



ALINEA LAND CORPORATION

**FUNCTIONAL WATER AND WASTEWATER
SERVICING REPORT**

Prepared By:

Metropolitan Consulting Inc.

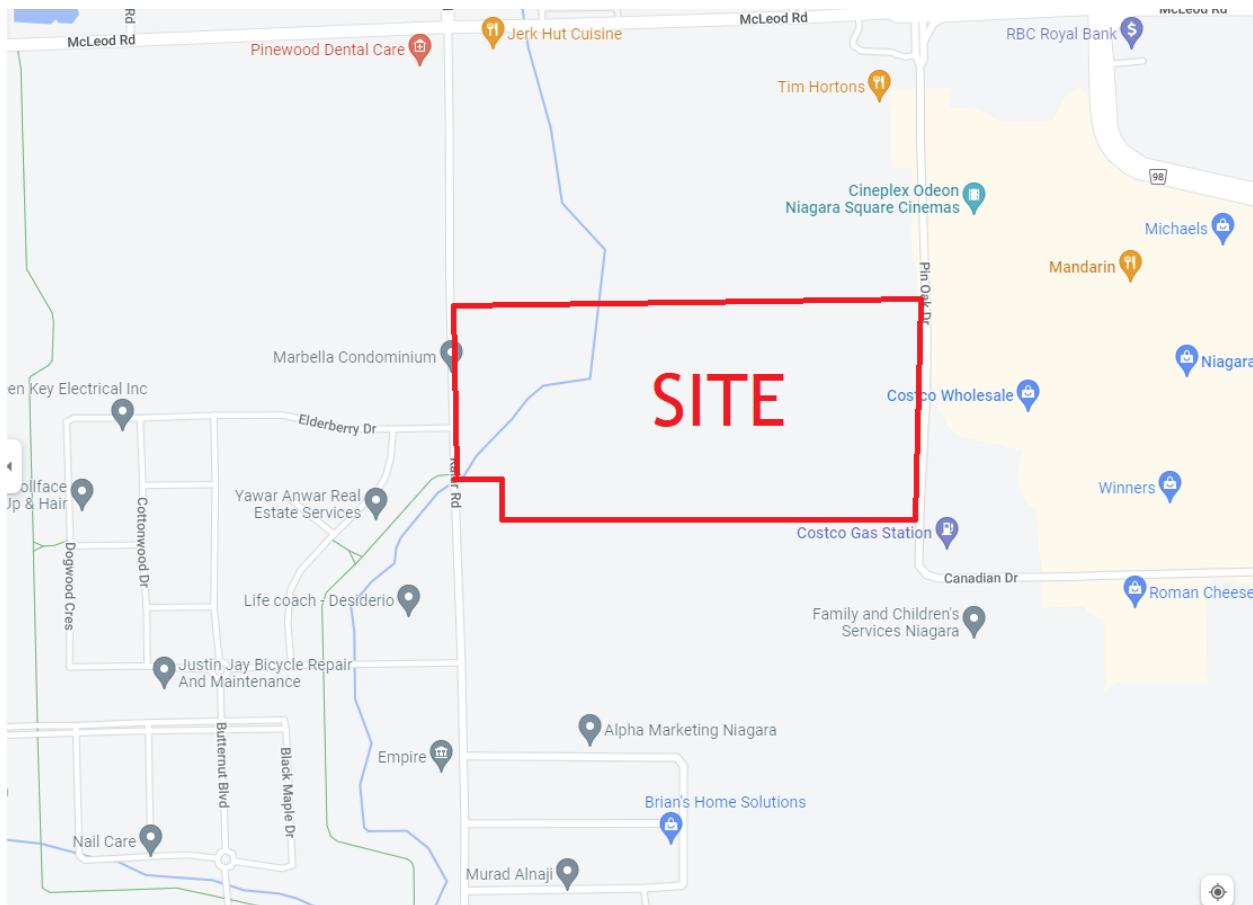
2255 Barton St E, Unit 3B

Hamilton, ON L8H 7T4

Date: December 2023

1.0 - INTRODUCTION

The property under study is 7580 Kalar Road (13.5 ha). The property is bounded by Kalar Road to the west, Niagara Peninsula Energy to the north, Pin Oak Drive to the east, and a residential home to the southwest.

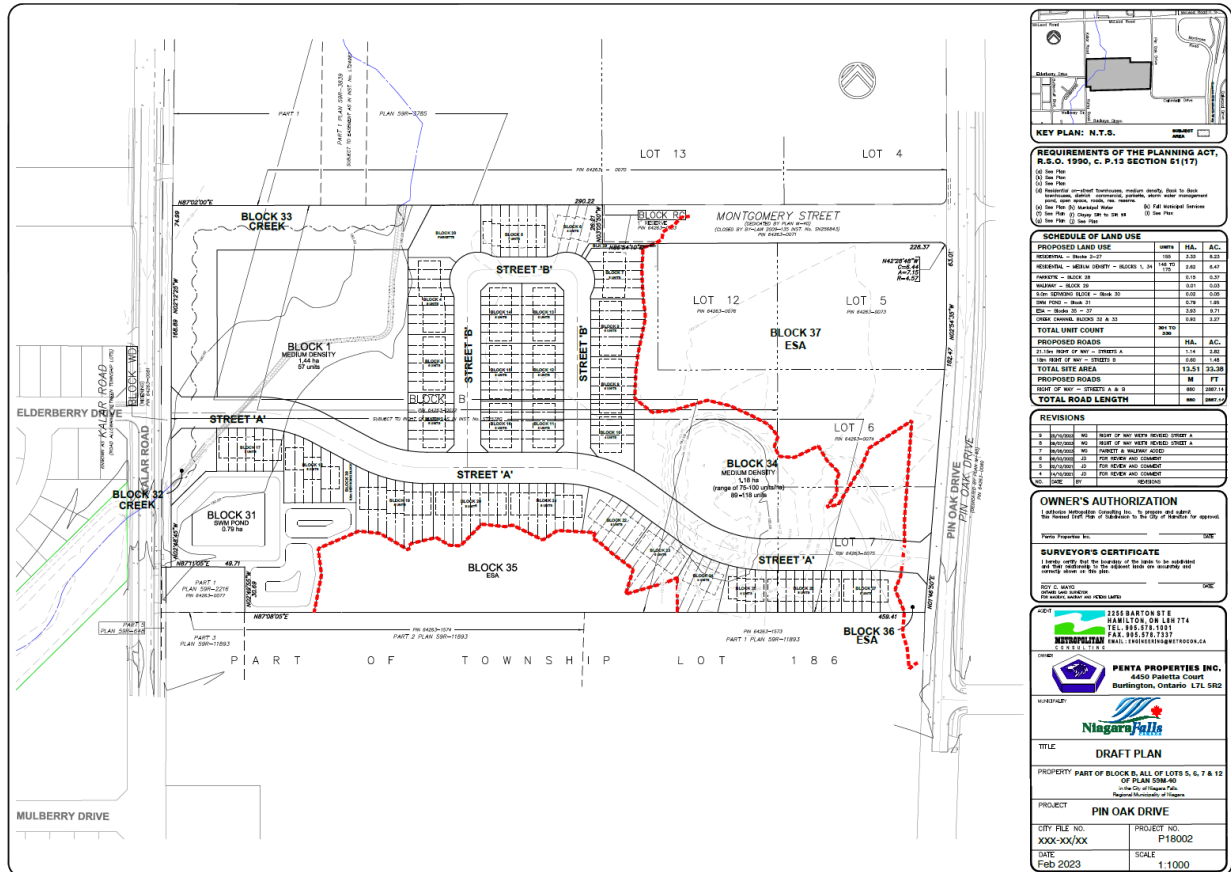


This report will outline the minimum requirements to service the site with respect to sanitary and water services to meet the Niagara Region requirements for land development. Refer to the Functional Stormwater Management Report for more information regarding the strategy for stormwater management.

A creek flows through the west side of the property, and there are multiple protected forested areas that are to be preserved. Refer to the Environmental Impact Study (GEI Consultants, March 2023) for information regarding the strategy for meeting the environmental requirements.

1.1 - PROPOSED DEVELOPMENT

It is proposed to construct 26 freehold townhome blocks totaling 155 units, and an additional 2 medium density blocks with up to 175 units, for a total of up to 330 residential units. In addition, it is proposed to construct a new public road ("Street A") through the site, connecting Kalar Road in the west to Pin Oak Drive in the east.



Proposed Development Draft Plan (December 2023)

For more information see the Proposed Draft Plan in the Appendix.

2.0 - SANITARY WASTE WATER DISPOSAL

2.1 - Existing Conditions

There are no existing sanitary sewer connections on this property. There is an existing 300mm sanitary sewer in Kalar Road to the west of the site, and an existing 750mm sanitary trunk sewer in Pin Oak Drive to the east of the site.

There is no existing development on the site, and therefore there is no existing population, but the site does contribute to the sanitary sewers via infiltration. As per drawings received from the City, the west side of the property (4.11 ha) is allocated to the existing sanitary sewer in Kalar Road. The flow to the existing sanitary sewer in Kalar Road generated by infiltration in the western portion of the site is **1.15 L/s**.

As per drawings received from the City, the remainder of the site is assumed to drain towards the sanitary trunk sewer in Pin Oak Drive. Since this is a trunk sewer, no additional analysis is required.

2.2 - Proposed Development

The proposed development will be drained to the existing sanitary sewer in Kalar Road. A new 250mm sanitary sewer will be built in the proposed "Street A" to collect flow from the site, which will be directed to a new manhole that will be installed in the existing sanitary sewer in Kalar Road. See the Sanitary Drainage Figure in the Appendix for more details.

The following standards for population densities were used to calculate the populations:

| Land Use ** | Population Density (persons/ha) |
|-------------------------|---------------------------------|
| Residential | |
| R1-R2 | 45.5 |
| R3-R4 | 96.4 |
| R5A-R5B | 163.1 |
| R5C | 229.8 |
| R5D-R5E | 355.8 |
| Industrial | |
| General Industrial (I) | 153.2 |
| Commercial | |
| General Commercial (GC) | 180.4 |
| Tourist Commercial (TC) | 284.2 |
| | |
| Institutional | 96.4 |



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PIN OAK DRIVE**

The proposed development will add 27 townhouse blocks (155 units) and 2 medium density blocks (up to 175 units). The Roads and EPA areas do not contribute to population density. The areas per zoning type are as follows:

- R3: 3.33ha * 96.4 persons/ha = 321 persons
- R4: 1.44ha * 96.4 persons/ha = 139 persons
- R5C: 1.18ha * 229.8 persons/ha = 271 persons

The total population of the proposed developments is therefore 731 persons. See Schedule 1 plan in the Appendix for more details.

The proposed post-development peak sanitary flow rate due to population is **11.45 L/s**, and the flow generated by infiltration is **6.24 L/s**. Therefore, the total post-development peak sanitary flow rate is **17.69 L/s**. This is an increase of 16.5 L/s from the existing condition.

With the additional flow from the proposed development, the existing downstream sewer on Kalar Road was determined to be at **67%** capacity. Since the additional flow in the existing downstream sewer does not raise the capacity above the 85% threshold, the existing sewers capacity is sufficient and no upgrades are required.

Detailed sewer modeling provided by the City (see appendix) has confirmed that there are no issues with downstream sewer capacity to accommodate the 10-year design storm, and this design does not trigger the planned upgrades in the region trunk or Niagara Falls WWTP per 2021 MSP . Detailed calculations of sanitary discharge rates and downstream sanitary sewer capacity can be found in the Appendix.

All lateral servicing connections shall exceed the minimum self-cleansing velocity of 0.6m/s.

It would instead be possible to install a connection from the property directly to the sanitary trunk sewer in Pin Oak Drive to the east, though this would require installing sanitary sewers through a protected environmental area. Since there is sufficient capacity in the existing sanitary sewer in Kalar Road, a connection to the sanitary trunk sewer in Pin Oak Drive is not necessary.



3.0 - WATER DISTRIBUTION

3.1 - Existing Conditions

There are no existing watermain connections on this property. There is an existing 300mm watermain on Pin Oak Drive, east of the site, and an existing 300mm watermain in Kalar Road, west of the site.

3.2 - Proposed Development

The proposed development will be serviced by a 300mm PVC watermain that will be constructed in the proposed "Street A". This new watermain will be connected to the existing watermain in Kalar Road to the west and the existing watermain in Pin Oak Drive to the east, forming a closed loop. Refer to the servicing drawing in the Appendix for details.

The unit rate and peaking factors of water consumption, minimum pipe size and allowable pressure in line were established from the M.E.C.P. criteria.

The Ontario Building Code (OBC) requires a minimum of two sources of water supply from a public system if a building is over 84m in height. Since none of the buildings will be over 84m in height, satisfying these criteria is not a consideration for this development.

The residential water demands for the proposed developments were calculated as follows:

| | | |
|---|-----------------------------------|------------|
| a) Average Day domestic demand <i>As per Sanitary calculations</i> | 360 L/person/day (731 persons) | 3.05 L/sec |
| b) Peak Day Demand | 1.3 x daily demand | 3.96 L/sec |
| c) Peak Hour Demand | 2.5 x daily demand | 7.61 L/sec |
| d) Fire Flow | | 150 L/sec |

Total Residential Water Demand = Peak Hour Demand + Fire Flow = 157.6 L/s.

There are no commercial properties in the proposed development, and thus there is no commercial water demand. Therefore, the Total Water Demand is equal to the Total Residential Water Demand, or **157.6 L/s**.

As per Region standards, all new developments must demonstrate that the Total Water Demand is less than the flow at 20 psi in the existing watermain. A flow test will be required during the SPA stage to determine if there is adequate flow in the existing watermains.

4.0 - CONCLUSIONS

The existing sanitary sewer was evaluated and the proposed development can be accommodated, as described in this report. The additional flow generated by the proposed development does not cause the existing downstream sewer to rise over 85% capacity, and therefore no upgrades are required.

| Summary | |
|--|-------|
| Existing Sanitary Discharge Flow Rate (L/sec) | 1.15 |
| Proposed Sanitary Discharge Flow Rate (L/sec) | 17.69 |
| Total Water Demand (L/sec) | 157.6 |
| Available Flow at 20 PSI Residual Pressure (L/sec) | TBD |

Prepared by



Kevin Hollingworth, P.Eng



A handwritten signature in black ink, appearing to read "Paul Jarzecki".

Paul Jarzecki, P.Eng



**ALINEA LAND CORPORATION
FUNCTIONAL WATER AND
WASTEWATER SERVICING REPORT
PIN OAK DRIVE**

Appendix

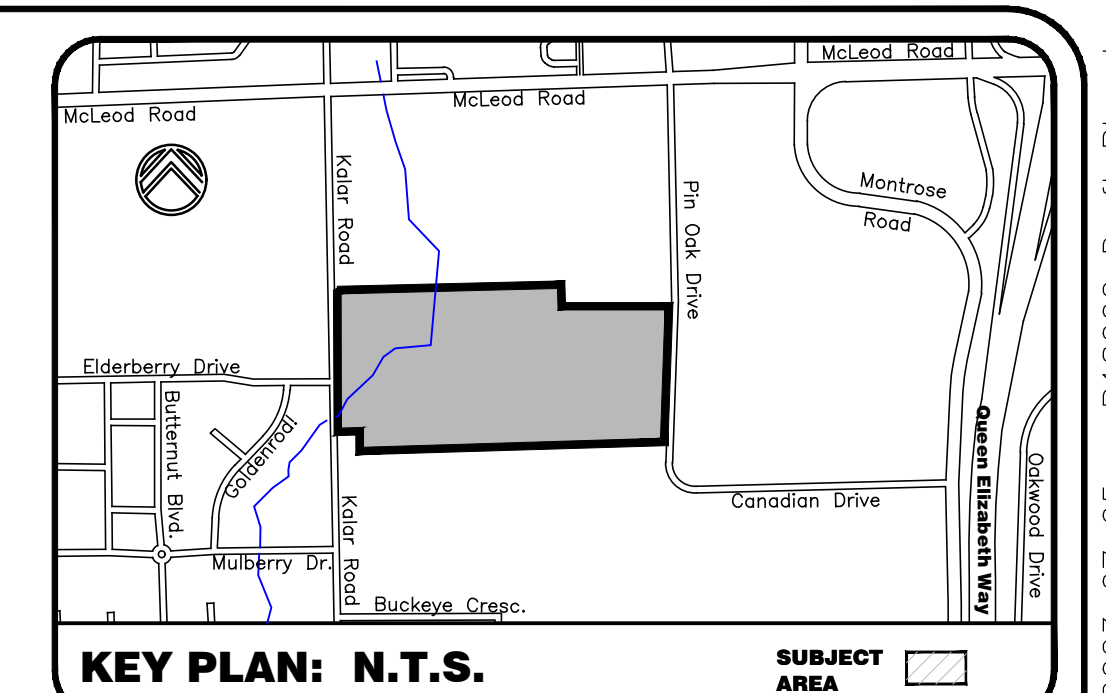
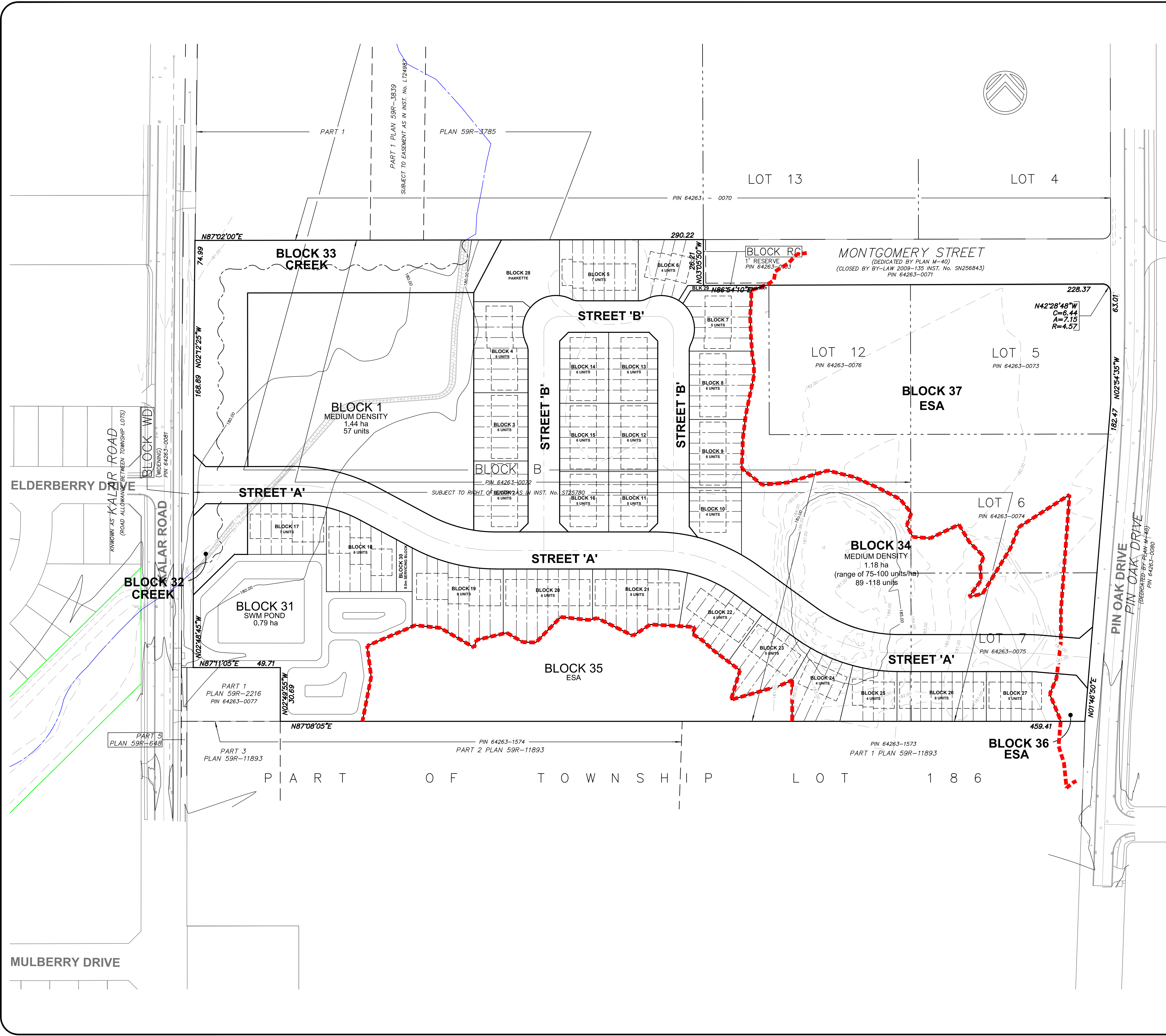
Draft Plan

Sanitary Design Sheet

Schedule 1

Environmental Impact Study (GEI Consulting)

Sanitary Modeling from City of Niagara Falls (GM BluePlan Engineering Limited)



REQUIREMENTS OF THE PLANNING ACT, R.S.O. 1990, c. P.13 SECTION 51(17)

(a) See Plan
 (b) See Plan
 (c) See Plan
 (d) Residential on-street townhouses, medium density, Back to Back townhouses, district commercial, parkette, storm water management pond, open space, roads, res. reserve.
 (e) See Plan (h) Municipal Water (k) Full Municipal Services
 (f) See Plan (i) Clayey Silt to Silt till (l) See Plan
 (g) See Plan (j) See Plan

SCHEDULE OF LAND USE

| PROPOSED LAND USE | UNITS | HA. | AC. |
|---|-------------------|--------------|----------------|
| RESIDENTIAL - Blocks 2-27 | 155 | 3.33 | 8.23 |
| RESIDENTIAL - MEDIUM DENSITY - BLOCKS 1, 34 | 146 TO 175 | 2.62 | 6.47 |
| PARKETTE - BLOCK 28 | | 0.15 | 0.37 |
| WALKWAY - BLOCK 29 | | 0.01 | 0.03 |
| 9.0m SERVICING BLOCK - Block 30 | | 0.02 | 0.05 |
| SWM POND - Block 31 | | 0.79 | 1.95 |
| ESA - Blocks 35 - 37 | | 3.93 | 9.71 |
| CREEK CHANNEL BLOCKS 32 & 33 | | 0.92 | 2.27 |
| TOTAL UNIT COUNT | 301 TO 330 | | |
| PROPOSED ROADS | | HA. | AC. |
| 21.15m RIGHT OF WAY - STREETS A | | 1.14 | 2.82 |
| 18m RIGHT OF WAY - STREETS B | | 0.60 | 1.48 |
| TOTAL SITE AREA | | 13.51 | 33.38 |
| PROPOSED ROADS | | M | FT |
| RIGHT OF WAY - STREETS A & B | | 880 | 2887.14 |
| TOTAL ROAD LENGTH | | 880 | 2887.14 |

REVISIONS

| NO. | DATE | BY | REVISIONS |
|-----|------------|----|-------------------------------------|
| 9 | 25/10/2023 | WG | RIGHT OF WAY WIDTH REVISED STREET A |
| 8 | 09/07/2023 | WG | RIGHT OF WAY WIDTH REVISED STREET A |
| 7 | 09/06/2023 | WG | PARKETTE & WALKWAY ADDED |
| 6 | 08/03/2022 | JD | FOR REVIEW AND COMMENT |
| 5 | 02/12/2021 | JD | FOR REVIEW AND COMMENT |
| 4 | 14/10/2021 | JD | FOR REVIEW AND COMMENT |

OWNER'S AUTHORIZATION

I authorize Metropolitan Consulting Inc. to prepare and submit this Revised Draft Plan of Subdivision to the City of Hamilton for approval.

Penta Properties Inc. _____ DATE _____

SURVEYOR'S CERTIFICATE

I hereby certify that the boundary of the lands to be subdivided and their relationship to the adjacent lands are accurately and correctly shown on this plan.

ROY C. MAYO _____ DATE _____
 ONTARIO LAND SURVEYOR
 FOR MACKAY, MACKAY AND PETERS LIMITED

AGENT 2255 BARTON STE
 HAMILTON, ON L8H 7T4
 TEL. 905.578.1001
 FAX. 905.578.7337
 EMAIL: ENGINEERING@METROCON.CA
 CONSULTING

OWNER **PENTA PROPERTIES INC.**
 4450 Paletta Court
 Burlington, Ontario L7L 5R2

MUNICIPALITY **Niagara Falls CANADA**

TITLE **DRAFT PLAN**

PROPERTY **PART OF BLOCK B, ALL OF LOTS 5, 6, 7 & 12 OF PLAN 59M-40**
 in the City of Niagara Falls,
 Regional Municipality of Niagara

PROJECT **PIN OAK DRIVE**

CITY FILE NO. PROJECT NO.
 XXX-XX/XX P18002

DATE SCALE
 Feb 2023 1:1000

SANITARY SEWER DESIGN SHEET - Existing

Project No.: P18002
Date: 2023-12-15

Project: Kalar Rd
Location:

| LOCATION | | | | | | | | FLOW | | | | | | SEWER DESIGN | | | | |
|------------------------|---------------|------------------|--------------------|------------|------------------------|------------------------|--------------------|------------------------|-----------------------------|-------------------|-----------------------|--------------------------------|------------------|--------------------|-----------|--------------------------|--------------------------|------------------|
| LOCATION (STREET NAME) | AREA LABEL(S) | Upstream Manhole | Downstream Manhole | Total Area | Incremental Population | Accumulated Population | Peaking Factor (M) | Incremental Flow (L/s) | Accumulated Peak Flow (L/s) | Section Area (ha) | Accumulated Area (ha) | Accumulated Infiltration (L/s) | Total Flow (L/s) | Pipe Diameter (mm) | Slope (%) | Full Flow Capacity (L/s) | Full Flow Velocity (m/s) | Percent Full (%) |
| Kalar Rd | 1, 2 | SA-06-04-0710 | SA-06-04-0700 | 18.29 | 1185 | 1185 | 3.75 | 19.55 | 19.55 | 18.29 | 18.29 | 5.12 | 24.67 | 250 | 0.73 | 51 | 1.04 | 48.6% |
| Kalar Rd | 3 | SA-06-04-0700 | SA-06-04-0690 | 1.85 | 231 | 1416 | 3.70 | 3.76 | 23.31 | 1.85 | 20.14 | 5.64 | 28.95 | 250 | 0.81 | 54 | 1.09 | 54.1% |
| Kalar Rd | 4, 5 | SA-06-04-0690 | SA-06-04-0680 | 2.30 | 0 | 1416 | 3.70 | 0.00 | 23.31 | 2.30 | 22.44 | 6.28 | 29.60 | 300 | 0.40 | 61 | 0.87 | 48.4% |
| Kalar Rd | 6 | SA-06-04-0680 | SA-06-04-0670 | 2.84 | 0 | 1416 | 3.70 | 0.00 | 23.31 | 2.84 | 25.28 | 7.08 | 30.39 | 300 | 0.40 | 61 | 0.87 | 49.7% |
| Kalar Rd | 7 | SA-06-04-0670 | SA-06-04-0660 | 0.50 | 30 | 1446 | 3.69 | 0.49 | 23.80 | 0.50 | 25.78 | 7.22 | 31.02 | 300 | 0.21 | 44 | 0.63 | 70.0% |
| Kalar Rd | - | SA-06-04-0660 | SA-06-04-0650 | 0.00 | 0 | 1446 | 3.69 | 0.00 | 23.80 | 0.00 | 25.78 | 7.22 | 31.02 | 300 | 0.31 | 54 | 0.76 | 57.6% |

| | | | |
|--------------------|--|-------|--------|
| Existing Flow Rate | | 380 | L/pp/d |
| Infiltration | | 0.280 | L/s/ha |
| n = | | 0.013 | |

SANITARY SEWER DESIGN SHEET - Proposed

Project No.: P18002
Date: 2023-12-15

Project: Kalar Rd
Location:

| LOCATION | | | | | | | | FLOW | | | | | | SEWER DESIGN | | | | | | |
|------------------------|---------------|------------------|--------------------|------------|------------------------|------------------------|--------------------|------------------------|-----------------------------|-------------------|-----------------------|--------------------------------|-------------------------|--------------------|-----------|--------------------------|--------------------------|------------------|--|--|
| LOCATION (STREET NAME) | AREA LABEL(S) | Upstream Manhole | Downstream Manhole | Total Area | Incremental Population | Accumulated Population | Peaking Factor (M) | Incremental Flow (L/s) | Accumulated Peak Flow (L/s) | Section Area (ha) | Accumulated Area (ha) | Accumulated Infiltration (L/s) | Total Flow (L/s) | Pipe Diameter (mm) | Slope (%) | Full Flow Capacity (L/s) | Full Flow Velocity (m/s) | Percent Full (%) | | |
| Kalar Rd | 1, 2 | SA-06-04-0710 | SA-06-04-0700 | 18.29 | 1185 | 1185 | 3.75 | 19.55 | 19.55 | 18.29 | 18.29 | 5.12 | 24.67 | 250 | 0.73 | 51 | 1.04 | 48.6% | | |
| Kalar Rd | 3 | SA-06-04-0700 | SA-06-04-0690 | 1.85 | 231 | 1416 | 3.70 | 3.76 | 23.31 | 1.85 | 20.14 | 5.64 | 28.95 | 250 | 0.81 | 54 | 1.09 | 54.1% | | |
| Kalar Rd | 4 | SA-06-04-0690 | SA-06-04-0680 | 1.03 | 0 | 1416 | 3.70 | 0.00 | 23.31 | 1.03 | 21.17 | 5.93 | 29.24 | 300 | 0.40 | 61 | 0.87 | 47.8% | | |
| Kalar Rd | 6 | SA-06-04-0680 | SA-06-04-0670 | 13.50 | 731 | 2147 | 3.56 | 11.45 | 34.76 | 13.50 | 34.67 | 6.24 | 41.00 | 300 | 0.40 | 61 | 0.87 | 67.0% | | |
| Kalar Rd | 7 | SA-06-04-0670 | SA-06-04-0660 | 0.50 | 30 | 2177 | 3.56 | 0.47 | 35.23 | 0.50 | 35.17 | 9.85 | 45.08 | 300 | 0.21 | 44 | 0.63 | 101.7% | | |
| Kalar Rd | - | SA-06-04-0660 | SA-06-04-0650 | 0.00 | 0 | 2177 | 3.56 | 0.00 | 35.23 | 0.00 | 35.17 | 9.85 | 45.08 | 300 | 0.31 | 54 | 0.76 | 83.7% | | |
| | | | | | | | | | | | | | Proposed Flow Rate | | 380 | L/pp/d | | | | |
| | | | | | | | | | | | | | Infiltration (New) | | 0.180 | L/s/ha | | | | |
| | | | | | | | | | | | | | Infiltration (Existing) | | 0.280 | L/s/ha | | | | |
| | | | | | | | | | | | | | n = | | 0.013 | | | | | |

SCHEDULE 1 TO BY-LAW NO. 20XX-XXX

SUBJECT LANDS:



R3



R4



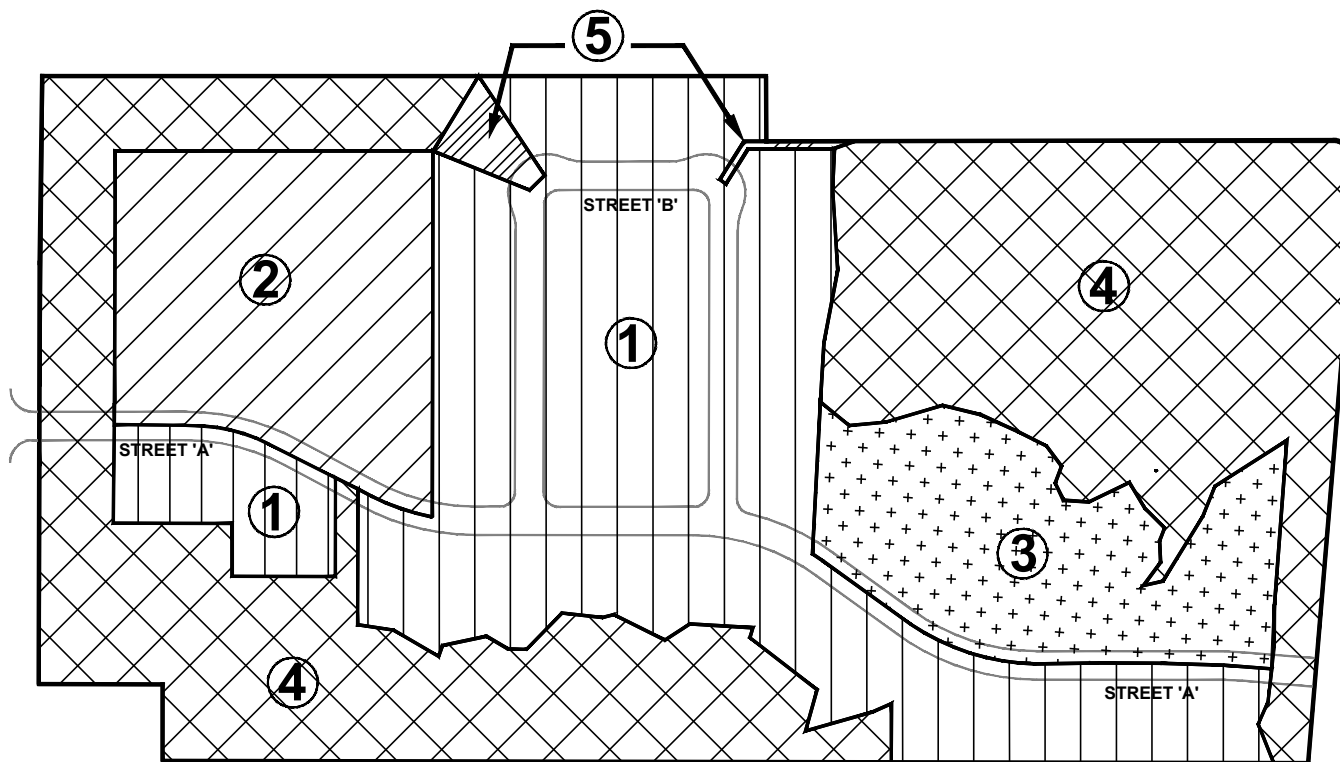
R5C



EPA



OS



SCHEDULE 1 TO BY-LAW NO. 20XX-XXX

DESCRIPTION: PART OF BLOCK B, ALL OF LOT 5, 6, 7 AND 12 OF PLAN 59M-40; NIAGARA FALLS
PIN: 64263-0072 (LT), 64263-0073 (LT), 64263-0074 (LT), 64263-0075 (LT), 64263-0076 (LT)

APPLICATION: ALINEA DEVELOPMENT GROUP

ASSESSMENT #:



N.T.S.
AM-2023-XXC



Environmental Impact Study

Pin Oak Drive, Niagara Falls

Submitted to:

Penta Properties
4480 Paletta Court
Burlington, ON L7L 5R2

Submitted by:

GEI Consultants Ltd.
100 Ahrens Street West, Unit 201
Kitchener, Ontario N1G 3G9
1-800-810-3281

March 2023
Project 1902131

Statement of Conditions

This Report / Study (the “Work”) has been prepared at the request of, and for the exclusive use of, the Owner / Client, Niagara Region and its affiliates (the “Intended User”). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of GEI Consultants Ltd. and its Owner. GEI Consultants Ltd. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work.

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1. Introduction

GEI Consultants Ltd. (GEI) was retained by Penta Properties to complete an Environmental Impact Study (EIS) to support a proposed Draft Plan Subdivision for lands, legally described as Lots 179 and 186, Stamford (herein referred to as the Subject Lands), within the City of Niagara Falls, Ontario (**Figure 1, Appendix A**). The property is generally bounded by Kalar Road to the west, Pin Oak Drive to the east, Brown Road to the south and McLeod Road to the north. The Subject Lands are approximately 13.5 ha in area and occupy a portion of the Warren Creek Provincially Significant Wetland (PSW) Complex (**Figure 2, Appendix A**).

1.1 Project Overview

1.1.1 Project Study Area

The Subject Lands are characterized by old field meadow, treed swamps and cultural thicket, which reflect the anthropogenic nature of the surrounding land uses (i.e., residential, industrial and commercial). Wetlands associated with the Warren Creek Wetland Complex occur in the northeastern, eastern and southern portions of the property and occupy 4.06 ha. The property also occurs within an Environmental Protection Area (EPA) designated by the Official Plan of the City of Niagara Falls (2019).

The EPA designation is intended to provide a high-level depiction of environmentally sensitive lands and significant features and may not accurately reflect the ecological significance of these lands on a site-by-site basis. Minor refinement of the EPA boundary may be permitted in areas of limited ecological significance, subject to the approval of the City and Niagara Peninsula Conservation Authority (NPCA).

This EIS provides an assessment of the proposed development limits of the Subject Lands in support of the proposed Draft Plan Subdivision. An analysis of the ecological constraints and development opportunities for the property based on the proposed development footprint for the residential development has been completed, and any potential impacts affecting ecological features or functions on, or adjacent to, the Subject Lands are discussed.

1.2 Purpose of the Report

An EIS is required to characterize the existing environment, provide an overview of the landscape context, consider the significance and sensitivity of natural heritage features and functions, provide an assessment of potential impacts, and recommend mitigation strategies associated with the proposed development. This EIS has been scoped based on comments received from the City, Region and NPCA on the EIS Terms of Reference (TOR; September 20, 2019). This work considers applicable provincial and municipal requirements, and policies including reference to the natural heritage policies of the Province of Ontario's Provincial Policy Statement (PPS; MMAH 2020), associated provincial implementation guidance



contained in the Natural Heritage Reference Manual (NHRM; MNR 2010), the Official Plan of the City of Niagara Falls (2019) and the Niagara Region Official Plan (2022).

The EIS is a requirement of the municipal planning process and is intended to address the policies of the Niagara Region, the City of Niagara Falls and the NPCA.

The EIS components include:

- A review of existing background information, policies and legislation applicable to the Subject Lands in its regional context;
- A field review of the natural heritage features on, and immediately adjacent to, the Subject Lands through the completion of various ecological surveys and inventories;
- An evaluation of the sensitivity of the natural heritage features and their functions on the Subject Lands;
- An assessment of constraints to development and whether any of the existing natural heritage features within the Subject Lands meet the test of 'significance' as identified by the PPS (MMAH 2020), or the requirements to be part of the NHS;
- A description of the proposed undertaking and development proposal;
- Identification and discussion of the potential impacts that could occur to the natural heritage features as a result of the proposed development;
- Recommendations for mitigation to avoid or minimize impacts; and
- Opportunities for enhancement or restoration of natural features.



2. Natural Heritage Planning Considerations

An assessment of the quality and extent of natural heritage features found on, and adjacent to, the Subject Lands and the potential impacts to these features from the proposed development application was completed to address the natural heritage components of the following regulatory agencies, local and regional municipalities, and/or legislation:

- Provincial Policy Statement (MMAH 2020);
- Provincial *Endangered Species Act, 2007 (ESA)*;
- Federal *Migratory Birds Convention Act, 1994*;
- Federal *Fisheries Act, 1985*;
- Niagara Region Official Plan (Consolidated 2022);
- City of Niagara Falls Official Plan, 1993 (Consolidated 2019);
- NPCA Policies and Procedural Documents; and,
- Conservation Authorities Act O. Reg. 155/06, 1990 (Consolidated 2021).

The relevant aspects of existing and amended environmental legislation are discussed in the following sections.

2.1 Provincial Policy Statement

The PPS (MMAH 2020) provides direction on matters of provincial interest related to land use planning and development. It “*supports a comprehensive, integrated and long-term approach to planning...*” The PPS is to be read in its entirety and land use planners and decision-makers need to consider all relevant policies and how they work together.

This report addresses those policies that are specific to Natural Heritage (section 2.1) with some reference to other policies relevant to natural heritage and impact assessment considerations and areas of overlap (e.g., those related to Efficient and Resilient Development and Land Use Patterns, section 1.1; Sewage, Water and Stormwater, section 1.6.6; Water, section 2.2; Natural Hazards, section 3.1).

Eight types of significant natural heritage features are defined in the PPS, as follows:

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant areas of natural and scientific interest.



Development and site alteration shall not be permitted in Significant wetlands, or in Significant coastal wetlands in Ecoregions 5E, 6E and 7E. The Subject Lands are located within Ecoregion 6E. Development and site alteration shall not be permitted in Significant woodlands, Significant valleylands, SWH or significant ANSIs, unless it is demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Development and site alteration shall not be permitted in the habitat of endangered and threatened species or in fish habitat, except in accordance with provincial and federal requirements. Development and site alteration may be permitted on lands adjacent to fish habitat provided it has been demonstrated that there will be no negative impacts on the natural feature or their ecological functions.

2.2 Provincial Endangered Species Act

The provincial *Endangered Species Act, 2007* (ESA; Consolidated October 2021) was developed to:

- Identify Species at Risk (SAR), based upon best available science;
- Protect SAR and their habitats and to promote the recovery of the SAR; and
- Promote stewardship activities that would support those protection and recovery efforts.

The ESA protects all threatened, endangered and extirpated species listed on the Species at Risk in Ontario (SARO) list. These species are legally protected from harm or harassment, and their associated habitats are legally protected from damage or destruction, as defined under the ESA.

2.3 Migratory Bird Conservation Act

Environment and Climate Change Canada (ECCC) administers the Migratory Bird Convention Act, 1994 (amended 2017), which protects the nests of migratory bird species from destruction, including incidental take (i.e., the unintentional destruction of a nest), as well as from disturbance. The Migratory Birds Convention Act does not provide a set date where activities, such as tree removal, can be completed without the risk of incidental harm to the nests of birds. The requirement to ensure that there are no bird nests present within the work area rests with the proponent of the activity.

2.4 Federal Fisheries Act

Fisheries and Oceans Canada (DFO) administers the federal Fisheries Act, 1985, which defines fish habitat as “water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas” (s. 2(1)). The Fisheries Act prohibits the death of fish by means other than fishing (s. 34.4(1)), and the harmful alteration, disruption or destruction of habitat (HADD; s. 35(1)). A HADD is defined as “any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat’s capacity to support one or more life processes” (DFO 2019).



2.5 Niagara Region Official Plan

The Niagara Region Official Plan (2022) provides guidance and direction pertaining to natural heritage features and associated functions. The natural environment system is made up of individual natural heritage features and areas, key natural heritage features, key hydrological features, and other individual components.

The individual features and components of the natural environment system include:

- Significant Woodlands;
- other woodlands;
- Provincially Significant Wetlands;
- other wetlands and non-provincially significant wetlands;
- life science areas of natural and scientific interest;
- earth science areas of natural and scientific interest;
- permanent and intermittent streams;
- inland lakes; and
- linkages.

As per Schedule C2 (Natural Environment System: Individual Components and Features), the Subject Lands and adjacent areas contain PSWs, other Wetlands and Non-Provincially Significant Wetlands and Significant Woodlands.

The natural environment system policies that apply on the Subject Lands are summarized below:

- Changes to the limits or classification of individual features or components of the natural environment system identified through Regional criteria may be considered through the submission of an environmental impact study and/or hydrologic evaluation based on a terms of reference approved by the Region, in accordance with the policies of this Plan, and in consultation with the Conservation Authority as appropriate.
- Where development or site alteration is proposed within or adjacent to the natural environment system, new lots shall not be created which would fragment a natural heritage feature or area, key natural heritage feature, or key hydrologic feature. The lands to be retained in the natural environment system shall remain in a natural state.
- The natural feature and any required buffer or vegetation protection zone shall be maintained in a single block and zoned to protect the natural features and its ecological functions.
- Applications for a lot boundary adjustment shall avoid the fragmentation of provincially Significant wetlands and Significant woodlands.

If fish habitat is determined to be present, a fish habitat assessment undertaken by a qualified professional shall be required for development or site alteration. Development or site alteration may be exempt from this requirement provided that:



- the development satisfies Federal and Provincial requirements or has been specifically authorized by the appropriate approval authority; and
- the regulated setback, vegetated shoreline, stormwater management, and slope related policies of this Plan are met and the proposal is not for major development.

2.6 City of Niagara Falls Official Plan

The City of Niagara Falls Official Plan (OP; 2019) provides a policy basis for guidance to manage development within the municipality, in accordance with the *Planning Act*.

The Subject Lands are within the Garner South Secondary Plan area depicted on Schedule A-3. The Secondary Plan provides a detailed land use plan for developable Greenfield lands bounded by McLeod Road to the north, the Queen Elizabeth Way to the east, Chippawa Creek Road to the south and Beechwood Road to the west. Lands within the Secondary Plan area shall be subject to the public notification requirements of the *Planning Act*.

Schedule A (Future Land Use) of the Official Plan provides a high-level depiction of two specific land use designations on the Subject Lands: EPA at the southern and eastern limits of the Subject Lands as well as in the northwestern portion, and Residential land use in the central portion of the property. As per Schedule A-1 (Natural Heritage Plan), one creek occurs within the EPA in the northwestern portion of the property. Wetland buffers surround the Warren Creek Wetland Complex within the EPAs at the southern and eastern limits of the Subject Lands. The EPA designation applies to PSWs, NPCA regulated wetlands greater than 2 ha in size, Provincially Significant Life Areas of Natural and Scientific Interest (ANSIs), Significant habitat of Threatened and Endangered species, floodways, erosion hazard areas and environmentally sensitive areas. Development and site alteration shall not be permitted within the EPA designation. An EIS shall be required as part of a complete application under the Planning Act for site alteration or development on lands within or adjacent to an EPA. A minimum vegetated buffer established by an EIS shall be maintained around Provincially Significant Wetlands and Niagara Peninsula Conservation Area Wetlands greater than 2 ha in size. New development or site alteration within a vegetated buffer is not permitted.

2.7 Niagara Peninsula Conservation Authority

The NPCA conducts reviews of planning processes associated with future development of properties within its jurisdictional boundaries. NPCA provides planning and technical advice to planning authorities to assist them in fulfilling their responsibilities regarding natural hazards, natural heritage and other relevant policy areas pursuant to the Planning Act. In addition to their regulatory responsibilities, NPCA provides advice as both a watershed-based resource management agency and through planning advisory services.

NPCA administers the *Development, Interference with Wetlands, Alterations to Shorelines and Watercourses Regulation*, (O. Reg.) 155/06, which defines the areas of interest that allow NPCA to:



- Prohibit, regulate, or provide permission for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream, watercourse or changing or interfering with a wetland; and
- Prohibit, regulate, or provide permission for development if the control of flooding, erosion, dynamic beaches, pollution or the conservation of land may be affected by the development.

A review of the NPCA's Watershed Explorer (2023) was completed to determine the extent of the regulated areas within the Subject Lands. The NPCA regulates watercourses (including floodplains, meander belts), valleylands (crest of slope), wetlands and shorelines. The regulation mapping delineates hazardous lands, wetlands, shorelines and areas susceptible to flooding and associated allowances. Within the Subject Lands, the creek is identified by the NPCA as a regulated area with a floodplain. In addition, regulated wetlands (Warren Creek Wetland Complex) are located at the southern and eastern limits of the Subject Lands (**Figure 2; Appendix A**).

NPCA implements its authority under O. Reg. 155/06 in accordance with the *NPCA Policy Document: Policies for the Administration of Ontario Regulation 155/06 and the Planning Act* (NPCA 2018a).

Pursuant to the Development, Interference with Wetland and Alterations to Shorelines and Watercourse Regulation (NPCA; O. Reg. 155/06), any development in or on areas defined in the Regulation (e.g., river or stream valleys, hazardous land, wetlands) requires permission from the Conservation Authority. The Conservation Authority may grant permission for development in or on these areas if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development. The Regulation also states that it is prohibited to straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or change or interfere in any way with a wetland without permission from the Conservation Authority.



3. Background Information Review

3.1 Background References

The following resources were reviewed for information relating to natural features and species that may be found on the Subject Lands:

- Land Information Ontario database;
- Natural Heritage Information Centre database;
- Online Atlas Data;
- Aquatic species at risk distribution maps; and
- Other sources (e.g., subwatershed studies, watershed management plans, fisheries management plans, eBird, iNaturalist).

The results of the background review are discussed in the following sections. This information assisted in defining the search effort and target species for studies on and immediately adjacent to the Subject Lands.

3.1.1 *Land Information Ontario Natural Features Summary*

Based on the Ministry of Natural Resources and Forestry (MNRF) Land Information Ontario (LIO) geographic database, the following features were found within and adjacent to the Subject Lands (**Figure 2, Appendix A**):

- The Warren Creek Complex, an Environmental Conservation Area and Environmental Protection Area with Provincially Significant Wetlands is located at the eastern and southern portions of the Subject Lands;
- A tributary of Welland River bisects the northwestern corner of the site;
- A white-tailed Deer Wintering Area is located adjacent to the southern boundary of the Subject Lands; and
- Thompson Creek Wetland Complex is located approximately 650 m southwest of the Subject Lands

No other known natural heritage features were identified within or adjacent to the Subject Lands.

3.1.2 *Natural Heritage Information Centre*

The NHIC database (MNRF 2022) was searched for records of provincially significant plants, vegetation communities and wildlife on, and in the vicinity of, the Subject Lands. The database provides occurrence data by 1 km² area squares, with two squares overlapping at least a portion of the Subject Lands (17PH5169 and 17PH5269).



A total of six species were recorded in the atlas squares that overlap with the Subject Lands, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO list:
 - Deerberry (*Vaccinium stamineum*)- Threatened;
 - Northern Bobwhite (*Colinus virginianus*) – Endangered;
 - Round Hickorynut (*Obovaria subrotunda*)- Endangered;
 - Round-leaved Greenbrier (*Smilax rotundifolia*)-Threatened
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species):
 - Eastern Pondmussel (*Ligumia nasuta*)- Special Concern; and
 - Grass Pickerel (*Esox americanus*)- Special Concern

3.1.3 Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas (OBBA) contains detailed information on the population and distribution status of Ontario birds (Bird Studies Canada et al. 2006). The data is presented on 100 km² area squares with one square overlapping a portion of the Subject Lands (17PH56). It should be noted that the Subject Lands are a small component of the overall bird atlas square, and therefore it is unlikely that all bird species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in bird species presence and use.

A total of 95 species were recorded in the atlas squares that overlap with the Subject Lands, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO list:
 - Barn Swallow (*Hirundo rustica*)- Threatened;
 - Bobolink (*Dolichonyx oryzivorus*)- Threatened;
 - Chimney Swift (*Chaetura pelagica*)- Threatened; and
 - Eastern Meadowlark (*Sturnella magna*)- Threatened.
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species):
 - Eastern Wood-Pewee (*Contopus virens*)- Special Concern;
 - Purple Martin (*Progne subis*)- S3B (Vulnerable);
 - Grasshopper Sparrow (*Ammodramus savannarum*)- Special Concern;
 - Tufted Titmouse (*Baeolophus bicolor*)- S3 (Vulnerable);
 - Upland Sandpiper (*Bartramia longicauda*)- S2B (Vulnerable);
 - Wood Thrush (*Hylocichla mustelina*)- Special Concern.

3.1.4 Ontario Reptile and Amphibian Atlas

The Ontario Reptile and Amphibian Atlas contains detailed information on the population and distribution status of Ontario herpetofauna (Ontario Nature 2019). The data is presented on 100 km² area squares with one square overlapping a portion of the Subject Lands (17PH56).



It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore it is unlikely that all herpetofauna species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in herpetofauna species presence and use.

A total of 20 species was recorded in the atlas square that overlaps the Subject Lands, of which two are salamander species, eight are frog and toad species, five are turtle species and five are snake species. Of these species, one species listed as Threatened on the SARO list was noted: Blanding's Turtle (*Emydoidea blandingii*).

Five Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species) were identified:

- Eastern Musk Turtle (*Sternotherus odoratus*)- Special Concern;
- Eastern Ribbonsnake (*Thamnophis sauritus*)- Special Concern;
- Northern Map Turtle (*Graptemys geographica*)- Special Concern; and
- Snapping Turtle (*Chelydra serpentina*)- Special Concern

3.1.5 Ontario Butterfly and Moth Atlases

The Ontario Butterfly and Moth Atlases (Toronto Entomologists' Association 2022, 2020) contain detailed information on the population and distribution status of Ontario butterflies and moths. The data is presented on 100 km² area squares with one square overlapping a portion of the Subject Lands (17PH56). It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore it is unlikely that all butterfly and moth species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in butterfly and moth species presence and use.

A total of 44 species was recorded in the atlas square that overlaps with the Subject Lands, of which 33 are butterfly species and 11 are moth species. Of these species, one Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species) was noted: Monarch (*Danaus plexippus*) ranked Special Concern in Ontario and Endangered in Canada.

3.1.6 Aquatic Species at Risk Distribution Mapping

Aquatic SAR mapping (DFO 2022) was reviewed to identify any known occurrences of aquatic SAR, including fish and mussels, within the subwatershed where the Subject Lands are located. No aquatic SAR were identified on the Subject Lands. However, east of the Subject Lands, a watercourse south of Canadian Drive was recognized as Grass Pickerel habitat, a species of Special Concern.

3.1.7 eBird Results

The eBird (2022) database is a large citizen science-based project with a goal to gather bird diversity information in the form of checklists of birds, archive it, and share it to power new



data-driven approaches to science, conservation and education. As the observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence, and species may be filtered out based on habitat and target survey efforts.

This online database was examined to identify observations made within the Subject Lands. However, no significant bird species were found on the Subject Lands or within 120 metres of its boundaries.

3.1.8 *iNaturalist Results*

The iNaturalist (2022) database is a large citizen science-based identification and data collection app. It allows any citizen to submit observations to be reviewed and identified by other naturalists and scientists to help provide accurate species observations. As the observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence, and species may be filtered out based on habitat and target survey efforts.

This online database was examined to identify observations made within the Subject Lands that were research grade. One Snapping Turtle mortality was observed on Winston Churchill Boulevard east of the Subject Lands. No other significant species were found on the Subject Lands or within 120 metres of its boundaries.



4. Technical Methods and Field Studies

An ecological field survey program was undertaken to support the ecological characterization of the Subject Lands. The ecological inventories were completed during the 2018-2020 field seasons:

- Seasonal botanical inventories (spring, summer and fall);
- Ecological Land Classification (ELC) of vegetation communities;
- Breeding Bird Surveys;
- Breeding Amphibian Surveys;
- Turtle Habitat Assessment;
- Salamander Habitat Assessment and Egg Mass Survey;
- Bat Habitat Assessment and Acoustic Monitoring Surveys;
- Headwater Drainage Feature Assessment (HDFA); and
- Incidental Wildlife Observations

Additional surveys completed in 2022 include a spring fish community sampling and targeted surveys for the provincially rare Sharp Fruited Rush (*Juncus acuminatus*).

Some additional commentary regarding ecological field methods are presented in the following sections, and **Table 1 (Appendix B)** lists field dates and personnel engaged. Sampling locations associated with the field studies discussed below are shown in **Figures 5a, 5b and 5c (Appendix A)**.

4.1 Vegetation Survey Methods

ELC and botanical inventories were completed on September 18, 2018, and May 27, August 15 and October 24 of 2019.

Vegetation communities were first identified on aerial imagery and then verified in the field. Vegetation community types were confirmed, sampled and revised, if necessary, using the sampling protocol of the ELC for Southern Ontario (Lee et al. 1998). ELC was completed to the finest level of resolution (Vegetation Type) where feasible. Species names generally follow nomenclature from the Database of Vascular Plants of Canada (Brouillet et al. 2010+). ELC for the Subject Lands is shown on **Figure 3, Appendix A**.

The provincial status of all plant species and vegetation communities is based on NHIC (2022). Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.



Potential sensitivity of natural heritage features, ecosystem attributes, and communities was evaluated through an assessment of vegetation communities (age, habitat quality, degree of disturbance, weediness) and sensitive species (plants with a high CC value, area-sensitive bird species).

Targeted Survey for Sharp Fruited Rush

Sharp Fruited Rush is a provincially rare (S3; Vulnerable) species found on the Subject Lands. Targeted surveys were completed on August 12, 2022, by walking transects within the wetland communities to locate and map individuals using a hand-held GPS on the Subject Lands.

4.2 Wildlife Survey Methods

Breeding Bird Surveys

Breeding bird surveys were conducted following protocols set forth by the Ontario Breeding Bird Atlas (Cadman et al. 2007) and Ontario Forest Bird Monitoring Program (Cadman et al., 1998). The survey was conducted between dawn and five hours after dawn with suitable wind conditions, no thick fog or precipitation (Cadman et al. 2007). A total of three point count stations were located in various habitat types within the Subject Lands and combined with area searches to help determine the presence, variety and abundance of bird species (**Figure 4a, Appendix A**). Each point count station was surveyed for 10 minutes for birds within 100 m and outside 100 m. All species recorded at a point-count were mapped to provide specific spatial information and were observed for signs of breeding behaviour. Surveys were conducted on June 9, June 19 and July 5, 2019. Both the NHIC (2022) database and the SARO list (O. Reg. 230/08) were reviewed to determine the current provincial status for each bird species observed.

Open grassland habitats, including pasture, hay fields and fallow areas, were surveyed according to the MNR (2012) Guidelines for Bobolink and Eastern Meadowlark. Point count stations (discussed above) were located within open grassland habitat. Where this habitat was greater than 250 m wide or long, two-point count stations were completed (point count stations are set up every 250 m in large habitats). Transects or area searches were also conducted in addition to the 10-minute point count stations.

Amphibian Call Count Survey

Three rounds of evening AMC surveys were conducted on April 16, May 27 and June 19, 2019. Survey stations were first identified based on a preliminary review of aerial photography and were verified in the field to confirm the presence of suitable breeding habitat prior to the completion of surveys. Survey locations are shown on **Figure 4a, Appendix A**.

The first and third round surveys followed standard protocols outlined in the Great Lakes Marsh Monitoring Program (BSC 2004). Surveys were conducted on warm nights with little wind. Surveys commenced one half hour before dusk and ended before midnight. Visits were 15 days apart and, as per protocols, the first occurred with a minimum nighttime air temperature of 5°C, the second visit with a minimum of 10°C and the third visit with a minimum



of 17°C. If noise from plane, road traffic and/or trains was present, monitoring was delayed and began during a quiet period.

The second-round survey was conducted using a combination of standard survey protocols and acoustic song meters (SM4). Song meters were deployed at AMC12, AMC13, AMC14, AMC15, AMC16 and AMC17 on May 28 and May 29, 2019, after field staff encountered an aggressive coyote on-site. Each song meter was set to record for five minutes. Collected data was analyzed by a wildlife ecologist.

Each station was surveyed for three minutes, and a three-level call category system was used to identify the level and type of frog activity.

The standard call levels are:

- 1) Individual calls do not overlap and calling individuals can be discreetly counted;
- 2) Calls of individuals sometimes overlap but number of individuals can still be estimated; and
- 3) Overlap among calls seems continuous (full chorus) and a count estimate is impossible.

Anurans were recorded as within the station if they were within 100 m. All other species were recorded as incidental records heard outside of the station.

Salamander Habitat Assessment and Hydroperiod Monitoring

All wetland habitats identified through orthophotograph interpretation and provincial wetland mapping (LIO 2018) were ground truthed to determine salamander habitat suitability. The identified wetlands were verified during a habitat assessment survey on April 15, 2019 and further assessed for suitability throughout the spring and summer of 2019 during amphibian call count survey efforts. Survey locations are shown on **Figure 4b, Appendix A**.

The salamander habitat suitability surveys recorded micro-habitat characteristics including water presence/absence, water depth, wetland shape, canopy cover, in-feature vegetation, presence of suitable egg attachment sites and observations of predatory fish, as well as hydroperiod monitoring.

Habitat suitability was assessed over several days in April due to the late winter thaw in 2019. Additional survey dates in May and June were conducted to collect hydroperiod data.

Turtle Habitat Assessment

GEI completed a turtle habitat assessment in conjunction with the salamander habitat assessment and amphibian call count surveys to assess the potential for turtles to be occupying portions of the Subject Lands including the wetlands and surface water drainage features (e.g. for overwintering purposes) and to use the property for nesting.

Amphibian Egg Mass Survey



An amphibian egg mass survey was conducted in the same eighteen potentially suitable habitats identified during the Salamander Habitat Assessment surveys. Survey effort included walking the perimeter of the vernal pool/wetland while scanning for egg masses. Submerged sticks, emergent vegetation and shrubs were carefully checked for eggs/egg masses, with minimal intrusion into the vernal pool/wetland. Logs or debris in the vicinity of each feature were also checked for presence of adult salamanders (all items were returned to their original location/position to maintain micro-habitat conditions).

The egg mass survey was conducted after confirmed migration movements were reported on the message forum on April 15, 2019.

Bat Habitat Assessment

A bat habitat assessment was completed on May 2, 2019.

Bat habitat assessments are used to determine whether identified features are to be considered candidate SWH, or whether the habitat provides conditions favourable for SAR bats. The presence of snags is considered an indicator of high-quality bat maternity roost habitat, and while they may indicate the presence of high-quality SAR bat habitat, all SAR bat habitat, regardless of quality, is protected under the *ESA* (2007).

The Subject Lands were assessed through aerial interpretation and ELC to determine whether any forested communities were present that would provide suitable habitat for bat maternity roosts. The habitat assessment was completed using survey methods developed based on a combination of professional experience and a modified application of the MNRF survey guidelines for “Bats and Bat Habitats: Guidelines for Wind Power Projects” (MNR 2011) and “MNRF Survey Protocol for Species at Risks Bats within Treed Habitats: Little Brown Myotis, Northern Myotis and Tri-Coloured Bat” (MNRF 2017).

The Significant Wildlife Habitat Criteria Schedules (MNRF 2015) consider deciduous and mixed forests and swamps (i.e., ELC communities: FOD, FOM, SWD, SWM), which include trees at least 25 cm DBH, suitable bat maternity colony habitat. The Survey Protocol for Species at Risk Bats (MNRF 2017) states that any coniferous, deciduous or mixed wooded ecosite, including treed swamps, that includes trees at least 10 cm DBH should be considered suitable maternity roost habitat. Cultural treed areas with trees at least 10 cm DBH are generally considered suitable habitat by some MNRF Districts. Tree snags identified as potential bat habitat are shown in **Figure 4c, Appendix A**.

Bat Acoustic Monitoring

Since suitable bat habitat features were identified during the bat habitat assessments, acoustic surveys were required in accordance with MNRF protocols. Six acoustic monitoring recorders were deployed on May 31, 2019 and retrieved after 10 nights of surveys on June 10, 2019 (**Figure 4c, Appendix A**). The recorders were programmed to begin recording at sunset and to end recording at sunrise. Following the survey, all ultrasonic recordings was filtered to eliminate recordings with high levels of noise or those with no bat calls and then further analyzed using SonoBat’s auto-classification tool. Any calls with a positive



identification were manually vetted by a wildlife ecologist with training in bat species identification by sonogram.

The field program was adapted from the MNRF protocols for bat surveys provided in *Bats and Bat Habitats: Guidelines for Wind Power Projects*, as required in the Significant Wildlife Habitat Ecoregion Criteria Schedules. Information acquired through the bat habitat assessment and acoustic surveys will help to identify if Bat Maternity Roosting SWH or maternity roosting habitat for SAR bats is present on the site.

4.3 Aquatic Resources

Headwater Drainage Feature Assessment

Ahead of conducting the first round HDFA, GEI completed a desktop review to identify the locations of potential headwater drainage features. This was completed through an ArcGIS mapping exercise using available LiDAR data to determine where potential flow paths may be located within the landscape based on relative topographic relief. The presence of all feature locations within the Subject Lands were confirmed during the first round HDFA. If features were not present within the landscape or were dry upon site assessment, these features were not mapped.

Per the requirements of the HDFA Guidelines, GEI completed three site visits to assess headwater drainage features on the Subject Lands on the following dates:

- Round 1 – April 16, 2019;
- Round 2 – May 27, 2019; and
- Round 3 – August 30 2019

During the first site visit, all areas of the Subject Lands were walked to identify potential headwater drainage features. Each headwater drainage feature observed was separated into specific reaches, per the guidance on reach delineation in the HDFA Guidelines, and data collection was completed for each reach based on Ontario Stream Assessment Protocols for Unconstrained Headwater Sampling, Section 4: Module 11 (Stanfield, ed. 2017). Sampling of each reach was then completed in accordance with OSAP protocols. A photographic record of each headwater drainage feature was collected during each survey event.

Following completion of the three survey rounds, the collected data was used to classify each headwater drainage feature, based on the HDFA Guideline hierarchy.

Fish Community Sampling

One fish community sampling event was completed on March 2, 2022 to confirm the distribution and extent of direct fish habitat within the tributary of the Welland River on the Subject Lands, and to identify species diversity and relative abundance.



Prior to commencing the survey, GEI obtained a License to Collect Fish for Scientific Purposes from the MNRF Guelph District. During these sampling events, a Halltech HT-2000 Battery Backpack Electrofisher and two D-frame dip nets with a 500-micron mesh size was used to retrieve fish and semi-aquatic organisms (e.g., frogs) from the feature. Sampling was conducted using the Ontario Stream Assessment Protocol standard single pass survey method (Stanfield 2017). The survey was completed within a defined stretch through riffles, pools and runs. Fish captured were transferred into aerated buckets for processing. Each fish was identified to species level, enumerated and weighed before being returned to the channel, downstream from the sampling location. Weather conditions and electrofisher shocking parameters (e.g., voltage and frequency) were recorded. All data recorded was reported to the MNRF in accordance with the License requirements.



5. Environmental Setting And Characteristics

5.1 Physiography

The Subject Lands are situated within the Clay Plain physiographic region of southern Ontario which is underlain by Silurian and Devonian limestone bedrock. The area is characterized by mainly reddish-hued lacustrine heavy clay (Chapman and Putnam 1984).

5.2 Landscape Ecology

The Subject Lands occur within the Lake Erie-Lake Ontario Eco-region 7E, which extends from extends from Windsor and Sarnia east to the Niagara Peninsula and Toronto, with shoreline on Lakes Huron, Erie, and Ontario. Ecoregion 7E falls within the Deciduous Forest Region, Niagara Forest Section an area of mild climate with diverse flora and fauna. Remnants of Carolinian forests contain species such as the Tulip-Tree (*Liriodendron tulipifera*), Black Gum (*Nyssa sylvatica*), Sycamore (*Platanus occidentalis*), Pawpaw (*Asimina triloba*), various Oaks (*Quercus spp.*) and Hickories (*Carya spp.*), and in addition to the more common Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), White Ash (*Fraxinus americana*), Eastern Hemlock (*Tsuga canadensis*), and Eastern White Pine (*Pinus strobus*).

Consideration of the larger ecological matrix or landscape contributes to a better understanding of potential interactions between abiotic and biotic flows and exchanges. As depicted on **Figure 2 (Appendix A)**, the landscape surrounding the Subject Lands is a mixture of commercial and industrial land uses and residential communities. In terms of potential movement of organisms, matter and energy, the creek, a tributary of the Welland River is a primary linkage feature that traverses the landscape from north to south and provides a continuous connection to the Warren Creek Wetland Complex and the Thompson Creek Wetland Complex.

5.2.1 Vegetation Communities

The Subject Lands can generally be divided into three main areas:

- A large old field meadow complex in the center-west half;
- A deciduous swamp in the north-east area; and
- A complex of old field meadow and thicket on old stockpiled earth in the south-east area

Several other minor units are also present, mostly in the peripheral areas as shown on the ELC mapping (**Figure 3, Appendix A**) and in **Table 2, Appendix B**.



5.2.2 Vascular Plants

Botanical inventories completed on the Subject Lands identified a total of 148 species of vascular plants. Of that number, 109 (or 74%) are native and 39 (or 26%) are exotic. A full species list is included in **Table 3 (Appendix B)**.

The majority of the native species (89%) are ranked S5 (secure in Ontario). Eleven species (10%) are ranked S4 (apparently secure in Ontario; NHIC, 2022).

Four locally rare plants were observed, as per the Niagara Region rarity rankings (Oldham 2010):

- Daisy Fleabane (*Erigeron strigosus*) – occasional in old field meadows;
- River Bulrush (*Bulboschoenus fluviatilis*) – local in unit MAM2-10;
- Finely-nerved Sedge (*Carex leptonevia*) – local in deciduous swamp units;
- Sharp-fruited Rush – rare in unit MAM2-11.

One provincially rare species (S3; NHIC, 2022) was observed – Sharp-fruited Rush rare in unit MAM2-2/2-11.

5.2.3 Survey for Sharp-fruited Rush

Targeted surveys within all wetland communities were completed on the Subject Lands. A total of eight Sharp-fruited Rush species individuals were identified (**Figure 5, Appendix A**). Two individuals were located in the southern MAM2-2/2-11 community, two individuals were located in the eastern MAS2-10 community, and four individuals were located in the eastern MAM2-2 community.

5.3 Terrestrial Ecology: Wildlife Habitat Assessment and Species Occurrences

Ecological investigations were completed in 2019 and 2022 to assist in understanding the baseline conditions and constraints present on the Subject Lands in support of the proposed severance application. Dates and purposes of the fieldwork, as well as surveyor and protocol information, are summarized in **Table 1 (Appendix B)**. The results of wildlife field studies completed on, and adjacent to, the Subject Lands are discussed in the following sections. A list of all wildlife species recorded during the site investigations is provided in **Table 8 (Appendix B)**.

5.3.1 Breeding Birds

A total of 32 bird species were observed within the Subject Lands. Of this total, 5 species are confirmed, 11 are probable and 11 are possible breeders on the Subject Lands. The remaining 5 bird species are considered non-breeders, flyovers or migrants. The observed breeding bird species are discussed in the sections below. All species observed on the Subject Lands are listed in **Table 4 (Appendix B)**.



A total of 27 (100%) of the confirmed, probable or possible breeders are provincially ranked S5 (common and secure), S4 (apparently common and secure) or SNA (species not native to Ontario). No bird species are considered provincially rare (S1-S3; NHIC 2023).

The following Species at Risk were observed on the Subject Lands:

Eastern Wood Pewee Special Concern in Ontario: Two males were recorded in suitable breeding habitat during surveying. Observations were separated by at least seven days in the same location, providing probable breeding evidence.

Barn Swallow Threatened in Ontario: Individuals were observed in flight only, with no suitable structures available on the subject lands for nesting. Thus, no breeding evidence was obtained for Barn Swallow on the subject lands.

Bobolink Threatened in Ontario. A single male was observed advertising in suitable breeding habitat during the first round of surveying. The habitat was considered marginal for Bobolink, due to the rank growth (not regularly cut) and dominance of plant species not typically associated with Bobolink breeding habitat. The bird was not detected on the second round of surveying, likely due to the unsuitability of the habitat. As such, possible breeding habitat was the highest level of breeding evidence recorded on the subject lands.

5.3.2 Amphibian Call Count

A total of six amphibian species were heard calling within the Subject Lands during the three rounds of call count surveys (**Table 5, Appendix B**). All six of these species are provincially ranked S5 (common and secure) or S4 (apparently common and secure). There was a total of 17 stations located throughout the Subject Lands within or adjacent to the wetland vegetation communities (MAM, MAS, SWD). The station locations are shown on **Figure 4a in Appendix A**.

5.3.3 Turtle Habitat Assessment

The turtle habitat characterizing survey was completed at the same time as the salamander and amphibian survey efforts.

The lack of suitable turtle overwintering depths (greater than 1 m) was observed throughout the Subject Lands. The MAM/MAS features associated with the watercourse are too shallow to support overwintering habitat and dry out fully in June. Although shallower features can sometimes be used if they are permanent online features, these conditions were not met on the Subject Lands. However, the watercourse may be used as a movement corridor. In addition, vernal pools within the SWD communities were the deepest features present on site with less than 60 cm in depth and were heavily shaded. Therefore, turtle basking surveys were not determined to be warranted.



5.3.4 Salamander Habitat Assessment

A total of eighteen candidate wetland habitats were identified and surveyed within the Subject Lands (**Figures 4b, Appendix A**). Of the eighteen features present within the Subject Lands, the majority of the vernal pools had suitable breeding habitat characteristics (sufficient canopy cover, in-feature vegetation, presence of suitable egg attachment sites and absence of predatory fish). VP4, VP5, VP6, VP7, VP13, VP14, VP15, VP16 and VP17 had the highest habitat quality suitable for salamander breeding.

Hydroperiod data was also collected to confirm that sufficient water presence would persist long enough to support salamander development. Each feature was visited in the spring and summer. The following vernal pools were dry as of June: VP3, VP9, VP10, VP11, VP12, VP17. The following pools had 5 cm of water or less in June and are considered unlikely to support salamander development: VP1, VP2, VP8. The remaining vernal pools are potentially suitable for salamander breeding: VP4, VP5, VP6, VP7, VP13, VP14, VP15, VP16, VP18. No evidence of salamander breeding was observed during the egg mass survey.

5.3.5 Amphibian Egg Mass Survey

A total of 20 egg masses at VP5 for the Western Chorus Frog (*Pseudacris triseriata*) were observed along with a variety of adult Western Chorus Frogs that were calling from the surrounding wetland features (VP5, VP7, VP13, VP15, VP18) (**Table 6, Appendix B**).

5.3.6 Bat Habitat Assessment

Bat snag locations are shown on **Figure 4c (Appendix A)**. The results of the qualitative Assessment are presented in **Table 1** below.

Table 1 Suitable Bat Roosting Tree Density Survey Results from the Subject Lands.

| Area Identification Polygon Number | Community Type | Approx. Area Size (ha) | Survey Type (Transect/ Plot) | # of snag trees observed at >25 cm DBH | # of snag trees observed at >10 cm DBH | SWH Density (# of snag trees/ha at >25 cm DBH) |
|------------------------------------|----------------|------------------------|------------------------------|--|--|--|
| 1 | SWD3-1 /SWD1-3 | 2.69 | Transect | 34 | 0 | 12.64 |
| 2 | SWD3-1 /SWD1-3 | 0.51 | Transect | 5 | 0 | 9.80 |

With respect to bat maternity colony SWH, Polygon 1 (SWD3-1/SWD1-3) surveyed on the Subject Lands meet the minimum density criteria for significance (>10 suitable roosting trees/ha). With respect to SAR bats, Polygon 1 (SWD3-1/SWD1-3) surveyed on the Subject Lands contain features that may be used by SAR bats. Acoustic monitoring is required to confirm the presence/absence of these species.



5.3.7 Bat Acoustic Monitoring

Six bat species were confirmed to be present within the woodlands: Big Brown Bat (*Eptesicus fuscus*), Silver-haired Bat (*Lasionycteris noctivagans*), Hoary Bat (*Lasiurus cinereus*), Eastern Red Bat (*Lasiurus borealis*), and Small-footed Myotis (*Myotis leibii*).

The acoustic recorder at station F did malfunction, however there is sufficient data collected from the other five stations.

During 10 detector evenings of acoustic surveys, the northeastern woodland recorded a total of 1,516 calls. Of the calls that were identified to species, 313 were Big Brown Bat, 107 were Silver-haired Bat, 293 were Hoary Bat, 39 were Eastern Red Bat, and 4 were Eastern Small-footed Myotis (**Table 7, Appendix B**). An additional 14 calls showed Myotis characteristics (i.e., calls with frequencies greater than 40 kHz).

During 10 detector evenings of acoustic surveys, the southern woodland recorded a total of 266 calls. Of the calls that were identified to species, 48 were Big Brown Bat, 15 were Silver-haired Bat, 37 were Hoary Bat, 8 were Eastern Red Bat, and 2 were Eastern Small-footed Myotis (**Table 7, Appendix B**).

Eastern Small-footed Myotis are listed as Endangered on the Species at Risk in Ontario List. These individuals were detected (0.7% of recorded identifiable calls) at station D and E associated with both woodlands on the Subject Lands.

5.4 Aquatic Resources

5.4.1 Headwater Drainage Feature Assessment

There is one headwater drainage feature (HDF) on the Subject Lands (designed as H1S1) (**Figure 4a, Appendix A**). This feature is an unnamed tributary of the Welland River. The feature flows through the adjacent subdivision where it has been realigned.

At the northern property boundary, the feature is conveyed onsite via a culvert beneath the fence line. Adjacent commercial land uses have channelized flows and altered runoff patterns. The drainage feature receives inputs from the adjacent work yard, parking areas and overland flow from the cultural meadow communities on the Subject Lands. Surface water runoff that accumulates within the feature flows offsite via an open-bottom box culvert beneath Kalar Road. The drainage feature then flows southwest adjacent the boundary of a residential area before receiving discharge from downstream stormwater management pond. No additional headwater drainage features were identified on the Subject Lands.

H1S1 was defined as an ephemeral swale. The feature was flowing during the first-round assessment window, under freshet conditions. Standing water was documented throughout the feature during May 2019 (second round assessment window), although the upstream connection had been restricted by extensive damage to the upstream culvert. The upstream and downstream portions of the reach were dry during the third-round assessment, however, standing water was present at the entrance to the downstream culvert. This water



accumulation is attributed to downed silt fencing, which has created a small area of ponding, and is not considered characteristic of the entire reach. No water was observed within the downstream culvert.

H1S1 supports riparian hydrophilic emergent vegetation including Cattail (*Typha spp.*), Reed Canary Grass (*Phalaris arundinacea var. arundinacea*), Purple Loosestrife (*Lythrum salicaria*), Rice Cutgrass (*Leersia oryzoides*) and Water Plantain (*Alisma spp.*). Adjacent vegetation communities predominantly consist of cultural meadow habitat. The swale provides a terrestrial connection to meadow marsh wetland pockets associated with the drainage feature (i.e., MAS2-1, MAM2-2 and MAM2-10) and may function as stepping-stone habitat between these communities. Although no fish were observed within the feature, fish were present at the downstream culvert west of Kalar Road during the third round assessment, which suggests that this feature could potentially provide seasonal habitat when water levels are sufficient to support a downstream connection

Part 2 of the HDFA Guidelines (CVC/TRCA 2014) provides an approach to classify headwater drainage features by providing a step by step characterization of specific functions that may be associated with the features assessed, including hydrology, riparian function and provision of fish or terrestrial habitat. **Table 9 (Appendix B)** highlights the key components of this analysis based on the third round HDFA and incidental observations collected in 2019.

Part 3 of the HDFA Guidelines (CVC/TRCA 2014) provides guidance on linking the characteristics and functions of features to specific management recommendations that may be applied to those features. To assist, the HDFA Guidelines include Figure 2: “Flowing Chart Providing Direction on Management Options”. The flow chart depicts various decision points associated with hydrology, fish habitat, riparian vegetation and terrestrial habitat, and ultimately leads the user to an appropriate management recommendation for each headwater drainage feature segment. Management recommendations can include the following:

- Protection;
- Conservation;
- Mitigation;
- Maintain Recharge;
- Maintain/Replicate Terrestrial Linkage; or
- No Management Required.

The flow chart was used to determine the management recommendation for the headwater drainage feature on the Subject Lands (as identified in the second last column of **Table 9, Appendix B**). However, in some instances the management recommendations resulting from the HDFA Guidelines are not always warranted, given that the HDFA Guidelines do not cover every possible scenario, and in these instances, the guidelines permit flexibility to suggest alternate management recommendations. Therefore, a final management recommendation column has been added to identify the long-term recommendation from the Project Team.

The resulting final management recommendations is as follows:



Conservation (H1S1)

Based on the HDFA Guidelines, the feature would receive a management recommendation of Protection, based on the presence of wetland riparian habitat and potential seasonal fish habitat. However, these values could be maintained and/or enhanced if the feature were to be realigned on the property. Therefore, a final management recommendation of Conservation was provided to permit flexibility to management the feature on the Subject Lands, while ensuring that important functions were maintained. An open channel conveyance system is considered necessary to mitigate fish, and riparian and terrestrial habitat functions. The recommended management measures for Conservation reaches from the HDFA Guidelines (TRCA and CVC 2014) include:

- Maintain, relocate and/or enhance drainage feature and its riparian corridor zone;
- If catchment drainage had been previously removed or will be removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e., restore original catchment using clean roof drainage), where feasible;
- Maintain or replace on-site flows using mitigation measures and/or wetland creation, if necessary;
- Maintain or replace external flows;
- Use natural channel design techniques to maintain or enhance overall productivity of the reach; and/or
- Drainage feature must connect to downstream.

5.4.2 Fish Community Sampling

Fish community sampling was completed on March 2, 2022 within the tributary of Welland River on the Subject Lands. The tributary was fished for 1894 seconds and a total of three Brook Stickleback (*Culaea inconstans*) were captured.



6. Analysis of Ecological and Natural Heritage Significance

Eight types of significant natural heritage features are defined in the PPS (MMAH 2020), as follows:

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant areas of natural and scientific interest.

The presence/absence of these elements on, or adjacent to, the Subject Lands is discussed in detail in the following sections. The NHRM (MNR 2010) was referenced to assess the potential significance of natural areas and associated functions. Where significant natural heritage features are present, the sensitivity of those features is also discussed.

6.1 Significant Wetlands

Within Ontario, Significant wetlands have been previously identified by the MNRF or by their designates. Other evaluated or unevaluated wetlands may be identified for conservation by the municipality or the conservation authority. MNRF's database was consulted and natural heritage features on, and in the vicinity of, the Subject Lands are depicted on **Figure 2 (Appendix A)**.

PSWs that make up the Warren Creek Wetland Complex are identified on the southern and eastern limits of the Subject Lands.

Due to updates made to the Ontario Wetland Evaluation System (effective December 22, 2022) all wetland features will be re-evaluated under the new criteria. Any findings differing from the current Significance designations to wetlands on the Subject Lands will be provided in an addendum.

6.2 Significant Coastal Wetlands

Like Significant wetlands, the MNRF or their designates were previously responsible for identifying Significant coastal wetlands present on the landscape. Coastal wetlands are defined in the NHRM (MNR 2010) as:



- a) “any wetland that is located on one of the Great Lakes or their connecting channels (Lake St. Clair, St. Mary’s, St. Clair, Detroit, Niagara and St. Lawrence Rivers); or
- b) Any other wetlands that is on a tributary to any of the above-specified water bodies and lies, either wholly or in part, downstream of a line located two km upstream of the 1:100-year floodplain (plus wave run-up) of the large water body to which the tributary is connected.”

No Significant coastal wetlands are identified on the Subject Lands and would not be expected given the distance of the Subject Lands from the waterbodies noted above.

6.3 Significant Woodlands

Significant woodlands are identified by the planning authority in consideration of criteria established by the MNRF. Under the NHRM (2010), woodlands are defined as:

“...treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels.”

The Niagara Region Official Plan (2022) defines a Significant woodland as an area that is:

“ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.”

In accordance with the NHRM (MNR 2010), natural treed communities (FOC, FOD, FOM, SWC, SWD, SWM) and cultural forest/plantation communities (CUW, CUP) are considered woodlands (i.e., meet the Forestry Act woodland density requirements). Woodland patches are considered part of the same continuous woodland if they are within 20 m of each other. With respect to the Subject Lands, two woodlands are present and are located within the Warren Creek Wetland Complex PSW.

The woodland bordering the southern portion of the site is contiguous with the swamp woodland south of the Subject Lands (Warren Woods East). Therefore, this woodland is part of an approximately 17.7 ha contiguous woodland extending off-site. This woodland meets the size criteria for ecological function, uncommon characteristics and economic and social functional value. The second woodland located within the Subject Lands, is approximately 2.84 ha within the northeast portion of the property. This woodland meets the size criteria for



uncommon characteristics. As a result, both woodlands located within the Subject Lands meet the criteria for significance.

6.4 Significant Valleylands

Significant valleylands are defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the NHRM (MNR 2010) for Policy 2.1 of the PPS (MMAH 2020). Recommended criteria for designating Significant valleylands include prominence as a distinctive landform, degree of naturalness, and importance of its ecological functions, restoration potential, and historical and cultural values.

No valleylands are identified on the Subject Lands.

6.5 Significant Wildlife Habitat

SWH is one of the more complex natural heritage features to identify and evaluate. There are several provincial documents that discuss identifying and evaluating SWH including the NHRM (MNR 2010), the Significant Wildlife Habitat Technical Guide (MNR 2000), and the SWH Eco-Region Criterion Schedule (MNR 2015). The Subject Lands are located in Eco-Region 7E and were therefore assessed using the 7E Criterion Schedule (MNR 2015).

There are four general types of SWH:

- Seasonal concentration areas;
- Rare or specialized habitats;
- Habitat for species of conservation concern; and
- Animal movement corridors.

General descriptions of these types of SWH are provided in the following sections.

Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather at one time of the year, or where several species congregate. Seasonal concentration areas include: deer yards; wintering sites for snakes, bats, raptors and turtles; waterfowl staging and molting areas, bird nesting colonies, shorebird staging areas, and migratory stopover areas for passerines or butterflies. Only the best examples of these concentration areas are usually designated as SWH.

No seasonal concentration areas were identified within the Subject Lands. While the northern SWD woodland surveyed on the Subject Lands did meet the minimum density criteria for significance (>10 suitable roosting trees/ha) and had confirmed indicator bat species (Big Brown Bat, Silver-haired Bat), the acoustic data does not meet the threshold numbers of 10 Big Brown Bats and 5 Silver-haired Bats utilizing the habitat for roosting. Therefore, bat maternity SWH is not present on the Subject Lands.



Rare or Specialized Habitats

Rare and specialized habitat are two separate components. Rare habitats are those with vegetation communities that are considered rare in the province. SRANKS are rarity rankings applied to species at the 'state', or in Canada at the provincial level, and are part of a system developed under the auspices of the Nature Conservancy (Arlington, VA). Generally, community types with SRANKS of S1 to S3 (extremely rare to rare-uncommon in Ontario), as defined by the NHIC (2022), could qualify. It is to be assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Specialized habitats are microhabitats that are critical to some wildlife species. The NHRM (MNR 2010) defines specialized habitats as those that provide for species with highly specific habitat requirements, areas with exceptionally high species diversity or community diversity, and areas that provide habitat that greatly enhances species' survival.

No rare or specialized habitat was identified within the Subject Lands.

Habitat for Species of Conservation Concern

Species of conservation concern include those that are provincially rare (S1 to S3), provincially historic records (SH) and Special Concern species. Several specialized wildlife habitats are also included in this SWH category, including Terrestrial Crayfish habitat, and significant breeding bird habitats for marsh, open country and early successional bird species.

Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the ESA (2021 Consolidation). Endangered and threatened species are discussed in **Section 6.7**.

Habitat for the Eastern Wood-Pewee (Special Concern) was identified within the SWD1-1/1-3 woodland in the northeastern portion of the Subject Lands. Sharp Fruited Rush (S3) was identified within the southern MAM2-2/2-11 wetland community and the eastern MAS2-10 and MAM2-2 wetland communities on the Subject Lands

Animal Movement Corridors

Animal movement corridors are areas that are traditionally used by wildlife to move from one habitat to another. This is usually in response to different seasonal habitat requirements, including areas used by amphibians between breeding and summer/over-wintering habitats, called amphibian movement corridors.

No animal movement corridors were identified within the Subject Lands

SWH Summary

Table 10 (Appendix B) evaluates whether any SWH was present within the Subject Lands and determined the following SWH:

- Habitat for the Eastern Wood-Pewee (northeastern SWD1-1/1-3); and



- Habitat for Sharp Fruited Rush (southern MAM2-2/2-11, eastern MAS2-10 and MAM2-2)

6.6 Fish Habitat

Fish habitat, as defined in the federal Fisheries Act, c. F-14, means, “*spawning grounds and any other areas including nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes*”. Fish, as defined in S.2 of the Fisheries Act, c. F-14, includes “*parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals*”.

The tributary of Welland River that bisects the Subject Lands functions primarily as a cold-water drainage and supports direct fish habitat.

6.7 Habitat of Endangered and Threatened Species

No threatened or endangered species and their suitable habitat were identified on the Subject Lands.

6.8 Summary of Ecological Components Subject to Impact Assessment

The following natural heritage features are present within the Subject Lands and shown on **Figure 6, Appendix A**:

- Provincially Significant Wetlands;
- Significant Woodlands;
- Fish habitat; and
- SWH
 - Habitat for the Eastern Wood-Pewee; and
 - Habitat for Sharp Fruited Rush.



7. Proposed Development

The proposed development for the Subject Lands includes 29 residential blocks, including a medium density block with 55 units, for a total of 219 residential units. In addition, it is proposed to construct a new public road (“Street A”) through the site, connecting Kalar Road in the west to Pin Oak Drive in the east as per the Secondary Plan. The proposed site plan is overlaid on ecological features in **Figure 7, Appendix A**.

This proposed development will drain to the existing sanitary sewer in Kalar Road. The new 250mm sanitary sewer will be built in the proposed “Street A” to collect flow from the site, which will be directed to a new manhole that will be installed in the existing sanitary sewer in Kalar Road.

The proposed development is expected to be serviced by a 250mm PVC watermain that will be constructed in the proposed “Street A”. This new watermain will be connected to the existing watermain in Kalar Road to the west and the existing watermain in Pin Oak Drive to the east, forming a closed loop.

It is our understanding from the findings in the FSR that there will be no negative impact to Warren Creek Wetland Complex due to site development and surface water drainage alterations (Metropolitan, 2022).

Please see the Functional Water and Wastewater Servicing Report (Metropolitan, 2022) for the full servicing details.



8. Impact Assessment, Avoidance and Mitigation Measures

This section of the EIS assesses the impacts, predicted effects, mitigation and enhancement measures associated with the proposed Draft Plan Subdivision. Potential effects to the natural heritage features and environmental functions that exist on, and adjacent to, the Subject Lands are evaluated over the short and long term, with consideration given to measures to avoid and/or mitigate negative impacts, where appropriate.

The Subject Lands are characterized by old field meadow, treed swamps and cultural thicket, which reflect the anthropogenic nature of the surrounding land uses (i.e., residential, industrial and commercial). Wetlands associated with the Warren Creek Wetland Complex occur in the northeastern, eastern and southern portions of the property and occupy 4.06 ha. The property also occurs within an EPA designated by the Official Plan of the City of Niagara Falls (2019) (**Figure 2, Appendix A**).

The range of potential impacts from proposed development can generally be divided into these two categories: direct impacts are normally associated with the physical removal or alteration of natural features that could occur based upon a land use application, and indirect impacts may be changes or impacts (these could be minor or major) to less visible functions or avenues that could cause negative impacts to natural heritage features over time.

The impact assessment outlined in **Table 11 (Appendix B)** examines the predicted effects of development on the natural heritage features and associated functions present within the feature of interest along with recommendations for proposed mitigation. This evaluation was formulated based on the limits of the proposed Draft Plan. The potential direct and indirect effects of development, and a summary of recommended mitigation and restoration strategies are provided below. Detailed ecological enhancement and restoration opportunities will be determined during the detailed design phase pending approval of the proposed severance application.

8.1 Significant Wetlands

As mentioned in **Section 6.1**, PSWs as part of the Warren Creek Wetland Complex were identified on the northern, eastern, and southern limits of the Subject Lands. No removal of wetland vegetation communities will occur. As per the requirements of the Niagara Falls OP (2019), the minimum vegetated buffer will be established by an environmental impact study. A 0 m buffer is shown on **Figure 7 (Appendix A)** as per adjacent developments, which includes Significant Wetland removals and 0 m buffers, given that to our knowledge no negative impacts have been attributed to those developments.

The proposed development has potential for an increase in ambient lighting, penetrating the PSW, which could disturb any light-sensitive wildlife species. It is recommended that any substantial new lighting should be directed away from natural vegetation communities and



outdoor light standards should utilize downward-facing fixtures. Additional indirect impacts associated with development include increased pedestrian and pet access, increased soil disturbances, colonization of invasive species on disturbed soils, increase in noise disturbances, increased traffic, potential for accidental spills and potential for increased sediment mobility during construction activities.

To avoid adverse effects during construction, erosion and sediment control (ESC) measures will be in place along the outer limits of proposed work areas to protect features from increased erosion and soil mobility during construction activities. ESC measures should be regularly inspected and maintained in good working order throughout the construction period. ESC measures should be removed upon completion of construction after exposed soils have been stabilized with a native seed mix.

The proposed road "Street A" between Block 35, Block 36 and Block 37 is depicted as crossing of a narrow wetland adjacent to Pin Oak. This road connection is supported by the Secondary Plan but the connection location was not predefined. The proposed locations minimize the impact to the Warren Creek Wetland Complex. Compensation for the area of wetland impacted is suggested to be included in Block 34. Appropriate compensation will be determined through consultation with the region, City and NPCA.

The proposed road "Street A" between Block 35, Block 36 and Block 37 may act as partial barriers to wildlife movement and are likely to partially obstruct terrestrial wildlife movement. The facilitation of wildlife corridors through the establishments of culverts or wildlife passages will provide an increase in habitat availability for various species and will work to increase native diversity on the site.

8.2 Significant Woodlands

As described in **Section 6.3**, the northeastern and southern SWD woodlands on the Subject Lands (**Figure 6, Appendix A**) meet the minimum criteria for significance under the NHRM (MNR 2010). The Significant Woodlands within the Subject Lands shall be retained.

Potential indirect impacts to the Significant woodlands include damage or stress to tree rooting zones; edge effects (i.e., wind throw, sun scald and pests due to thinned edge vegetation); increased noise, increased pedestrian access, increased lighting from residential development, intrusion by pets, increased soil disturbances, colonization of invasive species on disturbed soils, increased traffic and potential for accidental spills.

Based on the proposed development, it is GEI's opinion that no net negative impact to Significant woodlands will occur, provided that appropriate mitigation measures are implemented. As the Significant woodlands overlap with the PSWs on the Subject Lands, the 0 m vegetated buffer required for PSWs will provide sufficient protection for the woodlands as well.

Tree protection fencing and/or ESC measures should be installed adjacent to retained features to aid in reducing excess disturbance caused by vegetation removals, ground disturbance and dislodging of sediment. These ESC measures will already be in place due to



the overlapping PSWs. Heavy equipment use should be managed to prevent inadvertent damage to retained woodland features, and transportation of non-native and invasive species.

Connectivity between the two Significant Woodlands will be facilitated through the creation of a wildlife passage.

With the implementation of these mitigation measures, no negative impacts to Significant Woodlands are expected.

8.3 Significant Wildlife Habitat

SWH for the Eastern Wood-pewee and the Sharp-fruited rush was identified within the PSWs and Significant woodlands on the Subject Lands. The SWH will be protected through avoidance and the outer limits of the work area as defined by the PSWs and Significant Woodlands.

Potential indirect impacts to the SWH include increased noise, increased pedestrian access, increased lighting from residential development, intrusion and predation by pets, increased soil disturbances, colonization of invasive species on disturbed soils, increased traffic and potential for accidental spills.

Ambient noise from construction activities could result in wildlife avoidance of the edges abutting active work areas during the construction period, however, this would occur on a temporary basis. Wildlife usage in this area has adapted to existing ambient noises from adjacent commercial, industrial and residential use. Some localized movement of wildlife out of these edge areas may still occur during the construction phase. As noted, the wildlife in this area are already subjected to a certain level of background noise and activity level associated with existing site development and its proximity to major arterial road networks. All lighting should be directed away from the woodland to avoid impacts to natural processes (e.g., breeding, nesting).

Following construction, increased noise in vicinity of the woodland community due to residential activities (e.g., vehicle movement), and the potential for increased predation pressure from domestic cats allowed to roam free outdoors may occur. Educational materials will be distributed to all new residents (through brochures or within owner's manuals upon purchase of the residence) and informative signage at the entrances to the existing trail system will be utilized to educate residents of the importance of maintaining and protecting the natural heritage system and its associated wildlife.

With the implementation of these mitigation measures, no negative impacts to SWH are expected.

8.4 Fish Habitat

The tributary of Welland River was identified as a cold-water drainage and supports direct fish habitat. To support the proposed development the tributary of Welland River shall be re-aligned along the northwestern boundary of the Subject Lands.



Approximately 10 m buffer shall be provided as part of the re-aligned tributary (Block 33). A less than 10m buffer is proposed adjacent to the stormwater management pond (Block 31).

8.5 Other Wetlands

Wetland communities (MAM2-2 and MAM2-11) surround the tributary of the Welland River. The re-alignment of the creek will necessitate disturbance of the wetland communities. The re-aligned creek will be provided with a 10 m buffer where the wetland communities will be re-established.

8.6 Summary of Predicted Direct/Indirect Affects

This assessment considers both potential direct and indirect effects to the retained natural heritage features and is based on the proposed boundaries of development.

8.6.1 Potential Indirect Effects

Indirect effects are those potential effects on the biophysical environment that could potentially result in adverse effects on the tributary of Welland River or adjacent PSWs. This could potentially include erosion from the work area with associated sedimentation in watercourses and wetlands, accidental spills, water management practices during construction, and human disturbance to rare or sensitive habitats and species resulting in impacts to wildlife movement patterns and disruption of landscape-scale linkages and corridors. Each of these are discussed in the following sections.

Erosion and Sedimentation

Erosion and sedimentation from the disturbed work area associated with the proposed development could potentially result in adverse effects to water quality (e.g., increased turbidity) or sedimentation and associated effects on wetlands (e.g., smothering of aquatic vegetation).

It is recommended that the contractor prepare and implement ESC Plan to minimize the potential for erosion and sedimentation from the construction site. The ESC Plan should be developed based on the guidance provided in the *Erosion and Sediment Control Guideline for Urban Construction* (GGHCA 2006). Basic elements of the plan should include consideration of:

- Construction phasing to minimize the amount of time soils are barren and therefore, more susceptible to erosion;
- Requirements and timing for rehabilitation of disturbed areas;
- SWM strategies during construction;
- Grading during periods when features are dry, to minimize potential for adverse effects on water quality;
- Erosion prevention measures (e.g., hydroseeding, sodding, erosion control matting, tarping of stockpiles);



- Sedimentation control measures (e.g., silt fences); and
- Inspection and performance monitoring requirements and adaptive management considerations.

Implementation of an effective ESC Plan, incorporating both erosion and sediment controls, coupled with regular inspection and performance monitoring and implementation of any remedial actions necessary to ensure effective performance, is anticipated to be largely effective in preventing the movement of eroded soil particles towards the tributary of Welland River or adjacent PSWs.

Overall, no adverse effects to aquatic habitats are predicted to occur as a result of erosion and sedimentation during construction, provided an effective ESC Plan, including monitoring and adaptive management, is implemented.

Accidental Spills

Accidental spills of potentially hazardous materials (e.g., fuel and oil from heavy equipment), if transported to the tributary of Welland River or adjacent PSWs, could cause stress or injury to aquatic biota.

In order to mitigate the potential for adverse effects on aquatic habitat due to potential accidental spills during construction, it is recommended that the contractor prepare a spill prevention and response plan to outline the material handling and storage protocols, mitigation measures (e.g., spill kits on-site), monitoring measures and spill response plans (i.e., emergency contact procedures, including MOECC Spills Action Centre, and response measures including containment and clean-up). Implementation of an effective spill prevention and response plan is anticipated to be largely effective in preventing adverse effects on the tributary of Welland River and adjacent PSWs.

Impacts on Migratory Birds

The federal *Migratory Birds Convention Act* (MBCA; 1994) prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. During construction, particularly during activities that may result in tree removals, migratory birds, and eggs and nests of these birds could be harmed inadvertently.

As per the MBCA (1994), it is recommended that any tree removals occur prior to, or after, the migratory breeding bird season (April 1 to August 31). If this window cannot be avoided, nest searches are necessary to determine the presence/absence of nesting birds or breeding habitat every 72 hours until clearing is complete, or until August 31, whichever comes first. If an active nest is observed, a designated setback will be identified within which no construction activity will be allowed while the nest remains active. The setback distance ranges from 5 m to 60 m from the nest, depending on the species and its sensitivity to adjacent activities. These distances have been reviewed and approved by Environment Canada.



With the implementation of the above stated mitigation measures, no net effect on migratory birds is anticipated.

Introduction of Exotic and Invasive Plant Species

The introduction of invasive and non-native plant species along the disturbed margins of the development footprint may displace some native flora, particularly in areas where vegetation removals have created new woodland edges. In order to reduce opportunities for the colonization of invasive and non-native species, areas where disturbance has exposed bare soils should be seeded with a cover crop and native species seed mix.

Light and Noise Effects on Wildlife

Light can be a concern where it is directed towards a variety of natural features and functions.

Primary sources for “new light” will be from exterior lighting on the residence. To minimize light being directed into the adjacent ecological features, outdoor lighting should be located and directed away from the retained features. In addition, to minimize potential impacts, direct upward light should be eliminated, spill light should be minimized, and all lighting sources should illuminate only non-reflective surfaces (e.g., as per City of Toronto Green Development Standard 2007).

Noise associated with heavy equipment movement may provide some temporary disturbance to wildlife. Given the vicinity of the development envelope to the existing road, the relatively short time period associated with construction and existing disturbances in the area it is not expected that the additional noise generated from construction would have a measurable effect on the local distribution of wildlife.

Domestic Pets

Domestic cats are known to prey on small mammals and birds, in that order of preference. It is recommended that the homeowners ensure that any domestic cats are kept out of the adjacent natural areas to minimize wildlife predation.

8.7 Recommended Measures to Avoid and Mitigate Potential Construction Effects

The extent to which construction will affect the edge habitat conditions of key features can be limited by the implementation of the following measures:

- Locate and flag development limits prior to construction;
- Pre-construction erection of tree protection fencing along confirmed protection edges and specific trees (at outer limit of the dripline) for proposed retention along the woodland edge closest to the development;



- Appropriate pre-construction briefing of site workers to advise regarding the sensitivity of the development edge conditions (i.e., specialized wildlife habitat, species of conservation concern, etc.); and
- Matching of tree retention areas at existing grade (i.e., feathered grades from development edges).



9. Recommended Restoration and Potential Enhancement Opportunities

Conceptual compensation and restoration strategies will be developed during the detailed design stage to address potential impacts associated with proposed road “Street A” crossing a narrow section of the Warren Creek Wetland Complex and the realignment of the drainage feature.

The objective of mitigation measures will be to contribute to positive ecological outcomes including conserving, protecting, and enhancing biodiversity; and promoting long-term ecological sustainability of natural features and functions. Restoration strategies will be defined in consultation with NPCA and the Municipality of Niagara during the detailed design phase. Where applicable, restoration works will focus on generating multiple benefits by restoring physical/hydrologic functions in conjunction with habitat enhancement. Proposed infrastructure will also contribute to the long-term maintenance of retained vegetation communities by applying ecological restoration principles and opportunities (e.g., slope stabilization, naturalized retaining walls, etc.) along the development boundary, where possible.

9.1 Tributary of Welland River Re-alignment

The channel corridor will ensure the replication of regulated tributary length within the Subject Lands at a 1:1 ratio. The low flow channel will incorporate riffle-pool morphology with a range of grain sizes and hydraulic conditions to increase habitat complexity and biophysical functioning of the channel, relative to current, relatively homogenous habitat conditions. Riffles, which are not generally present in the existing creek, will assist with aeration and provide habitat for specialized benthic invertebrate species and potentially fish. The channel will be designed with deeper pools and Large Woody Debris that would be expected to provide more complex refuge habitat for fish.

The portions of the corridor outside the low flow channel will be planted with range of vegetation species and forms to provide functioning riparian habitat, designed to stabilize creek banks and the floodplain, provide long-term shading of the channel, and enhance allochthonous inputs (e.g., twigs, leaves) to provide a source of forage and habitat within and downstream from the realigned reach.



10. Monitoring Requirements

A monitoring program should be discussed and developed with NPCA to ensure that:

- Protective mitigation strategies and actions are effectively implemented;
- Ecological restoration measures are effectively implemented; and,
- Restored features and associated functions are developing along projected trajectories.

Baseline monitoring is required to understand the significance and function of existing systems and provide a baseline for comparisons to future function. This monitoring was completed from 2018-2022 within the Subject Lands; no additional baseline monitoring is warranted in support of the proposed site development.

Construction monitoring is intended to monitor the effectiveness of measures and practices designed/implemented to manage impacts due to construction. This form of monitoring most often translates into ensuring that all ESC measures are in place and functioning, the installation of plant material or other parameters of concern.

Post-construction compliance monitoring is driven by the need to comply with permits or other approvals. It is intended to demonstrate that measures are constructed as designed. This monitoring is relatively local in scale and associated with specific works. For the Subject Lands, it would apply to the restoration vegetation within Block 33, the re-aligned tributary of Welland River and associated created wetlands.

Post-construction performance monitoring relates to the functionality of the re-aligned tributary of Welland River associated created wetland. The scale of performance monitoring is typically broader than compliance monitoring and provides a means of comparison against the initial baseline monitoring.

Where necessary, adjustments through adaptive management should be applied to ensure that performance standards are achieved and to address any unanticipated impacts or deficiencies.



11. Conclusions

This EIS was developed as part of the Draft Plan Subdivision for lands located at Pin Oak Drive within the City of Niagara Falls, Ontario. An assessment of the natural heritage features and their associated functions on, and adjacent to, the Subject Lands has been conducted and discussed in relation to the PPS (MMAH 2020), related guidance documents, and the regional and municipal Official Plans.

Various natural heritage features are associated with the Warren Creek Wetland Complex on the Subject Lands. Of these, Significant wetlands, Significant woodlands, fish habitat and SWH for the Eastern Wood-Pee-wee and the Sharp-fruited Rush were identified.

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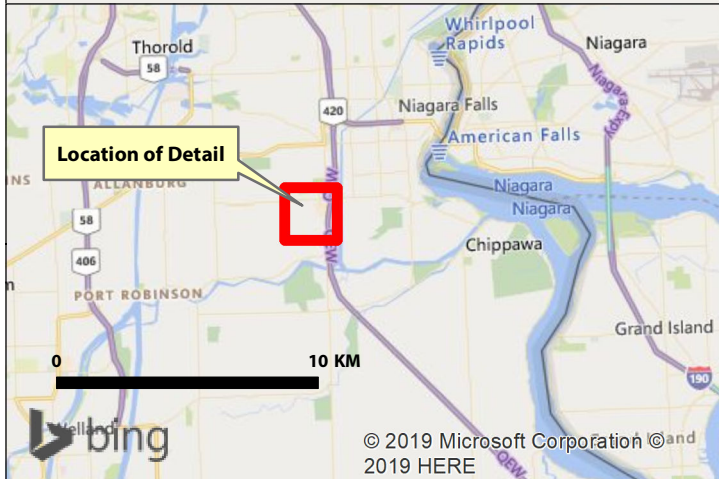
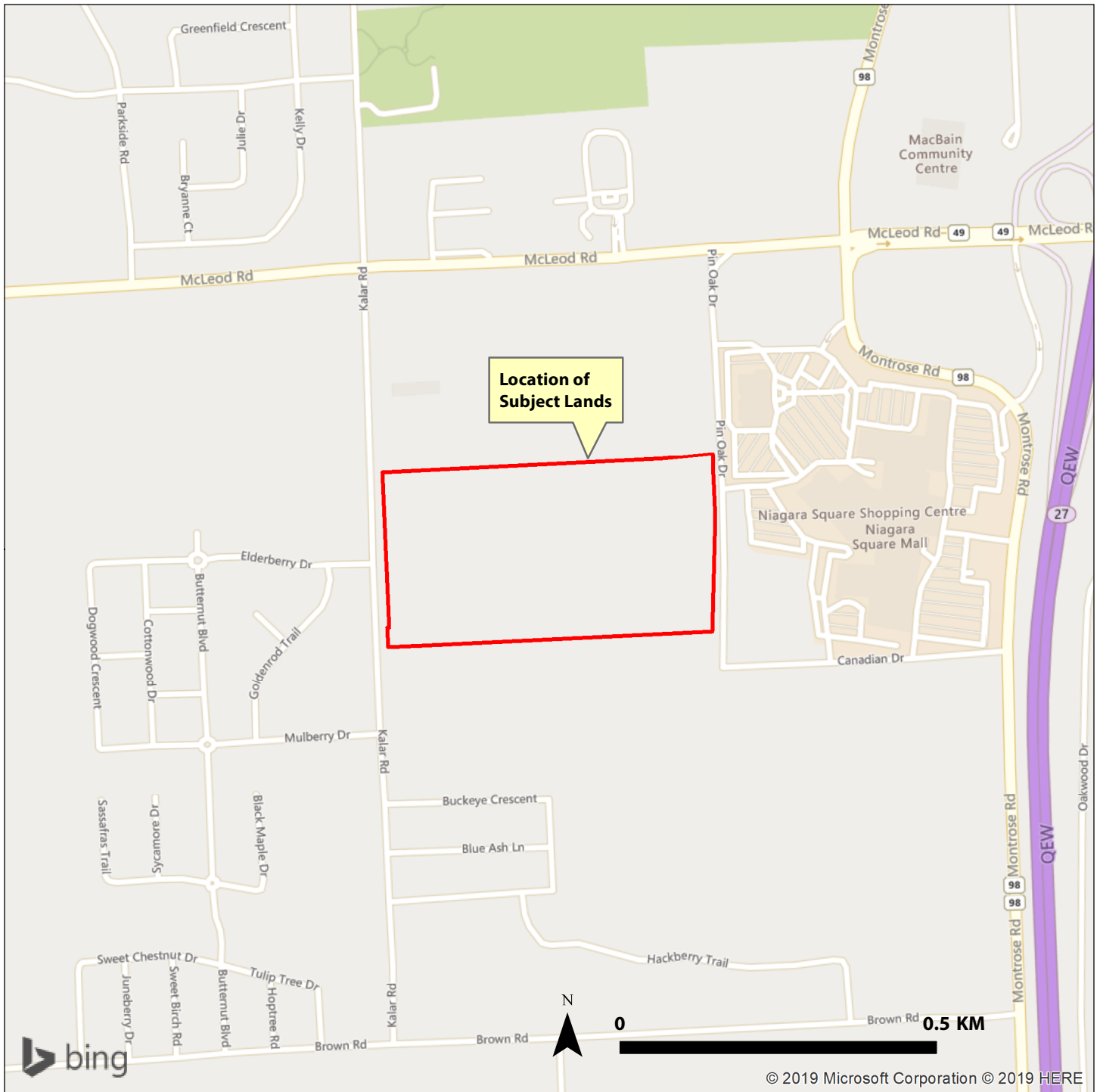
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Appendix A

Figures

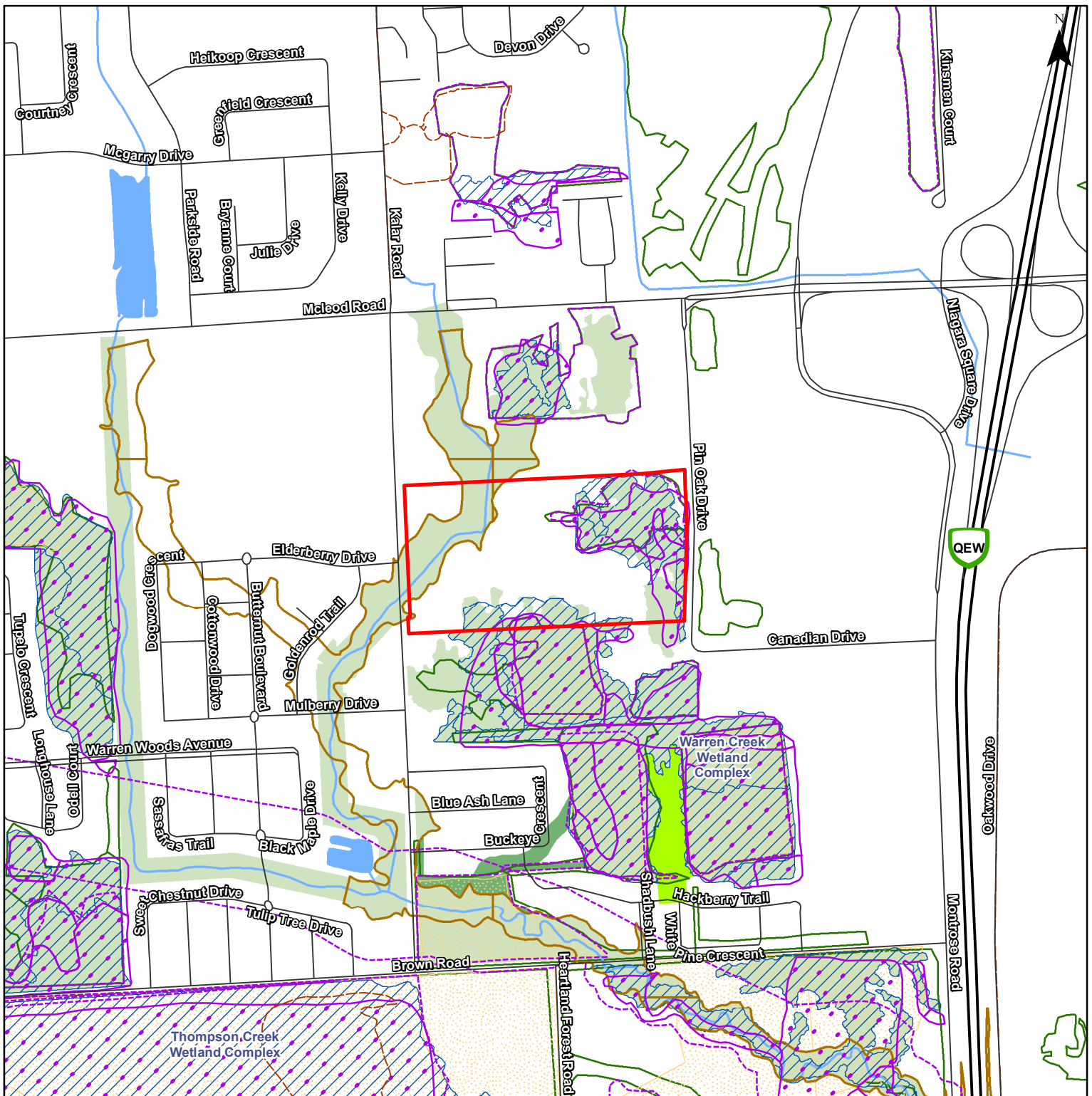




Pin Oak Drive, Niagara Falls

Figure 1
Location of Subject Lands

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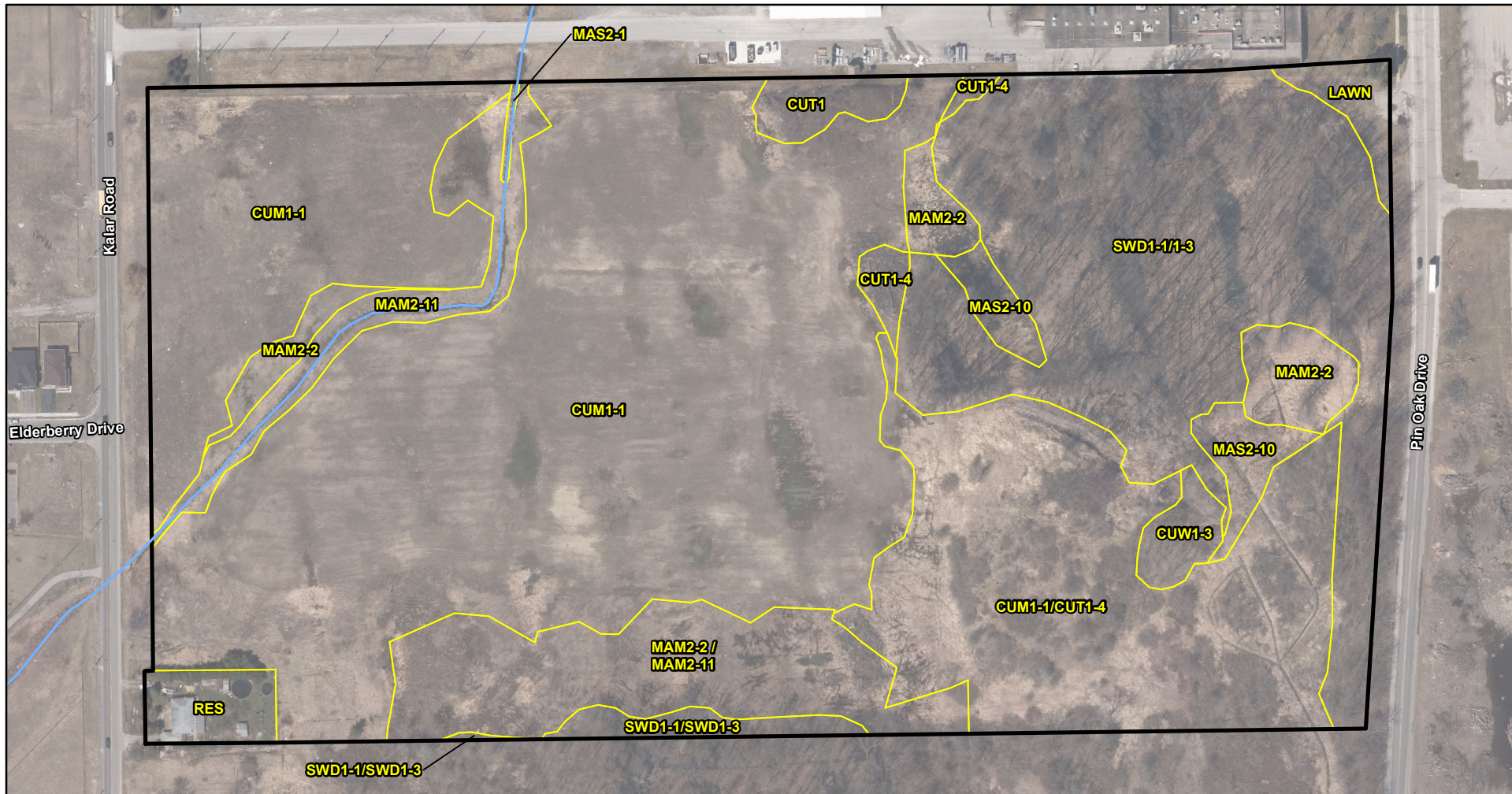


Pin Oak Drive, Niagara Falls

Figure 2 Landscape Setting

Legend

- Subject Lands
- Trail Segment (MNRF-LIO)
- Provincially Significant Wetland (MNRF-LIO)
- White-tailed Deer Wintering Area (MNRF-LIO)
- Watercourse (MNRF-LIO)
- Waterbody (MNRF-LIO)
- Wooded Area (MNRF-LIO)
- Environmental Conservation Area (Niagara Region SCH C 2015)
- Environmental Protection Area (Niagara Region SCH C 2015)
- Environmental Conservation Area (City of Niagara SCH A3 2017)
- Environmental Protection Area (City of Niagara SCH A3 2017)
- Open Space (City of Niagara SCH A3 2017)
- Regulated Floodplain (NPCA)



Pin Oak Drive, Niagara Falls

Figure 3 Ecological Land Classification

- Subject Lands
- Watercourse (MNR-F-LIO)
- Ecological Land Classification

ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

LAWN, Lawn
RES, Residential

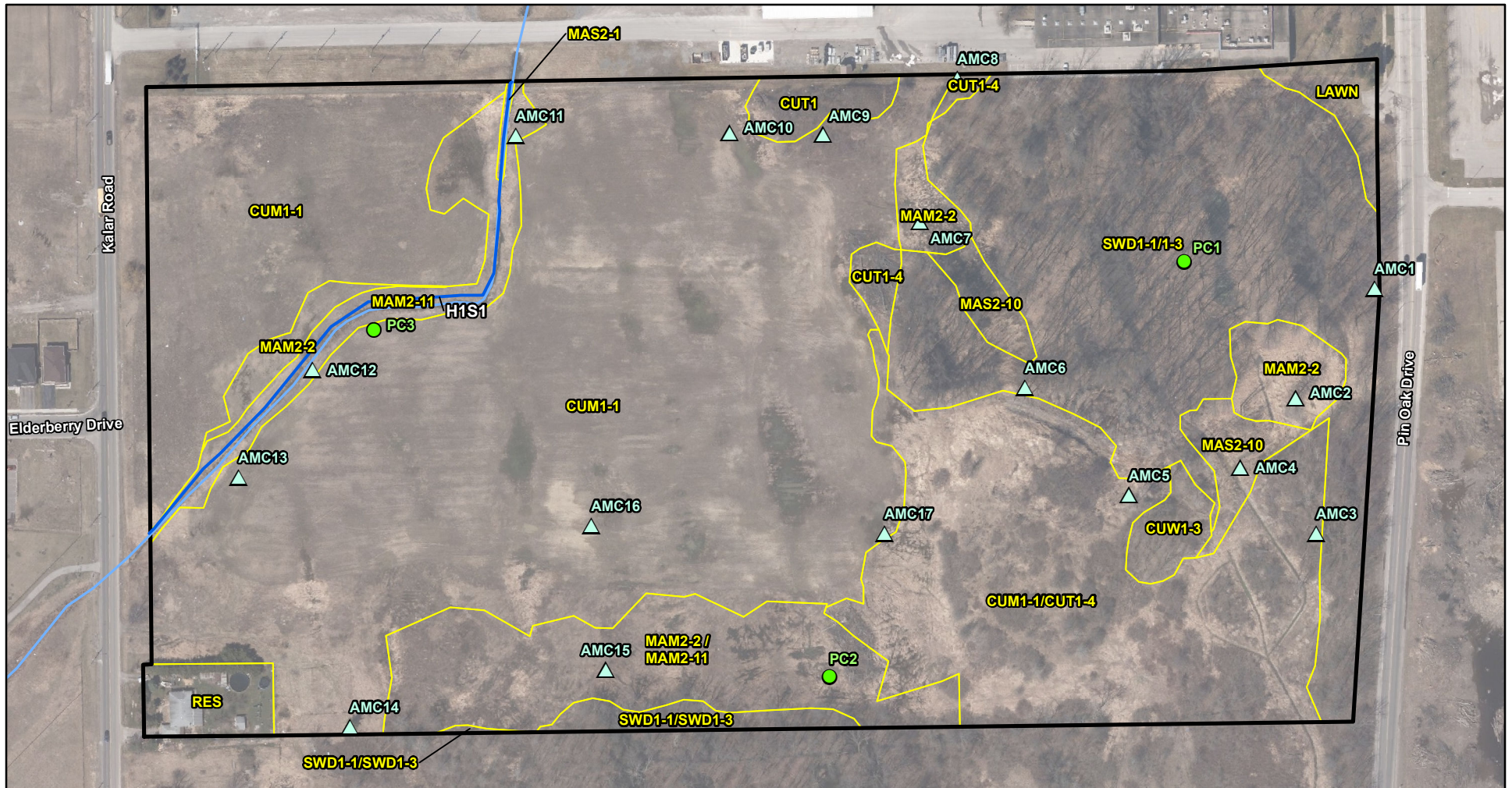
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Pin Oak Drive, Niagara Falls

Figure 4a Ecological Monitoring Stations

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- Subject Lands
- Watercourse (MNR-F-LIO)
- Ecological Land Classification

Ecological Monitoring Stations

- ▲ Amphibian Call Count Station
- Breeding Bird Point Count Station
- Headwater Drainage Feature

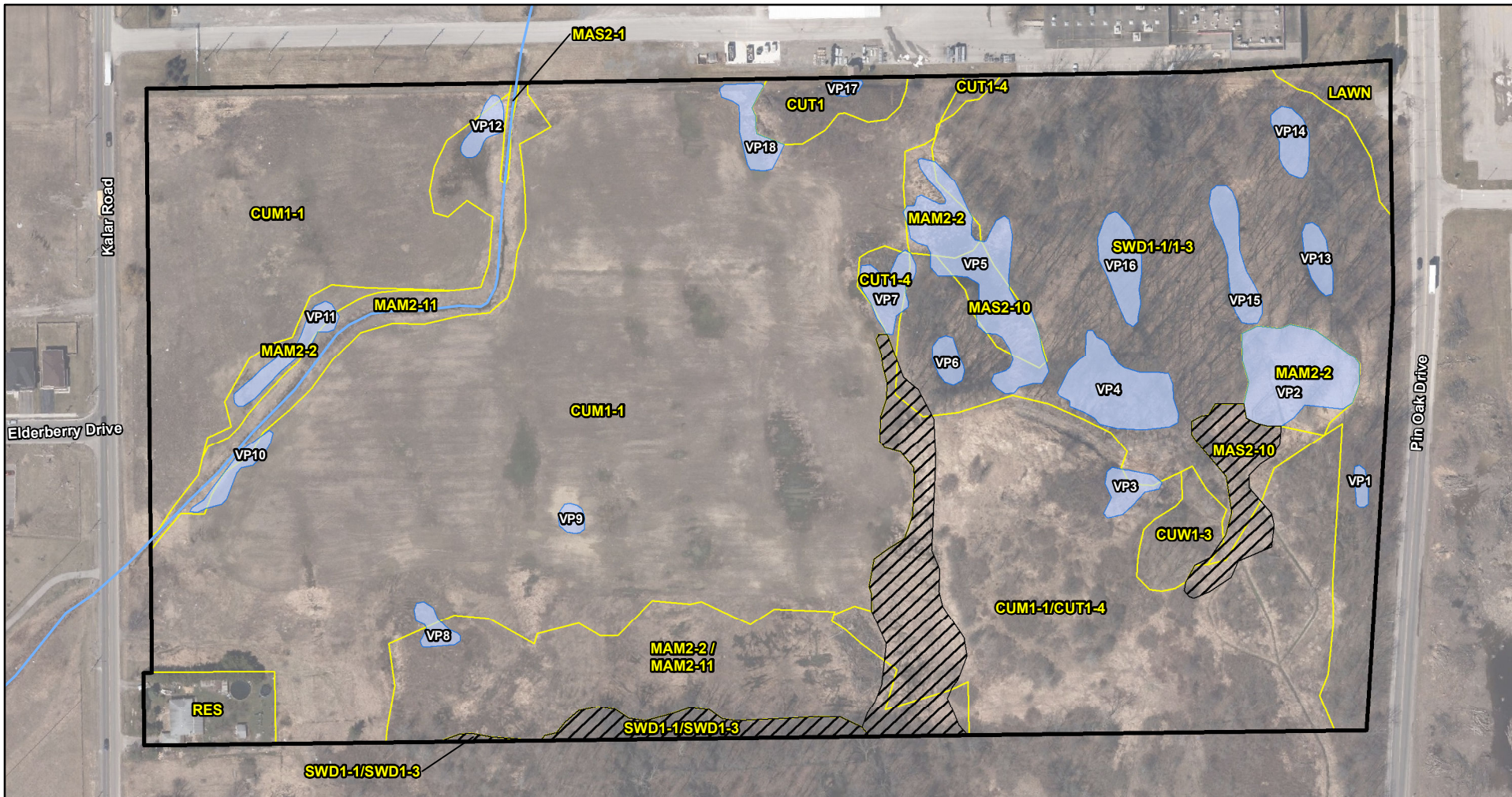
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ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

LAWN, Lawn
RES, Residential

*Not listed in Southern Ontario ELC Guide



Pin Oak Drive, Niagara Falls

Figure 4b Salamander Habitat Assessment

- Subject Lands
- Watercourse (MNRFLIO)
- Ecological Land Classification
- Salamander Habitat Assessment**
- Salamander Habitat Assessment
- Dry Feature

ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

LAWN, Lawn
RES, Residential

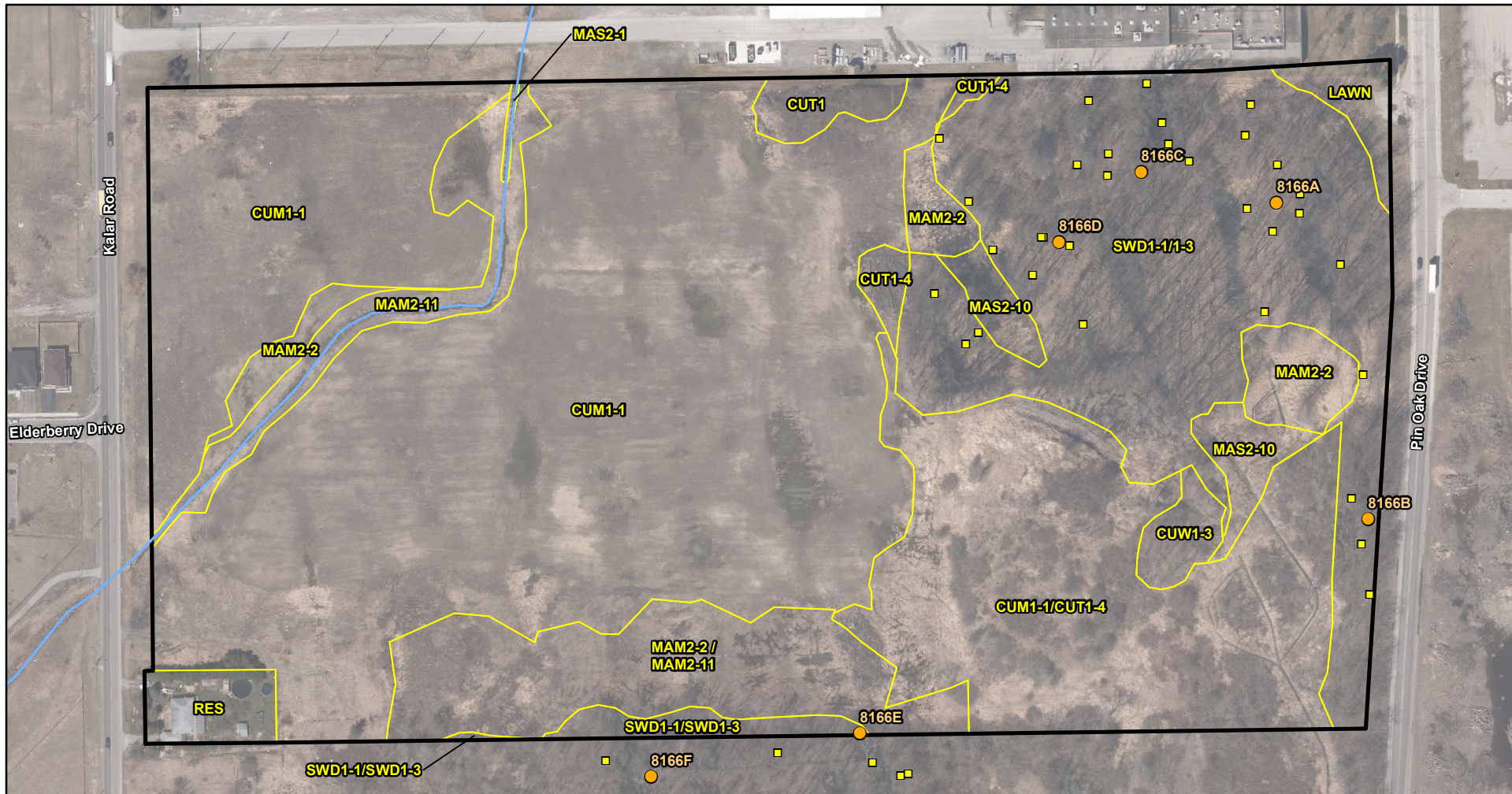
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Pin Oak Drive, Niagara Falls

Figure 4c Bat Monitoring Locations

- Subject Lands
- Watercourse (MNRF-LIO)
- Ecological Land Classification
- Bat Monitoring Locations**
- Bat Snag Location
- Acoustic Bat Monitoring Station

ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

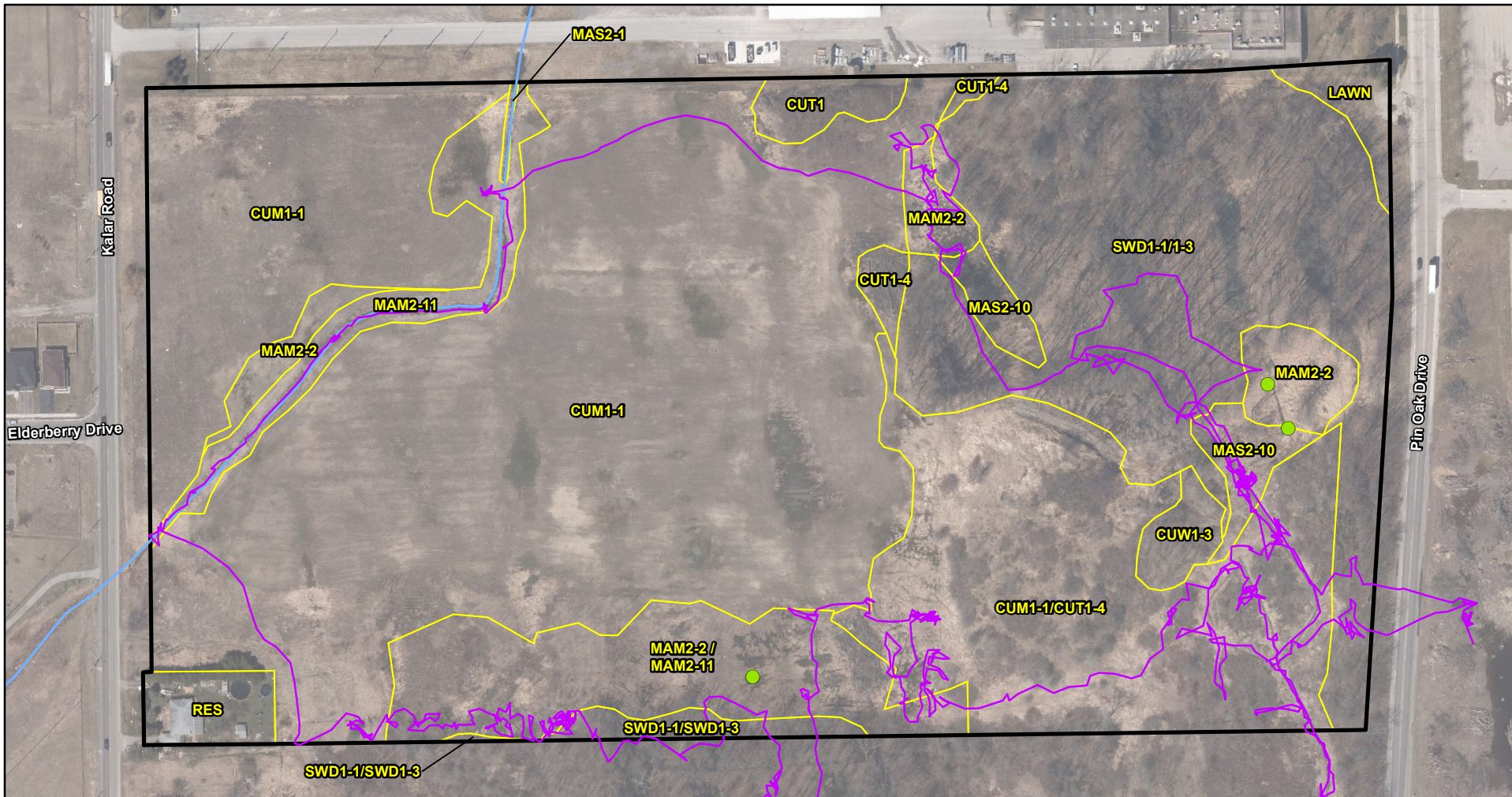
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RES, Residential

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Figure 5 Jancus Survey

- Subject Lands
- Watercourse (MNR-F-LIO)
- Ecological Land Classification
- Jancus Acuminatus
- Jancus Survey Track

ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

LAWN, Lawn
RES, Residential

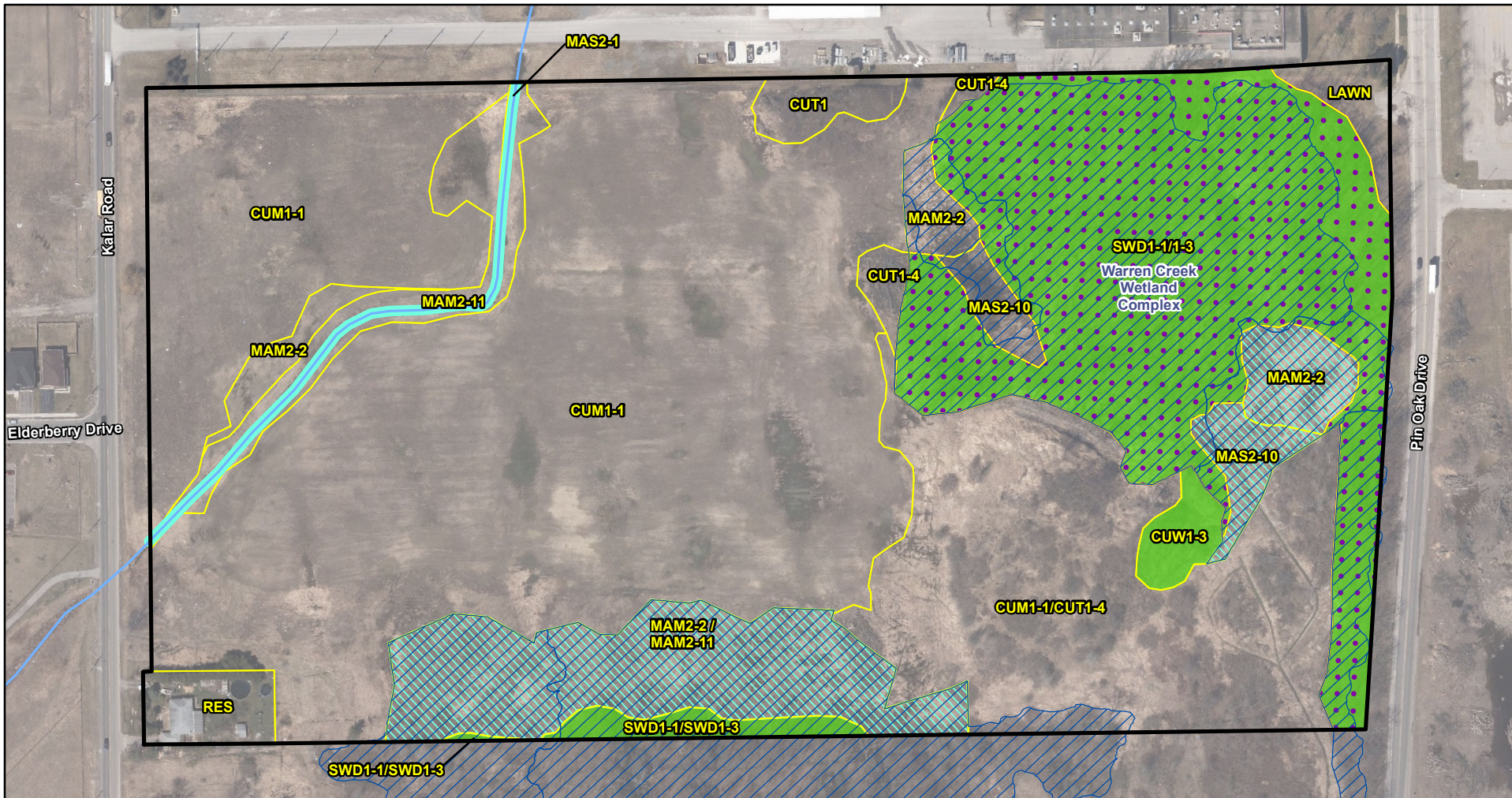
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Pin Oak Drive, Niagara Falls

Figure 6 Significant Natural Heritage Features

Concept Plan: Metropolitan Consulting Inc. April 25, 2022

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- Subject Lands
- Watercourse (MNRF-LIO)
- Fish Habitat
- Provincially Significant Wetland (MNRF-LIO)
- Significant Woodland
- Significant Wildlife Habitat**
- Habitat for the Eastern Wood-Pewee
- Habitat for Sharp Fruited Rush

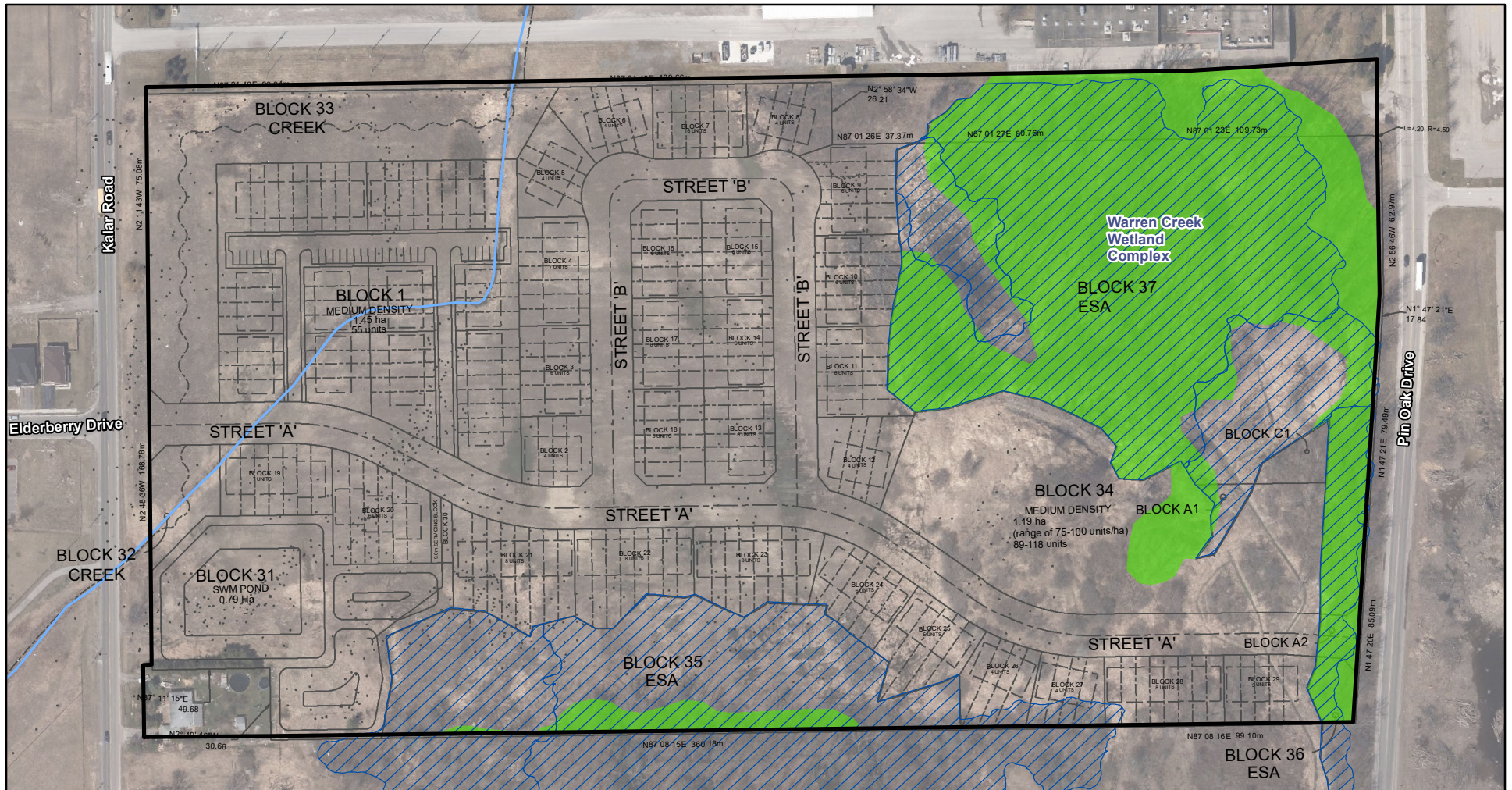
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ELC Legend

- CUM1-1, Dry-Moist Old Field Meadow
- CUT1, Mineral Cultural Thicket
- CUT1-4, Grey Dogwood Cultural Thicket
- CUW1-3*, Black Locust Cultural Woodland Ecosite
- MAM2-2, Reed-canary Grass Mineral Meadow Marsh
- MAM2-11*, Mixed Mineral Meadow Marsh
- MAS2-1, Cattail Mineral Shallow Marsh
- MAS2-10*, Common Reed Mineral Shallow Marsh
- SWD1-1, Swamp White Oak Mineral Deciduous Swamp
- SWD1-3, Pin Oak Mineral Deciduous Swamp

LAWN, Lawn
RES, Residential

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Pin Oak Drive, Niagara Falls

Figure 7 Conceptual Site Plan

Concept Plan: Metropolitan Consulting Inc. April 25, 2022.

- Subject Lands
- Watercourse (MNRF-LIO)
- Provincially Significant Wetland (MNRF-LIO)
- Woodland

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Orthoimagery source: First Base Solutions. Imagery taken in 2018.

Appendix B

Tables



Table 1: Field Studies and Natural Inventories (2018-2022)

| SURVEYORS (SURNAME, INTL) | SURVEY ROUND | SURVEY TYPE | DATE | TIME | | AIR TEMP (C°) | HUMIDITY (%) | CLOUD COVER (%) | BEAUFORT WIND SPEED | PRECIPITATION COMMENTS |
|------------------------------|-----------------|---|-------|-------|-------|---------------------|-----------------|-----------------------|------------------------|---------------------------|
| | | | | START | END | | | | | |
| 2018 | | | | | | | | | | |
| Zoladeski, C. | 1 | Botanical Inventory and ELC | 18-SE | 09:30 | 15:30 | 23 | 77 | 90 | 4 | None |
| 2019 | | | | | | | | | | |
| Green, M., Williamson, L. | 1 | Salamander Habitat Assessment and Amphibian EMS, Turtle Habitat Assessment | 15-AP | 13:00 | 16:00 | 6.1 | 68 | 75 | 4 | None |
| Green, M., Boucher, N. | 1 | Headwater Drainage Feature Assessment | 16-AP | 10:00 | 13:00 | 6.7 | 43 | 90 | 3 | None |
| Green, M., McLaren A. | 1 | Breeding Amphibian Survey | 16-AP | 20:30 | 22:30 | 5 | 86 | 90 | 2 | None |
| Zoladeski, C. | 1 | Bat Habitat Assessment | 2-MA | 11:00 | 14:30 | 5 | 95 | 100 | 3 | Fog |
| Zoladeski, C. | 2 | Botanical Inventory and ELC | 27-MA | 09:30 | 14:30 | 18 | 53 | 20 | 3 | None |

Table 1: Field Studies and Natural Inventories (2018-2022)

| SURVEYORS (SURNAME, INTL) | SURVEY ROUND | SURVEY TYPE | DATE | TIME | | AIR TEMP (C°) | HUMIDITY (%) | CLOUD COVER (%) | BEAUFORT WIND SPEED | PRECIPITATION COMMENTS |
|---|-----------------|--|-------|-------|-------|---------------------|-----------------|-----------------------|------------------------|---------------------------|
| | | | | START | END | | | | | |
| Green, M., Boucher, N. | 2 | Headwater Drainage Feature Assessment | 27-MA | 10:00 | 12:30 | 19 | 52 | 50 | 2 | None |
| Williamson, L., Green, M. | 2 | Breeding Amphibian Survey | 27-MA | 21:00 | 22:30 | 16 | 63 | 100 | 4 | None |
| Williamson, L., Green, M. | 2 | Breeding Amphibian Survey | 29-MA | 21:00 | 22:30 | 13 | 82 | 0 | 3 | None |
| Williamson, L., Green, M. | 2 | Breeding Amphibian Survey | 30-MA | 21:00 | 22:30 | 18 | 68 | 0 | 3 | None |
| Lee, R. | 1 | Bat Acoustic Monitoring Deployment | 31-MA | 10:20 | 11:45 | 15 | 57 | 5 | 2 | None |
| Burke, P. | 1 | Breeding Bird Survey | 9-JU | 05:30 | 09:30 | 14 | 50 | 75 | 3 | None |
| Lee, R. | 1 | Bat Acoustic Monitoring Retrieval | 10-JU | 10:00 | 11:00 | 16 | 97 | 100 | 3 | Fog |
| Green, M., Williamson, L., Zoladeski, C., Boucher, N. | 3 | Breeding Amphibian Survey | 19-JU | 21:20 | 23:00 | 18 | 64 | 80 | 2 | None |

Table 1: Field Studies and Natural Inventories (2018-2022)

| SURVEYORS (SURNAME, INTL) | SURVEY ROUND | SURVEY TYPE | DATE | TIME | | AIR TEMP (C°) | HUMIDITY (%) | CLOUD COVER (%) | BEAUFORT WIND SPEED | PRECIPITATION COMMENTS |
|------------------------------|-----------------|---------------------------------------|-------|-------|-------|---------------------|-----------------|-----------------------|------------------------|---------------------------|
| | | | | START | END | | | | | |
| Burke, P. | 2 | Breeding Bird Survey | 22-JU | 05:30 | 09:30 | 14 | 69 | 0 | 2 | None |
| Burke, P. | 3 | Breeding Bird Survey | 5-JL | 05:45 | 06:30 | 22 | 79 | 25 | 3 | None |
| Zoladeski, C. | 3 | Botanical Inventory and ELC | 15-AU | 09:00 | 13:00 | 20 | 65 | 25 | 3 | None |
| Green, M., Boucher, N. | 3 | Headwater Drainage Feature Assessment | 30-AU | 08:30 | 10:00 | 18 | 72 | 0 | 4 | None |
| Zoladeski, C. | 4 | Botanical Inventory and ELC | 24-OC | 10:00 | 12:00 | 13 | 59 | 75 | 4 | None |
| 2020 | | | | | | | | | | |
| Zoladeski, C. | 1 | Soil Survey for MAM2-2 | 23-AP | 13:00 | 14:00 | 5 | 38 | 75 | 4 | None |
| 2022 | | | | | | | | | | |
| Boucher, N., Nieroda, M. | 1 | Fish Community Sampling | 2-MR | 09:50 | 10:50 | -1 | 57 | 0 | 3 | None |
| Martin, S. | 1 | <i>Juncus Acuminatus</i> Survey | 12-AU | 11:00 | 13:30 | 23 | 30 | 0 | 3 | None |

Table 1: Field Studies and Natural Inventories (2018-2022)

LEGEND:

| BEAUFORT WIND SPEED SCALE | | MONTH (CODE) | |
|---------------------------|-------------------------------|--------------|-----------|
| 0 | Calm (<1 km/hr) | JA | January |
| 1 | Light Air (1-5 km/hr) | FB | February |
| 2 | Light Breeze (6-11 km/hr) | MR | March |
| 3 | Gentle Breeze (12-19 km/hr) | AP | April |
| 4 | Moderate Breeze (20-28 km/hr) | MA | May |
| | | JN | June |
| | | JL | July |
| | | AU | August |
| | | SE | September |
| | | OC | October |
| | | NO | November |
| | | DE | December |

Table 2: Ecological Landscape Characterization (ELC) Community Descriptions

| ELC TYPE | COMMUNITY DESCRIPTION | S-RANK (NHIC 2023) |
|--|--|--------------------|
| CULTURAL | | |
| Cultural Meadow | | |
| CUM1-1 Old Field Meadow | <ul style="list-style-type: none"> A regenerating community of native species and exotics occupying major central portions of the Subject Lands. Floristically very diverse, with several possible local dominants and species combinations. The main species are Tall Goldenrod (<i>Solidago altissima</i>), Redtop (<i>Agrostis gigantea</i>), Self-heal (<i>Prunella vulgaris</i>), Reed-canary Grass (<i>Phalaris arundinacea</i>), Wild Carrot (<i>Daucus carota</i>), Bird's-foot Trefoil (<i>Lotus corniculatus</i>), Teasel (<i>Dipsacus fullonum</i>) and several others. | N/A |
| Cultural Thicket | | |
| CUT1-4 Grey Dogwood Cultural Thicket | <ul style="list-style-type: none"> This type occurs in association with unit CUM1-1 on the heavily disturbed stockpiled substrate in the eastern half of the Subject Lands. Grey Dogwood (<i>Cornus foemina</i>) and Sumac (<i>Rhus typhina</i>) are the main shrub species, followed by Black Raspberry (<i>Rubus occidentalis</i>), Common Buckthorn (<i>Rhamnus cathartica</i>) and Tartarian Honeysuckle (<i>Lonicera tatarica</i>). Ground cover is composed of old field meadow species. | N/A |
| Cultural Woodland | | |
| CUW1-3* Black Locust Cultural Woodland Ecosite | <ul style="list-style-type: none"> Small area of Black Locust (<i>Robinia pseudoacacia</i>) grove, with a few White Ash (<i>Fraxinus americana</i>) and Bur Oak (<i>Quercus macrocarpa</i>). Grey Dogwood is the main shrub species. Herbaceous layer is dominated by Tall Goldenrod and Starved Aster (<i>Symphotrichum lateriflorum</i>). | N/A |
| SWAMP | | |
| Deciduous Swamp | | |
| SWD3-1 /SWD1-3 Red Maple/ Pin Oak Mineral Deciduous Swamp Complex | <ul style="list-style-type: none"> A large complex of various deciduous swamp types, principally dominated by Red and Pin Oaks (<i>Quercus rubra</i>, <i>Q. palustris</i>), extensively flooded in the spring. Secondary tree species include Silver Maple (<i>Acer saccharinum</i>), Swamp White Oak (<i>Quercus bicolor</i>), Red Maple (<i>A. rubrum</i>), Shagbark Hickory (<i>Carya ovata</i>) and, on slightly raised areas, Sugar Maple (<i>A. saccharum</i>) and Black Cherry (<i>Prunus serotina</i>). In the moderately well developed shrub layer grow Grey Dogwood, Blue-beech (<i>Carpinus caroliniana</i>), Red-osier Dogwood (<i>Cornus stolonifera</i>) and Winterberry (<i>Ilex verticillata</i>). Herb cover is rich and very diverse, composed of such species as Sensitive Fern (<i>Onoclea sensibilis</i>), False Nettle (<i>Boehmeria cylindrica</i>), Jewelweed (<i>Impatiens capensis</i>), Pennsylvania Sedge (<i>Carex pensylvanica</i>), Large-leaved Aster (<i>Eurybia</i> | S2S3/S5 |

Table 2: Ecological Landscape Characterization (ELC) Community Descriptions

| ELC TYPE | COMMUNITY DESCRIPTION | S-RANK (NHIC 2023) |
|---|--|--------------------|
| | <i>macrophylla</i>), and many others. | |
| MARSH | | |
| Meadow Marsh | | |
| MAM2-2 Reed-canary Grass Mineral Meadow Marsh | <ul style="list-style-type: none"> Reed-canary Grass is the main species, but is usually accompanied by several other graminoids and forbs, for example Jewelweed, Common Boneset (<i>Eupatorium perfoliatum</i>), Porcupine Sedge (<i>Carex hystericina</i>), Blue Vervain (<i>Verbena hastata</i>), and Tall Goldenrod. | S5 |
| MAM2-11* Mixed Mineral Meadow Marsh | <ul style="list-style-type: none"> Rich and diverse associations of swales or shallow depressions. Possible dominant and subdominant graminoids and forbs include, for example, Wool-grass (<i>Scirpus cyperinus</i>), Tall Goldenrod, Reed-canary Grass, Purple Loosestrife (<i>Lythrum salicaria</i>), Swamp Aster (<i>Symphotrichum puniceum</i>), and many others. | N/A |
| Shallow Marsh | | |
| MAS2-1 Cattail Mineral Shallow Marsh | <ul style="list-style-type: none"> Glaucous Cattail (<i>Typha x glauca</i>) is the main tall herb species, followed by Reed-canary Grass in the lower layer. Secondary species include Jewelweed, Purple Loosestrife, Swamp Aster and Dark-green Bulrush (<i>Scirpus atrovirens</i>). | S5 |
| MAS2-10* Common Reed Mineral Shallow Marsh | <ul style="list-style-type: none"> The main layer is composed of densely growing Common, or European, Reed (<i>Phragmites australis</i>). Occasional species in the lower herb layer include Reed-canary Grass and False nettle. | S5 |

*Denotes a type not listed in the Southern Ontario ELC Guide

| ORDER | FAMILY | LATIN NAME | COMMON NAME | COEFFICIENT OF CONSERVATISM | WETNESS INDEX | OWES WETLAND SPECIES | WEEDNESS INDEX | INVASIVE EXOTIC RANK (Global/Local/Regional) | PROVINCIAL STATUS (S-RANK) | GLOBAL STATUS (G-RANK) | COSSARO (M/N/R) | COSEWIC STATUS | SITE DISTRICT 7E-4 (Vegex 2002) | SW ON (October 1990) | SW REGION | NIAGARA (04/June 2018) | SPECIES CODE | AUTHORITY | | |
|----------------|----------------|--|-------------------------------------|-----------------------------|---------------|----------------------|----------------|--|----------------------------|------------------------|-----------------|----------------|---------------------------------|----------------------|-----------|------------------------|--------------|------------------------|-------------------------------|-------------------------------------|
| DICOTYLEDONS | Vitaceae | Vitis rotundifolia | Riverbank Grape | 0 | 0 | | | | S5 | G5 | | | | | | R | RNYCAP | Torrey | | |
| MONOCOTYLEDONS | Amarillidaceae | Allium canadense var. canadense | Canada Garlic | 8 | 3 | | | | S5 | G5T | | | SW | | | | SLESPA | Fernald | | |
| MONOCOTYLEDONS | Asparagaceae | Mitella dipetala | Large Flower Solomon's Seal | 4 | 3 | | | | S5 | G5T | | | | | | | NAGJUL | Fernald | | |
| MONOCOTYLEDONS | Colchicaceae | Uvularia sessilifolia | Sessile Leaved Bellwort | 7 | 3 | | | | S4 | G5 | | | | | | | S5MDCR | Fernald | | |
| MONOCOTYLEDONS | Cyperaceae | Carex leptoneura | Finely Nerved Sedge | 5 | 0 | | | | S5 | G5 | | | | | | | TRULFE | (Muhlentz) Harrison | | |
| MONOCOTYLEDONS | Cyperaceae | Carex pennsylvanica | Pennsylvania Sedge | 5 | 5 | | | | S5 | G5 | | | | | | | G00OBLD | Rafinesque | | |
| MONOCOTYLEDONS | Cyperaceae | Carex mirata | (Carex athrodes + Carex lupulina) | | -5 | | | | SNA | GNA | | | | | | | SPMAGN | Shovik | | |
| MONOCOTYLEDONS | Juncaceae | Juncus effusus ssp. effusus | Soft Rush (ssp. effusus) | | -5 | | | | SNA | GNR | | | R1 | | | | BRONUSE | Muhlenberg & Willdenow | | |
| MONOCOTYLEDONS | Liliaceae | Erythronium americanum ssp. americanum | Yellow Trout Lily | 5 | 5 | | | | S5 | G5TS | | | R4 | | | | C | CINARUN | L. | |
| MONOCOTYLEDONS | Poaceae | Agristis agrippoides | Rattail | | -3 | | -2 | | SNA | G4GS | | | X | | | | IR | ERAGU | (Muhlentz) Vignolo ex Janchen | |
| MONOCOTYLEDONS | Poaceae | Bromus inermis | Smooth Brome | | 5 | | -3 | 4 | SNA | G5TRN | | | X | | | | | HORVULG | L. | |
| MONOCOTYLEDONS | Poaceae | Dactylis glomerata | Orchard Grass | | 3 | | -1 | 3 | SNA | GNR | | | X | | | | | C | MUHMEME | L. |
| MONOCOTYLEDONS | Poaceae | Elymus repens | Quackgrass | | 3 | | -3 | 3 | SNA | GNR | | | X | | | | | | POABAR | R. Brown |
| MONOCOTYLEDONS | Poaceae | Phleum pratense ssp. pratense | Common Timothy | | 3 | | -1 | | SNA | GNR | | | X | | | | | IC | POTGRS | L. |
| MONOCOTYLEDONS | Poaceae | Poa compressa | Canada Bluegrass | | 3 | | | | SNA | GNR | | | X | | | | | RH | POTPRAE | L. |
| MONOCOTYLEDONS | Poaceae | Poa nemoralis | European Woodland Bluegrass | | 3 | | | | SNA | GNR | | | X | | | | | R | POTPRAE | Walters |
| MONOCOTYLEDONS | Poaceae | Poa pratensis ssp. pratensis | Kentucky Bluegrass (ssp. pratensis) | | 3 | | -1 | | SNA | G5 | | | R2 | SW | RSWR | | | | POTPRAE | (A. Bennett) Rydberg |
| MONOCOTYLEDONS | Poaceae | Poa pratensis ssp. pratensis | Kentucky Bluegrass (ssp. pratensis) | | 3 | | | | SNA | G5TS | | | X | | | | | | POTPRAE | (A. Bennett) Rydberg |
| MONOCOTYLEDONS | Smilacaceae | Smilax herbacea | Herbaceous Clematisflower | 5 | 0 | | | | S4T | G5 | | | X | | SW | | | | ORACRCK | (A. Braun ex Dowell) Kunze ex Druce |

STATISTICS

Species Diversity

| | |
|-------------------------|-----|
| Total Number of Species | 105 |
| Native Species | 74% |
| Exotic Species | 26% |
| S1-S3 Species | 1% |
| S4 Species | 10% |
| S5 Species | 89% |

Floristic Quality Assessment (FQA)

| | |
|---------------------------------------|-----|
| Mean Coefficient of Conservatism (CC) | 3.7 |
| CC 0 - 3 = lowest sensitivity | 47% |
| CC 4 - 6 = moderate sensitivity | 47% |
| CC 7 - 8 = high sensitivity | 6% |
| CC 9 - 10 = highest sensitivity | 1% |
| Floristic Quality Index (FQI) | 38 |

Weedy & Invasive Species

| | |
|---|------|
| Mean Weediness Index (Green et al.) | -2.0 |
| -1 = low potential invasiveness | 12% |
| -2 = moderate potential invasiveness | 31% |
| -3 = high potential invasiveness | 28% |
| Mean Exotic Rank (Green Power Associates) | 2 |
| Category 1 | 7% |
| Category 2 | 18% |
| Category 3 | 13% |
| Category 4 | 10% |
| Category 5 | 15% |
| Potentially Invasive (PI) | 2 |
| Potentially Invasive (PI) | 5% |

Wetland Species

| | |
|---------------------|------|
| Mean Wetness Index | -0.2 |
| Upland | 20% |
| Facultative upland | 14% |
| Facultative | 24% |
| Facultative wetland | 19% |
| Facultative wetland | 24% |
| Obligate wetland | 18% |

| Common Name | Species Code | Scientific Name | Provincial Status (S Rank) | Global Status (G Rank) | COSSARO (MNRFP) | COSEWIC (Federal) | SWH Indicator Species | Highest Breeding Evidence | Round 1 | Round 1 | Round 1 | Incidenta | Off Site | Round 2 | Round 2 | Round 2 | Incidenta | Off Site | Round 3 | Incidenta | Off Site | SWH Indicator Species (MNR, Special) 2012) Notes: (1) All migratory songbirds | |
|------------------------|--------------|----------------------------------|----------------------------|------------------------|-----------------|-------------------|-----------------------|---------------------------|---------|----------|----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|---|--|
| | | | | | | | | | PC 1 | PC 2 | PC 3 | l Round 1 | Round 1 | PC 1 | PC 2 | PC 3 | l Round 2 | Round 2 | PC 3 | l Round 3 | Round 3 | | |
| | | | | | | | | | Date: | 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 5-Jul-19 | 5-Jul-19 | 5-Jul-19 | |
| | | | | | | | | | Time: | 5:58 | 7:12 | 8:40 | | | 5:48 | 6:56 | 8:11 | | | 6:09 | | | |
| Anseriformes | | | | | | | | | | | | | | | | | | | | | | | |
| Anatidae | | | | | | | | | | | | | | | | | | | | | | | |
| Canada Goose | CANG | <i>Branta canadensis</i> | S5 | G5 | | | X | OB-X | | | | | | | | | | | | | | 1.1 Waterfowl stopover / staging | |
| Mallard | MALL | <i>Anas platyrhynchos</i> | S5 | G5 | | | X | PO-H | | | 1 | | | | | | | | | | | 1.2.2 Waterfowl Nesting Area 7E, 6E, | |
| Columbiformes | | | | | | | | | | | | | | | | | | | | | | | |
| Columbidae | | | | | | | | | | | | | | | | | | | | | | | |
| Mourning Dove | MODO | <i>Zenaidura macroura</i> | S5 | G5 | | | | PO-H | | | | | | | | | | | | | 4 | | |
| Charadriidae | | | | | | | | | | | | | | | | | | | | | | | |
| Killdeer | KILL | <i>Charadrius vociferus</i> | S5B, S5N | G5 | | | | OB-X | | | | | | | | | | | | | 1 | | |
| Scolopacidae | | | | | | | | | | | | | | | | | | | | | | | |
| Spotted Sandpiper | SPSA | <i>Actitis macularia</i> | S5 | G5 | | | X | PO-H | | | | 1 | | | | | | | | | 1 | 1.1 Shorebird migratory stopover area 7E, 6E | |
| Laridae | | | | | | | | | | | | | | | | | | | | | | | |
| Ring-billed Gull | RBGU | <i>Larus delawarensis</i> | S5B, S4N | G5 | | | X | OB-X | | 5 | 14 | | | | 18 | 50 | | | | | | 1.1 Colonial nesting breeding habitat (ground) | |
| Ardeidae | | | | | | | | | | | | | | | | | | | | | | | |
| Great Blue Heron | GBHE | <i>Ardea herodias</i> | S4 | G5 | | | X | OB-X | | | 1 | | | | 1 | | | | | | 2 | 1.1 Colonial nesting breeding habitat (trees / | |
| Piciformes | | | | | | | | | | | | | | | | | | | | | | | |
| Picidae | | | | | | | | | | | | | | | | | | | | | | | |
| Red-bellied Woodpecker | RBWO | <i>Melanerpes carolinus</i> | S4 | G5 | | | | PR-P | | | 1 | | 2 | | | | | | | | | | |
| Downy Woodpecker | DOWO | <i>Picoides pubescens</i> | S5 | G5 | | | | PO-H | | 1 | | | | | | | | | | | | | |
| Northern Flicker | NOFL | <i>Colaptes auratus</i> | S4B | G5 | | | | PR-T | | | | 1 | | | 1 | | | | | | | | |
| Passeriformes | | | | | | | | | | | | | | | | | | | | | | | |
| Tyrannidae | | | | | | | | | | | | | | | | | | | | | | | |
| Eastern Wood-Pewee | EAWP | <i>Contopus virens</i> | S4B | G5 | SC | SC | X | PR-T | | 1 | 1 | | | | 1 | | | | | | | | |
| Vireonidae | | | | | | | | | | | | | | | | | | | | | | | |
| Warbling Vireo | WAVI | <i>Vireo gilvus</i> | S5B | G5 | | | | PO-S | | 1 | | | | | | | | | | | | | |
| Corvidae | | | | | | | | | | | | | | | | | | | | | | | |
| Blue Jay | BLJA | <i>Cyanocitta cristata</i> | S5 | G5 | | | | CO-CF | | 1 | | | | | 1 | | | | | | 2 | | |
| Hirundinidae | | | | | | | | | | | | | | | | | | | | | | | |
| Barn Swallow | BARS | <i>Hirundo rustica</i> | S4B | G5 | THR | THR | | OB-X | | | | | | | | | 1 | 1 | | | 1 | | |
| Turdidae | | | | | | | | | | | | | | | | | | | | | | | |
| American Robin | AMRO | <i>Turdus migratorius</i> | S5B | G5 | | | | CO-CF | | 3 | 1 | 1 | 1 | | 2 | 1 | 1 | 2 | | | 1 | | |
| Mimidae | | | | | | | | | | | | | | | | | | | | | | | |
| Gray Catbird | GRCA | <i>Dumetella carolinensis</i> | S4B | G5 | | | | PR-P | | 1 | 1 | | 2 | | | | | | | | | | |
| Sturnidae | | | | | | | | | | | | | | | | | | | | | | | |
| European Starling | EUST | <i>Sturnus vulgaris</i> | SNA | G5 | | | | PO-H | | | | | | | | | | | | | 2 | | |
| Fringillidae | | | | | | | | | | | | | | | | | | | | | | | |
| House Finch | HOFI | <i>Haemorhous mexicanus</i> | SNA | G5 | | | | PR-P | | | | 2 | 1 | | | | | | | | | | |
| American Goldfinch | AMGO | <i>Spinus tristis</i> | S5B | G5 | | | | PR-P | | | 2 | | | | 2 | | | | | | 2 | | |
| Passerellidae | | | | | | | | | | | | | | | | | | | | | | | |
| Field Sparrow | FTSP | <i>Spizella pusilla</i> | S4B | G5 | | | X | PO-S | | | | 1 | | | | | | | | | | 1.3 Shrub / Early Successional bird breeding | |
| Savannah Sparrow | SAVS | <i>Passerculus sandwichensis</i> | S4B | G5 | | | X | PR-T | | | | 2 | | | | | | | | | 1 | 1.3 Open Country bird breeding habitat 7E, 6E | |
| Song Sparrow | SOSP | <i>Melospiza melodia</i> | S5B | G5 | | | | CO-CF | | 2 | 1 | 3 | 1 | | 2 | 2 | 5 | | | | 5 | | |
| Swamp Sparrow | SWSP | <i>Melospiza georgiana</i> | S5B | G5 | | | | PO-S | | | | | | 1 | 1 | | | | | | | | |
| Icteridae | | | | | | | | | | | | | | | | | | | | | | | |
| Bobolink | BOBO | <i>Dolichonyx oryzivorus</i> | S4B | G5 | THR | THR | | PO-S | | | | 1 | 1 | | | | | | | | | | |
| Baltimore Oriole | BAOR | <i>Icterus galbula</i> | S4B | G5 | | | | PR-T | | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Red-winged Blackbird | RWBL | <i>Agelaius phoeniceus</i> | S4 | G5 | | | | CO-CF | | 3 | 2 | 4 | | 1 | 1 | 5 | | | | | 9 | | |
| Brown-headed Cowbird | BHCO | <i>Molothrus ater</i> | S4B | G5 | | | | PO-H | | | | | | | | | | | | | 1 | | |
| Common Grackle | COGR | <i>Quiscalus quiscula</i> | S5B | G5 | | | | PR-T | | | | | | | | 4 | 2 | | | | 1 | | |
| Parulidae | | | | | | | | | | | | | | | | | | | | | | | |
| Common Yellowthroat | COYE | <i>Geothlypis trichas</i> | S5B | G5 | | | | PR-T | | 1 | 2 | 1 | | | 1 | 1 | 1 | | | | | | |
| Yellow Warbler | YWAR | <i>Setophaga petechia</i> | S5B | G5 | | | | PO-S | | | | 1 | | | | | | | | | | | |
| Cardinalidae | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Cardinal | NOCA | <i>Cardinalis cardinalis</i> | S5 | G5 | | | | PR-T | | | 1 | | | | | | | | | | | | |
| Rose-breasted Grosbeak | RBGR | <i>Pheucticus ludovicianus</i> | S4B | G5 | | | | CO-CF | | 1 | | 1 | | | 2 | | | | | | | | |

Species Common Name and Scientific Name: Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stoltz, B. W. Winger, and K. Winker. 2018. Check-list of North American Birds (online). American Ornithological Society. <http://checklist.aou.org/taxa>

Species Code: Consistent with the American Ornithologists' Union. 2018. Species 4-Letter-Codes. Available online: <http://www.birdsontario.org/atlas/codes.jsp?lang=en&pg=species>

Highest Breeding Evidence: Codes assigned for breeding evidence are consistent with the Ontario Breeding Bird Atlas (OBBA). 2018. Breeding Evidence Codes. Available online: <http://www.birdsontario.org/atlas/codes.jsp?lang=en&pg=breeding&sortorder=auo>

S ranks: Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperiled), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list December 2018. Available to download from: <https://www.ontario.ca/page/get-natural-heritage-information>

| Common Name | Species Code | Scientific Name | Provincial Status (S Rank) | Global Status (G Rank) | COSSARO (MNRF) | COSEWIC (Federal) | SWH Indicator Species | Highest Breeding Evidence | Round 1 | Round 1 | Round 1 | Incidenta | Off Site | Round 2 | Round 2 | Round 2 | Incidenta | Off Site | Round 3 | Incidenta | Off Site | SWH Indicator Species (MNR, 2012) Special Notes: (1) All migratory songbirds |
|-------------|--------------|-----------------|----------------------------|------------------------|----------------|-------------------|-----------------------|---------------------------|----------------|----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|--|
| | | | | | | | | | PC 1 | PC 2 | PC 3 | l Round 1 | Round 1 | PC 1 | PC 2 | PC 3 | l Round 2 | Round 2 | l Round 3 | Round 3 | | |
| | | | | | | | | | Date: 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 9-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 22-Jun-19 | 5-Jul-19 | 5-Jul-19 | 5-Jul-19 | |
| | | | | | | | | | Time: 5:58 | 7:12 | 8:40 | | | 5:48 | 6:56 | 8:11 | | 6:09 | | | | |

G ranks: Global ranks are from the Natural Heritage Information Centre; G1 (extremely rare), G2 (very rare), G3 (rare to uncommon), G4 (common), G5 (very common); ranks were updated using NHIC species list December 2018. Available to download from: <https://www.ontario.ca/page/get-natural-heritage-information>

COSSARO (MNRF): Ontario Species at Risk as listed by the Committee on the Status of Species at Risk in Ontario (from NHIC Table December 2018 and updates posted on Ontario Regulation 230/08 Species at Risk in Ontario website as of August 1, 2018: <https://www.ontario.ca/laws/regulation/080230/>); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk

COSEWIC: Assessed Species at Risk at the national level as listed by the Committee on the Status of Endangered Wildlife in Canada (from COSEWIC: https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk

SWH Indicator Species: SWH refers to Significant Wildlife Habitat as defined by the MNR (2015) Significant Wildlife Habitat Criteria Schedules for Ecoregions 7E and 6E (as appropriate for the Subject Lands). SWH indicator species are identified in this table and any potential

Table 5: Amphibian Call Count Survey Station Results

| SURVEY ROUND | STATION NUMBER | SPECIES CODE | | | | | | | | | | | WATER | | |
|--------------|----------------|--------------|------|------|------|------|-------|------|------|------|------|------|-------|---------------|------------|
| | | NOAM | AMTO | FOTO | GRTR | SPPE | CHFR | WOFR | NLFR | PIFR | GRFR | BULL | MIFR | Present (Y/N) | Depth (CM) |
| 1 | AMC1 | | | | | 1(5) | 1(7) | | | | | | | Y | 25 |
| 2 | AMC1 | | | | 1(3) | | | | | | | | | Y | 20 |
| 3 | AMC1 | X | | | | | | | | | | | | Y | 10 |
| 1 | AMC2 | | | | | | 2(10) | | | | | | | Y | 15 |
| 2 | AMC2 | X | | | | | | | | | | | | Y | 3 |
| 3 | AMC2 | X | | | | | | | | | | | | Y | 5 |
| 1 | AMC3 | X | | | | | | | | | | | | Y | 10 |
| 2 | AMC3 | X | | | | | | | | | | | | Y | 4 |
| 3 | AMC3 | X | | | | | | | | | | | | Y | 5 |
| 1 | AMC4 | | | | | | 1(4) | | | | | | | Y | 15 |
| 2 | AMC4 | X | | | | | | | | | | | | Y | 5 |
| 3 | AMC4 | X | | | | | | | | | | | | Y | 2 |
| 1 | AMC5 | | 1(3) | | | | | | | | | | | Y | 17 |
| 2 | AMC5 | DRY | | | | | | | | | | | | N | DRY |
| 1 | AMC6 | | | | | | 2(15) | | | | | | | Y | 50 |
| 2 | AMC6 | | | | 1(5) | | 1(1) | | | | | | | Y | 10 |
| 3 | AMC6 | X | | | | | | | | | | | | Y | 5 |
| 1 | AMC7 | | | | | 2(8) | 3 | | 1(3) | | | | | Y | 60 |
| 2 | AMC7 | | | | 1(5) | | | | | | | | | Y | 30 |
| 3 | AMC7 | | | | 1(4) | | | | | | 1(1) | | | Y | 10 |
| 1 | AMC8 | | | | | | 1(3) | | | | | | | Y | 25 |
| 2 | AMC8 | X | | | | | | | | | | | | Y | 15 |
| 3 | AMC8 | X | | | | | | | | | | | | Y | 5 |
| 1 | AMC9 | | | | | | 1(1) | | | | | | | Y | 5 |
| 2 | AMC9 | X | | | | | | | | | | | | Y | 5 |
| 3 | AMC9 | X | | | | | | | | | | | | N | DRY |

Table 5: Amphibian Call Count Survey Station Results

| SURVEY ROUND | STATION NUMBER | SPECIES CODE | | | | | | | | | | | WATER | | |
|--------------|----------------|--------------|------|------|------|------|-------|------|------|------|------|------|-------|---------------|------------|
| | | NOAM | AMTO | FOTO | GRTR | SPPE | CHFR | WOFR | NLFR | PIFR | GRFR | BULL | MIFR | Present (Y/N) | Depth (CM) |
| 1 | AMC10 | | | | | 1(1) | 2(9) | | 1(1) | | | | | Y | 20 |
| 2 | AMC10 | | | | | | 1(1) | | | | | | | Y | 15 |
| 3 | AMC10 | X | | | | | | | | | | | | Y | 15 |
| 1 | AMC11 | | | | | | 1(1) | | | | | | | Y | 40 |
| 2 | AMC11 | X | | | | | | | | | | | | Y | 20 |
| 3 | AMC11 | X | | | | | | | | | | | | N | DRY |
| 1 | AMC12 | | | | | | 1(3) | | | | | | | Y | 5 |
| 2 | AMC12 | | | | | 1(1) | 1(2) | | | | | | | Y | 3 |
| 3 | AMC12 | X | | | | | | | | | | | | N | DRY |
| 1 | AMC13 | X | | | | | | | | | | | | Y | 5 |
| 2 | AMC13 | | | | | 1(1) | | | | | | | | Y | 5 |
| 3 | AMC13 | X | | | | | | | | | | | | N | DRY |
| 1 | AMC14 | | | | | 1(1) | 1(6) | | | | | | | NA | NA |
| 2 | AMC14 | | | | | 1(1) | | | | | | | | NA | NA |
| 3 | AMC14 | | | | | | | | | | 1(1) | | | NA | NA |
| 1 | AMC15 | | | | | 1(1) | 2(8) | | | | | | | Y | 18 |
| 2 | AMC15 | | | | 1(4) | 1(1) | 1(2) | | | | | | | Y | 3 |
| 3 | AMC15 | X | | | | | | | | | | | | Y | 3 |
| 1 | AMC16 | | 1(3) | | | | | | | | | | | Y | 7 |
| 2 | AMC16 | | | | | 1(1) | 1(2) | | | | | | | Y | 10 |
| 3 | AMC16 | X | | | | | | | | | | | | N | DRY |
| 1 | AMC17 | | 1(3) | | | | 2(22) | | | | | | | Y | 60 |
| 2 | AMC17 | | | | 1(4) | 1(1) | 1(2) | | | | | | | Y | 13 |
| 3 | AMC17 | X | | | | | | | | | | | | Y | 5 |

LEGEND:

Table 5: Amphibian Call Count Survey Station Results

| SPECIES CODE | COMMON NAME | SCIENTIFIC NAME | CALL CODES | |
|--------------|-----------------------|-------------------------------------|------------|---|
| NOAM | No Amphibians | No amphibians despite survey effort | X | No amphibians heard |
| AMTO | American Toad | <i>Anaxyrus americanus</i> | 1 | Calls can be counted without error |
| FOTO | Fowler's Toad | <i>Anaxyrus fowleri</i> | 2 | Calls overlap but can be reliably estimated |
| GRTR | Gray Treefrog | <i>Hyla versicolor</i> | 3 | Calls overlap too much to estimate number |
| SPPE | Spring Peeper | <i>Pseudacris crucifer</i> | | |
| CHFR | Western Chorus Frog | <i>Pseudacris triseriata</i> | | |
| WOFR | Wood Frog | <i>Lithobates sylvaticus</i> | | |
| NLRF | Northern Leopard Frog | <i>Lithobates pipiens</i> | | |
| PIFR | Pickerel Frog | <i>Lithobates palustris</i> | | |
| GRFR | Green Frog | <i>Lithobates clamitans</i> | | |
| BULL | American Bullfrog | <i>Lithobates catesbeianus</i> | | |
| MIFR | Mink Frog | <i>Lithobates septentrionalis</i> | | |

Note: For each species, the first number is the call code and the second number, which is in brackets, is the number of individuals of that species heard calling.

Table 6: Amphibian Egg Mass Survey Results

| SURVEY ROUND | STATION NUMBER | SPECIES CODE | | | | | | | | | | | WATER | | |
|--------------|----------------|--------------|------|------|------|------|------|------|------|------|------|------|-------|---------------|------------|
| | | NOAM | AMTO | FOTO | GRTR | SPPE | CHFR | WOFR | NLFR | PIFR | GRFR | BULL | MIFR | Present (Y/N) | Depth (CM) |
| 1 | VP1 | X | | | | | | | | | | | | | |
| 1 | VP2 | X | | | | | | | | | | | | | |
| 1 | VP3 | X | | | | | | | | | | | | | |
| 1 | VP4 | X | | | | | | | | | | | | | |
| 1 | VP5 | | | | | | 20 | | | | | | | | |
| 1 | VP6 | X | | | | | | | | | | | | | |
| 1 | VP7 | X | | | | | | | | | | | | | |
| 1 | VP8 | X | | | | | | | | | | | | | |
| 1 | VP9 | X | | | | | | | | | | | | | |
| 1 | VP10 | X | | | | | | | | | | | | | |
| 1 | VP11 | X | | | | | | | | | | | | | |
| 1 | VP12 | X | | | | | | | | | | | | | |
| 1 | VP13 | X | | | | | | | | | | | | | |
| 1 | VP14 | X | | | | | | | | | | | | | |
| 1 | VP15 | X | | | | | | | | | | | | | |
| 1 | VP16 | X | | | | | | | | | | | | | |
| 1 | VP17 | X | | | | | | | | | | | | | |
| 1 | VP18 | X | | | | | | | | | | | | | |

LEGEND:

| SPECIES CODE | COMMON NAME | SCIENTIFIC NAME |
|--------------|---------------------|-------------------------------------|
| NOAM | No Amphibians | No amphibians despite survey effort |
| AMTO | American Toad | <i>Anaxyrus americanus</i> |
| FOTO | Fowler's Toad | <i>Anaxyrus fowleri</i> |
| GRTR | Gray Treefrog | <i>Hyla versicolor</i> |
| CHFR | Western Chorus Frog | <i>Pseudacris triseriata</i> |
| WOFR | Wood Frog | <i>Lithobates sylvaticus</i> |

Table 6: Amphibian Egg Mass Survey Results

| | | |
|------|-----------------------|-----------------------------------|
| NLRF | Northern Leopard Frog | <i>Lithobates pipiens</i> |
| PIFR | Pickerel Frog | <i>Lithobates palustris</i> |
| GRFR | Green Frog | <i>Lithobates clamitans</i> |
| BULL | American Bullfrog | <i>Lithobates catesbeianus</i> |
| MIFR | Mink Frog | <i>Lithobates septentrionalis</i> |

Note: The quantity reported in each cell is the cumulative count of all life stages (egg mass, tadpole, adult) of the individuals observed of that species during each egg mass survey round.

Table 7: Bat Acoustic Survey Results

| DATE 2019 | SM4 ID | SPECIES CODE | | | | | | | | |
|--------------------|----------------|--------------|------|------|------|------|------|------|------|------|
| | | NOBA | LACI | LANO | EPFU | LABO | PESU | MYLU | MYSE | MYLE |
| MAY 31- JUNE 10 | SM4 STATION A | | 238 | 29 | 10 | 18 | 0 | 0 | 0 | 0 |
| MAY 31- JUNE 10 | SM4 STATION B | | 38 | 24 | 214 | 5 | 0 | 0 | 0 | 0 |
| MAY 31- JUNE 10 | SM4 STATION C | - | 3 | 23 | 21 | 13 | 0 | 0 | 0 | 0 |
| MAY 31- JUNE 10 | SM4 STATION D | - | 14 | 31 | 68 | 3 | 0 | 0 | 0 | 4 |
| MAY 31- JUNE 10 | SM4 STATION E | - | 37 | 15 | 48 | 8 | 0 | 0 | 0 | 2 |
| MAY 31- JUNE 10 | SM4 STATION F* | - | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Equipment malfunction

LEGEND:

| SPECIES CODE | COMMON NAME | SCIENTIFIC NAME |
|--------------|-------------------|-----------------------------------|
| NOBA | No Bats | No recorded despite survey effort |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> |
| LANO | Silver-haired Bat | <i>Lasionycteris noctivagans</i> |
| EPFU | Big Brown Bat | <i>Eptesicus fuscus</i> |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> |
| PESU | Tri-coloured Bat | <i>Perimyotis subflavus</i> |
| MYLU | Little Brown Bat | <i>Myotis lucifuga</i> |
| MYSE | Long-eared Bat | <i>Myotis septentrionalis</i> |
| MYLE | Small Footed Bat | <i>Myotis leibii</i> |

| Inside Study Area | Outside Study Area | COMMON NAME | Provincial Status (S RANK) | Global Status (G RANK) | SARO (MECP) | COSEWIC (Federal) | Niagara Region CA Status | SWH Indicator Species 7E |
|-------------------|--------------------|---|----------------------------|------------------------|-------------|-------------------|--------------------------|--------------------------|
| X | X | | | | | | | |
| | | BUTTERFLIES | | | | | | |
| x | | Monarch | S4B, S2N | G4 | SC | END | | X |
| X | X | | | | | | | |
| | | AMPHIBIANS | | | | | | |
| x | | American Toad | S5 | G5 | | | W | X |
| x | | Gray Treefrog | S5 | G5 | | | L | X |
| x | | Western Chorus Frog (Carolinian population) | S4 | G5 | NAR | NAR | | X |
| x | | Spring Peeper | S5 | G5 | | | W | X |
| x | | Northern Green Frog | S5 | G5 | | | W | X |
| x | | Northern Leopard Frog | S5 | G5 | | NAR | W | X |
| X | X | | | | | | | |
| | | BIRDS | | | | | L | |
| x | | Canada Goose | S5 | G5 | | | | X |
| x | | Mallard | S5 | G5 | | | U | X |
| x | | Mourning Dove | S5 | G5 | | | | |
| x | | Killdeer | S4B | G5 | | | | |
| x | | Spotted Sandpiper | S5B | G5 | | | U | |
| x | | Ring-billed Gull | S5 | G5 | | | | X |
| x | | Great Blue Heron | S4 | G5 | | | R | X |
| x | | Red-bellied Woodpecker | S5 | G5 | | | R | |
| x | | Downy Woodpecker | S5 | G5 | | | | |
| x | | Northern Flicker | S5 | G5 | | | U | |
| x | | Eastern Wood-Pewee | S4B | G5 | SC | SC | | X |
| x | | Warbling Vireo | S5B | G5 | | | | |
| x | | Blue Jay | S5 | G5 | | | | |
| x | | Barn Swallow | S4B | G5 | THR | SC | U | |
| x | | American Robin | S5 | G5 | | | U | |
| x | | Gray Catbird | S5B, S3N | G5 | | | C | |
| x | | European Starling | SNA | G5 | | | U | |
| x | | House Finch | SNA | G5 | | | O | |
| x | | American Goldfinch | S5 | G5 | | | | |
| x | | Field Sparrow | S4B, S3N | G5 | | | R | X |
| x | | Savannah Sparrow | S5B, S3N | G5 | | | | X |
| x | | Song Sparrow | S5 | G5 | | | C | |
| x | | Swamp Sparrow | S5B, S4N | G5 | | | O | |
| x | | Bobolink | S4B | G5 | THR | THR | | |
| x | | Baltimore Oriole | S4B | G5 | | | U | |
| x | | Red-winged Blackbird | S5 | G5 | | | C | |
| x | | Brown-headed Cowbird | S5 | G5 | | | C | |
| x | | Common Grackle | S5 | G5 | | | | |
| x | | Common Yellowthroat | S5B, S3N | G5 | | | | |
| x | | Yellow Warbler | S5B | G5 | | | | |
| x | | Northern Cardinal | S5 | G5 | | | U | |
| x | | Rose-breasted Grosbeak | S5B | G5 | | | C | |

SUMMARY

| | |
|------------------------|----|
| Total Odonata: | 0 |
| Total Butterflies: | 1 |
| Total Other Arthropods | 0 |
| Total Amphibians: | 6 |
| Total Reptiles: | 0 |
| Total Birds: | 32 |
| Total Breeding Birds: | 27 |
| Total Mammals: | 0 |

SIGNIFICANT SPECIES

| | |
|-------------|---|
| Global: | 0 |
| National: | 4 |
| Provincial: | 4 |
| Regional: | 3 |
| Local: | 3 |

Explanation of Status and Acronyms

| Inside Study Area | Outside Study Area | COMMON NAME | Provincial Status (S RANK) | Global Status (G RANK) | SARO (MECP) | COSEWIC (Federal) | Niagara Region CA Status | SWH Indicator Species 7E |
|-------------------|--------------------|--|----------------------------|------------------------|-------------|-------------------|--------------------------|--------------------------|
| | | <p>COSSARO: Committee on the Status of Species at Risk in Ontario COSEWIC: Committee on the Status of Endangered Wildlife in Canada S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences) S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer), S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer) S4: Apparently Secure—Uncommon but not rare S5: Secure—Common, widespread, and abundant in the province SX: Presumed extirpated SH: Possibly Extirpated (Historical) SNR: Unranked SU: Unrankable—Currently unrankable due to lack of information SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities. S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species S#B- Breeding status rank S#N- Non Breeding status rank ?- Indicates uncertainty in the assigned rank G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range G1G2: Extremely rare to very rare globally G2: Very rare globally; usually between 5-10 occurrences in the overall range G2G3: Very rare to uncommon globally G3: Rare to uncommon globally; usually between 20-100 occurrences G3G4: Rare to common globally G4: Common globally; usually more than 100 occurrences in the overall range G4G5: Common to very common globally G5: Very common globally; demonstrably secure GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed. T: Denotes that the rank applies to a subspecies or variety Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable. END: Endangered THR: Threatened SC: Special Concern NAR: Not At Risk IND: Indeterminant, insufficient information to assign status DD: Data Deficient 6: Rare in Site Region 6 7: Rare in Site Region 7 Area: Minimum patch size for area-sensitive species (ha) H- highly significant in Hamilton Region (i.e. rare) m- moderately significant in Hamilton Region (i.e. uncommon) L1- extremely rare locally (Toronto Region) L2- very rare locally (Toronto Region) L3- rare to uncommon locally (Toronto Region) HR- rare in Halton Region, highly significant HU- uncommon in Halton Region, moderately significant</p> <p>REFERENCES</p> <p>COSSARO Status Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List (O. Reg. 230/08). Accessed October 7, 2016.</p> <p>COSEWIC Status COSEWIC. 2016. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.</p> <p>Local Status Dwyer, Jill K. 2003. Nature Counts Project Hamilton Natural Areas Inventory 2003. Species Checklists. Hamilton Naturalists Club. Halton Natural Areas Inventory. 2006. Volume 2 Species Checklists (ISBN 0-9732488-7-4). Region of Waterloo. 1996. Regionally Significant Breeding Birds. Toronto and Region Conservation Authority (TRCA). 2016. Revised Fauna Scores and Ranks, February 2016 Hamilton Conservation Authority (HCA). 2014. Hamilton Natural Areas Inventory Project (3rd Edition).</p> <p>Significant Wildlife Habitat (SWH) Indicator Species</p> <p>Ministry of Natural Resources and Forestry (MNRF). 2015. Significant wildlife habitat criteria schedules for ecoregion 6E. Available at: https://dr6j45jk9xcmk.cloudfront.net/documents/4775/schedule-6e-jan-2015-access-ver-final-s.pdf.</p> <p>Ministry of Natural Resources and Forestry (MNRF). 2015. Significant wildlife habitat criteria schedules for ecoregion 7E. Available at: https://dr6j45jk9xcmk.cloudfront.net/documents/4776/schedule-7e-jan-2015-access-vers-final-s.pdf.</p> <p>Natural Heritage Information Center (NHIC). 2016. Ontario Species List: All Species.</p> | | | | | | |

Table 9: Headwater Drainage Feature Classification and Management Recommendations

| DRAINAGE FEATURE SEGMENT | STEP 1. HYDROLOGY | | STEP 2. RIPARIAN | STEP 3. FISH HABITAT | STEP 4. TERRESTRIAL HABITAT | MANAGEMENT RECOMMENDATION PER HDFA GUIDELINES (CVC AND TRCA 2014) | FINAL MANAGEMENT RECOMMENDATION |
|--------------------------|--|---|--|--|--|--|--|
| | FUNCTION | MODIFIERS | | | | | |
| H1S1 | <p>FT – 7 FC – 4 (Round 1) FC – 2 (Round 2) FC – 1 (Round 3)</p> <p>Valued – Swale was flowing during the first round assessment under freshet conditions and was holding water during the second round survey. The feature was dry during the third round assessment and no evidence of sediment sorting was observed.</p> | <p>Adjacent (upstream) commercial land uses have channelized flows and altered runoff patterns.</p> | <p>Important – Wetland and meadow</p> | <p>Valued – Fish were present at the downstream culvert west of Kalar Road during the third-round assessment. This feature may provide some limited seasonal habitat when flows are sufficient to support a downstream connection. Dense vegetation and lack of defined channel limit value of seasonal habitat provided.</p> | <p>Valued – Swale provides a terrestrial connection to meadow marsh wetland pockets associated with the drainage feature. Due to the potential presence of fish during the breeding season, this reach does not provide suitable amphibian breeding habitat. Swale likely functions as stepping-stone habitat between adjacent wetland communities.</p> | <p>Protection – Recommendation results from valued fish habitat and important riparian habitat.</p> | <p>Conservation – The functions provided by this feature (i.e., wetland riparian habitat, limited seasonal fish habitat, freshet flow conveyance) do not necessarily warrant protection in place and these functions could be maintained/enhanced if the feature were to be realigned. Therefore, a final management recommendation of Conservation is provided to provide flexibility to realign/enhance the drainage feature while ensuring that its functions will be maintained post-development.</p> |

LEGEND:

| | |
|----|--|
| FT | Feature Types (1-defined natural channel, 2-channelized, 3-multi-thread, 4-no defined feature, 5-tiled drainage, 6-wetland, 7-swale, 8-roadside ditch, 9-online pond outlet) |
| FC | Flow Conditions (1-no surface water, 2-standing water, 3-interstitial flow, 4-surface flow minimal, 5-surface flow substantial) |

Note: Codes correspond with Ontario Stream Assessment Protocol (OSAP) guidelines

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|--|--|---|---------------------------------|---|------------------|
| 1. SEASONAL CONCENTRATION AREAS OF ANIMALS | | | | | |
| Waterfowl Stopover and Staging Areas (Terrestrial) | Yes – CUM1 vegetation community is present on the Subject Lands | No - Feature is not large enough to attract or support significant numbers. This area does not have historical waterfowl stopover use and is not an area known for sheet water use. | No | N/A | Not Present |
| Waterfowl Stopover and Staging Areas (Aquatic) | Yes – MAS2 and SWD1 vegetation communities are present within the Subject Lands | No - Feature within the Subject Lands is not large enough to attract or support significant numbers. This area does not have historical waterfowl stopover use. | No | N/A | Not Present |
| Shorebird Migratory Stopover Areas | Yes – MAM vegetation communities are present within the Subject Lands | No- Feature within the Subject Lands is not large enough to attract or support significant numbers. This area does not have historical waterfowl stopover use. | No | N/A | Not Present |
| Raptor Wintering Areas | No – The combination of suitable ecosites is not present within the Subject Lands. | No | No | N/A | Not Present |
| Bat Hibernacula | No – Suitable ecosites are not present within the Subject Lands | No | No | N/A | Not Present |
| Bat Maternity Colonies | Yes –SWD vegetation communities are present within the Subject Lands | Yes – SWD3-1/SWD1-3 forest community in the northeastern portion of the Subject Lands meet the habitat criteria threshold of >10/ha large diameter (>25cm DBH) trees | Yes | A Bat Habitat Assessment and Bat Acoustic Monitoring were completed on the Subject Lands (see Figure 4c, Appendix A). One of the SWD communities surveyed on the Subject Lands meet the minimum density criteria for significance (>10 suitable roosting trees/ha). Both indicator bat species were confirmed to be present within SWD3-1/SWD1-3: Big Brown Bat, Silver-haired Bat. The acoustic data does not meet the threshold numbers of 10 Big Brown Bats and 5 Silver-haired Bats utilizing the habitat for roosting. | Not Present |

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|---|--|---|--|---|------------------|
| Turtle Wintering Areas | Yes – SW vegetation community is present within the Subject Lands. In addition to the SWD, the tributary of Welland River also bisects the Subject Lands | Possibly – In general, suitable overwintering features were not observed during field surveys. The tributary is a fairly shallow feature with limited riparian vegetation. This feature likely acts as a movement corridor but has minor potential to provide overwintering habitat, with very limited basking habitat available. | No | N/A | Not Present |
| Reptile Hibernacula | Yes – Ecosites may be present within the Subject Lands | No – No natural/naturalized or anthropogenic features were identified within the Subject Lands that provide any subsurface access below the frost line. | No | N/A | Not Present |
| Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) | Yes – CUM1 and CUT1 vegetation communities are present within the Subject Lands | No – Presence of exposed or eroding banks, hills, steep slopes and sand piles are not present within the limit of disturbance. | No | N/A | Not Present |
| Colonially-Nesting Bird Breeding Habitat (Tree and Shrub) | Yes – SWD1 vegetation communities are present within the Subject Lands | Yes | Yes | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). SWH indicator species and nests were not identified despite survey effort (see Table 4, Appendix B for breeding bird survey results). | Not Present |
| Colonially-Nesting Bird Breeding Habitat (Ground) | No – No rocky islands or peninsulas are present within the Subject Lands. | No | No | N/A | Not Present |
| Migratory Butterfly Stopover Areas | No – The combination of suitable ecosites is not present within the Subject Lands. | No | No | N/A | Not Present |
| Landbird Migratory Stopover Areas | Yes- SWD vegetation communities are present within the Subject Lands | No- The Subject Lands are not within 5 km of Lake Ontario. | No | N/A | Not Present |
| Deer Winter Congregation Areas | Yes - SWD vegetation communities are present within the Subject Lands | No - Habitat features do not meet the size criteria (> 100 ha) | No - Mapping from LIO database does not identify Subject Lands as within a Deer Wintering Area. However, south and adjacent to the Subject Lands, a Deer Wintering Area is recognized (see Figure 2, Appendix A) | N/A | Not Present |

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|--|--|---|---|---|------------------|
| 2. RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITAT FOR WILDLIFE | | | | | |
| 2a. Rare Vegetation Communities | | | | | |
| Rare Vegetation Types (cliffs, talus slopes, sand barrens, alvars, old-growth forests, savannahs, and tallgrass prairies) | No – Rare vegetation types are not present within the Subject Lands | No | No | N/A | Not Present |
| Other Rare Vegetation Types (S1 to S3 communities) | No – Other rare vegetation types are not present within the Subject Lands | No | No | N/A | Not Present |
| 2b. Specialized Wildlife Habitat | | | | | |
| Waterfowl Nesting Areas | Yes – Upland habitats (CUM, CUW and CUT) are located adjacent to SWD communities within the Subject Lands | No - Feature is not large enough to attract or support significant numbers. This area does not have historical waterfowl nesting use. | No. However, as breeding bird surveys were completed within the Subject Lands it was confirmed that none of the indicator species were observed effort (see Table 4, Appendix B for breeding bird survey results). | N/A | Not Present |
| Bald Eagle and Osprey Nesting, Foraging and Perching Habitat | Yes - SWD vegetation communities are directly adjacent to wetland communities present within the Subject Lands | No –Large aquatic features are absent within the Subject Lands | No. However, as breeding bird surveys were completed within the Subject Lands, it was confirmed that none of the indicator species or their nests were observed (see Table 4, Appendix B for breeding bird survey results). | N/A | Not Present |
| Woodland Raptor Nesting Habitat | Yes –SWD vegetation communities are present within the Subject Lands | No – Forested habitat features do not meet the minimum size criteria (> 30 ha with >4 ha of interior forest habitat) | No | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). SWH indicator species were not identified despite survey effort (see Table 4, Appendix B for breeding bird survey results). | Not Present |
| Turtle Nesting Areas | No – Suitable ecosites are not present within the Subject Lands | No –Suitable nesting habitat was not observed during field surveys. | No | N/A | Not Present |
| Seeps and Springs | Yes – Forested vegetation communities (SWD, CUW) are present within the Subject Lands | No – Forested vegetation community is not associated with headwater drainage features. | No | N/A | Not Present |

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|--|---|---|---------------------------------|--|------------------|
| Amphibian Breeding Habitat (Woodland) | Yes - SWD vegetation communities are present within the Subject Lands | Yes – Wetlands are within 120 m of woodland. Suitable habitat features were observed during field surveys. Vernal pools and standing water were present. | Yes | Three rounds of amphibian breeding surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). While SWH indicator species were identified, the SWH criteria requires at least 20 individuals of each species which was not met during amphibian breeding surveys (see Table 5, Appendix B for amphibian survey results) | Not Present |
| Amphibian Breeding Habitat (Wetland) | Yes – MA and SW vegetation communities are present within the Subject Lands | No- Wetland ecosites are no isolated and 120 m from woodlands | No | N/A | Not Present |
| Woodland Area-Sensitive Bird Breeding Habitat | Yes- SWD vegetation communities are present within the Subject Lands | No – Forested habitat features do not meet the minimum size criteria (> 30 ha with interior forest habitat at least 200 m from forest edge) | No | N/A | Not Present |
| 3. SPECIES OF CONSERVATION CONCERN | | | | | |
| Marsh Bird Breeding Habitat | Yes – MAM2 vegetation communities and CUM1 vegetation communities preferred by Green Heron are present within the Subject Lands | Yes – Wetland habitat with shallow water and emergent aquatic vegetation is present | Yes | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). SWH indicator species and nests were not identified despite survey effort (see Table 4, Appendix B for breeding bird survey results). | Not Present |
| Open Country Bird Breeding Habitat | Yes – CUM1 vegetation community is present within the Subject Lands | No – Meadow community does not meet the size criteria (> 30 ha) and is highly disturbed from adjacent existing land use | No | N/A | Not Present |
| Shrub/Early Successional Bird Breeding Habitat | Yes – CUT and CUW vegetation communities are present within the Subject Lands. | No- Subject Lands have large field areas succeeding into shrub and thicket habitat. However, they do not meet the size criteria (> 10 ha) | Yes | N/A | Not Present |

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|---|--|---|---|--|------------------|
| Terrestrial Crayfish | Yes – MAM, SWD and CUM vegetation communities are present within the Subject Lands | Possibly - Wet meadow and edges of shallow marshes are present | Yes | No – No Terrestrial Crayfish chimneys were observed during any of the survey efforts completed. | Not Present |
| Special Concern and Rare Wildlife Species | | | | | |
| (i) Eastern Wood-Pewee (<i>Contopus virens</i>) | N/A | Yes – Forested vegetation communities (SWD, CUW) are present on and adjacent to the Subject Lands | Yes | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). Eastern Wood-pewee was observed (Table 4, Appendix B). | Present |
| (ii) Grasshopper Sparrow (<i>Ammodramus savannarum</i>) | N/A | Unlikely – Suitable vegetation communities are not present on the Subject Lands | Yes | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). Grasshopper Sparrow was not identified despite survey effort (see Table 4, Appendix B for breeding bird survey results). | Not Present |
| (iii) Wood Thrush (<i>Hylocichla mustelina</i>) | N/A | Yes – Forested vegetation communities (SWD, CUW) are present on and adjacent to the Subject Lands | Yes | Three rounds of breeding bird surveys were completed in 2019 (see Table 1, Appendix B for survey dates and conditions). Wood Thrush was not identified despite survey effort (see Table 4, Appendix B for breeding bird survey results). | Not Present |
| (iv) Snapping Turtle (<i>Chelydra serpentina</i>) | N/A | No – Suitable aquatic communities and nesting sites are not present within the Subject Lands | No | N/A | Not Present |
| (v) Eastern Musk Turtle (<i>Sternotherus odoratus</i>) | N/A | No – Suitable aquatic communities and nesting sites are not present within the Subject Lands | No | N/A | Not Present |
| (vi) Northern Map Turtle | N/A | No – Suitable aquatic communities and nesting sites are not present within the Subject Lands | No | N/A | Not Present |
| (vii) Eastern Ribbonsnake | N/A | Yes- Suitable MAM habitat for foraging is present on the Subject Lands | No- While foraging habitat is present no natural/naturalized or anthropogenic features were identified within the Subject Lands that provide any subsurface access below the frost line for hibernation | N/A | Not Present |

Table 10: Ecoregion 7E Significant Wildlife Habitat Assessment

| SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE | ELC ECOSITE(S) PRESENT | HABITAT CRITERIA MET | TARGETED FIELD STUDIES REQUIRED | DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH) | SWH TYPE PRESENT |
|--|------------------------|---|---|--|------------------|
| (viii) Monarch Butterfly (<i>Danaus plexippus</i>) | N/A | No - Although a CUM1 community is present on the Subject Lands, no large congregations of Milkweed (<i>Ascpelias sp.</i>) were observed, therefore breeding habitat is unlikely to be present (refer to Butterfly Stopover Habitat for further discussion on non-breeding Monarch habitat). | No | N/A | Not Present |
| (ix) Eastern Pondmussel (<i>Ligumia nasuta</i>) | N/A | No- Lakes are present within the Subject Lands | No | N/A | Not Present |
| (x) Grass Pickerel (<i>Esox americanus</i>) | | No- Suitable aquatic communities are not present within the Subject Lands | No | N/A | Not Present |
| (xi) Sharp Fruited Rush (<i>Juncus acuminatus</i>) | N/A | Yes- Suitable MA and SW habitat present on the Subject Lands | Yes- Targeted surveys were completed on August 12, 2022 | Yes- Eight individuals were identified within the Subject Lands | Present |
| 4. ANIMAL MOVEMENT CORRIDORS | | | | | |
| Amphibian Movement Corridors | N/A | No –Amphibian breeding SWH is not present on the Subject Lands | No | N/A | Not Present |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|--|---|--|---|--|---|--|
| PPS NATURAL HERITAGE FEATURES | | | | | | |
| <p>1. Significant Wetlands</p> | <p>The Warren Creek Wetland Complex is considered a Provincially Significant Wetland (PSW).</p> | <p>Potential indirect impacts to retained wetland features include:</p> <ul style="list-style-type: none"> • Short-term impacts (i.e., related to construction activities) • Increased soil disturbance (e.g., soil compaction or erosion) • Loud disturbances • Increased traffic • Increased lighting | <p>Potential indirect effects to retained wetland communities include:</p> <ol style="list-style-type: none"> 1) Increased soil disturbance: <ul style="list-style-type: none"> ○ Soil compaction reduces the pore space within soils, limiting what plant species are able to root in the substrate ○ Colonization of invasive species on disturbed soils ○ Increased sediment transport during precipitation events 2) Loud Disturbances: <ul style="list-style-type: none"> ○ Disturbance of wildlife patterns and behaviours (i.e., interfere with bird breeding calls) ○ Temporarily vacate habitats near construction 3) Increased traffic <ul style="list-style-type: none"> ○ Injury or mortality of wildlife ○ Increased road runoff (decreased water quality) 4) Increased lighting: <ul style="list-style-type: none"> ○ Disrupt wildlife behaviours (i.e., disturb day/night cycles) ○ Shade tolerant vegetation unable to prosper in areas of intense light 5) Accidental spills: <ul style="list-style-type: none"> ○ Accidental spills during construction may release deleterious | <p>The retained wetland habitat units will be buffered by a minimum 0 m vegetated buffer.</p> <p>ESC measures will be used throughout construction to avoid/minimize the potential for sediment mobilization into wetland habitats. ESC measures will be developed during the detailed design phase.</p> <p>A spill prevention and response plan should be prepared during detailed design to identify measures to avoid negative effects due to accidental spills during construction on the Subject Lands.</p> | <p>No negative impacts are anticipated.</p> | <p>Construction monitoring to ensure the effectiveness and maintenance of the erosion and sediment control measures.</p> |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|--|--|--|---|---|---|--|
| | | | <p>substances into wetland communities.</p> <p>Wildlife may be accustomed to some level of disturbance (noise and lighting) from land development in the immediate vicinity of the Subject Lands.</p> | | | |
| <p>2. Significant Coastal Wetlands</p> | <p>Not Present</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> |
| <p>3. Significant Woodlands</p> | <p>The northeastern woodland (SWD1-1/1-3) and the southern woodland (SWD1-1/1-3) on the Subject Lands are considered significant as identified on Figure 7, Appendix A.</p> | <p>Potential impacts to Significant Woodlands on the Subject Lands would include the following:</p> <ul style="list-style-type: none"> • Development and site alteration adjacent woodlands; • Increased pedestrian use of woodlands; • Increased lighting from residual development. | <p>Potential indirect effects to retained woodland communities include:</p> <ol style="list-style-type: none"> 1) Increased soil disturbance: <ul style="list-style-type: none"> ○ Soil compaction reduces the pore space within soils, limiting what plant species are able to root in the substrate ○ Colonization of invasive species on disturbed soils ○ Increased sediment transport during precipitation events 2) Loud Disturbances: <ul style="list-style-type: none"> ○ Disturbance of wildlife patterns and behaviours (i.e., interfere with bird breeding calls) ○ Temporarily vacate habitats near construction 3) Increased traffic <ul style="list-style-type: none"> ○ Injury or mortality of wildlife ○ Increased road runoff (decreased water quality) 4) Increased lighting: | <p>The woodlands will have a 0 m vegetative buffer.</p> <p>The below noted effects to Significant Woodlands are predicted to occur should the site be developed:</p> <ul style="list-style-type: none"> • New lighting will be directed away from natural vegetation communities to limit impacts to wildlife activity; • Tree protection fencing and erosion and sediment control measures will be installed adjacent to all natural heritage features to protect the integrity of the natural feature and aide in eliminating excess ground disturbance and dislodgement of sediment. | <p>No negative effects are anticipated.</p> | <p>Construction monitoring to ensure the effectiveness and maintenance of the erosion and sediment control measures.</p> |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|--|---|--|---|--|---|--|
| | | | <ul style="list-style-type: none"> ○ Disrupt wildlife behaviours (i.e., disturb day/night cycles) ○ Shade tolerant vegetation unable to prosper in areas of intense light 5) Accidental spills: <ul style="list-style-type: none"> ○ Accidental spills during construction may release deleterious substances into wetland communities. <p>Wildlife may be accustomed to some level of disturbance (noise and lighting) from land development in the immediate vicinity of the Subject Lands.</p> | | | |
| <p>4. Significant Valleylands</p> | <p>Not Present</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> | <p>N/A</p> |
| <p>5. Significant Wildlife Habitat</p> | <p>The following SWH are present within the Subject Lands:</p> <ul style="list-style-type: none"> • Habitat for Species of Special Concern (Eastern Wood-Pewee and Sharp-fruited Rush) | <p>Potential indirect impacts associated with SWH include:</p> <ul style="list-style-type: none"> • Short-term impacts (i.e., related to construction activities): • Increased soil disturbance (e.g., soil compaction or erosion); and • Loud disturbances. • Long-term impacts (i.e., related to residential development): • Increased pedestrian usage; • Introduction of pets; • Increased traffic; • Increased lighting | <p>Potential indirect effects to retained SWH include:</p> <ol style="list-style-type: none"> 1) Increased soil disturbance: <ul style="list-style-type: none"> ○ Soil compaction reduces the pore space within the soils, limiting what plant species are able to root in the substrate; and ○ Colonization of invasive species on disturbed soils. 2) Loud disturbances <ul style="list-style-type: none"> ○ Disturbances of wildlife patterns and behaviours (i.e., interfere with breeding calls from amphibians and birds); and ○ Temporarily vacate habitats near construction. | <p>There will be a 0 m vegetative buffer applied to the outer edge of retained SWH features.</p> <p>Vegetation removal should be conducted outside of the active bat and breeding bird window (March 15 and November 30).</p> <p>Tree protection fencing and erosion control measures will be installed to protect the integrity of natural features and aide in eliminating excess disturbance through ground disturbance and dislodgement of sediment.</p> <p>Noise associated with construction is only temporary and will have short term impacts on wildlife behaviour.</p> <p>New lighting along the streetscape will be directed away from natural vegetation</p> | <p>No negative effects are anticipated.</p> | <p>Construction monitoring to ensure the effectiveness and maintenance of the erosion and sediment control measures.</p> |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|--|--|---|---|---|---|--|
| | | | <p>Indirect effects from long-term impacts include:</p> <ul style="list-style-type: none"> 1) Increased pedestrian usage: <ul style="list-style-type: none"> o Increased invasive species transport; and o Degradation of surrounding vegetation. 2) Introduction of pets: <ul style="list-style-type: none"> o Predation of wildlife (e.g., bird nests). 3) Increased traffic: <ul style="list-style-type: none"> o Injury or mortality of wildlife crossing roadways. 4) Increased lighting: <ul style="list-style-type: none"> o Disrupt wildlife behaviours; and o Shade tolerant vegetation unable to prosper in areas of intense light. | <p>communities to limit impacts to wildlife activity.</p> | | |
| <p>6. Fish Habitat</p> | <p>Tributary of Welland River provides fish habitat.</p> | <p>Removal and re-alignment of the tributary of Welland River</p> <p>Earthworks (grading) in proximity of retained watercourse.</p> <p>Use of heavy equipment during construction and associated potential for accidental spills of potentially toxic materials (e.g., fuel, oil, hydraulic fluid).</p> | <p>Accidental spills during construction could impair water quality and have negative effects on aquatic biota and aquatic and riparian vegetation.</p> <p>Erosion and sedimentation from the disturbed work area during construction could result in increased turbidity and suspended solids being conveyed to downstream aquatic habitats.</p> <p>Unmitigated, this could cause negative effects on fish habitat (e.g., infilling of interstitial spaces) and mortality, health effects or altered behavior of aquatic biota (fish and benthic invertebrates) and aquatic vegetation.</p> | <p>Approximately 10 m buffer shall be provided as part of the re-aligned tributary.</p> <p>ESC measures will be used throughout construction to avoid/minimize negative effects to fish and fish habitat.</p> <p>A spill prevention and response plan will be prepared and implemented to identify measures to avoid negative effects due to accidental spills during construction.</p> | <p>No negative effects are anticipated.</p> | <p>A construction monitoring program will be developed and implemented to ensure that the ESC measures are installed correctly and maintained in good working order throughout construction.</p> <p>Monitoring of adherence to and effectiveness of the spill prevention and response measures is recommended throughout the construction period.</p> <p>Monitoring of vegetation growth within retained buffer zones.</p> |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|--|--|---|---|--|--|---|
| 7. Habitat of Endangered and Threatened Species | Not Present | N/A | N/A | N/A | N/A | N/A |
| 8. Significant Areas of Natural and Scientific Interest | Not Present | N/A | N/A | N/A | N/A | N/A |
| OTHER PROVINCIAL PLANS | | | | | | |
| Greenbelt Plan | Not Present | N/A | N/A | N/A | N/A | N/A |
| Oak Ridges Moraine | Not Present | N/A | N/A | N/A | N/A | N/A |
| Niagara Escarpment | Not Present | N/A | N/A | N/A | N/A | N/A |
| OTHER FEATURES AND FUNCTIONS | | | | | | |
| Other Wetlands | Wetland communities (MAM2-2 and MAM2-11) surround the tributary of the Welland River | Proposed removal and compensation of wetlands within channel block | Proposed removal of the wetlands results in loss of reproductive habitat and introduction of non-native and invasive plant species that may outcompete species. | Approximately 10 m buffer shall be provided as part of the re-aligned tributary. A less than 10m buffer is proposed adjacent to the stormwater management pond. ESC measures will be used throughout construction to avoid/minimize the potential for sediment mobilization into wetland habitats. ESC measures will be developed during the detailed design phase. A spill prevention and response plan should be prepared during detailed design to identify measures to avoid negative effects due to accidental spills during construction on the Subject Lands. | No negative effects are anticipated once compensation is complete. | A construction monitoring program will be developed and implemented to ensure that the ESC measures are installed correctly and maintained in good working order throughout construction. Monitoring of adherence to and effectiveness of the spill prevention and response measures is recommended throughout the construction period. Monitoring of vegetation growth within retained buffer zones. |
| Regionally and Locally Important Species | Four locally rare plants were observed, as per the Niagara Region rarity rankings (Oldham 2010): • Daisy Fleabane (<i>Erigeron strigosus</i>) – occasional in old field meadows; • River Bulrush (<i>Bulboschoenus fluviatilis</i>) – local in unit MAM2-10; | The following impacts are perceived: <ul style="list-style-type: none">• Increased pedestrian use within the habitat;• Increase in lighting from residential development; and• Construction activity within vicinity of the species. | The below noted effects are predicted to occur should site development and/or alteration occur: <ul style="list-style-type: none">• Mortality due to increased stress or injury of the stems during construction;• Increased vectors for transference of the disease due to | 0 m vegetated buffer zones are proposed along Provincially Significant Wetlands and Significant Woodlands throughout the Subject Lands. Erosion and sediment control measures will be in place. | There are no anticipated negative impacts to the species populations | N/A |

Table 11: Predicted Effects, Mitigation, Enhancement and Net Effects

| NATURAL HERITAGE FEATURES AND ASSOCIATED FUNCTIONS | SIGNIFICANT CHARACTERISTICS AND SENSITIVITY | IMPACTOR | PREDICTED EFFECTS | AVOIDANCE, MITIGATION AND/OR RESTORATION | NET EFFECTS | MONITORING AND MANAGEMENT |
|---|--|---|--|--|---|---------------------------|
| | <ul style="list-style-type: none"> • Finely-nerved Sedge (<i>Carex leptonevia</i>) – local in deciduous swamp units; • Sharp-fruited Rush (<i>Juncus acuminatus</i>) – rare in unit MAM2-11. | | <p>increased access to the general public;</p> <ul style="list-style-type: none"> • Soil compaction and potential for micro-drainage changes that could cause localized ponding and inundation of rooting systems. Grading may also cause damage to rooting systems; • Loss of reproductive habitat; and, - Introduction of non-native and invasive plant species that may outcompete species. | | | |
| Environmentally Significant Areas | Not Present | N/A | N/A | N/A | N/A | N/A |
| Other – Presence of Species under the Migratory Birds Convention Act | The federal Migratory Birds Convention Act (MBCA) prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. | During construction, in particular tree removal, migratory birds, and eggs and nests of these birds, could inadvertently be harmed. | Inadvertent harm to migratory birds or their eggs or nests. | Any tree or vegetation removal should occur outside of the migratory bird-nesting window of April 1 – July 31 (approximate). In rare circumstances where this window cannot be avoided, a nest search is recommended and a buffer will be marked off surrounding any active nests that must be maintained until activity in the nest has ceased. | With the implementation of the mitigation measures, no net effect is anticipated. | None |

Appendix C

Terms of Reference



September 20, 2019

Melissa Kiddie, Natural Heritage Planner
City of Niagara Falls
Niagara, ON
L8P 4Y5

Sarah Mastroianni
Niagara Peninsula Conservation Authority
250 Thorald Road, 3rd Floor West
Welland, ON
L3C 3W2

Dear Ms. Kiddie and Ms. Mastroianni:

**RE: Environmental Impact Study Terms of Reference
Pin Oak Drive, City of Niagara Falls, ON**

1.0 INTRODUCTION

Savanta Inc. (Savanta) has been contracted by Penta Properties to complete an Environmental Impact Study (EIS) for a property located east of Kalar Road, west of Pin Oak Drive, north of Brown Road and south of McLeod road in the City of Niagara Falls (herein referred to as the Subject Lands). Savanta understands that the property is proposed for development. The Subject Lands are largely composed of old field meadow, treed swamp, cultural thicket and one headwater drainage features within the Niagara Falls Urban subwatershed. Given the natural features present on the Subject Lands, an EIS is proposed to guide this development.

This letter provides Terms of Reference (TOR) for the completion of the EIS for the proposed development of the Subject Lands. The TOR summarizes the desktop and field studies planned to provide an ecological characterization of the Subject Lands, and the assessment and analysis requirements. This TOR provides an outline for the EIS report, in accordance with the Niagara Region Environmental Impact Study Guidelines (September 2012).

2.0 EIS CONTENT

The technical investigations to be conducted as part of the EIS will focus on the Subject Lands as shown on **Figure 1 (Appendix A)**. Impacts to adjacent lands (i.e., within 120 m of the Subject Lands, as identified within the Natural Heritage Reference Manual; MNR 2010) will also be considered.

The EIS will consider and include the following information:

-
- Description of the proposal;
 - Description of the surrounding environment and associated natural heritage and/or hydrologic features as well as linkages between these features;
 - Identification and assessment of the potential constraints and impacts of the proposal on the environment and the significant natural heritage and hydrologic features present;
 - Identification of positive effects of the proposal such as enhancement and/or restoration of significant features;
 - Evaluation of the feasibility of alternative mitigation measures or techniques and the ability of such measures to prevent or minimize impacts;
 - Recommendations on the advisability of proceeding with the proposal, appropriate mitigation measures, changes to the proposal; and,
 - Recommendations on a monitoring plan and contingency plans and funds should the proposal result in any unexpected impacts to the significant natural heritage and hydrologic features present, if necessary.

All figures provided within the EIS will utilize the most up-to-date aerial imagery available. A proposed Table of Contents is provided within **Appendix B**.

2.1 Background Information Review

Savanta reviewed the following background material and policy documents to determine the proposed scope of work:

- Aerial imagery;
- City of Niagara Falls Official Plan (City of Niagara Falls 2017);
- The Greenbelt Plan (2017);
- Provincial Policy Statement (MMAH 2014);
- Niagara Region (Niagara Regional Official Plan 2014)
- Niagara Peninsula Conservation Authority (NPCA) planning documents; and
- Online citizen science databases (e.g., eBird and iNaturalist).

The following background materials have already been reviewed by Savanta and have informed the proposed fieldwork program (described in section 2.2):

- Ministry of Natural Resources and Forestry's (MNRF) Natural Heritage Information Centre (NHIC) database (2019);
- MNRF's Land Information Ontario (LIO) database (2019);
- Bird Studies Canada's Atlas of the Breeding Birds of Ontario (BSC et al. 2008);
- Ontario Nature's Reptile and Amphibian Atlas (2019);
- Toronto Entomologists' Association's (TEA) Ontario Butterfly and Moth Atlases (2019 a, b);
- Fisheries and Oceans Canada's (DFO) Aquatic Species at Risk (SAR) Map (2018).

2.1.1 NHIC Database Results

The NHIC database (MNRF 2019) was searched for records of provincially significant plants, vegetation

communities and wildlife on and in the vicinity of the Subject Lands. The database provides occurrence data by 1 km² area squares, with three squares overlapping at least a portion of the Subject Lands (17PH5169 and 17PH5269). Within these squares, the search revealed four records, three of which had an element occurrence rank considered to be ‘Historical’ (greater than 50 years old) and are not addressed as current occurrences in this reporting. One record is considered as current occurrence and is listed as a threatened species on the Species at Risk in Ontario (SARO) list: Round-leaved Greenbrier (*Smilax rotundifolia*).

2.1.2 Land Information Ontario Natural Features Results

Based on the MNRF LIO geographic database, natural heritage features identified on or adjacent to the Subject Lands include: Provincially Significant Wetlands which are part of the Warren Creek Wetland complex and woodlands as shown on **Figure 1 (Appendix A)**

2.1.3 Ontario Breeding Bird Atlas Results

The Ontario Breeding Bird Atlas (OBBA) contains detailed information on the population and distribution status of Ontario birds (Bird Studies Canada et al. 2006). The data is presented on 100 km² area squares with one square overlapping the Subject Lands (17PH56). It should be noted that the Subject Lands are a small component of the overall bird atlas square, and therefore it is unlikely that all bird species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in bird species presence and use.

A total of 96 species were recorded in the atlas square that overlaps with the Subject Lands, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO list:
 - Chimney Swift (*Chaetura pelagica*) – Threatened;
 - Barn Swallow (*Hirundo rustica*) – Threatened;
 - Bobolink (*Dolichonyx oryzivorus*) – Threatened; and,
 - Eastern Meadowlark (*Sturnella magna*) – Threatened.
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species):
 - Eastern Wood-Pewee (*Contopus virens*) – Special Concern;
 - Grasshopper Sparrow (*Ammodramus savannarum*) – Special Concern; and,
 - Wood Thrush (*Hylocichla mustelina*) – Special Concern.

2.1.4 Ontario Reptile and Amphibian Atlas Results

The Ontario Reptile and Amphibian Atlas contains detailed information on the population and distribution status of Ontario herpetofauna (Ontario Nature 2018). The data is presented on 100 km² area squares with one square overlapping the Subject Lands (17PH56). It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore it is unlikely that all herpetofauna species are

found within the Subject Lands. Habitat type, availability and size are all contributing factors in herpetofauna species presence and use.

A total of 21 species were recorded in the atlas square that overlaps with the Subject Lands, of which three are salamander species, eight are frog and toad species, five are turtle species and five are snake species. Of these species, the following species of interest are noted:

- Species listed as Threatened or Endangered on the SARO list:
 - Blanding’s Turtle (*Emydoidea blandingii*)
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species):
 - Eastern Musk Turtle (*Sternotherus odoratus*) – Special Concern;
 - Eastern Ribbonsnake (*Thamnophis sauritus*) – Special Concern;
 - Eastern Milksnake (*Lampropeltis Triangulum*) – Special Concern;
 - Northern Map Turtle (*Graptemys geographica*) – Special Concern; and
 - Snapping Turtle (*Chelydra serpentina*) – Special Concern.

2.1.5 Ontario Butterfly and Moth Atlas Results

The Ontario Butterfly and Moth Atlases (Toronto Entomologists’ Association 2018a, 2018b) contain detailed information on the population and distribution status of Ontario butterflies and moths. The data is presented on 100 km² area squares with one square overlapping the Subject Lands (17PH56). It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore it is unlikely that all butterfly and moth species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in butterfly and moth species presence and use.

A total of 32 butterfly species were recorded in the atlas square that overlaps with the Subject Lands. No information was available for moth species in atlas square 17PH56. Of these species, the following species of interest is noted:

- Species of Conservation Concern (i.e., listed as Special Concern on the SARO list, or identified as an S1-S3 species):
 - Monarch (*Danaus plexippus*) – Special Concern.

2.1.6 Aquatic SAR Distribution Mapping Results

Aquatic species at risk distribution mapping (DFO 2018) was reviewed to identify any known occurrences of aquatic species at risk, including fish and mussels, within the subwatershed where the Subject Lands are located.

No aquatic species at risk were identified on or within 120 m of the Subject Lands or within the subwatershed.

2.2 Ecological Inventories

An ecological field survey program is proposed to provide the data required to complete a significant assessment for each natural heritage feature present on and adjacent to the Subject Lands. Based on Savanta's review of aerial imagery of the Subject Lands and habitat features/types that appear to be present, we have proposed the following ecological field studies:

- Amphibian Egg Mass and Call Count Surveys (Spring 2019)
- Turtle Habitat Assessment (Spring 2019)
- Bat Habitat Assessment and Acoustic Surveys (Spring/Summer 2019)
- Botanical Inventories and Ecological Land Classification (ELC) (Spring - Fall 2018);
- Headwater Drainage Feature Assessment (HDFA) and Fish Community Sampling (Summer 2019); and,
- Breeding Bird Surveys (Spring/Summer 2019).

It should be noted that all survey efforts were completed in 2019, Savanta recognizes that TORs are typically completed prior to completion of any field inventories to ensure that all appropriate inventories have been completed within appropriate timeframes. Due to project initiation timelines field investigations were conducted before preparation of the TOR so as not to miss seasonal windows.

All species identified will include federal, provincial and local status rankings. The local status ranking will be based upon the Niagara Natural Areas Inventory (2010a, 2010b).

2.2.1 Botanical and Ecological Land Classification Surveys

Three rounds of botanical inventories (spring/summer/fall) and ELC surveys were completed by Savanta's senior botanist. Vegetation communities within the Study Area were verified through the review of aerial imagery and ground truthing in the field. A botanical inventory list will be compiled to understand the flora present within these lands. Flora nomenclature will be based on the Ontario Plant List (Newmaster et al. 1988) with updates from the NHIC database (2014). ELC surveys followed the ELC for Southern Ontario Protocol (Lee et al. 1998). Observations of rare, threatened or endangered species were documented and mapped during the field investigations.

Should any trees be removed to accommodate site alteration/development, Savanta's certified arborist will complete a tree inventory. At this time, the site plan is unknown so it is not proposed within this TOR, however it will be considered during the EIS process.

2.2.2 Bat Habitat Assessment

Targeted bat surveys were completed to assess the potential occurrence of bat species protected under the *Endangered Species Act, 2007* as well as to assist in the identification of candidate Significant Wildlife Habitat (SWH).

A Bat Habitat Assessment was completed in the woodland communities under leaf-off conditions in accordance with MNR Guelph District's protocol (2017b) to document trees that may provide bat

maternity colony habitat, including those with loose or peeling bark, cavities and/or clumps of dead leaves. The density of candidate bat maternity colony trees within the woodland community will be determined to confirm whether this feature may provide candidate SWH functions.

Based on aerial interpretation, bat maternity roosting habitat on the Subject Lands is likely present. Six passive acoustic monitoring stations were set up to record over a minimum of 10 consecutive nights in June to identify which species are using the habitat. All recordings will be analyzed using automatic software and then vetted by a wildlife biologist to determine the number of bat passes by for each species of bat.

2.2.3 Headwater Drainage Assessment

A headwater drainage assessment was completed on the tributary of the Welland River bisecting the west sector of the Subject Lands. The assessment was completed during the summer months to understand the nature of hydrologic features on the Subject Lands. The assessment identified ephemeral, intermittent and permanent features on the landscape. Headwater drainage features were divided into reaches as appropriate and analysis of the headwater feature will be conducted utilizing the *Evaluation, Classification and Management of Headwater Drainage Feature Guidelines* (the Guideline: TRCA and CVC 2014).

2.2.4 Turtle Habitat Assessment

One habitat assessment survey was conducted in conjunction with the first round calling amphibian survey. The habitat assessment will determine if any suitable habitat such as overwintering or nesting habitat for turtles is present on the Subject Lands. Wetland and aquatic features were assessed for overwintering suitability, while adjacent substrates were assessed for turtle nesting suitability.

2.2.5 Breeding Bird Surveys

Three Breeding Bird Surveys (area searches, point counts) were conducted according to Ontario Breeding Bird Atlas Protocol (OBBA, 2001-2005). Surveys were completed at least two weeks apart between late May and early July, with first round surveys being undertaken between March 24th and June 15th, and second round surveys being completed between June 15th and July 10th, 2020. Point count stations were surveyed between dawn and five hours after dawn. Surveys consisted of a combination of point count surveys and area searches to be completed under favourable weather conditions (i.e., without thick fog or precipitation and wind speeds generally below 19 km/h). Habitat is present for grassland birds, such as Bobolink or Eastern Meadowlark, and a third-round survey was required as per the MNR (2012) "Bobolink Survey Protocol".

2.2.6 Incidental Observations

Savanta recorded all incidental observations of wildlife (i.e., insects, mammals, amphibians, turtles) during each of the above noted surveys and will provide federal, provincial, regional and local rarity ranking, where present.

2.3 Natural Heritage Features Analysis

Eight types of significant natural heritage features are defined in the PPS (MMAH 2014), as follows:

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant areas of natural and scientific interest.

All eight types of significant natural heritage feature types will be evaluated. SWH will be assessed using the Significant Wildlife Habitat Technical Guide (MNR 2000) and the SWH Eco-Region Criterion Schedule 7E (MNRF 2015). All four general types of SWH (seasonal concentration areas, rare or specialized habitats, habitat for species of conservation concern, and animal movement corridors) will be evaluated.

SAR and their habitats are considered provincially sensitive information. Due to the sensitive nature of this information, all correspondence and precise location-related information will remain with the Ministry of Environment, Conservation and Parks (MECP). All SAR information will be disclosed to the MECP through their Information Gathering Form, or a similar process upon completion of the EIS prior to site alteration/development.

2.4 Impact Assessment, Avoidance and Mitigation Measures Discussion

The EIS will present and discuss the natural heritage features and associated functions that occur on and/or adjacent to the Subject Lands. Where available, engineering reports will be incorporated into the impact assessment to assess potential impacts to the Subject Lands.

The EIS will assess the potential effects to natural heritage features and functions that occur over various periods of time (short and long-term) following the implementation and construction of a conceptual site plan. The EIS will also identify planning, design and construction practices that are recommended to maintain, and where possible, improve or restore the health, diversity and size of natural heritage features on and adjacent to the Subject Lands. Impact avoidance, mitigation and/or restoration measures will be identified along with predicted net effects. Recommended monitoring strategies will be provided to assess the effectiveness of mitigation measures.

3.0 PROPOSED TIMELINE

Below is the proposed timeline for the EIS.

| TIME PERIOD | KEY ACTIVITIES |
|--------------------------------|---|
| spring 2019 – late summer 2019 | Complete ecological field program |
| Fall 2019 | Prepare EIS report |
| November 2019 | Submit EIS report to reviewing agencies |

4.0 FINAL REMARKS

We trust that the above information and proposed EIS TOR will be met with your approval. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours truly,
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Appendices

A – Figures

B – Sample Table of Contents

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Niagara Falls – 7580 Kalar Road

| | |
|--|--------------------------------|
| Organization: City of Niagara Falls | GM BluePlan Project No: 621014 |
| Attention: Jessica Brownlee | Date: December 5, 2023 |
| Project: 7580 Kalar Road | Assignment: 031 |



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1 Project Scope

The City of Niagara Falls has retained GM BluePlan Engineering to assess the effects of a proposed development, which involves the construction of 157 units of townhomes and up to 175 units of a “medium-density” development, with a total of up to 332 residential units, as shown in **Figure 1**.



Figure 1: Development Location

1.1 Hydraulic Sanitary Model

The system was assessed using:

- The City’s existing wastewater model that was developed as part of the City’s Pollution Prevention Control Plan (2016) and update as part of the Region’s Master Servicing Plan Update (2022).

2 Sanitary System Review

2.1 Local System

The proposed site will tie-in to the existing sewer on Kalar Road as shown in **Figure 2**.

- 900m of 300 to 375mm City sewer from the development on Kalar Rd to Brown Road
- 260m of 525mm City sewer on Brown Road from Kalar Road to Heartland Forest Road
- 85m of 600mm City Sewer on Heartland Forest Road before discharging into the Garner Road SPS

The sanitary flows originating at this proposed development contributes to the Garner Road Sewage Pumping Station (SPS). The scope of the servicing review will be limited to the City-owned sewers upstream of the SPS.



Figure 2: Wastewater Flow Route

2.2 Wastewater Flow Analysis

The system was evaluated under both existing and post-development conditions to gauge the development impact holistically on the sanitary system. Post-development sanitary flows were calculated by Metropolitan Consulting Inc. and supplied in their Functional Servicing Report. The Metropolitan Consulting Inc. flow rates were reviewed against City of Niagara Falls Engineering Design Standards Manual *Section 3: Sanitary Drainage Systems* methodology, outlined below, with an updated average domestic flow allowance of 255 L/cap/d based on the recently completed 2021 MSPU.

$$Q(d) = \frac{PqM}{86.4} + (I A)$$

Where: P = design population in thousands
q = avg. daily per capita flow in l/cap.day
M = peaking factor = $5 / P^{0.2}$) (Babbitt Formula)
I = infiltration in l/ha. sec
A= tributary area in ha
Q(d) = peak domestic sewage flow in l/sec (including extraneous flows)

- a) for design purposes a maximum infiltration allowance of 0.28 l/ha.sec has been provided
- b) for design purposes a maximum avg. domestic flow allowance of 450 l/cap.day has been provided
- c) check with Municipal staff when designing sewers in areas where high I/I has been identified

Table 1 below summarizes the Metropolitan Consulting Inc calculated sanitary flows against the methodology outlined in the Design Standards Manual. It is noted that the Metropolitan Consulting Inc. report used a mixture of values that partially differed from the City's criteria to estimate sanitary flows. The flow value calculated in the Metropolitan Consulting Inc. report is a more conservative estimate than the value generated using the City's methodology. The GM BluePlan system review was completed using the flow results generated using the values provided by Metropolitan Consulting Inc. modified to use Harmon's Peaking Factor, without RDII contributions for consistency with the City's methodology.

Table 1: Sanitary Flows

| | Metropolitan Consulting Inc. | Niagara Falls D.C. | Units |
|------------------------|--|---|-----------|
| Lot Area | 13.5 | | ha |
| Population | Townhouses 4.85 ha @ 96.4 ppha “Medium-density blocks” 1.18 ha @ 229.8 ppha 739 pop | Townhouses 157 units @ 2.05 ppu “Medium-density blocks” 175 units @ 1.55 ppu 593 pop | pop |
| Per Capita Flow | 380 L/cap/day | 255 L/cap/day | L/cap/day |
| Avg Domestic Flow | 3.25 | 1.75 | L/s |
| Peaking Factor | 3.56 (method unclear) (3.25 modified to Harmon’s Peaking Factor) | 3.25 (Harmon’s Peaking Factor) | |
| Peak Domestic Flow | 11.57 (12.61 modified) | 6.89 | L/s |
| Infiltration Allowance | 0.286 | 0.286 | L/s/ha |
| RDII | 3.86 (0.0*) (Lot Area) | 0.0* | L/s |
| Design Flow | 15.43 (12.61 modified using Harmon’s PF and no RDII)* | 6.89* | L/s |

*Redevelopment of existing catchment area. No new RDII contributions.

2.3 Impact on Sanitary Sewer System Performance

2.3.1 Sewer System Capacity

For existing sewer capacities, sewer performance criteria were assessed using the following conditions:

- Maintaining depth of flow in pipe equal to or less than obvert elevation ($d/D \leq 1$); and, if failing to do so then,
- Maintain system hydraulic grade line (HGL) of a surcharging sewer below the basement protection freeboard of 1.8 meters below grade.

Under dry weather flow conditions, no downstream sewer surcharging, or system overflows are anticipated under both existing and post-development conditions.

The system performance was reviewed under a variety of design storm conditions under the 2-year, 5-year, and 10-year design storms using the City’s existing wastewater model. **Table 2** below summarizes the sewer system performance before and after development.

Table 2 Wastewater Surcharge Depth & HGL Results

| Scenario | | Development on Kalar Rd to Brown Rd (300 to 375mm City Sewer) | | Brown Road from Kalar Road to Heartland Forest Rd (525mm City Sewer) | | Heartland Forest Road to Garner Rd SPS (600mm City Sewer) | |
|-----------|----------|---|---------------|--|---------------|---|---------------|
| | | d/D | Freeboard (m) | d/D | Freeboard (m) | d/D | Freeboard (m) |
| 1:2 Year | Pre-Dev | 0.32 | 4.54 | 0.25 | 9.57 | 0.19 | 9.57 |
| | Post-Dev | 0.39 | 4.50 | 0.29 | 9.55 | 0.22 | 9.55 |
| 1:5 Year | Pre-Dev | 0.37 | 4.54 | 0.28 | 9.55 | 0.21 | 9.55 |
| | Post-Dev | 0.43 | 4.49 | 0.32 | 9.53 | 0.24 | 9.53 |
| 1:10 Year | Pre-Dev | 0.40 | 4.53 | 0.30 | 9.54 | 0.23 | 9.54 |
| | Post-Dev | 0.46 | 4.49 | 0.34 | 9.53 | 0.25 | 9.53 |

As seen in **Table 2**, the existing sewers The existing sewer downstream of the development on Kalar Road has sufficient capacity to safely convey the 2-year, 5-year, and 10-year design storms with development flows without sewer surcharging.

2.3.2 Pump Station Performance

Flows ultimately discharge to the Region’s Garner Road Sewage Pumping Station (SPS). The 2021 Region MSPU identified Garner Road SPS as having surplus capacity to support growth to 2051. The proposed development population of 739 people are within the planned growth population of 2,305 people.

3 Summary and Recommendations

Based on the analysis, the impact of the 7580 Kalar Road development on the wastewater system are as follows:

- The existing sewer downstream has sufficient capacity to accommodate the additional flows under the design 10-year storm.

Further, the proposed development results in:

- Does not appear to trigger planned upgrades in the region trunk or Niagara Falls WWTP per 2021 MSP

Based on the above findings, the proposed development is not expected to have a significant impact on the existing downstream sewer system.