*Lilium lancifolium*	1										
IRIS FAMILY	*IRIDACEAE*											
narrow-leaved blue-eyed-grass	*Sisyrinchium mucronatum*	2	X									
ORCHID FAMILY	*ORCHIDACEAE*											
helleborine	*Epipactis helleborine*	2										
Total Number of Plant Species	162		22	8	8	17	14	14	7	6	12	11

Number of Plant Species Per Community

APPENDIX B List of Significant Plant Species

Plant species observed by GHD 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 Canada

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

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

STATUS CODES

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

		NATIONAL RANKINGS		PROVINCIAL RANKINGS		REGIONAL RANKINGS				
Common Name	**Scientific Name**	**COSEWIC**	**SARA**	**COSSARO**	**SRank**	**Peterborough**				
ground cedar	Diphasiastrum complanatum					R				
Austrian pine	Pinus nigra					R				
butternut	Juglans cinerea	END Apr/14	END Mar/13	END Jun/14	S3?					
black walnut	Juglans nigra					R				
Norway maple	Acer platanoides					R				
black ash	Fraxinus nigra	THR Nov/18		END Oct/20						
Guelder rose	Viburnum americanum					R				

Common Name	Scientific Name		COSEWIC	SARA	COSSARO	SRank	Peterborough				
lily-of-the-valley	Convallaria majalis L.						R				
Plants with Ranking	**Total:** 8	**Status List Totals**	2	1	2		6	0	0	0	0

Appendix C

Bird Status Report by Station and Comprehensive

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, October, 2021.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, January, 2021.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, 2022.
	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 GHD)

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 GHD)

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.: 01BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
GBHE	Great Blue Heron	*Ardea herodias*	B	X				No				
KILL	Killdeer	*Charadrius vociferus*	B	H				No				
MODO	Mourning Dove	*Zenaida macroura*	B	S				No				
WIFL	Willow Flycatcher	*Empidonax traillii*	B	S				No				
LEFL	Least Flycatcher	*Empidonax minimus*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	H				No				
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
EUST	European Starling	*Sturnus vulgaris*	B	H				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	H				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	SC	THR	THR	No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	H				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
COGR	Common Grackle	*Quiscalus quiscula*	B	H				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**21**	**No. of Breeding Species Observed in Station:**	**21**		**2**	**2**	**2**	**0**	**0**	**0**	**0**	

Station No.: 02BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
KILL	Killdeer	*Charadrius vociferus*	B	H				No				
RBGU	Ring-billed Gull	*Larus delawarensis*	B	X				No				
MODO	Mourning Dove	*Zenaida macroura*	B	H				No				
BEKI	Belted Kingfisher	*Megaceryle alcyon*	B	H				No				
NOFL	Northern Flicker	*Colaptes auratus*	B	H				No				
WIFL	Willow Flycatcher	*Empidonax traillii*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	H				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
HOWR	House Wren	*Troglodytes aedon*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
EUST	European Starling	*Sturnus vulgaris*	B	H				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
COGR	Common Grackle	*Quiscalus quiscula*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	S				No				
No. of Species Observed in Station:	**19**	**No. of Breeding Species Observed in Station:**	**19**		**1**	**1**	**1**	**0**	**0**	**0**	**0**	

Station No.: 03BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
TUVU	Turkey Vulture	*Cathartes aura*	B	X				No				
RBGU	Ring-billed Gull	*Larus delawarensis*	B	X				No				
NOFL	Northern Flicker	*Colaptes auratus*	B	H				No				
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	H				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	A				No				
GRCA	Gray Catbird	*Dumetella carolinensis*	B	H				No				
EUST	European Starling	*Sturnus vulgaris*	B	H				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	H				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No				
OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	H				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	FY				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	H				No				
COGR	Common Grackle	*Quiscalus quiscula*	B	CF				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	P				No				
No. of Species Observed in Station: 20		**No. of Breeding Species Observed in Station: 20**			**0**	**0**	**0**	**1**	**0**	**0**	**0**	

Station No.: 01MLS01											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	SC	THR	THR	No			
EAME	Eastern Meadowlark	*Sturnella magna*	B	FY	THR	THR	THR	No			
No. of Species Observed in Station:	**2**	**No. of Breeding Species Observed in Station:**	**2**		**2**	**2**	**2**	**0**	**0**	**0**	**0**

Station No.: 01MLS02											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	None	SC	THR	THR	No			
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**2**	**No. of Breeding Species Observed in Station:**	**2**		**2**	**2**	**2**	**0**	**0**	**0**	**0**

Station No.: 02MLS01											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 01MLS03											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 01MLS04											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 04BBS												
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				
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	H				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
HOWR	House Wren	*Troglodytes aedon*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
GRCA	Gray Catbird	*Dumetella carolinensis*	B	S				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	None				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No				
OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes				
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	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	FY	THR	THR	THR	No				
COGR	Common Grackle	*Quiscalus quiscula*	B	FY				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	H				No				
PUFI	Purple Finch	*Carpodacus purpureus*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	P				No				
No. of Species Observed in Station:	**22**	**No. of Breeding Species Observed in Station:**	**22**		**1**	**1**	**1**	**1**	**0**	**0**	**0**	

Station No.: 05BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
DOWO	Downy Woodpecker	*Picoides pubescens*	B	H				No				
PIWO	Pileated Woodpecker	*Dryocopus pileatus*	B	S				No				
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	P				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
CCSP	Clay-colored Sparrow	*Spizella pallida*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
RBGR	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	P				No				
No. of Species Observed in Station:	**15**	**No. of Breeding Species Observed in Station:**	**15**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 06BBS												
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				
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	H				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No				
HOWR	House Wren	*Troglodytes aedon*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
GRCA	Gray Catbird	*Dumetella carolinensis*	B	S				No				
CSWA	Chestnut-sided Warbler	*Dendroica pensylvanica*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	FY				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No				
COGR	Common Grackle	*Quiscalus quiscula*	B	FY				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	H				No				
No. of Species Observed in Station:	**16**	**No. of Breeding Species Observed in Station:**	**16**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 02MLS01											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 02MLS02											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 02MLS03												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	SC	THR	THR	No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
No. of Species Observed in Station:	**2**	**No. of Breeding Species Observed in Station:**	**2**		**2**	**2**	**2**	**0**	**0**	**0**	**0**	

Station No.: 03MLS01												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**2**		**1**	**1**	**1**	**0**	**0**	**0**	**0**	

Station No.: 03MLS02												
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	SC	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.: 03MLS03												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
EAME	Eastern Meadowlark	*Sturnella magna*	B	P	THR	THR	THR	No				
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**1**		**1**	**1**	**1**	**0**	**0**	**0**	**0**	

Station No.: 04MLS01											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	A	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**2**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 04MLS02											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**2**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 04MLS03											
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No			
No. of Species Observed in Station:	**1**	**No. of Breeding Species Observed in Station:**	**2**		**1**	**1**	**1**	**0**	**0**	**0**	**0**

Station No.: 07BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
CAGO	Canada Goose	*Branta canadensis*	B	X				No				
ROPI	Rock Pigeon	*Columbia livia*	B	X				No				
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
LEFL	Least Flycatcher	*Empidonax minimus*	B	P				No				
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	S				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
BRTH	Brown Thrasher	*Toxostoma rufum*	B	S				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	X				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
CCSP	Clay-colored Sparrow	*Spizella pallida*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No				
GRSP	Grasshopper Sparrow	*Ammodramus savannaru*	B	S	SC	SC	SC	No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	SC	THR	THR	No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	X				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
COGR	Common Grackle	*Quiscalus quiscula*	B	X				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	S				No				
No. of Species Observed in Station:	**22**	**No. of Breeding Species Observed in Station:**	**22**		**3**	**3**	**3**	**0**	**0**	**0**	**0**	

Station No.: 08BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No				
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	S				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	X				No				
BARS	Barn Swallow	*Hirundo rustica*	B	X	THR	THR	THR	No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
GRCA	Gray Catbird	*Dumetella carolinensis*	B	S				No				
EUST	European Starling	*Sturnus vulgaris*	B	S				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
AMGO	American Goldfinch	*Carduelis tristis*	B	X				No				
No. of Species Observed in Station:	**21**	**No. of Breeding Species Observed in Station:**	**21**		**2**	**2**	**2**	**0**	**0**	**0**	**0**	

Station No.: 09BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
ROPI	Rock Pigeon	*Columbia livia*	B	X				No				
MODO	Mourning Dove	*Zenaida macroura*	B	S				No				
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No				
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	H				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	X				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No				
EAME	Eastern Meadowlark	*Sturnella magna*	B	S	THR	THR	THR	No				
BAOR	Baltimore Oriole	*Icterus galbula*	B	S				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	X				No				
No. of Species Observed in Station:	**20**	**No. of Breeding Species Observed in Station:**	**20**		**1**	**1**	**1**	**0**	**0**	**0**	**0**	

Station No.: 10BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	X				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	X				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	H				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
EUST	European Starling	*Sturnus vulgaris*	B	X				No				
BLWW	Blue-winged Warbler	*Vermivora pinus*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No				
CCSP	Clay-colored Sparrow	*Spizella pallida*	B	S				No				
FISP	Field Sparrow	*Spizella pusilla*	B	S				No				
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No				
COGR	Common Grackle	*Quiscalus quiscula*	B	X				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	P				No				
No. of Species Observed in Station:	**16**	**No. of Breeding Species Observed in Station:**	**16**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 11BBS												
AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6			
ROPI	Rock Pigeon	*Columbia livia*	B	X				No				
MODO	Mourning Dove	*Zenaida macroura*	B	X				No				
DOWO	Downy Woodpecker	*Picoides pubescens*	B	H				No				
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No				
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No				
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	P				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	X				No				
AMCR	American Crow	*Corvus brachyrhynchos*	B	X				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No				
GRCA	Gray Catbird	*Dumetella carolinensis*	B	S				No				
BRTH	Brown Thrasher	*Toxostoma rufum*	B	S				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
CCSP	Clay-colored Sparrow	*Spizella pallida*	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	H				No				
AMGO	American Goldfinch	*Carduelis tristis*	B	H				No				
No. of Species Observed in Station:	**19**	**No. of Breeding Species Observed in Station:**	**19**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Station No.: 12BBS												
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	S				No				
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No				
LEFL	Least Flycatcher	*Empidonax minimus*	B	S				No				
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	X				No				
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No				
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No				
AMRO	American Robin	*Turdus migratorius*	B	S				No				
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No				
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No				
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No				
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No				
SOSP	Song Sparrow	*Melospiza melodia*	B	S				No				
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	X				No				
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	X				No				
COGR	Common Grackle	*Quiscalus quiscula*	B	X				No				
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	X				No				
No. of Species Observed in Station:	**16**	**No. of Breeding Species Observed in Station:**	**16**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TOTAL BIRD SPECIES OBSERVED DURING STATION SURVEYS: 52

APPENDIX C 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, October 2021.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2021.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, February 2022.
	Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000
	Region 6	Southern Ontario Wetland Evaluation Appendix 11B, Version 3.3, March 2014

Breeding Status: (Observed By GHD)

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 GHD)

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		
CAGO	Canada Goose	*Branta canadensis*	B	X				No			
MALL	Mallard	*Anas platyrhynchos*	B	None				No			
GBHE	Great Blue Heron	*Ardea herodias*	B	X				No			
GRHE	Green Heron	*Butorides virescens*	B	None				No			
TUVU	Turkey Vulture	*Cathartes aura*	B	X				No			
COHA	Cooper's Hawk	*Accipiter cooperii*	B	None				No			
KILL	Killdeer	*Charadrius vociferus*	B	H				No			
RBGU	Ring-billed Gull	*Larus delawarensis*	B	X				No			
ROPI	Rock Pigeon	*Columbia livia*	B	X				No			
MODO	Mourning Dove	*Zenaida macroura*	B	S				No			
BBCU	Black-billed Cuckoo	*Coccyzus erythropthalmu*	B	None				No			
RTHU	Ruby-throated Hummingbi	*Archilochus colubris*	B	None				No			
BEKI	Belted Kingfisher	*Megaceryle alcyon*	B	H				No			
YBSS	Yellow-bellied Sapsucker	*Sphyrapicus varius*	B	None				Yes			
DOWO	Downy Woodpecker	*Picoides pubescens*	B	H				No			
NOFL	Northern Flicker	*Colaptes auratus*	B	S				No			
PIWO	Pileated Woodpecker	*Dryocopus pileatus*	B	S				No			
ALFL	Alder Flycatcher	*Empidonax alnorum*	B	S				No			
WIFL	Willow Flycatcher	*Empidonax traillii*	B	S				No			
LEFL	Least Flycatcher	*Empidonax minimus*	B	P				No			
EAPH	Eastern Phoebe	*Sayornis phoebe*	B	None				No			
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	S				No			
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	P				No			
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	S				No			
BLJA	Blue Jay	*Cyanocitta cristata*	B	S				No			
AMCR	American Crow	*Corvus brachyrhynchos*	B	H				No			

CORA	Common Raven	*Corvus corax*	B	None				No			
BARS	Barn Swallow	*Hirundo rustica*	B	X	THR	THR	THR	No			
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	S				No			
HOWR	House Wren	*Troglodytes aedon*	B	S				No			
AMRO	American Robin	*Turdus migratorius*	B	A				No			
GRCA	Gray Catbird	*Dumetella carolinensis*	B	S				No			
BRTH	Brown Thrasher	*Toxostoma rufum*	B	S				No			
EUST	European Starling	*Sturnus vulgaris*	B	S				No			
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	P				No			
BLWW	Blue-winged Warbler	*Vermivora pinus*	B	S				No			
YEWA	Yellow Warbler	*Dendroica petechia*	B	S				No			
CSWA	Chestnut-sided Warbler	*Dendroica pensylvanica*	B	S				No			
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	S				No			
AMRE	American Redstart	*Setophaga ruticilla*	B	S				No			
OVEN	Ovenbird	*Seiurus aurocapillus*	B	S				Yes			
COYE	Common Yellowthroat	*Geothlypis trichas*	B	S				No			
CHSP	Chipping Sparrow	*Spizella passerina*	B	S				No			
CCSP	Clay-colored Sparrow	*Spizella pallida*	B	S				No			
FISP	Field Sparrow	*Spizella pusilla*	B	FY				No			
SASP	Savannah Sparrow	*Passerculus sandwichens*	B	S				No			
GRSP	Grasshopper Sparrow	*Ammodramus savannaru*	B	S	SC	SC	SC	No			
SOSP	Song Sparrow	*Melospiza melodia*	B	FY				No			
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	S				No			
RBGR	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B	S				No			
INBU	Indigo Bunting	*Passerina cyanea*	B	S				No			
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	S	SC	THR	THR	No			
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	S				No			
EAME	Eastern Meadowlark	*Sturnella magna*	B	FY	THR	THR	THR	No			
COGR	Common Grackle	*Quiscalus quiscula*	B	CF				No			
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	P				No			

BAOR	Baltimore Oriole	*Icterus galbula*	B	S				No			
PUFI	Purple Finch	*Carpodacus purpureus*	B	S				No			
AMGO	American Goldfinch	*Carduelis tristis*	B	P				No			
TOTAL SPECIES OBSERVED:	**59**	**BREEDING SPECIES OBSERVED:**	**59**		**4**	**4**	**4**	**2**	**0**	**0**	**0**

Appendix D

Breeding Herpetozoa Detailed Survey – Station Report and Status Report

Appendix **D** Breeding Herpetozoa Survey -Detailed Station Report

This report summarizes all herpetozoa (amphibian and reptiles) observations recorded by GHD for each visit to survey stations established within a project site. Details for each visit include station physical and spatial descriptions as well as sampling conditions and timing. Observations will note type of observation, quantity, call index, life stage and location when applicable.

AMPHIBIAN CALLING INDEX

1 - Individuals can be counted; there is space between calls
2 - Calls of individuals can be distinguished but there is some overlapping calls
3 - Full chorus, calls are constant, continuous and overlapping

Project ID: 20-044 Location: Lakefield

Project Name: Lakefield Tower Rd 2 Project Remarks

Number of Herp Species Observed in Project: 3

Station No.: 02MA

Vegetation Community No. (if applicable): 0

Habitat Description: setback forest edge then MAM2

UCLatitude: 715141 Corrected Latitude: 0 UTM:

UCLongitude 4921676 Corrected Longitude 0 Way Point #

Date: 5/25/2020

SampleID: 442
Visit No.: 2
StatWayPt:

Survey Method: Auditory
Survey Type: MMP
Start Time: 9:21:00 PM
End Time: 9:26:00 PM

Wind Conditions: 0
CloudCover: 0
Precipitation: None
Precipitation (within 24hrs): Heavy Rai
Temp Start: 23
Water Temp Start:

Background Noise: 1
Remarks:

Recorder:
Observers: CT JB

OBSERVATIONS

ObsID	Common Name	Observation Code	Call Index	Quantity	Life Stage	Distance (m)	Direction	AreaLoc	HWFName	Comment
1252	Gray Treefrog	Call	1	2	Adult	200	250	Out		

Number of Herp Species Observed in Sample: 1

Number of Herp Species Observed in Station 02 : 1

Station No.: 04MA

Vegetation Community No. (if applicable): 0

Habitat Description swamp thicket

UCLatitude: 716315 Corrected Latitude: 0 UTM:

UCLongitude 4920729 Corrected Longitude 0 Way Point #

Date: 5/25/2020

SampleID: 444 Survey Method: Auditory Wind Conditions: 0 Background Noise: 1

Visit No.: 2 Survey Type: MMP CloudCover: Remarks:

StatWayPt: Start Time: 9:48:00 PM Precipitation: None

End Time: 9:53:00 PM Precipitation (within 24hrs): Heavy Rai

Temp Start: 23 Recorder:

Water Temp Start: Observers: jb ct

OBSERVATIONS

ObsID	Common Name	Observation Code	Call Index	Quantity	Life Stage	Distance (m)	Direction	AreaLoc	HWFName	Comment
1254	Boreal Chorus Frog	Call	1	1	Adult	50	50	In		
1253	Spring Peeper	Call	3	25	Adult	50	60	In		

Number of Herp Species Observed in Sample: 2

Date: 4/28/2020

SampleID: 470
Visit No.: 1
StatWayPt:

Survey Method: Auditory
Survey Type: MMP
Start Time: 9:04:00 PM
End Time: 9:09:00 PM

Wind Conditions: 1
CloudCover: 9
Precipitation: None
Precipitation (within 24hrs):
Temp Start: 10
Water Temp Start:

Background Noise:
Remarks:
Recorder:
Observers:

OBSERVATIONS

ObsID	Common Name	Observation Code	Call Index	Quantity	Life Stage	Distance (m)	Direction	AreaLoc	HWFName	Comment
1287	Boreal Chorus Frog	Call	2	5	Adult	50	250	In		
1286	Boreal Chorus Frog	Call	2	5	Adult	40	240	In		

Number of Herp Species Observed in Sample: 1

Number of Herp Species Observed in Station 04 : 2

Number of Herp Species Observed in Project: 3

APPENDIX D Herpetozoa Status Report

Project ID: 20-044

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
Treefrogs		*Hylidae*				
Spring Peeper		*Pseudacris crucifer*				No
Gray Treefrog		*Hyla versicolor*				No
Boreal Chorus Frog		*Pseudacris maculata*				No
No. of Species Observed	3		**0**	**0**	**0**	**0**

No. of Species Observed in Projec 3

Appendix E

Mammal Status Report

APPENDIX E 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
Eastern Gray Squirrel (Gray Phase)	*Sciurus carolinensis*				No
Common Raccoon	*Procyon lotor*				No
No. of Species Observed in Projec 3		**0**	**0**	**0**	**0**

Appendix F

Fish Species List by Ray's Creek and the Otonabee River

Appendix F Fish Species List for Ray's Creek and Otonabee River

Family Name	Common Name	Scientific Name	Thermal Regime	Spawning Season	Ray's Creek	Otonabee River
Atherinopsidae	Brook Silverside	*Labidesthes sicculus*	Warmwater	Spring-Summer (May-August)		●
Catostomidae	White Sucker	*Catostomus commersonii*	Coolwater	Spring (April-June)	●	●
Centrarchidae	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
	Catostomidae	*White Sucker*	Catostomus commersonii	Coolwater	Spring (April-June)	●
Cottidae	Mottled Sculpin	*Cottus bairdii*	Coolwater	Spring (April-May)		●
Cyprinidae	Blackchin Shiner	*Notropis heterodon*	Coolwater	Summer (June-August)		●
	Blacknose Dace	*Rhinichthys obtusus*	Coolwater	Spring (May-June)	●	
	Bluntnose Minnow	*Pimephales notatus*	Warmwater	Summer (June-August)		●
	Brassy Minnow	*Hybognathus hankinsoni*	Coolwater	Spring-Summer (May-July)	●	
	Common Carp	*Cyprinus carpio*	Warmwater	Spring-Summer (May-August)		●
	Creek Chub	*Semotilus atromaculatus*	Coolwater	Spring (May-June)	●	

Family Name	Common Name	Scientific Name	Thermal Regime	Spawning Season	Ray's Creek	Otonabee River
	Dace species	*Phoxinus sp*	n/a	n/a	●	
	Fathead Minnow	*Pimephales promelas*	Warmwater	Spring (May-August)	●	
	Northern Redbelly Dace	*Chrosomus eos*	Coolwater	Spring-Summer (May-July)	●	
	Spottail Shiner	*Notropis hudsonius*	Coolwater	Spring (May-June)		●
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	Coolwater	Spring-Summer (May-July)	●	
Ictaluridae	Brown Bullhead	*Ameiurus nebulosus*	Warmwater	Spring (May-June)		●
Umbridae	Central Mudminnow	*Umbra limi*	Coolwater	Spring (April-May)	●	
Percidae	Iowa Darter	*Etheostoma exile*	Coolwater	Spring (April-June)	●	●
	Log Perch	*Percina caprodes*	Warmwater	Spring (May-June)		●
	Yellow Perch	*Perca flavescens*	Coolwater	Spring (April-May)	●	●

Note: Fish species list obtained from the Ontario Ministry of Natural Resources (OMNR, 2012), fish species spawning season obtained from the *Ontario Freshwater Fishes Life History Database* (Eakins, 2019).


GHD